FINAL

Programmatic Environmental Impact Statement Executive Summary

Hawaiian Monk Seal Recovery Actions

March 2014

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Lead Agency:	United States Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Silver Spring, MD
Responsible Official:	Eileen Sobeck Assistant Administrator for Fisheries
For Further Information Contact:	Amy Sloan National Marine Fisheries Service Office of Protected Resources Permits and Conservation Division 1315 East-West Highway Silver Spring, MD 20910 (301) 427-8401

Abstract: The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Services (NMFS) is the Federal agency responsible for management, recovery and conservation of Hawaiian monk seals under the Endangered Species Act (16 United States Code [U.S.C.] 1531 *et seq*.) and the Marine Mammal Protection Act (16 U.S.C. 1361 *et seq*.). As part of their responsibilities, NMFS funds, permits, and conducts research and enhancement activities on endangered Hawaiian monk seals in the Northwestern Hawaiian Islands (NWHI), main Hawaiian Islands (MHI), and Johnston Atoll. NMFS proposes to implement research and enhancement actions identified in the Hawaiian Monk Seal Recovery Plan (NMFS 2007), with the goal of conserving and recovering the species. This Final Programmatic Environmental Impact Statement (PEIS) provides decision-makers and the public with an evaluation of the environmental, social, and economic effects of the proposed program and alternatives to the proposed action.

The agency's recommended Preferred Alternative is Alternative 3 (Limited Translocation). Alternative 3 encompasses a broad scope of research and enhancement activities that would yield greater recovery benefits to the species over the next several years than would be expected under the other alternatives. It is important to note that while Alternative 4 (Enhanced Implementation) was

Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The only distinction between these two Alternatives is that Alternative 3 (Preferred) does *not* include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI.

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LIST OF ACRONYMS

ESA	Endangered Species Act
FR	Federal Register
MHI	Main Hawaiian Islands
MMPA	Marine Mammal Protection Act
Monument	Papahānaumokuākea National Monument
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NWHI	Northwestern Hawaiian Islands
PEIS	Programmatic Environmental Impact Statement
U.S.	United States
U.S.C.	United States Code
UDP	Unanticipated Discovery Plan
WNV	West Nile Virus

ES-1.0 INTRODUCTION

This executive summary provides an overview of the Hawaiian Monk Seal Recovery Actions Programmatic Environmental Impact Statement (PEIS). The PEIS presents:

- The purpose and need for action;
- A reasonable range of alternatives that fulfill the purpose and need for this proposed federal action;
- An overview of public comments received during the August – October 2011 public comment period and how comments were addressed;
- An evaluation of the type and range of direct and indirect effects associated with Hawaiian monk seal research and enhancement activities that may be implemented in future research permits;
- The contribution of research activities to the cumulative effects on species and resources likely to be affected by these activities, including effects from past, present, and reasonably foreseeable future events and activities that are external to the research activities; and
- Recommendations, monitoring plans, and processes for proposed new research and enhancement activities that include considerations for continued and improved stakeholder and community involvement.

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Services (NMFS) is the Federal agency responsible for management, conservation and recovery of Hawaiian monk seals under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). As part of their responsibilities, NMFS funds, permits, and conducts research and enhancement activities on Hawaiian monk seals in the Northwestern Hawaiian Islands (NWHI) and main Hawaiian Islands (MHI).

Hawaiian monk seals have experienced a prolonged population decline. In 1976, Hawaiian monk seals were listed as "endangered" under the ESA (41 Federal Register [FR] 51611) and "depleted" under the MMPA. The Hawaiian monk seal is the most endangered pinniped species in United States (U.S.) waters and the second most endangered pinniped in the world.

The most recently published best estimate of total abundance is 1,212 seals (Carretta *et al.* 2013) in 2010, and the number was estimated to be declining at approximately 4.0% per year. Preliminary unpublished results from more recent years indicate the population is still declining. The population is many times larger in the NWHI than in the MHI. However, the MHI population is increasing and juvenile survival rates are consistently higher than in the NWHI.

Hawaiian monk seals occur on islands, atolls, and emergent reefs throughout the Hawaiian Archipelago, from Kure Atoll to Hawai`i Island, a distance of over 2,500 km (approximately 1,553 miles). The seals forage in and transit the waters surrounding and between all land areas. Intermittent sightings of Hawaiian monk seals have also occurred at Johnston Atoll, approximately 800 km (approximately 497 miles) south of the Hawaiian Archipelago.

ES-2.0 PROPOSED ACTION

NMFS is required by section 4(f) of the ESA to develop a recovery plan for this critically endangered species. NMFS' proposed action includes permitting and implementing research and enhancement activities (as described in Section ES-5.0, below) identified in the Hawaiian Monk Seal Recovery Plan (NMFS 2007). NMFS considered a reasonable range of alternatives including the most promising actions to improve monk seal survival and provide the best hope for conservation and recovery of the species

ES-3.0 PURPOSE AND NEED

The purpose of implementing recovery activities (research and enhancement) for the Hawaiian monk seal is to promote the recovery of the species to population levels at which ESA protection is no longer needed.

The need for this action is rooted in fundamental biological and ecological factors that are now limiting the population. A comprehensive research program enables NMFS to recognize, and possibly quantify, factors limiting the population in order to designate appropriate actions to minimize human-induced impacts and other factors affecting seal survival. Data and analyses derived from research lead to improved decision-making, and strategic management and enhancement activities that promote population recovery, prevent harm, and avoid jeopardy or continued disadvantage to the species as required under the ESA. Research and monitoring will continue to play a key role in determining whether enhancement activities achieve their desired outcomes.

ES-4.0 PUBLIC INVOLVEMENT

NMFS initiated public scoping for this PEIS when the Notice of Intent (NOI) was published in the Federal Register on October 1, 2010 (75 FR 60721). The NOI requested public participation in the scoping process and presented information to stimulate public discussion, such as a statement of purpose and need for the proposed action and preliminary alternatives. Scoping comments were summarized in the Scoping Report that was included as Appendix B of the Draft PEIS.

The Notice of Availability (NOA) for the Draft PEIS was published in the *Federal Register* on August 19, 2011 (76 FR 51945), which began the official public comment period for this PEIS. The public comment period lasted for 60 days and concluded on October 17, 2011.

A total of 341 comment submissions were received from agencies and the public on the Draft PEIS. These submissions generated 1,183 substantive comments. Substantive comments received during the public comment process raised issues that have been addressed and incorporated throughout this Final PEIS.

A Comment Analysis Report is included as Appendix B to this Final PEIS. The Comment Analysis Report provides NMFS' responses to issues raised in comments and also refers to specific sections of this Final PEIS where additional information can be found or where changes to the document have been made after consideration of public comments.

Table ES-1 lists issues raised during the comment period and specific sections of this Final PEIS where those issues are discussed. More detailed comment summaries are provided in the Comment Analysis Report in Appendix B.

Table ES-1 Issues Raised During the Public Comment Period and Where They Are Addressed in the Final PEIS

Issue	Sections in the PEIS Where Issue Is Discussed	General Description of Revisions Made
Alternatives	• 2.6 Alternatives Carried Forward for Analysis • 2.11 Alternatives Not Carried Forward for Analysis • 4.7 Elements Common to All Alternatives • 4.8.1 through 4.9.7 Environmental Consequences of Alternatives for Resources Evaluated	• 2.6 - Additional information is provided on the total number of weaned monk seal pups that could be translocated under Alternatives 3 and 4. • 2.11 – Additional information has been added about the rationale for eliminating alternatives such as predator control on the NWHI.
Behavior Modification	• 2.5 Research and Enhancement Components of the Alternatives • 2.9 Alternative 3: Limited Translocation (Preferred Alternative) • 2.10 Alternative 4: Enhanced Implementation • 4.9 Social and Economic Environment • 5.4 Plan for Development of a Behavior Modification Program	• 4.9.1 thru 4.9.3 and 4.9.5 – Additional information is provided on the effects of behavioral modification activities or lack thereof (Alternative 2) as they relate to human-seal interactions, including fisheries interactions.
Cumulative Effects	• 4.5 Steps for Identifying Cumulative Effects • The following sections present the evaluation of cumulative effects of the Alternatives on subject resources: • 4.8.1.21 Hawaiian Monk Seals • 4.8.3.6 Sea Turtles • 4.8.4.4 Cetaceans • 4.8.5.3 Fish • 4.8.6.5 Birds • 4.8.8.2 Invasive Species • 4.9.1.5 Commercial Fishing • 4.9.2.5 Subsistence Fishing • 4.9.3.5 Recreational Fishing • 4.9.4.5 Cultural Resources and Historic Properties • 4.9.5.9 Recreation and Tourism • 4.9.6. Environmental Justice • 4.9.7.5 Military Activities • 4.10 Summary of Effects	• Table 4.5-2 *Reasonably Foreseeable Future Actions Within the Project Area* has been updated with the most current reasonably foreseeable activities. • Section 4.8.1.21 – additional information provided on levels of take from other activities besides research. • Sections 4.9.1.5 thru 4.9.3.5 – additional activities including the designation of monk seal critical habitat, spinner dolphin protection measures and modifications to the Hawaiian Islands Humpback Whale National Marine Sanctuary are included in the analysis of cumulative effects on fisheries.
Diseases	• 3.3.1.7 Crucial and Serious Environmental and Anthropogenic Stressors/Threats (subheading Infectious Diseases) • 4.8.1.6 Mechanisms for Injury From Translocation • 4.8.1.8 Mechanisms of Injury from Vaccination • 4.8.1.15 Assessment of Beneficial Contributions Toward Conservation Objectives • 4.8.1.19 Direct and Indirect Effects of Alternative 3: Limited	• Appendix D – has been updated with additional information on what specific events may trigger vaccination of wild seals.

Issue	Sections in the PEIS Where Issue Is Discussed	General Description of Revisions Made
	Translocation • 4.8.1.20 Direct and Indirect Effects of Alternative 4: Enhanced Implementation • 5.3 Plan for the Vaccination Process • Appendix D – Vaccination Plan	
Ecosystem	• 3.2 Physical Environment • 3.3 Biological Environment • 4.8 Environmental Consequences – Biological Environment	• 3.3 and 4.8 general information has been updated as necessary.
Fisheries	• 3.4.3 Affected Environment – Commercial Fishing • 3.4.4 Affected Environment – Subsistence Fishing • 3.4.5 Affected Environment – Recreational Fishing • 4.9.1 Environmental Consequences – Commercial Fishing • 4.9.2 Environmental Consequences – Subsistence Fishing • 4.9.3 Environmental Consequences – Recreational Fishing	• 4.9.1 thru 4.9.3 – NMFS has made substantial revisions to the evaluation of fisheries-related impacts of the Alternatives. The analysis relies heavily upon a recently published report (Sprague et al. 2013). This publication evaluates reef fish biomass, monk seal biomass, monk seal consumption of fish, fishery landings and degree of overlap between monk seal prey selection and species targeted by fishers in the MHI. • Revisions also include information about potential costs associated with interactions between seals and fisheries such as increased fuel costs related to avoiding seals or damage to gear by seals.
Hawaiian Monk Seal Biology	• 3.3.1 Affected Environment - Hawaiian Monk Seals	
Human-Seal Interactions	• 3.4.8 Affected Environment – Recreation and Tourism • 3.4.9 Affected Environment – Public Safety • 4.9.1 Environmental Consequences – Commercial Fishing • 4.9.2 Environmental Consequences – Subsistence Fishing • 4.9.3 Environmental Consequences – Recreational Fishing • 4.9.5 Environmental Consequences – Recreation and Tourism • 4.9.6 Environmental Consequences – Environmental Justice	• 3.4.8 – Updates to the number and type of human-seal interactions that have occurred since publication of the Draft PEIS in 2011. • 4.9.1 thru 4.9.6 – Additional evaluation of the potential costs associated with human-seal interactions are provided in each of these sections. For example, the potential costs associated with fishermen attempting to avoid interactions with seals are evaluated.
Management	• 5.1 Implementation of the Hawaiian Monk Seal Recovery Actions PEIS Under NEPA • 5.2 Monitoring Plan for the Two-Stage Translocation Process • 5.3 Plan for the Vaccination Process • 5.4 Plan for Development of a Behavior Modification Program • 5.5 Mitigating Potential Impacts To Cultural Resources And Historical Properties • 5.6 Coordination with Stakeholders and Communities	• 5.1 thru 5.6 – Additional information has been provided on NMFS's implementation of these programs. • 5.6 – Additional detail is provided about NMFS's public outreach program.
Cultural	• 3.4.6 Affected Environment – Cultural Environment • 3.4.7 Affected Environment – Cultural Resources and Historic Properties • Appendix K – Historical and Contemporary Significance of the	• 3.4.6 thru 3.4.7 - Revisions have been made based on re-evaluation of potential impacts of monk seal research and enhancement activities on cultural and historic properties within the Project Area. • Appendix L – Section 106 Consultation has been completed and results of

Issue	Sections in the PEIS Where Issue Is Discussed	General Description of Revisions Made
	Endangered Hawaiian Monk Seal in Native Hawaiian Culture • Appendix L – Final Section 106 Analysis of the PEIS for the Hawaiian Monk Seal Recovery Actions	the evaluation as well as correspondence with the Hawai`i State Historic Preservation Division are provided. • Appendix M – Cultural Impact Assessment has been completed providing a detailed impact assessment and review of references and significance of monk seals in traditional Hawaiian culture.
Public Coordination	• 5.1 Implementation of the Hawaiian Monk Seal Recovery Actions PEIS Under NEPA • 5.2 Monitoring Plan for the Two-Stage Translocation Process • 5.3 Plan for the Vaccination Process • 5.4 Plan for Development of a Behavior Modification Program • 5.5 Mitigating Potential Impacts To Cultural Resources And Historical Properties • 5.6 Coordination with Stakeholders and Communities • Appendix B – Comment Analysis Report	• 5.1 thru 5.6 – Additional information has been provided on NMFS's implementation of these programs. • 5.6– Additional detail is provided about NMFS's public outreach program. • Appendix B – A Comment Analysis Report documenting the public comment period and associated public hearings is appended to the Final PEIS.
Regulatory	• 1.5 Federal Laws and Associated Permits and Authorizations Applicable to Hawaiian Monk Seal Research and Enhancement Activities • 1.6 Why a PEIS is Needed • 1.8 Required Decisions and Other Agencies Involved in this Analysis	• 1.5.2 Clarification has been added about civil penalties associated with the Endangered Species Act. • 1.5.4 An update on the Section 106 Consultation has been added • 1.5.6 An update on coordination with the Coastal Zone Management Program has been added.
Socioeconomic	• 3.4 Affected Environment – Social and Economic Environment • 4.9 Environmental Consequences – Social and Economic Environment	• 3.4 Updates to general social and economic information have been added such as population data, etc. • 4.9 Revisions to analysis of potential impacts of the Alternatives on fisheries, recreation and tourism, public safety, and cultural and historic properties have been made.
Translocation	• 2.5 Research and Enhancement Components of the Alternatives • 4.8.1 Environmental Consequences – Hawaiian Monk Seals • 4.9.1 thru 4.9.3 Environmental Consequences - Fisheries • Appendix E Proposed Translocation Plan	• 4.9.1 thru 4.9.3, 4.9.4 and 4.9.5 - Potential effects of the two-stage translocation (Alternatives 3 and 4) on fisheries, recreation and tourism, and cultural and historic properties have been re-evaluated and these revisions are presented in these sections.

ES-5.0 ALTERNATIVES

Three action alternatives and a no action alternative were developed and analyzed in this PEIS. The four alternatives carried forward for detailed analysis vary in scope and level of activities, including the types of research and enhancement activities and number of animals that would be permitted under each alternative. Different thresholds for "acceptable" levels of mortality are also associated with the range of research activities. Additional detail about the alternatives can be found in Chapter 2.

Alternative 1: Status Quo

Under the Status Quo Alternative, the current NMFS research and enhancement permit (Permit No. 10137) would continue until its expiration in 2014.

New permits or permit amendments for levels and types of research the same as currently permitted would be approved. New permits or amendments would not be approved if it were determined under the ESA that the permitted activities would jeopardize the continued existence of the species or adversely modify critical habitat when expected effects were added to existing research, enhancement, and other activities in the baseline at the time the application was received.

Research and enhancement activities allowed under the Status Quo Alternative are listed in Table 2.10-1 and include those that have been carried out consistently for decades (*e.g.,* land-based surveys and marking), newer research (*e.g.,* de-worming studies), and ongoing mitigation for mortality (*e.g.,* disentanglement).

No new activities nor an expansion of the scope of existing activities would occur under the Status Quo Alternative.

Alternative 2: No Action

The No Action Alternative would only allow Hawaiian monk seal research and enhancement activities to continue until the existing permit expires in 2014. No new permit would be issued to replace permit 10137 when it expires, nor could that permit be amended to allow modifications in research or enhancement activities, sample sizes, or objectives. After expiration of the permit, all research and enhancement activities conducted by NMFS and requiring a permit would cease. Limited enhancement (*e.g.*, entanglement and de-hooking; hazing or translocating seals away from imminently harmful situations) could be accomplished under the separate permit for the Marine Mammal Health and Stranding Response Program (see Section 1.4) and not as part of this research and enhancement program.

__Alternative 3: Limited Translocation (Preferred Alternative)__

Alternative 3 would include all currently permitted activities and further address the recommendations of the Hawaiian Monk Seal Recovery Plan (2007) by including new research and enhancement activities not currently permitted.

While Alternative 4 (Enhanced Implementation) was preferred in the Draft PEIS, Alternative 3 (Limited Translocation) has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does *not* include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI. However, a variety of translocation actions could occur under Alternative 3, including two-stage translocation *within* the NWHI, *within* the MHI, or from the MHI to the NWHI, with the option of returning the seals to their birth location or nearest appropriate site at age 2 years and older.

NMFS would conduct many important seal research and enhancement activities under Alternative 3 and engage the public in an effort to address concerns raised during the Draft PEIS public comment process, especially concerns related to human-seal interactions. Also, monitoring and intervention protocols to minimize undesirable human-seal interactions could be further developed under Alternative 3 (Preferred).

Alternative 3 would build upon the status quo and represents the assessment of steps that could be taken currently to prevent the extinction of the Hawaiian monk seal, based upon the best available scientific data. It encompasses a very broad and ambitious research and enhancement program, including research on population biology, ecology, health studies, foraging research, and a suite of enhancement tools designed to mitigate existing and emerging threats to the species, as identified in the species' recovery plan (NMFS 2007).

Activities currently permitted under the Status Quo that would continue under Alternative 3 (Preferred) are provided in Table 2.10-1 and include, but are not limited to:

- Monitoring via ground, vessel, and aerial surveys; marking and photo ID;
- Health screening and instrumentation;
- De-worming research;
- Specimen collection and import/export of specimens;
- Disentanglement and dehooking;
- Adult male removal for enhancement; and
- Translocation (one-way) for enhancement including:
    - Translocating abandoned nursing pups to a foster mother or their natural mother within their birth island or atoll;
    - Translocating weaned pups from a high risk area (e.g., known shark predation) to a low risk area within the same island or atoll

in the NWHI or Johnston Atoll; translocations in the MHI may be to a different location on the same island or to a different island in the MHI; and

  - Translocating weaned pups and juveniles in subpopulations where juvenile survival is low to subpopulations with higher rates of juvenile survival; seals may be translocated among subpopulations within the NWHI.

Activities not currently permitted that would also occur under Alternative 3 are provided in Table 2.10-1 and include, but are not limited to:

- Expanded surveys and use of new research tools (*e.g.*, new telemetry devices).
- Vaccination studies and potential implementation of vaccines to mitigate infectious disease.
- Potential implementation of de-worming as an enhancement tool to improve juvenile Hawaiian monk seal survival.
- Expanded scope and number of seal translocations, including:
  - Translocating seals with unmanageable human interactions from the MHI to the NWHI;
  - Translocating juvenile and older seals from the MHI to NWHI to examine their subsequent survival; and
  - Implementing a two-stage translocation program whereby weaned pups are taken from areas of lower survival to areas of higher survival within the NWHI, within the MHI, or from the MHI to the NWHI. ***This excludes taking weaned pups born in the NWHI to the MHI***. This program would include the option of returning the translocated seals to their birth location or nearest appropriate site at age 2 years or older. Note that seals born in the MHI and previously translocated to the NWHI may be returned to the MHI. Details of the translocations would be determined by a decision framework that is described in Section 5.3 and Appendix E.
- Supplemental feeding at NWHI locations where seals are released after being cared for in captivity.
- Research to develop tools for preventing or minimizing undesirable Hawaiian monk seal behavior (referred to as behavior modification) related to interactions with humans and fishing gear in the MHI. If proven effective by research, these tools would be implemented.
- Decreasing aggressive male monk seal behavior using a drug to reduce testosterone.

NMFS concludes that Alternative 3 would best achieve project goals consistent with the purpose and need statement, and complies with the various goals, objectives and requirements of the ESA, MMPA, and other applicable laws. Alternative 3 constitutes the most effective implementation of key elements in the Recovery Plan and is the agency's Preferred Alternative. It is a very broad program, including research on population biology, ecology, health studies, foraging research, and a suite of enhancement activities and tools designed to mitigate existing and emerging threats to the species.

Alternative 4: Enhanced Implementation

Alternative 4, the enhanced implementation alternative, would encompass all the activities permitted under Alternative 3 (Preferred), ***with the addition of the option for temporary translocation of weaned pups from the NWHI to the MHI***. At age 2-3 years, any surviving translocatees would be returned to the NWHI.

The decision framework (Section 5.3 and Appendix E) used in Alternative 3 for conducting translocations would also be used under this alternative. A distinguishing factor of Alternative 4 is that seals born in the NWHI may be temporarily translocated from the NWHI to the MHI during the first few years of their lives. While a total of 200 weaned pups could be translocated to the MHI from the NWHI over a 10-year period under this alternative, only a maximum of 60 of these would be in the MHI (or any other host site) at any given time as they will be returned when they reach 2 or 3 years of age.

The ability under Alternative 4 to conduct two-stage translocation from the NWHI to the MHI would allow for maximal flexibility to take advantage of the potential benefits of two-stage translocation, because weaned pups could be moved to wherever their survival chances are best. However, implementing two-stage translocations from the NWHI to the MHI would be infeasible at this time. NWHI pups, once brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation. As discussed above, monitoring and intervention activities could be further developed under Alternative 3 (Preferred). Thus, while Alternative 4 was the preferred alternative in the Draft PEIS, it is not the preferred alternative in the Final PEIS.

Alternatives Not Carried Forward for Analysis

The public comment process highlighted other considerations for alternatives. In Section 2.11, two alternatives were considered but were not carried forward for analysis in this PEIS.

One alternative considered but discarded was to reduce populations of large predatory fish in the NWHI (Papahānaumokuākea Marine National Monument [Monument]) as a way to increase survival of Hawaiian monk seals. This proposal is based on the hypothesis that one of the primary factors limiting monk seal recovery in the NWHI is predation and direct or indirect competition with other predatory species such as sharks and jacks.

NMFS currently lacks sufficient information on NWHI food web dynamics to make a reliable prediction whether predator reduction would be an effective method for improving juvenile monk seal survival without unintended consequences. Compared to all other actions proposed in Alternative 3 (Preferred), the results of large-scale predator management/removal is far more uncertain. It is not the ability to remove fish that is uncertain, but rather whether it would benefit monk seals without having unanticipated and undesirable environmental consequences. NMFS is not dismissing this concept indefinitely and plans to investigate it further with other agency and independent scientists outside the context of the PEIS. However, the time required to gather sufficient data in order to understand the impacts and effectiveness of reducing predatory fish populations would not be timely for the recovery of the monk seal – which makes predator reduction inconsistent with the purpose and meed of this PEIS.

Another alternative considered but not carried forward was to construct a research facility or aquarium for breeding, rearing, and feeding monk seals in the NWHI. Human impacts in the Monument are minimized and heavily regulated to protect the native ecosystem. Construction, operation, and maintenance of such a facility in the NWHI would be logistically challenging and several orders of magnitude more costly, making this alternative unreasonable.

ES-6.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

The direct and indirect effects, or environmental consequences, to the human environment were analyzed for each alternative. Each alternative was also evaluated to determine its contribution to cumulative effects on each resource.

Table ES-2 summarizes the direct, indirect, and cumulative effects under each alternative for all resources where environmental consequences were evaluated. Detailed analyses and discussions of effects can be found in Chapter 4.

The effects (both beneficial and adverse) of each alternative on a range of biological and socio-economic resources was analyzed and categorized on a scale ranging from *negligible* through *major*. A summary of the analysis results is presented in Table ES-2. The totality of these analyses was very complex; for some resources several types of effects (for example, on mortality, reproduction, habitat, *etc.*) were analyzed, and for each resource direct, indirect and cumulative effects were evaluated. Because of this complexity, it can be a challenge to sort out the main conclusions. In order to do so, it is useful to first present all the effects that were found to be consistent among alternatives, and then to focus on just how the alternatives were distinct in terms of their effects.

<u>Effects on Other Resources – Negligible Effects for All Alternatives</u>

Among the biological resources, all effects on sea turtles, cetaceans, corals, and fish species were found to be *negligible* for all alternatives.

Likewise, among socio-economic resources, all effects on fishing (commercial, subsistence and recreational), environmental justice, and military resources were determined to be *negligible* for all alternatives.

Regarding effects on fisheries (commercial, subsistence and recreational), this PEIS relies upon a recent study (Sprague et al. 2013) regarding the estimated consumption of prey by monk seals compared to available prey biomass, consumption by other apex predators, and commercial and non-commercial fisheries landings. This research indicates that the current population of approximately 200 monk seals in the main Hawaiian Islands consumes a maximum of 0.009% of the estimated available prey biomass. Also, apex predatory fish in the main Hawaiian Islands likely consume over 50 times more prey than the monk seal population. The analysis presented in this PEIS draws on this and other research findings to conclude *negligible* effects on fisheries for all alternatives.

<u>Effects on Other Resources – Variable Effects for Alternatives</u>

Effects on birds, and invasive species ranged from *negligible* to *minor adverse* and were identical for Alternatives 1 (Status Quo), 3 (Preferred) and 4 (Enhanced Implementation). A distinction was that under Alternative 2 (No Action), all effects on birds and invasive species were found to be *negligible*.

Similarly, effects on cultural and historic properties were deemed *minor adverse* to *negligible* and were identical for all the Action Alternatives (1, 3, and 4), and *negligible* for the No Action Alternative (2).

Recreation and Tourism effects were *negligible* for Alternatives 1 and 2, but were *moderate beneficial* for Alternative 3 and 4. The latter result was due to potentially increased wildlife viewing alternatives coupled with reduced negative human-seal interactions as a result of seal behavioral modification and translocation of seals that may become socialized to people.

Effects on Hawaiian Monk Seals

The greatest distinction among the alternatives was their effects on the Hawaiian monk seal, the species which is the subject of the proposed research and enhancement activities. Three types of effects on Hawaiian monk seals were analyzed for each alternative:

- Effects on Mortality;
- Effects on Reproduction; and
- Contributions to Conservation Objectives.

Mortality and reproductive effects are adverse to monk seals. However, those are counter-balanced by the beneficial effects of contributing to conservation objectives and recovery of the species in the long-term.

Effects on Hawaiian Monk Seal Mortality -Vary by Alternative

Mortality effects on monk seals were evaluated by how much the proposed lethal takes of seals allowed under each alternative would likely affect the species population in the future. Because Alternatives 3 and 4 involve a broader array of research and, especially, enhancement activities, there are greater associated risks of mortality. For that reason, **mortality effects on monk seals of Alternatives 3 and 4 were found to be *minor to moderate adverse***, slightly greater than the *minor adverse* effects under Alternative 1. Alternative 2 had *negligible* mortality effects because all permitted take of seals, including mortalities, would cease after 2014. In the context of the many other natural and human-caused sources of monk seal deaths, the cumulative effects of Alternative 1, 3 and 4 mortality was determined to be *negligible*.

Effects on Hawaiian Monk Seal Reproduction – Negligible for All Alternatives

Reproductive effects on monk seals under all alternatives were determined to be *negligible*. This was concluded based upon past research and publications that show the types of activities proposed have not had any detectable reproductive effects on Hawaiian monk seals or other seal species. Also, very cautious protocols that would be used by NMFS (for example, not capturing pregnant or nursing females and minimizing disturbance of mother-pup pairs) make any reproductive impacts exceedingly unlikely.

Contributions to Hawaiian Monk Seal Conservation –Vary by Alternative

Contributions to conservation benefits for monk seals varied among the alternatives. Under Alternative 1, status quo activities would continue to make *moderate beneficial* contributions, but not at a level that would be expected to make significant progress toward recovery. Alternative 2 would clearly lead to *major adverse* effects on conservation, because nearly all research and enhancement activities would cease after 2014.

The broader scope of research and enhancement under Alternatives 3 and 4 led to both being categorized as resulting in ***major beneficial*** **effects for conservation of monk seals**. Among those two alternatives, the only distinction is that Alternative 4 would allow for the option of temporary translocation of weaned pups from the NWHI to the MHI, followed by a return to the NWHI after age 2-3 yr.

Maximum potential benefits might not be realized through the two-stage translocation proposed under Alternative 3 because weaned pups could not be moved from areas of current low survival in the NWHI to current higher survival in the MHI. Weaned pups would only be translocated within each region or from the MHI to the NWHI. This limits the potential effectiveness of the translocation process given current demographic rates. If future conditions are such that translocations from the NWHI to MHI would be even more beneficial than they may be currently, the inflexibility to conduct such translocations would reduce potential conservation benefits of Alternative 3 further. However, monk seal monitoring and intervention capabilities essential for successful two-stage translocation from the NWHI to the MHI (as proposed under Alternative 4) require further development and refinement. Therefore, Alternative 3 is preferred at the present time.

Table ES-2 Summary of Direct/Indirect and Cumulative Effects

		Alternative 1: Status Quo	Alternative 2: No Action No Permit After 2014	Alternative 3: Limited Translocation (Preferred Alternative) (only MHI to NWHI or within each region)	Alternative 4: Enhanced Implementation
HAWAIIAN MONK SEALS					
Mortality	Direct/Indirect Effects	Minor Adverse	Negligible	Minor to Moderate Adverse	Minor to Moderate Adverse
	Cumulative Effects	Negligible contribution			
Reproduction	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			
Contribution to Conservation Objectives	Direct/Indirect Effects	Moderate beneficial	Major adverse	Major beneficial	Major beneficial
	Cumulative Effects	Moderate beneficial contribution	Major adverse contribution	Major beneficial contribution	Major beneficial contribution
SEA TURTLES					
Mortality	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			
Reproduction	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			

		Alternative 1: Status Quo	Alternative 2: No Action No Permit After 2014	Alternative 3: Limited Translocation (Preferred Alternative) (only MHI to NWHI or within each region)	Alternative 4: Enhanced Implementation
CETACEANS					
Mortality	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			
Reproduction	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			
FISH					
Mortality	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			
BIRDS					
Productivity	Direct/Indirect Effects	Negligible to Minor adverse	Negligible	Negligible to Minor adverse	Negligible to Minor adverse
	Cumulative Effects	Negligible to Minor adverse	Negligible to Minor adverse contribution	Negligible to Minor adverse contribution	Negligible to Minor adverse contribution
Survival	Direct/Indirect Effects	Negligible to Minor adverse (Moderate adverse for Laysan Finch)	Negligible to Minor adverse	Negligible to Minor adverse (Moderate adverse for Laysan Finch)	Negligible to Minor adverse (Moderate adverse for Laysan Finch)
	Cumulative Effects	Negligible to Minor adverse	Negligible contribution	Negligible to Minor adverse contribution	Negligible to Minor adverse contribution

		Alternative 1: Status Quo	Alternative 2: No Action No Permit After 2014	Alternative 3: Limited Translocation (Preferred Alternative) (only MHI to NWHI or within each region)	Alternative 4: Enhanced Implementation
Habitat Alteration	Direct/Indirect Effects	Negligible to Minor adverse	Negligible	Negligible to Minor adverse	Negligible to Minor adverse
	Cumulative Effects	Negligible to Minor adverse	Negligible contribution	Negligible to Minor adverse contribution	Negligible to Minor adverse contribution
CORALS					
Damage to corals and live rock	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			
INVASIVE SPECIES					
Spread of Invasive Species	Direct/Indirect Effects	Negligible to Minor adverse	Negligible	Negligible to Minor adverse	Negligible to Minor adverse
	Cumulative Effects	Negligible contribution			
COMMERCIAL FISHERIES					
Commercial Landings	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			
SUBSISTENCE FISHERIES					
Subsistence Catch	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			
RECREATIONAL FISHERIES					

		Alternative 1: Status Quo	Alternative 2: No Action No Permit After 2014	Alternative 3: Limited Translocation (Preferred Alternative) (only MHI to NWHI or within each region)	Alternative 4: Enhanced Implementation
Recreational Catch	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			
CULTURAL RESOURCES AND TRADITIONAL CULTURAL PRACTICES					
Traditional Fishing and Gathering Resources and Activities	Direct/Indirect Effects	Negligible to Minor adverse	Negligible to Minor adverse	Negligible to Minor adverse	Negligible to Minor adverse
	Cumulative Effects	Negligible contribution			
HISTORIC AND TRADITIONAL CULTURAL PROPERTIES					
Archaeological Sites, and other Historic Sites, and Cultural Properties	Direct/Indirect Effects	Negligible to Minor adverse	Negligible	Negligible to Minor adverse	Negligible to Minor adverse
	Cumulative Effects	Negligible contribution			
RECREATION AND TOURISM					
Recreation Experience and Cost, and Public Safety	Direct/Indirect Effects	Negligible	Negligible	Moderate beneficial	Moderate beneficial
	Cumulative Effects	Negligible contribution			
ENVIRONMENTAL JUSTICE					
Disproportionate	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible

		Alternative 1: Status Quo	Alternative 2: No Action No Permit After 2014	Alternative 3: Limited Translocation (Preferred Alternative) (only MHI to NWHI or within each region)	Alternative 4: Enhanced Implementation
Effects on Minority Populations	Cumulative Effects	Negligible contribution			
MILITARY ACTIVITIES					
Military Activities	Direct/Indirect Effects	Negligible	Negligible	Negligible	Negligible
	Cumulative Effects	Negligible contribution			

COLOR KEY

	Negligible effect
	Negligible to minor adverse effect
	Minor adverse effect
	Minor to moderate adverse effect
	Major adverse effect
	Moderate beneficial effect
	Major beneficial effect

ES-7.0 NEPA COMPLIANCE, IMPLEMENTATION, AND RECOMMENDATIONS

This PEIS addresses research and enhancement permit activities that are proposed in the foreseeable future. The process for preparing research and enhancement permit applications and how they would be reviewed for NEPA compliance using this PEIS is detailed in Chapter 5.

Proposed research and enhancement permit activities identified and analyzed within Alternative 3 (Preferred) will be subject to NEPA compliance review on a regular basis to determine whether activities conducted are within the scope of activities analyzed in this PEIS. Proposed research and enhancement permit activities not identified and analyzed in Alternative 3 (Preferred) will be subject to a separate NEPA compliance review, the level of which will be determined when an application is submitted.

Monitoring Plans for the Two-Stage Translocation Process

The proposed two-stage translocation strategy is an option included in Alternatives 3 (Preferred) and 4, with Alternative 4 allowing the additional option of temporary translocation of NWHI pups to the MHI. For both of these alternatives, two-stage translocation is aimed at improving juvenile Hawaiian monk seal survival.

A multitude of variables exist that contribute to uncertainty of outcomes, thus the translocation program would be monitored and guided by a complex and adaptive decision framework described in Appendix E and summarized in Section 5.2.

Many of the inputs to the decision framework rely on monitoring key indicators such as population status, juvenile survival rates, and results from previous translocations. At various points in the decision framework, researchers would use a computer model (called a stochastic simulation model) updated with the most recent seal population data to estimate the likely range of benefits associated with different choices (that is, different source sites and nursery sites, or different numbers of seals). Existing survival and age/sex structure information will be the primary basis for determining when to conduct translocations and between which subpopulations. Public input would also play a role in deciding the most appropriate release sites if translocations were done from the NWHI to the MHI (under Alternative 4). Continued monitoring of both translocated and non-translocated individuals will provide the basis for project evaluation, informing the subsequent steps and reducing uncertainties of simulations.

Plan for the Vaccination Process

The proposed vaccination program is somewhat unique among the actions in this PEIS because it is designed to address a potential, rather than a realized, threat to the Hawaiian monk seal. There is great potential for infectious disease to have devastating effects on the species. Morbillivirus and West Nile virus are two viral diseases, with available vaccines, that pose a potential threat to monk seals.

The proposed vaccination activities (detailed in Appendix D) for Hawaiian monk seals involve two primary elements as follows:

1) Continue research to test these vaccines on captive seals, confirm the vaccines' safety, and determine whether the expected immune response occurs by following up with blood tests; and
2) Be prepared with response plans should a "trigger" occur (for example, a case of morbillivirus in a wild monk seal). Even in the case of such a response, vaccinations would be initially limited to the population perceived to be at immediate risk, and would be expanded only after confirmation of safety and efficacy.

Prophylactic (preventative) vaccination may be considered in the future, but only after careful and conservative testing indicates that such an approach would be safe and effective.

Plan for Development of a Behavior Modification Program

Chapter 2 includes a description of a variety of aversive and disruptive (noise, visual, tactile, etc.) stimuli that may be considered for behavioral modification. Behavioral modification techniques will be applied only in situations where wild seals are beginning to regularly demonstrate behaviors that put themselves or humans at risk. Some examples include (but are not limited to): regularly interacting with snorkelers, divers or other ocean users; or regularly interacting with fishermen or fishing gear. The behavior modification program will employ a graduated approach, with escalating levels of aversive stimuli or deterrents (or positive stimuli to redirect behavior) delivered in response to increasing persistence or aggression on the part of the seal.

Mitigating Potential Impacts to Cultural Resources and Historic Properties

NMFS intends to implement activities or mitigation measures (described in Chapter 5) that are specifically designed to mitigate potential adverse impacts to historic and cultural properties. This includes coordination with the Hawai‘i State Historic Preservation Division (SHPD), which is currently updating its

Geographic Information System (GIS) database of historic properties located within the MHI. This database will show the exact location of all historic properties for which accurate location coordinates are available. The SHPD GIS database can serve as a useful tool in planning Hawaiian monk seal recovery actions so as to avoid impacting known historic properties. NMFS staff and volunteers conducting monk seal recovery actions will also receive training as needed in the recognition and avoidance of archaeological and cultural sites.

NMFS will further develop a protocol for dealing with the removal of Hawaiian monk seals if they enter traditional fishponds. This protocol would involve consultation with the landowner and/or kahu (caretaker) of the pond, SHPD, local Native Hawaiian Organizations (if appropriate), and other appropriate entities to plan and coordinate the safe removal of the monk seal in a manner that would have the least impact on the structural integrity of the fishpond.

Finally, in the NWHI, permits are required for access to conduct Hawaiian monk seal research and enhancement activities within the limits of the Monument. Any activities associated with monk seal recovery actions undertaken within the NWHI must therefore comply with Monument regulations and the terms and conditions of Presidential Proclamation 8031. Monument regulations state that "permittees [must] attend a cultural briefing on the significance of Monument resources to Native Hawaiians" and that there are "prohibitions against the disturbance of any cultural or historic property" (NOAA 2008b).

Coordination with Stakeholders and Communities

NMFS intends to further develop and maintain close coordination with key stakeholders, community members, and partners to facilitate implementation of the proposed recovery actions. Ocean-oriented stakeholders and community members, such as fishers, surfers, Native Hawaiian practitioners, coastal property managers, etc., are among those most likely to encounter monk seals or most likely to have unique knowledge or experience that would be useful for successful implementation of the proposed activities in the MHI. Government agency and non-government organizations have been, and will continue to be, essential partners in successful recovery action implementation. Chapter 5 summarizes community-based programs NMFS has or will support to the maximum extent possible and discusses how these or similar programs could facilitate implementation of the proposed recovery actions.

NMFS manages the Marine Mammal Response Network in Hawai`i in partnership with several government and non-government partners, and with oversight and authorization from the NMFS National Marine Mammal Health and Stranding Response Program. The network is comprised of island-based response coordinators who oversee the activities of numerous volunteers and partner agency staff. The network responds to monk seals reported as sick, injured, entangled or hooked in the MHI. The network also responds to "routine" monk seal haulouts and conducts outreach and education activities at schools and community events.

NMFS convened a Hawaiian Monk Seal Recovery Team to support development of the revised Hawaiian Monk Seal Recovery Plan (2007), and is convening a new recovery team to support implementation of the revised recovery plan, including implementation of research and enhancement actions proposed in this PEIS. The role of the new recovery team will be to advise NMFS on a variety of matters concerning the conservation and recovery of the endangered Hawaiian monk seal.

NMFS is developing a MHI Hawaiian Monk Seal Management Plan that will include roles for NMFS and partner government agencies, as well as non-government organizations, communities, and individual stakeholders. The MHI Management Plan will include an Outreach Plan, with the goal to inform citizens and thus enable them to think critically, and make decisions based on sound science and cultural information, about Hawaiian monk seals to facilitate monk seal population recovery. As part of the development of the outreach strategies related to the MHI Management Plan, significant input will be obtained from partners, stakeholders, and other individuals with expertise in conservation outreach and education.

Subject to available funding, the NMFS Pacific Islands Regional Office has and will continue to solicit competitive applications for partnerships supporting activities related to Hawaiian monk seal recovery, in particular activities related to recovery in the MHI. NMFS anticipates that priority will continue to be given to community-based and community- integrated projects or projects with an educational or outreach component geared to elevate public awareness and build capacity from the community level for Hawaiian monk seal recovery.

To support activities proposed in Alternative 3 (Preferred), coordination with community members should continue to draw on extensive two-way communication and information sharing between NMFS and the key stakeholders and community members as discussed above. This would be facilitated by continuing and expanding programs, such as those discussed above, that entail participatory planning and implementation, education and outreach, and other interactive and participatory activities.

ES-8.0 NEXT STEPS

This executive summary is a synopsis of the contents of the Hawaiian Monk Seal Recovery Actions Final PEIS. Comments received during the public comment period were reviewed and considered when developing this Final PEIS.

Approximately one month after the release of this Final PEIS, NMFS will publish a notification in the *Federal Register* announcing the issuance of the Record of Decision to the public. This decision document will conclude the NEPA process on the proposed action. For updates on the Record of Decision, please visit the NMFS project website at: http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonkseal.htm.

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1.0 *PURPOSE AND NEED*

1.1 *INTRODUCTION*

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Services (NMFS) is the Federal agency responsible for management of Hawaiian monk seals, under the Endangered Species Act (ESA) (16 United States Code [U.S.C.] 1531 *et seq*.) and the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 *et seq*.). NMFS funds, permits, and conducts research and enhancement activities on Hawaiian monk seals in the Northwestern Hawaiian Islands (NWHI) and Main Hawaiian Islands (MHI). The Hawaiian monk seal population has experienced a prolonged decline. In 1976, NMFS listed Hawaiian monk seals as "endangered" under the ESA (41 Federal Register [FR] 51611) and "depleted" under the MMPA. The most recent (2010) best estimate of total abundance is 1,212 seals (Carretta *et al*., 2013). A detailed description of Hawaiian monk seals is included in Section 3.3.1.

As required under Section 4 of the ESA, NMFS published a Recovery Plan for the species in 1983, which was revised in 2007. Numerous threats to the survival of Hawaiian monk seals are identified in the Recovery Plan including, but not limited to, starvation, predation of pups by sharks, entanglement in marine debris, and threatened terrestrial habitat due to sea level rise. Low juvenile survival over the past two decades is the primary cause of the population's decline. There is insufficient recruitment into the breeding population, and the population decline will likely continue without intervention. Potential disease outbreaks could be devastating to the population. Enhancement activities are being considered to improve juvenile survival and the overall health of the population.

NMFS administers funds that have been designated by Congress and allocated within NMFS' annual budget for the purpose of implementing recovery actions on Hawaiian monk seals. Using these funds, NMFS implements various management, research, and enhancement activities for recovery of the species.

The intent of this Programmatic Environmental Impact Statement (PEIS) is to evaluate, in compliance with the National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq*.) and the NOAA Administrative Order (NAO) 216-6, the potential direct, indirect, and cumulative impacts on the human environment of the alternative approaches to implementing recovery actions, including research and enhancement activities and the subset of actions requiring permits, under the Hawaiian monk seal recovery program.

1.2 PURPOSE AND NEED FOR ACTION

The purpose of implementing recovery activities (research and enhancement) for Hawaiian monk seals is to promote the recovery of the species population to levels at which ESA protection is no longer needed. Section 4(f) of the ESA (15 U.S.C. 1533(f) requires the development and implementation of recovery plans, except where such plans will not promote the conservation of the species. The proposed activities in this PEIS have been identified as recovery actions in the Hawaiian Monk Seal Recovery Plan (NMFS 2007).

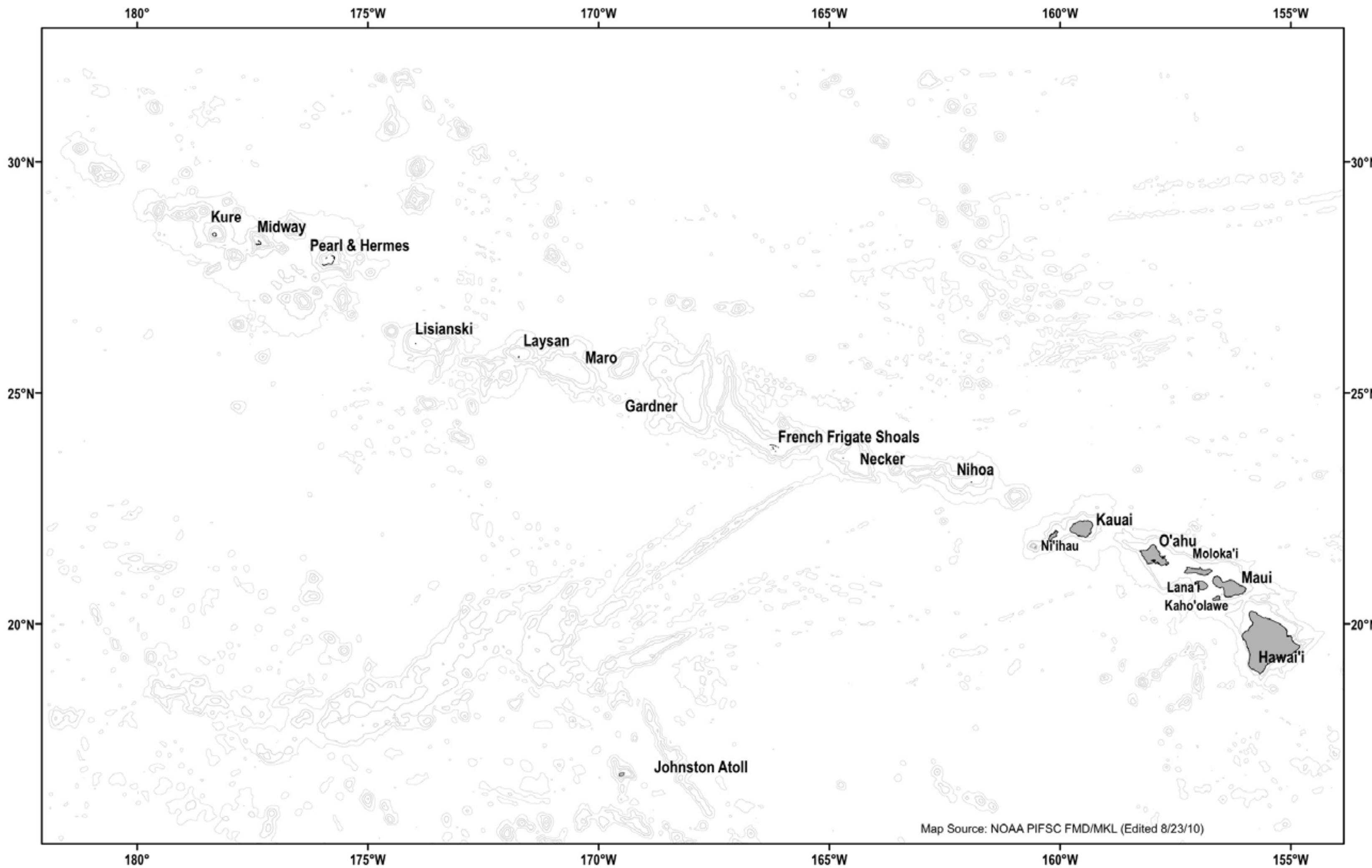
The need for this action is rooted in fundamental biological and ecological factors that are now limiting the population. A comprehensive research program enables NMFS to recognize, and possibly quantify, factors limiting the population in order to designate appropriate actions to minimize human-induced impacts and other factors affecting seal survival. Data and analyses derived from research lead to improved decision-making, and strategic management and enhancement activities that promote population recovery, prevent harm, and avoid jeopardy or continued disadvantage to the species as required under the ESA. Research and monitoring will continue to play a key role in determining whether enhancement activities achieve their desired outcomes.

1.3 DESCRIPTION OF THE PROJECT AREA

The Project Area for this PEIS encompasses the range where Hawaiian monk seals are found throughout the Hawaiian Archipelago including the NWHI, MHI and Johnston Atoll (Figure 1.3-1). More specifically, the Project Area includes portions of the open ocean and nearshore environment where monk seals may be found as well as the shorezone of the islands, islets and atolls that make up the Hawaiian Archipelago and Johnston Atoll. For the purposes of this project, the shore zone generally includes those terrestrial areas 5 meters (m) inland from the line where the shore meets the sea. In addition, secondary use areas, such as research field camps in the NWHI, are also considered for inclusion in the analysis.

In the NWHI, monk seals have six main reproductive sites including Kure Atoll, Midway Atoll, Pearl and Hermes Reef, Lisianski Island, Laysan Island, and French Frigate Shoals. Necker and Nihoa Islands have smaller breeding sub-populations, and monk seals have been observed at Gardner Pinnacles and Maro Reef. Monk seals are also found throughout the MHI where the population appears to be increasing (NMFS 2007). A more detailed description of the distribution of monk seals is provided in Section 3.3.1.

Figure 1.3-1 Project Area Map



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1.4 CURRENT RESEARCH AND ENHANCEMENT AND ASSOCIATED PERMITS

MMPA-ESA Permit No. 10137 (as amended) issued to the NMFS Pacific Islands Fisheries Science Center (PIFSC) authorizes research and enhancement activities on Hawaiian monk seals as summarized below.

The PIFSC is authorized to undertake the following activities annually through June 2014 when the permit will expire:

- **Harassment takes**[1] at any location in the Hawaiian Archipelago and Johnston Atoll for research and enhancement purposes:
  - **Monitoring**: 1,440 seals of any age/sex may be closely approached for monitoring activities via ground, aerial or vessel (includes photo-ID and unmanned aerial and amphibious vehicles, installation/maintenance of remote camera systems);
  - **Incidental harassment**: 200 seals of any age/sex may be incidentally disturbed during all other research and enhancement activities; and
  - **Bleach marking**: 1,315 seals may be approached and bleach marked.
- **Capture takes**[1] at locations specified for each activity:
  - **Flipper tagging for population monitoring**: 556 seals of any size or sex except lactating females and nursing pups may be captured, restrained, flipper and Passive Integrated Transponder (PIT) tagged, measured, and flipper plugs sampled; this includes retagging; locations include Hawaiian Archipelago and Johnston Atoll.

[1] Take as defined in the ESA means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do any of those things. Take as defined in the MMPA means to harass, hunt, capture, kill or attempt to do any of those things. Harassment is further defined in the MMPA as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment), or that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild (Level B harassment).

- **Sonic tags for monitoring shark predation**: up to 35 weaned pups at French Frigate Shoals may have sonic tags applied, concurrent with and on a flipper tag, annually for up to three years.
- **Health screening and foraging instrumentation research**: 70 healthy seals and 30 unhealthy seals of any age/sex excluding lactating females with pups and nursing pups may be captured, restrained, sedated, sampled for health and disease screening (swabs, blood, blubber biopsies, whisker sampling), measured, weighed, ultrasound measurements taken, and flipper and PIT tagged if necessary; of the healthy seals, 60 may also be instrumented with external telemetry/tracking devices; location is the Hawaiian Archipelago.
- **Translocation for enhancement**: immature seals may be translocated as follows:
  - 20 nursing pups of either sex that are abandoned or have been switched between two lactating females may be captured, restrained by hand or net, and relocated to a prospective foster mother or their natural mother, respectively; multiple attempts may occur to successfully unite pups with appropriate mothers; locations include the Hawaiian Archipelago and Johnston Atoll.
  - 35 weaned pups of either sex may be captured, restrained by hand or net, sedated, sampled for health and disease screening, instrumented, and relocated via boat, vehicle or aircraft from a high risk area (*e.g.*, known shark predation) to a low risk area within the same island or atoll in the NWHI or Johnston Atoll; translocations in the MHI may be to a different location on the same island or to a different island in the MHI; locations include the Hawaiian Archipelago and Johnston Atoll.
  - 6 weaned pups in subpopulations where juvenile survival is low may be translocated to subpopulations with higher rates of juvenile survival; seals may only be translocated among subpopulations within the NWHI.
- **De-worming research**: 200 seals of either sex, up to age 3 years, may be captured, weighed, treated for intestinal parasites, and have ultrasound measurements taken; treatment animals may include those captured for health assessments or foraging studies; location is the Hawaiian Archipelago, although the preponderance of activities occurs in the NWHI.
- **Disentanglement/de-hooking for enhancement**: as warranted, seals may be disentangled and de-hooked to prevent injury or death; location is the Hawaiian Archipelago and Johnston Atoll.

- **Specimen collection and import/export for research**: necropsies may be performed on all carcasses; samples (molt, scat, spew, urine, placentae) may be collected opportunistically from beaches; samples may be exported and re-imported for analysis (world-wide); location of necropsies and sample collection is the Hawaiian Archipelago and Johnston Atoll. After necropsy, tissue may be used as bait to mitigate shark predation when conducting permitted shark removals.

The following activities are authorized in the Hawaiian Archipelago and at Johnston Atoll over the 5-year duration of the permit (valid through June 2014):

- **Adult male removal for enhancement**: 10 adult males may be translocated, removed into permanent captivity, or euthanized to enhance survival of immature animals and adult females.
- **Euthanasia for research**: 10 moribund seals of any age/sex may be humanely euthanized or die incidental to handling during health assessments.
- **Incidental mortality during research and enhancement activities**: 4 incidental mortalities may occur during research and enhancement activities over 5 years, with no more than 2 occurring in a single year.

MMPA-ESA Permit No. 932-1905/MA-009526 issued to the NMFS Marine Mammal Health and Stranding Response Program (MMHSRP) authorizes enhancement activities on wild monk seals and research and enhancement activities on captive and rehabilitating monk seals through June 2014, when the permit will expire.

The following is authorized under the MMHSRP permit, as warranted, to respond to emergencies. (Note: the term "emergencies" generally refers to health emergencies involving marine mammals and includes, but is not limited to, stranding events, entanglements, disease outbreaks, and exposure to biotoxins.)

- Response (including ground, aerial and vessel surveys), rescue, rehabilitation, and release of stranded seals;
- Health-related research on captive and rehabilitating seals (excluding vaccination research); and
- Hazing or translocating seals away from imminently harmful situations.

Certain activities authorized under PIFSC Permit No. 10137 are also authorized under the MMHSRP permit. These include, but are not limited to:

- Disentanglement/de-hooking;
- Euthanasia of moribund seals;
- Incidental harassment and incidental mortality; and

- Specimen collection (*e.g.*, necropsies).

Coordination between PIFSC and the MMHSRP for activities authorized under both permits is discussed in Section 1.9.3.

1.5 FEDERAL LAWS AND ASSOCIATED PERMITS AND AUTHORIZATIONS APPLICABLE TO HAWAIIAN MONK SEAL RESEARCH AND ENHANCEMENT ACTIVITIES

This section summarizes federal laws applicable to Hawaiian monk seals research and enhancement activities, and federal permits, licenses, approvals, and consultation requirements for implementing the Preferred Alternative (Alternative 3).

1.5.1 National Environmental Policy Act

NEPA (42 U.S.C. 4321 *et seq*.) requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. NEPA is applicable to "major" federal actions affecting the quality of the human environment. A major federal action is an activity that is fully or partially funded, regulated, conducted or approved by a federal agency. NMFS' issuance of research and enhancement permits represents federal approval and regulation of activities. Federal funding is necessary for the PIFSC to conduct the recovery actions. Procedural requirements under NEPA are provided in the CEQ's implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508).

NMFS has, through NAO 216-6, established agency procedures for complying with NEPA and implementing regulations issued by the CEQ. NAO 216-6 specifies that issuance of scientific research permits under the MMPA and ESA is among a category of actions that are generally exempted (categorically excluded) from further environmental review, except under extraordinary circumstances.

When a proposed action that would otherwise be categorically excluded is the subject of public controversy based on potential environmental consequences, has uncertain environmental impacts or unknown risks, establishes a precedent or decision in principle about future proposals, may result in cumulatively significant impacts, or may have an adverse effect upon endangered or threatened species or their habitats, preparation of an Environmental Assessment (EA) or Environmental Impact Statement (EIS) is required.

1.5.2 *Endangered Species Act*

The ESA (16 U.S.C. l53l *et seq*.) was established to conserve and protect threatened and endangered species. Section 2 of the ESA sets forth the purposes and policy of the Act, which include providing a means to conserve endangered and threatened species' ecosystems and providing programs for the conservation of such species. It is the policy of the ESA that all federal agencies must seek to conserve threatened and endangered species and use their authorities to further the purposes of the ESA.

Section 4(f) of the ESA requires NMFS to develop and implement a recovery plan for the conservation and survival of this critically-endangered species. NMFS' proposed action includes implementation of recovery actions identified in the Hawaiian Monk Seal Recovery Plan (NMFS 2007), with the goal of conserving and recovering the species.

Section 7 of the ESA requires consultation with the appropriate federal agency (either NMFS or the United States Fish and Wildlife Service [USFWS]) for federal actions that "may affect" a listed species or adversely modify critical habitat. NMFS' issuance of a permit and carrying out research and enhancement activities affecting ESA-listed species or designated critical habitat, directly or indirectly, are federal actions subject to these consultation requirements.

Section 7 requires federal agencies to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species. NMFS is further required to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of critical habitat for such species. Such determinations must be made using the best scientific and commercial data available. Regulations specifying the procedural requirements for these consultations are found at 50 CFR Part 402.

Appendix A includes correspondence requesting consultation under section 7 of the ESA for effects to NMFS and USFWS species. Each agency has completed biological opinions. The NMFS biological opinion concluded that the actions proposed in Alternative 3 (Preferred) would not likely jeopardize the continued existence of Hawaiian monk seals or result in destruction or adverse modification to critical habitat (NMFS 2014). The USFWS biological opinion concluded that the actions proposed in the Alternative 3 (Preferred) would not likely jeopardize the continued existence of Laysan finch or result in destruction or adverse modification to critical habitat (USFWS 2014).

Section 9 of the ESA prohibits the take of endangered and threatened species unless a lawful exception is made, such as by issuance of a permit.

Under Section 10(a)(1)(a) of the ESA, NMFS may grant permits to take ESA-listed species for scientific purposes, or for the purpose of enhancing the survival of the species. In consideration of the ESA's definition of conserve, which indicates an ultimate goal of bringing a species to the point where listing under the ESA is no longer necessary (for example, the species is recovered), permits issued pursuant to section 10 of the ESA must be for activities that are likely to further the conservation of the affected species. The NMFS PIFSC applied for a scientific research and enhancement permit (File No. 16632) pursuant to section 10(a)(1)(A) of the ESA to carry out activities described in Alternative 3 (Preferred). Public notice of receipt the application for a new 5-year permit was published in the *Federal Register* on March 1, 2013 for a 45 day comment period (78 FR 13863).

NMFS' regulations implementing the permit provisions of the ESA can be found at 50 CFR Part 222. Regulations specifying requirements for issuance of ESA scientific research and enhancement permits are found at 50 CFR 222.308. According to 50 CFR 222.308(b), permits for endangered marine mammals must be issued according to MMPA regulations (50 CFR Part 216).

Section 10(d) of the ESA requires that, for NMFS to issue permits under section 10(a)(1)(A) of the ESA, the Agency must find that the permit:

- Was applied for in good faith;
- If exercised will not operate to the disadvantage of the species; and
- Will be consistent with the purposes and policy in Section 2 of the ESA.

Section 11(a)(3) of the ESA states that "no civil penalty shall be imposed if it can be shown by a preponderance of the evidence that the defendant committed an act based on a good faith belief that he was acting to protect himself or herself, a member of his or her family, or any other individual from bodily harm, from any endangered or threatened species" (U.S. Code, Title 16, Chapter 35, §1540 (a)(3)).

1.5.3 Marine Mammal Protection Act

The MMPA (16 U.S.C. 136I *et seq*.) prohibits takes of all marine mammals in the United States (U.S.) (including territorial seas) with few exceptions. Permits for *bona fide*[2] scientific research on marine mammals and permits to enhance the

[2] The MMPA defines bona fide research as "scientific research on marine mammals, the results of which – (A) likely would be accepted for publication in a refereed scientific journal; (B) are likely to contribute to the basic knowledge of marine mammal biology or ecology; or (C) are likely to identify, evaluate, or resolve conservation problems."

survival or recovery of a species, issued under section 104 of the MMPA, are two such exceptions. The NMFS PIFSC has applied for a scientific research and enhancement permit (File No. 16632) pursuant to section 104 of the MMPA [and section 10(a)(1)(A) of the ESA] to carry out activities described in Alternative 3 (Preferred). As noted above, public notice of receipt the application was published in the *Federal Register* on March 1, 2013 (78 FR 13863).

NMFS' Office of Protected Resources (OPR) issues permits for research and enhancement of Hawaiian monk seals. These permits must specify:

- The number and species of marine mammals authorized to be taken or imported;
- The manner (for example, methods, including but not limited to, capture, care, and transportation), location, and duration of the activities; and
- Any other terms or conditions NMFS deems appropriate.

Applications for MMPA permits must be reviewed by the Marine Mammal Commission. NMFS may issue a permit under section 104 of the MMPA if the activities are consistent with the purposes of the MMPA and applicable regulations at 50 CFR Part 216. NMFS must also find that the manner of taking is "humane"[3] as defined in the MMPA. If lethal taking of a marine mammal is requested, the applicant must demonstrate that using a non-lethal method is not feasible. For depleted species such as Hawaiian monk seals, NMFS must also determine activities resulting in lethal take will directly benefit the species or otherwise fulfill a critically important research need. Persons permitted to take marine mammals must submit reports on activities undertaken each year.

Under Section 104 of the MMPA, a permit may be issued for enhancing the survival or recovery of Hawaiian monk seals if the activity:

- Is likely to contribute significantly to maintaining or increasing distribution or numbers necessary to ensure the survival or recovery of the species; and
- The activity is consistent with the Hawaiian monk seal recovery plan (NMFS 2007).

Regulations specifying general issuance requirements for permits issued under Section 104 of the MMPA (50 CFR 216.34) and specific requirements for issuance

[3] The MMPA defines humane in the context of taking a marine mammal, as "that method of taking which involves the least possible degree of pain and suffering practicable to the mammal involved."

of scientific research and enhancement permits (50 CFR 216.41) are included in Section 2.6.

Section 109(h) of the MMPA authorizes Federal, State and local government employees, or NMFS Stranding Agreement holders, to take a marine mammal in a humane manner (including euthanasia) if it is for:

- The protection or welfare of the individual animal;
- The protection of public health and welfare; or
- The nonlethal removal of nuisance animals.

NMFS regulations implementing MMPA section 109(h) are found at 50 CFR 216.22 and 50 CFR 216.27. For threatened and endangered marine mammals, an ESA section 10(a)(1)(A) enhancement permit is also required to undertake such activities. Therefore, such activities on ESA-listed species must be consistent with the ESA and carried out to enhance the survival of the species.

Also under the MMPA, it is not unlawful for persons to use NMFS-approved methods to deter a marine mammal from endangering personal safety [section 101(a)(4)(A)] or take a marine mammal if imminently necessary in self-defense or to save the life of a person in immediate danger [section 101(c)].

1.5.4 National Historic Preservation Act

The goal of the National Historic Preservation Act (NHPA; 16 U.S.C. 470 *et seq*.) is to empower Federal agencies to act as responsible stewards of U.S. cultural resources when agency actions affect historic properties. The NHPA established the Advisory Council on Historic Preservation (ACHP), an independent Federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources, and advises the President and Congress on national historic preservation policy. The NHPA also authorized the Secretary of the Interior to expand and maintain a National Register of Historic Places composed of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture.

Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. In carrying out their responsibilities under Section 106, NHPA requires that Federal agencies consult with Indian tribes and Native Hawaiian Organizations that attach traditional religious and cultural significance to eligible or listed historic properties that may be affected by the agency's actions. The intent of the consultation is to identify historic properties potentially affected by the undertaking and to seek ways to avoid, minimize, or mitigate any adverse effects on those properties.

The Federal Code that implements the NHPA (36 C.F.R. §§ 800 *et seq*.) specifies the process for Section 106 consultation. The provision for consultation required under Section 106 applies when a project 1) includes a federal or federally licensed action, and 2) the action has the potential to affect properties that are listed in or are eligible for listing in the National Register of Historic Places.

NMFS has determined that the proposed Federal agency actions to recover the Hawaiian monk seal have the potential to affect listed or eligible historic properties. In fulfilling its responsibilities under Section 106 of the NHPA NMFS undertook a program of consultation with Native Hawaiian Organizations (NHO) and individuals that attach traditional religious and cultural significance to eligible or listed historic properties that have the potential to be affected by the undertaking associated with monk seal recovery as outlined in this PEIS. The intent of the consultation was to identify historic properties potentially affected by the undertaking and to seek ways to avoid, minimize, or mitigate any adverse effects on those properties.

The NHPA Section 106 consultation was completed in compliance with the NHPA and a determination of no historic properties affected was made. NMFS completed a separate document (Appendix L), describing the results of the Section 106 consultation process. This document was sent to the Hawaii State Historic Preservation Officer (SHPO) on November 12, 2013 (see Appendix A). No response was received from SHPO. On November 14, 2013, NMFS made the report available to the public, via its website: http://www.fpir.noaa.gov/PRD/prd_hms_how_noaa_helps.html#hms_management. The document describing the NHPA 106 process (Appendix L) was also sent to all consulting parties on November 19, 2013 (see Appendix A).

1.5.5 Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Congress defined Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). The EFH provisions of the MSFCMA offer resource managers a means to accomplish the goal of giving heightened consideration to fish habitat in resource management. NMFS OPR is required to consult with NMFS Office of Habitat Conservation for any action it authorizes (such as, research permits), funds, or undertakes, or proposes to authorize, fund, or undertake that may adversely affect EFH. This includes renewals, reviews or substantial revisions of actions.

NMFS has determined that the proposed activities will not affect designated EFH. Activities described in the alternatives are directed at Hawaiian monk seals and do not affect fish habitat. The activities do not involve alteration of substrate as no activities that could affect substrate, such as trawling, would occur. No other interactions with physical features of ocean and coastal habitat that could affect EFH would occur during research and enhancement activities.

1.5.6 Coastal Zone Management Act

Congress enacted the Coastal Zone Management Act (CZMA; 16 U.S.C. 1451 *et seq*.) to protect the coastal environment from growing demands associated with residential, recreational, commercial and industrial uses (such as, State and Federal offshore oil and gas development). Coastal states with an approved Coastal Zone Management Plan, which defines permissible land and water use within the state's coastal zone, can review Federal actions, licenses or permits for "Federal consistency." Federal consistency is the requirement that those Federal permits and licenses likely to affect any land/water use or natural resources of the coastal zone be consistent with the State program's enforceable policies.

The State of Hawai`i law for implementing the federal CZMA is Hawai`i Revised Statutes (HRS) 205A: Coastal Zone Management. The following state enforceable policies are potentially applicable to the activities in Alternative 3 (Preferred):

- HRS 195D and HAR 13-124: Conservation of Aquatic Life, Wildlife, and Land Plants (endangered species);
- HRS Chapter 6E: Historic Preservation; and
- HRS 342D and HAR 11-54: Water Pollution and Water Quality Standards.

Implementation of any of the alternatives would be conducted in a manner consistent with Hawaii's Coastal Zone Management Program in accordance with Section 307(c)(1) of the CZMA. A letter to this effect was sent to the State of Hawaii for comment on April 8, 2013 and a response was received on April 16, 2013 (see Appendix A). In the letter received on April 16, 2013, the Hawaii CZM Program indicated they would not be responding to the NMFS coastal consistency determination for the proposed activities due to the preemption of Hawaii CZM enforceable policies that are relevant to the taking of marine mammals.

1.5.7 National Marine Sanctuaries Act

The National Marine Sanctuaries Act (NMSA; 32 U.S.C. 1431 *et seq*.) authorizes the Secretary of Commerce to designate and manage areas of the marine environment with special national significance. The National Marine Sanctuary Program, operating under the NMSA and administered by NOAA's National

Ocean Service (NOS) has the authority to issue special use permits for research activities that would occur within a National Marine Sanctuary. Obtaining special use permits is the responsibility of individual researchers. However, as a courtesy, the NMFS OPR consults with NOS when proposed permitted activities would occur in or near a National Marine Sanctuary. The NMFS OPR sent a copy of the PIFSC permit application (File No. 16632) to NOS during the public comment period (78 FR 13863) and no comments were received from NOS.

1.5.8 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712) was enacted to ensure protection of shared migratory bird resources. The MBTA prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter, of any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit. The responsibilities of Federal agencies to protect migratory birds are set forth in Executive Order 13186 (see below). USFWS is the lead agency for migratory birds. The USFWS issues permits for takes of migratory birds for activities such as scientific research, education, and depredation control, but does not issue permits for incidental take of migratory birds. Thus, no MBTA permits are necessary.

1.5.9 Convention on International Trade in Endangered Species of Wild Fauna

The Convention on International Trade in Endangered Species (CITES) is an international agreement between governments with the goal of ensuring international trade in specimens of wild animals and plants does not threaten their survival. All import, export, re-export and introduction from the sea of species covered by CITES must be authorized through a licensing system. In the U.S., the USFWS is the Management Authority for CITES. Obtaining CITES permits from the USFWS is the responsibility of individual researchers prior to import or export of CITES-listed species.

1.5.10 Animal Welfare Act

The Animal Welfare Act (AWA) (7 U.S.C. 2131 – 2156) sets forth standards and certification requirements for the humane handling, care, treatment and transportation of mammals. Each research facility is required to establish an Institutional Animal Care and Use Committee (IACUC), which reviews study areas and animal facilities for compliance with the AWA standards. The IACUC also reviews research protocols and provides written approvals for those that comply with AWA requirements. Enforcement of these requirements for non-federal facilities is under jurisdiction of the U.S. Department of Agriculture's Animal and Plant Health Inspection Service. For federal research facilities, the head of the federal agency is responsible for ensuring compliance with the AWA requirements. It is the responsibility of researchers to seek and secure IACUC reviews and approvals for their research and adhere to other requirements of the AWA related to care and transport of marine mammals. NMFS researchers applying for permits must submit with a permit application verification of IACUC approval and the protocols reviewed by the IACUC. The NMFS PIFSC submitted with their permit application File No. 16632 such verification. Additional information on IACUC requirements is provided in Section 2.6.

1.5.11 Administrative Procedure Act

The Administrative Procedure Act (APA) (5 U.S.C. 551 *et seq*.) is the law under which federal regulatory agencies, including NMFS, create the rules and regulations necessary to implement and enforce major legislative acts such as the MMPA and ESA. The APA also provides for judicial review of agency final actions and regulations. Under the APA, courts may set aside agency actions as arbitrary and capricious, an abuse of discretion, unconstitutional, beyond statutory authority, unsupported by substantial evidence or unwarranted by the facts.

A decision by NMFS to issue or deny a permit is subject to judicial review based upon the administrative record. For this reason, NMFS maintains a thorough written record documenting the information reviewed and relied upon in making its conclusions, as well as a written record of the process by which the information was used.

1.5.12 Executive Orders

An Executive Order (EO) is an order having the force of law issued by the president of the U.S. to the army, navy, or other part of the executive branch of the government. An EO directs federal agencies in the execution of congressionally established laws or Executive policies. The following Presidential EOs are relevant to this analysis.

1.5.12.1 Executive Order 12898 - Environmental Justice

EO 12898 requires Federal agencies to consider the impacts of their actions on minority and low-income populations. Section 4.9.6 addresses such impacts.

1.5.12.2 Executive Order 13089 - Coral Reef Protection

EO 13089 requires Federal agencies whose actions may affect U.S. coral reef ecosystems to:

a. Identify their actions that may affect U.S. coral reef ecosystems;

b. Use their programs and authorities to protect and enhance the conditions of such ecosystems; and

c. To the extent permitted by law, ensure that any actions they authorize, fund, or carry out will not degrade the conditions of such ecosystems.

Coral species in the project area are described in Section 3.3.7, and potential impacts from the various alternatives and mitigation to prevent impacts to these species are provided in Section 4.8.7.

1.5.12.3 *Executive Order 13112 - Invasive Species*

EO 13112 requires Federal agencies to use authorities to prevent introduction of invasive species, respond to and control invasions in a cost-effective and environmentally-sound manner, and to provide for restoration of native species and habitat conditions in ecosystems that have been invaded. Section 3.3.9 provides information on invasive species in the Hawaiian Archipelago relative to the proposed action and associated project area. Section 4.8.8 describes the potential effects of the various alternatives on introduction or spread of invasive species.

1.5.12.4 *Executive Order 13158 - Marine Protected Areas*

EO 13158 requires Federal agencies to identify actions that affect natural or cultural resources within marine protected areas (MPA). It further requires Federal agencies, in taking such actions, to avoid harm to the natural and cultural resources that are protected by an MPA. Section 3.4.11 describes the Papahānaumokuākea Marine National Monument in the NWHI, one of the world's largest MPAs. The effects of the various alternatives to the resources within the Monument are described in Chapter 4.

1.5.12.5 *Executive Order 13186 - Responsibilities of Federal Agencies to Protect Migratory Birds*

Several international, bilateral conventions on migratory birds, of which the U.S. is a co-signatory, impose substantive obligations on the U.S. for the conservation of migratory birds and their habitats. Through the MBTA, the U.S. has implemented these migratory bird conventions with respect to the U.S. This EO directs executive departments and agencies to take certain actions to further implement the MBTA. Section 4.8.6 discusses mitigation measures required for the conservation of migratory birds and their habitats.

1.6 WHY A PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT IS NEEDED

Research and enhancement activities on Hawaiian monk seals considered in this PEIS require NMFS funding, permitting and execution, all of which constitute federal actions requiring NEPA compliance. A PEIS is typically a broad-scale environmental evaluation that examines a program, such as Hawaiian monk seal recovery actions, on a program level as well as analyzing specific research and enhancement procedures. A PEIS may be used to evaluate an ongoing program and alternative directions that the program may take in the future.

To streamline the NEPA process and avoid repetition, the Council on Environmental Quality (CEQ) regulations encourages federal agencies to develop a tiered approach to their analyses (40 CFR 1502.20). For example, future research and enhancement activities would be evaluated, in part, based on the analyses presented in this PEIS. This allows subsequent Memorandums, Categorical Exclusions, EAs or EISs to incorporate much of the detailed analyses presented herein as a means of streamlining (40 CFR 1500.4[I]).

To satisfy NEPA, a Memorandum would be prepared for future research and enhancement activities that fall within the range of activities analyzed in this PEIS. Site-specific activities will be evaluated against the analyses presented herein for future NEPA compliance and the appropriate level of NEPA review will be completed accordingly, as described in Chapter 5. Should NMFS need to evaluate potential effects of a new procedure not currently analyzed in this PEIS, or a procedure that may need to be expanded on or modified, the agency would tier a Categorical Exclusion, EA, or EIS.

NMFS' own guidelines, NAO 216-6 Section 5.09a, state that "a programmatic environmental review should analyze the broad scope of actions within a policy or programmatic context by defining the various programs and analyzing the policy alternatives under consideration and the general environmental consequences of each (alternative)."

1.7 RELATED NATIONAL ENVIRONMENTAL POLICY ACT DOCUMENTS THAT INFLUENCE THE SCOPE OF THIS ENVIRONMENTAL IMPACT STATEMENT

Section 1508.25 of CEQ's guidance on NEPA states that the scope of an individual EIS may depend on its relationship to other EAs or EISs and the evaluations considered therein. NEPA documents that have recently been published that influence the scope (in other words, issues considered) of this PEIS are described briefly in Table 1.7-1. To streamline the NEPA process and avoid duplication, pertinent information presented in these previous evaluations has been incorporated by reference where appropriate in this PEIS as cited. In addition, the analysis of cumulative effects presented in Chapter 4 of this document includes the activities listed below.

Table 1.7-1 Related NEPA Documents That Influence the Scope of this PEIS

Title	Year	Issues Evaluated	Associated Permit (if applicable)
EA on the Effects of NOAA Fisheries Permitted Scientific Research and Enhancement Activities on Endangered Hawaiian Monk Seals	2003	Issuance of Scientific Research and Enhancement Permit Under Section 104 of the MMPA and Section 10(a)(1)(A) of the ESA to NMFS Pacific Islands Fisheries Science Center Marine Mammal Research Program. A Finding of No Significant Impact (FONSI) for research and enhancement activities was signed in 2003.	NMFS Permit 848-1695
EA on Issuance of a Permit for Field Research and Enhancement Activities on the Endangered Hawaiian Monk Seal	2009	Issuance of Permit No. 10137 to the NMFS Pacific Islands Fisheries Science Center Marine Mammal Research Program to conduct field research and enhancement activities on Hawaiian monk seals to support recovery efforts. A FONSI for research and enhancement activities was signed in 2009. Two supplemental EAs were prepared and FONSIs signed in 2010.	NMFS Permit 10137 as amended (Current Permit active through June 2014)
Programmatic Environmental Impact Statement on the Marine Mammal Health and Stranding Response Program	2009	NMFS national oversight and collaboration of the MMHSRP including the following activities specific to Hawaiian monk seals: • Response, rescue, rehabilitation, and release of stranded seals; • Health-related research on captive and rehabilitating seals (excluding vaccination research); and • Hazing or translocating seals away from imminently harmful situations; and • Translocation of MHI seals in imminent danger or otherwise for their protection. The Record of Decision for the MMHRP PEIS was signed in 2009. (http://www.nmfs.noaa.gov/pr/health/eis.htm)	NMFS Permit 932-1905

Title	Year	Issues Evaluated	Associated Permit (if applicable)
Environmental Assessment (EA) Issuance of Annual Conservation and Management Permits to NMFS PIFSC PSD and PIRO PRD for Conducting Hawaiian Monk Seal Conservation and Management Activities in PMNM	2012	NMFS PIFSC proposed action analyzed in this EA included (1) monitoring Galapagos sharks adjacent to seal pupping areas and (2) conducting fishing activities to lethally remove up to 18 Galapagos sharks observed near seal pupping areas. A FONSI for research activities to reduce shark predation was signed in 2012.	PMNM Permit 2013-017

1.8 REQUIRED DECISIONS AND OTHER AGENCIES INVOLVED IN THIS ANALYSIS

NMFS must decide if issuing permits and permit amendments for conducting research and enhancement on Hawaiian monk seals would be consistent with the purposes and policies of the MMPA, ESA, and their implementing regulations.

Although NMFS has sole jurisdiction for issuance of research and enhancement permits for Hawaiian monk seals, NMFS consults with the MMC, NOAA's NOS, the USFWS, and other pertinent federal and state agencies in reviewing permit applications. In addition, other agency permits for access to lands and waters around the Hawaiian Archipelago are required for Hawaiian monk seal research and enhancement and are subject to separate NEPA compliance. However, other agencies may also choose to formally adopt this PEIS by publishing a separate Record of Decision (ROD). If another federal or state agency adopts this PEIS, NMFS does not represent that this document satisfies state HRS Chapter 343 requirements. Section 1.5 provides an overview of permits, authorizations and consultations necessary for monk seal research and enhancement activities.

1.8.1 Cooperating Agencies

Lead agencies, such as NMFS, preparing a NEPA document are required to do so in cooperation with other federal, state, and/or local agencies with jurisdiction by law or with special expertise with respect to an environmental impact involved in the proposal (40 CFR 1508.5). Outside of the scoping process, this cooperation can be formalized between the lead agency and another agency with a Memorandum of Understanding that formalizes the cooperating agency status and responsibilities.

On September 14, 2010, NMFS invited the USFWS and the Hawai`i Department of Land and Natural Resources (DLNR) to be cooperating agencies in the PEIS process. In a letter dated April 19, 2011, DLNR declined the invitation to be a cooperating agency. The USFWS also declined the invitation to be a cooperating agency. In correspondence with NMFS in the fall of 2011, USFWS stated "USFWS does not have, nor does it expect, any major concerns regarding either the process or the proposed work addressed in the PEIS". Cooperating agency correspondence is included in Appendix A.

1.8.2 Commenting Agencies

After release of the Draft PEIS in August 2011, an invitation to an Agency Meeting was provided to multiple federal, state and local agencies that were considered to have interest in the proposed action. This purpose of this meeting was to provide these agencies with an opportunity to comment on the document. The Agency Meeting was held at the NMFS PIRO offices September 12, 2010; 11 agency representatives attended (Table 1.8-1 Agency Meeting Attendees). Coordination with these agencies has continued throughout the PEIS process.

Agencies such as the United States Coast Guard (USCG) D14, USFWS, NOS including NOAA Sanctuaries, National Park Service (NPS), and others, dedicate resources each year to assisting NMFS in protecting Hawaiian monk seals including coordinating with the Marine Mammal Stranding Response Network working under the MMHSRP permit when monk seals become entangled or stranded. The MMHSRP permit is separate from the research and enhancement permit analyzed in this PEIS, as described in Section 1.9.

Table 1.8-1 Agency Meeting Attendees

Agencies
Federal Agencies
NOAA Hawaiian Islands Humpback Whale National Marine Sanctuary
NOAA National Ocean Service, Papāhanaumokuākea Marine National Monument
U.S. Navy, Naval Facilities Engineering Command, Hawaii
U.S. Navy, Pacific Fleet
Western Pacific Regional Fishery Management Council
State of Hawai`i Agencies
Department of Land and Natural Resources, Division of Aquatic Resources
Department of Health, Environmental Management Division

Agencies
Department of Transportation, Harbors Division

1.9 NOAA ACTIONS NOT INCLUDED WITHIN THE SCOPE OF THIS PEIS

During public scoping meetings and public comment hearings, many stakeholders expressed confusion about whether monk seal critical habitat, NOAA Sanctuary actions or other NOAA initiatives in the Pacific Islands were part of this project. This section is provided to help clarify confusion about these projects. Each of the subsections in 1.9 references the cumulative impact assessment in Chapter 4 where these actions are considered in the analysis.

NOAA is currently undertaking other management actions within or near the Project Area that are not within the scope of this PEIS. While these projects are considered separate federal actions, the PEIS project team is coordinating with managers responsible for these other projects. This coordination allows NMFS to share information about the PEIS that may be pertinent to other projects as well as gain an understanding of how other activities may influence the decision-making process for Hawaiian monk seal research and enhancement actions. Descriptions of these other NOAA actions follow.

1.9.1 National Marine Fisheries Service Hawaiian Monk Seal Critical Habitat Revision

Critical habitat was originally designated in 1986 (51 FR 16047; April 30, 1986), and revised shortly thereafter in 1988 (53 FR 18988; May 26, 1988). The current revision uses new information, available since the 1988 designation, to describe monk seal habitat needs.

On July 9, 2008, NMFS received a petition to revise the Hawaiian monk seal critical habitat designation under the ESA to include additional areas in the NWHI and new areas in the MHI. In accordance with procedures outlined in the ESA (16 U.S.C. 1533), NMFS found that a revision was warranted and announced its intent to revise Hawaiian monk seal critical habitat on June 12, 2009 (74 FR 27988). Critical Habitat is defined under the ESA (16 U.S.C. 1532) and may include the following:

- Specific areas within the geographical area occupied by the species at the time of listing, on which are found those physical or biological features essential to conservation, and which may require special management considerations or protection; and
- Specific areas outside the geographical area occupied by the species if the areas are determined essential for conservation.

On June 2, 2011 (76 FR 32026) NMFS proposed to revise critical habitat for the monk seal by extending the current designation in the NWHI and by designating new areas in the MHI. While critical habitat is essential to the recovery of the species, evaluation and subsequent revisions to habitat areas is considered a federal action separate from research and enhancement activities covered in this PEIS.

Existing monk seal critical habitat is described in more detail as part of the environmental baseline (Chapter 3) and will be evaluated as part of the cumulative effects assessment presented in Chapter 4. Additional information about the critical habitat revision process can be found at: http://www.nmfs.noaa.gov/pr/species/mammals/pinnipeds/hawaiianmonkseal.htm.

1.9.2 National Ocean Service Hawaiian Islands Humpback Whale National Marine Sanctuary Management Plan Review

The Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) was established in 1992 as a marine sanctuary to protect the winter breeding, calving and nursing range of the largest Pacific population of the endangered humpback whale (*Megaptera novaeangliae*). HIHWNMS is managed by the NOAA NOS, Office of National Marine Sanctuaries (ONMS), under the National Marine Sanctuaries Act (NMSA) in co-management partnership with the State of Hawai`i DLNR. Additional information about the HIHWNMS is provided in Section 3.4.11.

The purposes and policies of the National Marine Sanctuaries Act (NMSA, 16 U.S.C. 1434(e)) requires NOAA to periodically review and evaluate the implementation of management plans and goals for each national marine sanctuary. Accordingly, NOAA must revise management plans and regulations as necessary to ensure that national marine sanctuaries continue to best conserve, protect, and enhance nationally significant living and cultural resources. The current management plan review began in 2010, and the process will result in a new management plan for the sanctuary. The management plan review process will help to evaluate gaps in existing marine conservation efforts in Hawai'i, and identify potential roles for the sanctuary in future management. The target for completing a draft revised management plan is late 2013, and a final revised plan is targeted for completion in 2014.

As part of the review process, Sanctuary management engaged the Sanctuary Advisory Council (SAC) for recommendations to address priority issues identified during a 90-day public scoping period that was held in summer of 2010. In January 2012, the SAC recommended that the HIHWNMS future management plan adopt an integrated approach to management that considers the entire ecosystem, including Hawaiian monk seals. The

Sanctuary management will consider this and other recommendations in developing the revised management plan, with additional opportunities for public input. NMFS and the Sanctuary would coordinate closely on any issues related to Hawaiian monk seals. NMFS will continue to coordinate with the HIHWNMS management review team to discuss details of the PEIS and Sanctuary Management Plan.

While HIHWNMS management changes are separate from actions considered in this PEIS, the HIHWNMS is located within the PEIS Project Area. Therefore, anticipated Sanctuary management changes will be considered as part of the cumulative effects assessment presented in Chapter 4 of this PEIS. Additional information about the HIHWNMS Management Plan revision can be found at: http://hawaiihumpbackwhale.noaa.gov/.

1.9.3 *National Marine Fisheries Service Marine Mammal Health and Stranding Response Program*

As discussed in Section 1.4, the NMFS MMHSRP currently has a permit (MMPA-ESA Permit No. 932-1905/MA-009526) for activities specifically related to marine mammal (including Hawaiian monk seal) health and stranding response. The PIRO Stranding Coordinator, working under the MMHSRP permit coordinates closely with PIFSC on Hawaiian monk seal research and enhancement activities to ensure efforts undertaken to protect seals are not duplicative and are in the best interest of seals. While information from the MMHSRP PEIS has been incorporated by reference, the scope of this PEIS does not include all stranding and response activities. Captive care is currently covered under the MMHSRP PEIS (http://www.nmfs.noaa.gov/pr/health/eis.htm) as a tool for rehabilitating seals that need medical assistance due to such things as entanglement, illness, or other injuries.

Vaccinations of seals, while in temporary captive care for rehabilitation under the MMHSRP permit, are proposed under Alternatives 3 and 4 in this PEIS to be conducted under the PIFSC research and enhancement permit. In addition, some seals kept in temporary captive care under the MMHSRP permit could receive supplemental feeding after they have been released from captivity. Post-release supplemental feeding would be covered under the research and enhancement activities proposed under Alternatives 3 and 4 of this PEIS. This PEIS analyzes quarantine and disease screening procedures necessary for some translocations.

In general, all response activities in the MHI for seals in need of protection or medical attention are carried out under the MMHSRP permit in coordination with PIFSC. However, if PIFSC is conducting health assessment research in the MHI and discovers a captured seal needs to have a hook removed, this could all be done under the PIFSC permit to minimize the need for a second capture. PIRO and PIFSC share resources (equipment and personnel) to accomplish rescues and conduct necropsies in the MHI under the MMHSRP permit. PIFSC currently conducts all disentanglements and necropsies in the NWHI under Permit No. 10137.

1.9.4 *National Marine Fisheries Service Hawaiian Monk Seal Community-Based Activities, Education and Outreach*

In addition to the recovery actions presented in this PEIS, NMFS will continue or initiate several community-based activities supporting monk seal recovery. These activities, which are described in more detail in Section 5.6, include:

- Engaging the Hawaiian Monk Seal Recovery Team, pursuant to the ESA, to obtain advice regarding recovery program development, implementation and evaluation from a wide variety of subject matter experts.
- Developing and implementing a strategic plan for managing monk seals in MHI using a community-based, participatory planning methodology.
- Developing and implementing an outreach plan designed to enhance public understanding and support for recovery actions through both overarching and specific outreach strategies.
- Supporting a grant program for partnership projects designed to enhance community participation in Hawaiian monk seal recovery.
- Developing and implementing additional program activities that incorporate community feedback into Hawaiian monk seal research and enhancement activities.

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2.0 ALTERNATIVES

2.1 INTRODUCTION

This chapter describes a reasonable range of alternatives that meet the purpose and need of the proposed action to implement recovery activities involving research and enhancement on Hawaiian monk seals. Evaluation of these proposed alternatives is presented in Chapter 4.

The National Marine Fisheries Service (NMFS) has, in accordance with guidance from the Council on Environmental Quality (CEQ) on implementing the National Environmental Policy Act (NEPA) (40 Code of Federal Regulations [CFR] Part 1500), developed four alternatives for evaluation in this PEIS. These include the no action alternative as well as an array of activities involving various levels of research and enhancement on Hawaiian monk seals. According to CEQ, "reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ 1981). The four alternatives analyzed in this Programmatic Environmental Impact Statement (PEIS) were developed in light of this guidance.

Section 1502.14 of NEPA requires federal agencies to explore all reasonable alternatives including the alternative of no action. The no action alternative provides a benchmark, enabling decision makers to compare the magnitude of environmental effects of the action alternatives. In addition to No Action (Alternative 2), NMFS has evaluated three other alternatives: Alternative 1 Status Quo (*e.g.,* what is currently permitted), Alternative 3 Limited Translocation (an expanded research and enhancement program with limited scope of seal translocations, and Alternative 4 Enhanced Implementation (same as Alternative 3 but with expanded scope of translocation.

As described in Section 2.4, and in line with CEQ guidance (40 CFR 1501.7), NMFS has considered comments received during the scoping period and public comment period on the draft PEIS in determining the significant issues related to the proposed action to be considered during development of the alternatives presented herein.

2.2 RELATION OF ALTERNATIVES EVALUATED TO THE STATEMENT OF PURPOSE AND NEED

The alternatives evaluated in this PEIS must achieve the objectives of the proposed action as stated in the purpose and need (Section 1.2), without violating federal environmental statutes and regulations described in Section 1.8. Thus, comparing the alternatives to the stated purpose and need, as well as technical and economic practicality and feasibility, serves as a means to filter alternatives that may be carried forward for detailed analysis. Any alternative that fails to meet the agency's purpose and need or federal environmental statutes and regulations, need not be carried forward for further consideration in the PEIS. NEPA states that for alternatives eliminated from detailed study in the PEIS, the agency must describe reasons for why alternatives were eliminated (Section 2.11). As previously stated, evaluation of the no action alternative is required in an PEIS (40 CFR 1502.14).

2.3 *RELATION OF ALTERNATIVES TO THE RECOVERY PLAN*

The Hawaiian Monk Seal Recovery Plan (NMFS 2007) provides guidance to the agency on specific information needs and actions that may contribute towards species recovery. The recovery plan serves as a guide only and does not commit the agency to the actions listed in the plan, nor does it bind the agency to only those activities listed as long as proposed activities may justifiably contribute towards species recovery. The research and enhancement priorities listed in the 2007 Hawaiian Monk Seal Recovery Plan provided a general framework for activities listed in the range of alternatives analyzed in this PEIS. For additional detail on the Hawaiian Monk Seal Recovery Plan, please refer to Section 3.3.1.8.

2.4 *PUBLIC COMMENTS CONSIDERED IN DEVELOPING ALTERNATIVES*

The Hawaiian Monk Seal Recovery Actions Draft PEIS was released for public review on August 12, 2011 on the project website: http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonkseal.htm. The Notice of Availability (NOA) for the Draft PEIS was published in the *Federal Register* August 19, 2011 (76 Federal Register [FR] 51945), which began the official public comment period for this PEIS (see Attachment A). The public comment period lasted for 60 days and concluded on October 17, 2011.

The alternatives presented in the Draft PEIS were based on comment received during the scoping period (October 1 – November 30, 2010) and on permitted past and existing research and enhancement activities. The alternatives also included new concepts that have not yet been permitted, but based on existing information, may contribute to species recovery.

Substantive comments received on the Draft PEIS during the scoping process and the public comment period raised issues that have been addressed or incorporated into this PEIS and the alternatives evaluated. Table 2.4-1 below provides an overview of substantive comments received on the PEIS alternatives and indicates where they are addressed in the Final PEIS. The complete Comment Analysis Report is included in Appendix B and it includes additional information about the public comments received and provides agency responses to comments. The report summarizing comments received during the scoping process was included in the Draft PEIS and is available on the project website: http://www.nmfs.noaa.gov/pr/permits/eis/scoping_summary_report.pdf.

Table 2.4-1 Summary of public comments on alternatives and section where comments on alternatives are addressed in this Final PEIS.

Comment Summary	Sections in the PEIS Where Issue Is Discussed	General Description of Revisions Made
Support or opposition to specific alternatives	• 2.6 Alternatives Carried Forward for Analysis	• 2.6 - Additional information is provided on the total number of weaned monk seal pups that could be translocated under Alternatives 3 and 4.
Support for including predator control and captive seal rehabilitation facility in the NWHI	• 2.11 Alternatives Not Carried Forward for Analysis	• 2.11 – Additional information has been added about the rationale for eliminating alternatives such as predator control on the NWHI.
Issues associated with impact analysis of alternatives	• 4.7 Elements Common to All Alternatives • 4.8.1 through 4.9.7 Environmental Consequences of Alternatives for Resources Evaluated	• 4.9.1-4.9.3 – Additional information and analysis of fishery impacts.

2.5 *RESEARCH AND ENHANCEMENT COMPONENTS OF THE ALTERNATIVES*

The following is a narrative describing each of the research and enhancement components found in the alternatives.

Land-based surveys and observations: Population monitoring of Hawaiian monk seals is fundamentally based upon visual sightings of uniquely identifiable seals. The seals are identifiable by natural characteristics (scars, pelage marks, etc.) or applied marks (flipper tags, temporary pelage bleach marks). The accumulation of resightings are used to estimate abundance, age- and sex-structures, survival and reproductive rates, cause of mortality, movement rates, behavior, etc. Land-based surveys are the source of most of the observations. This typically involves a researcher walking the shoreline where seals are on land or swimming nearshore, approaching seals to read tags or taking photographs to document identifying marks.

Observers remain as far away as possible from seals during monitoring activities to obtain the necessary data, using binoculars and telephoto lenses as necessary for documentation, and only approach closely, *e.g.*, within 1 meter (3 feet [ft]), when necessary. The field staff is trained to be unobtrusive and use techniques to avoid disturbance appropriate to the environment in which the seal is encountered whenever seals may alert to human presence. Seals are specifically given a wide berth when they are judged especially susceptible to disturbance, such as lactating females or molting individuals. Data recorded on land-based surveys include date, time, location, and a variety of information about each individual seal encountered (size, sex, tag information [letter/number, condition, color, tag location], bleach marks, body condition, molt status, whether the seal was disturbed by the researcher, association with other seals, any injuries, and sometimes behavior). Digital photographs help identify each seal by matching with previous photographs catalogued in a multi-year digital image database. During land surveys, researchers also opportunistically collect fecal and spew samples for diet analysis, shed (molted) skin for genetic studies, and on rare occasions, urine for health studies.

All alternatives allow for expanded use of remotely-operated cameras set up at seal landing areas in order to augment surveillance with minimum human presence. Cameras would be placed at designated vantage points and powered with photovoltaic systems. Images would be transmitted via satellite or stored digitally on site for later retrieval. Remote camera systems would allow for greater vigilance at sites where specific threats are a concern (*e.g.,* male aggression, shark predation) and would also augment basic population data in sites that are difficult for observers to access (*e.g.,* Nihoa Island). These systems have the advantages of efficiently collecting large amounts of data while reducing the level of human disturbance.

Autonomous, amphibious rover vehicles could be used improve assessment and monitoring operations in certain situations (*e.g.*, crowded narrow pupping beaches, islands that are difficult to land on). Terrestrial rovers with mounted video cameras could be used to identify and photograph monk seals or potentially assess injuries at a distance of approximately 3 ft. The use of rovers has not been tried with monk seals so their application would be in two phases. The first would be to test the vehicles suitability in near shore environments for collecting current or better quality assessment data and monitor their potential for disturbing monk seals and other wildlife. If the rovers prove successful they will be used more broadly on an "as needed" basis to supplement traditional methods.

Vessel surveys and observations: Typically, these are conducted from small boats that may cruise shorelines from several hundred feet or more offshore until seals are sighted. The boat then approaches more closely at a slow speed to allow for observation through binoculars and photographic documentation. The current permit allows a minimum approach distance of 33 ft. To mitigate disturbance, any indication of seal response or awareness of vessels are carefully observed and approach is adjusted to minimize the potential for disturbance. Vessel-based surveys are usually conducted in cases where researchers cannot land safely either due to sea conditions or terrain or in sites with restricted access. Also, surveys may be conducted from boats as a precaution if researchers judge that landing (*e.g.,* on a tiny sand spit) might cause unnecessary disturbance to seals. The data collected on vessel surveys are similar to that collected on land-based surveys, except that typically less detail can be recorded for each seal because visibility is limited.

Aerial surveys and observations: Surveys are conducted from aircraft (airplanes and helicopters) in areas difficult to reach otherwise. Aerial surveys can be an efficient method to survey long stretches of shoreline with sparse seal presence in a short period of time. Aerial surveys are mostly conducted in the MHI, where aircraft and fuel are much more available compared to the NWHI. Typically, surveys are conducted by flying offshore of shorelines until a seal is spotted, then circling (or hovering, if helicopter-based) to observe and photograph. Minimum distance from the survey aircraft to seals under the current permit is 500 ft (vector combination of vertical and horizontal distance). This distance may be reduced in proposed Alternative 3 or 4 because experience has shown that monk seals rarely take notice of aircraft that approach much more closely, probably because unlike other pinnipeds (*e.g.,* harbor seals), monk seals have not evolved with aerial predators. Also, surveys may be conducted from small, unmanned remotely operated aircraft which have even less potential to disturb. In rare occurrences when a seal may appear to respond to aircraft presence, aircraft distance is increased until the seal settles down. Like vessel surveys, data collected on aerial surveys are similar to that collected on land-based surveys, except that lesser detail can typically be recorded for each seal because visibility is limited.

Sample collection and use of tissues from opportunistically encountered carcasses: Dead seals provide information on the health and ecology of the species. Examination of tissue samples can reveal illnesses which afflicted the seal, the cause of death, exposure to other pathogens, provide genetic material for a variety of applications, provide samples for assessing contaminant exposure and information on diet. Carcasses of seals are necropsied in a standard manner and specific to Hawaiian monk seals, with protocols refined as appropriate for specific samples to be taken, appropriate method of sample storage, and sample analyses. Specimens are retained according to the condition of the carcass. If the animal has recently died and the carcass is in good condition, samples from all major organs are retained and life history and morphometric data are recorded. If the carcass is in poor condition, a limited set of data is collected, including size (measurements), sex, and general description. Skulls are retained for subsequent measurement and additional skeletal materials may be retained. In most cases, carcasses are found in isolation and can be obtained and examined without risk of disturbing any other seals. In cases where other seals are present, researchers approach stealthily and remove the carcass to an isolated area to minimize incidental disturbance. In the NWHI, carcasses are typically buried; in the MHI, they are usually buried, cremated or disposed of at a waste facility. Salvaged parts may be used to enhance survival of pups (after necropsy, using seal tissue as bait for permitted shark removals).

Protocols for capture and handling: Many of the research and enhancement activities described below necessarily involve capturing, restraining and handling the seals. NMFS has developed extremely conservative protocols for seal handling that are designed to achieve the research or enhancement objectives, while minimizing disturbance to other seals in the area, and the risk of harm to the seal and the human handlers. These protocols have been developed over a long and successful history of safely handling seals with very low risk to the animals involved (Baker and Johanos 2002). Capture and handling protocols consider factors such as environmental conditions, status and health of the seals, capabilities of the capture team and presence of other seals in the area. Procedures conducted on captured seals minimize pain, risk of physical harm, and chance of disease transmission.

NMFS has a long-standing conservative approach to disturbance or capture of adult female seals. For example, no adult female is captured if she appears to be pregnant or is otherwise thought likely to be well into a pregnancy even if it is not visually apparent. The only exception is for a life-threatening situation such as a severe entanglement. Also, great pains are taken to minimize the disturbance of mother-pup pairs.

These protocols are arguably the most conservative and risk averse for any seal species in the world. Many prospective capture events are delayed or aborted entirely due to how conservatively perceived risks are assessed before the activity. Activities described below are performed using these conservative, risk-averse protocols.

Marking (tagging, bleaching): Researchers apply a variety of marks to facilitate both short- and long-term identification of individual seals, which is the most critical foundation of the population monitoring database. The most commonly applied marks are lettered and numbered flipper tags. Flipper tags are applied to weaned pups and to older individuals that may not have been tagged previously. Under some alternatives, pre-weaned pups may be flipper-tagged if pups are still nursing at the time researchers depart field camps in the NWHI. Tags would be re-applied to individual seals whose tags have become lost, broken, or excessively worn, in order to maintain the individual identities of these animals.

When captured for flipper tagging, seals are manually restrained by hand or in a net, then two plastic Temple Tags® (4 centimeters [cm] x 2 cm) are inserted through holes punched in the webbing between two digits of each rear flipper. During retagging old broken or unreadable tags may be removed. Restraint time averages approximately 5 minutes and does not exceed 15 minutes. After flipper tags have been applied, but while the seal is still under restraint, a Passive Integrated Transponder (PIT) tag is typically injected. These are the same kind of "chip" commonly inserted in domestic dogs and cats to facilitate identification. Most PIT tags would be injected just below the skin in the lateral lumbar area.

The injection site is cleansed with Betadine® and alcohol prior to PIT injection. The unique identifying code of each chip can later be determined using portable, hand-held readers, thereby providing long-term maintenance of identity even if flipper tags are lost.

A limited number of weaned pups may also be marked with a small sonic tag. Galapagos shark predation at French Frigate Shoals has drastically decreased pup survival for more than a decade. The primary purpose of sonic tagging is to gain information to aid in reducing this predation on weaned pups. Movements of pups and proximity to sonic-tagged sharks for the time period just after weaning is monitored via sonic tags attached to flipper tags. Receiving stations "listen" for both shark and seal sonic tags and record them when they are in range. These data are used to better inform management actions aimed at reducing shark predation, such as culling sharks. Sonic tags are deployed concurrent with standard flipper tagging of weaned pups. The sonic tag is attached onto one additional flipper tag during standard tagging procedures. The sonic tags are 2.4 cm long and weigh 3.6 grams (g). The sonic tag is about the size of the temple tag and is attached to the flipper tag with two small zip ties and epoxy.

Bleach marking seals' pelage (fur) is another integral part of individual monk seal identification. An over-the-counter cosmetic hair lightener is applied from a squeeze applicator (similar to a condiment dispenser) usually without disturbance to seals asleep on the beach. Marks remain on the seals' pelages until the annual molt, with a maximum duration of one year. Bleach is never applied to a part of the pelage that the seal could reach with a fore flipper, to ensure that the animal cannot rub any bleach on its face or in its eyes. Most of the seals to which marks are applied have been previously tagged and have an identity assigned. The presence of a highly visible bleach mark facilitates re-identification of an individual from a much greater distance than would otherwise be the case if researchers relied on flipper tags alone. Thus, there is less need to approach bleached seals closely, thereby reducing disturbance.

The technique for marking monk seals in the wild involves moving stealthily towards a sleeping seal and applying a unique identifier (usually a number) to the seal's pelage on the back or side. A bleach ring or "girdle" is also applied over the seal's circumference in the vicinity of the tail. The purpose of the girdle is to facilitate subsequent detection by observers that a seal has been bleached, even if the animal is lying on the previously applied number.

Collect measurements to determine body condition of individuals: Measurements of axillary girth and dorsal straight length are indicators of Hawaiian monk seal health and body condition. These data have proven especially useful for comparing condition of seals in different subpopulations and provide insight into the factors that affect survival and population trends. The measurements are typically made with a flexible tape measure. Seals are also sometimes weighed by suspending the seal in a hoop or stretcher net from a hanging scale supported by a tripod. Blubber depth measurements are sometimes collected using a portable imaging ultrasound by applying light pressure to the skin to obtain images along the sides and back of the animal. Blubber depth measurements indicate condition and nutritional state by assessing fat stores in the body.

These measurements are almost always conducted along with other activities that involve capture and restraint. For example, girth and length are measured at the same time weaned pups are captured for tagging. Older animals are measured when they are captured for instrumentation, health screening or other reasons. Thus, these measurements (morphometrics, weights, and ultrasound) usually do not increase the number of seals captured or disturbed.

Sample collection from captured animals to determine health status and diet: A suite of samples is collected from live-captured monk seals. Seals may be sampled for standard health screening, which is normally done opportunistically whenever a seal is captured and sedated for other reasons (*e.g.*, telemetry studies); or, the seal may have a particular health issue that is being investigated (*e.g.,* an abscess or illness). Also, tissue samples can be instrumental in determining the dietary habits of monk seals through fatty acid and stable isotope analyses. Samples collected include blood, blubber biopsies, viral and microbial swabs from body orifices (eyes, nose, mouth, anus, genital orifice) and external wounds, and whiskers (for diet and hormone studies).

Seals captured for health screening are usually sedated with diazepam administered intravenously in the extradural vein or with an intramuscular injection of midazolam. Up to 90 milliliters (ml) of whole blood is collected from the extradural vein using a standard syringe and external T-connector. Blubber core samples (through the full depth of the blubber layer) are collected from the dorsal pelvic region using a sterile 6 millimeter (mm) biopsy punch. One or two whiskers may be collected by snipping them at the base (if seal is not sedated) or plucking (if sedated).

Total handling time varies depending upon the procedure, but would range from approximately 5 to 20 minutes. Seals may be captured for focused health investigations, but these samples are routinely collected from any seal sedated for any reason (*e.g.,* instrumentation described below). By combining sample collection with other procedures, the maximum information is obtained with the minimum risk and disturbance to seals.

Appendix C provides a list of the drugs currently used or proposed to be used in Hawaiian monk seals, possible adverse effects including any observed in Hawaiian monk seals, and the pharmacokinetics of each drug (*i.e.,* known information on how the body affects the drug, including how the drug is absorbed, distributed, the rate of action and duration of effect, chemical changes in the body, and effects and routes of excretion of metabolites). Information in the table is from Plumb (2008) or other references if noted. More detailed information on each drug can be found in Plumb (2008). Over the next 10 years, new drugs may become available or other drugs may be prescribed for use in Hawaiian monk seals by the attending veterinarian. Information on such new drugs would be provided by PIFSC to the OPR Permits Division and may be incorporated into the protocols if indicated by the attending veterinarian.

In addition to the drugs in Appendix C, supportive fluids such as electrolytes, dextrose and sodium bicarbonate may be administered at the discretion of the attending veterinarian in response to adverse reactions to capture, handling and drug administrations.

Infectious Disease Mitigation: Current information suggests infectious disease is not limiting recovery of the Hawaiian monk seal. However, the species is rare, has very low genetic diversity and may have been buffered from exposure to many mammalian diseases due to its isolation in the Hawaiian Archipelago for millions of years. Together, these factors raise great concern that outbreaks of diseases to which monk seals have not been previously exposed could have devastating impacts.

Presently, the only permitted infectious disease mitigation (other than surveying exposure through sample collection described above) involves capturing seals with abscesses in order to open, drain and flush the affected area with water and hydrogen peroxide or similar disinfectant. This is rarely done, and usually involves weaned pups that develop infections presumably as a result of bite wounds inflicted by aggressive male seals. In many cases, the treatment allows the wound to heal and enhances the probability that affected seals will survive. Alternatives 3 and 4 involve the use of modern long-acting antibiotics to augment treatment of abscesses.

Alternatives 3 and 4 also include more proactive efforts to mitigate the potential or eventual negative effects of infectious disease on monk seals. Activities would include vaccination studies to determine the safety and efficacy of vaccines against specific pathogens considered most likely to spread to monk seals (*e.g.,* morbillivirus and West Nile virus). Captive studies would include both monk seals and surrogate species, and potentially free-ranging Hawaiian monk seals. If such research indicates that such vaccines are safe and effective, they may be administered preventatively or in response to an outbreak. Details on the *Vaccination Plan* can be found in Appendix D.

Conduct genetic sampling: Tissue (usually skin) samples are collected for genetic studies. Most genetic samples consist of small cylindrical skin punches that are a byproduct of flipper tag application. Genetic material may also be obtained from skin samples collected from carcasses or from shed molt samples (see land-based surveys, above). Collection of genetic samples, therefore, does not require any additional handling or disturbance.

Attachment of scientific instruments: A variety of instruments are attached to monk seals in order to track their movements, assess habitat use, and study foraging and haulout behavior. Seals are captured, restrained and sedated with diazepam or midazolam, and health screening is conducted as described above. Instruments are then glued to the dorsal pelage using 10-minute epoxy or a similar adhesive. Instruments are either recovered during a subsequent recapture or fall off before or during molt. Total restraint time averages approximately 25 minutes, and does not exceed 60 minutes.

The type of instruments attached include but are not limited to Very High Frequency (VHF) radio tags, time-depth recorders, satellite- or cell-phone-linked (Global Positioning System [GPS] or Argos system) location or dive recorders, and seal-mounted video cameras (*e.g.,* Crittercam). These instruments provide a wealth of information and are used to research seals and are also sometimes applied during translocation procedures (see below) or in other cases where the movements of seals are of particular interest (*e.g.,* to monitor the near-term survival, movement and behavior of seals that have had fish hooks surgically removed). New and improved instruments are constantly being developed and will be utilized as appropriate.

De-worming: Gastro-intestinal parasites are common in pinnipeds, including Hawaiian monk seals. In young seals that are struggling to find sufficient prey, parasites may impact the seals' energy and nutrition available for maintenance, growth, development and ultimately, survival. NMFS is conducting research on the feasibility and effectiveness of reducing parasite burdens in free-ranging juvenile monk seals by administering de-worming drugs periodically, then measuring whether treated and control seals differ in their subsequent growth rates or survival. Seals are captured in a net, weighed, and either given a dose of de-wormer (treatment) or simply released (controls). Two different drugs were initially tested (fendbendazole and praziquantel), administered either orally or via intra-muscular injection. Repeated treatments are given to help ascertain the most effective regimen. To reduce the number of captures required to administer drugs, a topical de-wormer is being tested, because this method reduces the need for capture and disturbance.

If de-worming proves feasible and effective, under some alternatives it may be applied as an enhancement tool in the wild population and as a complement to translocations (see below) and captive care for rehabilitation (conducted by the Marine Mammal Health and Stranding Response Program).

Translocate animals to improve survival or alleviate male aggression: According to the "IUCN Guidelines for Reintroduction", translocation is defined as *"deliberate and mediated movement of wild individuals or populations from one part* *of their range to another."* Hawaiian monk seals are translocated to address a variety of threats:

Nursing, or pre-weaned pups separated from their mothers may be captured, and relocated to a prospective foster mother or back to their natural mother, respectively. Young pups that are prematurely weaned or otherwise separated from their mother suffer high rates of mortality. In these cases, intervention to restore nursing can enhance the pup's survival.

Weaned pups in locations where there is a severely reduced chance of survival, such as areas of high shark predation (*e.g.,* some islets at French Frigate Shoals), disease or contaminant exposure, or likelihood of human interaction (*e.g.,* hooking, entanglement, socialization, disturbance in the MHI), may be moved to locations which present less risk. In such cases, pups born within the NWHI are translocated to other sites within the same NWHI atoll, and pups born within the MHI are moved to other beaches or islands in the MHI.

Weaned pups and juvenile seals in subpopulations where juvenile survival is low may be translocated to subpopulations with higher rates of juvenile survival. Survival at the original site may be relatively low due to insufficient prey availability (thought to be the primary cause of juvenile mortality), but may also be affected by other factors. The current permit allows for such translocations only among subpopulations *within* the NWHI. Alternative 4 would allow for more flexible application of this tool to move seals anywhere within the monk seal range. Alternative 3 would allow translocations anywhere within the monk seal range except Alternative 3 would not include translocating weaned pups from the NWHI to the MHI.

Also, Alternatives 3 and 4 allow for a return translocation of individuals back to their natal subpopulations once they have reached an age (2-3 years) when their survival probability is universally quite high. Details on this approach, referred to as *two-stage translocation*, can be found in Appendix E. The *Health Screening and Quarantine Protocols for Hawaiian Monk Seal Translocation Between Subpopulations* is presented in Appendix F.

Alternatives 3 and 4 would allow for the experimental translocation of MHI-born seals age 2 years and older to the NWHI. This activity would approximate the return portion of two-stage translocation, and thus provide information on that aspect of the strategy without waiting for translocated seals to reach age 3 years. That is, it would evaluate how well seals that have grown up in favorable conditions (currently prevailing in the MHI) fare when taken at age 2 years or older to an area with less favorable conditions (currently prevailing in the NWHI).

Seals with unmanageable human interactions may be taken from the MHI to the NWHI under Alternatives 3 and 4. Occasionally, individual seals in the MHI develop habitual patterns of seeking out humans and interacting with them, sometimes in ways that constitute a public safety risk and a risk to individual seals. Research to develop tools to prevent and mitigate human interactions with individual seals is proposed (see below). However, there are likely to be cases in the future, as there have been in the past, where despite all efforts to alter seal or human behavior, the interactions persist. In such cases, unmanageable seals could be translocated from the MHI to the NWHI, where they could continue to live in a wild population that is isolated from human contact.

Aggressive male monk seals, either acting singly or in groups, can severely injure other monk seals of any age or sex, but typically their victims are either weaned pups or adult females. When such males are identified as confirmed or highly suspect aggressors, they may be translocated to alternate sites where they would be less likely to cause harm. Other tools for mitigating male aggression include hazing, removal to permanent captivity or, as a last resort, lethal removal. Under some alternatives, chemical alteration to reduce aggression may be explored (see discussion about behavior modification).

Appropriate methods for translocation vary greatly depending upon the age and size of the animals involved and the distances and geographic circumstances. For example, nursing pups are typically captured by hand and may be carried on foot to lactating females, whereas aggressive adult males may need to be captured in a hoop net, sedated, placed in a cage and transported great distances in a combination of small boats, large sea-going ships, airplanes or automobiles. Protocols have been developed by the NMFS over the past several decades to safely and successfully transport live seals (Baker *et al*., 2011).

During translocation projects, it will sometimes be necessary to temporarily hold seals captive on the beach (especially in the NWHI). For example, when collecting seals from a given subpopulation, the subjects may need to be gathered together over the course of several days so that they can subsequently be efficiently and safely transported to a ship or plane. Likewise, seals may be held at their destination for some time prior to release. The primary structure for temporary holding (longer than approximately two days) will be shoreline pens, measuring up to approximately 24 ft x 80 ft. Approximately 30 percent (%) of the surface area will include water at least 2 ft deep at lowest tide. The remainder of the pen would be intertidal and dry resting area above the high water line. No more than 5 seals would be held in a pen at any one time. In some instances requiring short temporary captivity (*e.g.,* less than two days), a shaded holding pen may be erected in the vicinity of the field station, and seals would be wetted down periodically.

Pens will be constructed from plastic or metal (typically mesh) material, approximately 4-ft high, supported by approximately 10 ft x 2-3 in diameter steel pipe driven into the sand at approximately 8-10 ft intervals. Pipe or water filled fire hose will be used to secure the bottom of the fencing material. Plastic ties will fix the fencing to the support piping and bottom weights, and windbreaks will be erected along the fence as necessary. Fence perimeters (in and out of water) will be monitored at least twice daily, and will be repaired or changed as necessary to prevent escape or injurious entrapment. Alternate but comparable construction materials or pen configurations may be used within the range of dimensions described above. Finally, temporary holding cages with a much smaller footprint (*e.g.,* less than 8-ft long x 4-ft wide x 4-ft high) may be used for transport and holding (*e.g.,* up to one week in cage for transport and holding). Pens would be erected only when needed and dismantled as soon as they are no longer required.

Supplemental feeding following captive care: Captive care or rehabilitation of Hawaiian monk seals in need of medical attention (*e.g.,* stranded, prematurely weaned or emaciated seals), can be conducted under the authority of the NMFS Marine Mammal Health and Stranding Response Program (MMHSRP). Thus, this type of captive care is not an activity proposed in this PEIS. However, Alternatives 3 and 4 do propose to complement captive care with supplemental feeding of seals after they have been released in the NWHI. The concept is to provide a more gradual transition from captivity (where seals will have been fed) to independence (where seals will need to forage for themselves). The training to take food from people in captivity would be bridged to a wild context, such that released seals could be gradually "weaned" from human support rather than making an abrupt transition. This may improve the survival prospects of seals following captive care.

Such supplemental feeding of wild seals would occur only in the NWHI where human presence is minimal. It would not be conducted in the MHI, to avoid the problem of these seals approaching members of the public as a food source. Supplemented seals would receive Individually Quick Frozen (IQF) herring in quantities of up to 5% of body weight as frequently as once per day or at longer intervals for up to one year. This technique has not been tried with monk seals to date. Much would depend on the seals' behavior, as they would need to make themselves available to be fed.

In order to "wean" the animal while keeping it in good body shape, feeding may be more regular (daily) and involve higher rations at the start of the supplementation, then gradual reduction. It is important to note that the supplemented seals would be pre-trained to approach on cue for feeding, thus non-target seals would very likely not try to obtain provisions. Any uneaten portion of herring offered to a seal would be collected and disposed of properly to keep any waste out of the natural environment.

Mitigate fishery and human/domestic animal interactions: Marine debris and derelict fishing gear have been well documented to entangle Hawaiian monk seals, which have one of the highest documented entanglement rates of any pinniped species. Marine debris entanglement causes harm to seals by drowning, causing severe wounds, and restricting behavior (including swimming, diving and foraging). Whenever it can be safely accomplished, seals are disentangled.

Monk seals also get hooked by derelict and actively fished gear, almost exclusively in the MHI. Hooks may be embedded in the body, in and around the mouth or are sometimes ingested. Hookings can cause pain, injury and mortality in monk seals and, like entanglement, hooks are removed whenever it can be accomplished safely.

Seals which are observed to be entangled by nets, lines, or other marine debris are freed by either of two methods: (1) Animals would be captured by hand or net, restrained, disentangled (by hand or by using a cutting implement), and freed; or (2) The entangling item would be cut free using a cutting implement by hand (while the seal is asleep) or attached to a pole, with no restraint of the animal. The selected technique depends upon the particular circumstances of each case. Hooks would be removed from seals by similarly restraining the animal and removing the hook by hand, often with the aid of de-hooking tools designed specifically for this purpose. The seals sometimes require sedation on the beach, and, if necessary, are brought into temporary captivity for surgical hook removal by a veterinary staff, requiring general anesthesia.

Behavior Modification: In addition to entanglement and hooking interactions, seals in the MHI sometimes become socialized or habituated to people or domesticated animals. Such interactions may involve humans provisioning seals with food, seals taking catch from fishers, play or aggressive behavior between people, pets and seals, etc. These interactions can be dangerous for all participants. Historically, NMFS typically intervenes by first attempting to haze or harass habituated seals away from high risk areas, and then, if the behavior persists, by translocating the seal to locations where there are more seals and less human interaction. As each interaction situation entails a unique set of circumstances and complications, a variety of methods may be necessary to resolve each situation, including a suite of methods generally referred to as behavioral conditioning or behavior modification.

Alternatives 3 and 4 involve research to prevent or reduce these interactions. Techniques may involve aversive conditioning, where seals behaving in an undesirable fashion are exposed to unpleasant (but not harmful) experiences in order to discourage the undesired behavior. A variety of aversive and disruptive stimuli may be considered for behavioral modification. While the specific stimuli would be varied they would fall under the following general categories:

- Visual and aural disruptive stimuli: These are stimuli that are intended to stop a seal from its current behavior. It could be any type of aural or visual stimulus (like waving palm fronds) that disrupts a behavior or displaces a seal from an area.

- Tactile harassment: This includes any technique that repels seals or stops a behavior by direct contact, including prodding with blunt objects (*e.g.,* poles), crowding boards, or low-velocity objects tossed or projected, etc.

- Acoustic harassment and deterrents: designed to cause temporary annoyance, discomfort or to frighten seals to displace them from specific locations where conflict occurs. This could include seal crackers (similar to a small firework), underwater speakers, etc.

- Chemical: This includes any chemical that may be used to alter the taste of prey seals obtain in an undesirable ways (*e.g.,* by depredating fishers' catch, bait or gear) or is used to cause temporary minor discomfort to seals to displace them from an area or stop particular behaviors.

In addition to aversive stimuli, positive reinforcers may also be researched and developed to replace the reinforcement of interacting with humans. Tools and techniques would be developed in a careful experimental fashion, and if proven safe and effective, applied as appropriate. If behavioral modification allows a seal that might otherwise be translocated or brought into captivity to live out its life in the wild, it could be a valuable tool for species recovery.

In addition, aggressive adult male seals may be hazed away from conspecific victims by field staff approaching, vocalizing or otherwise making noise, prodding with a long pole, or throwing objects (*e.g.*, rocks, coral, sticks, debris). Care will be taken not to harm or cause severe pain to the male. The objective is to distract the target animal and frighten him away rather than to cause harm or pain. However, the risk of death to a conspecific outweighs any risk of injury to the adult male.

Mortality incidental to research activities: Despite NMFS's excellent record of safely handling Hawaiian monk seals, there is always some finite risk of mortality inherent in research activities that involve handling seals. Since 2000, one such unintentional research-related mortality has occurred.

In addition to unintentional mortalities, moribund/unhealthy seals may be humanely euthanized or die incidental to handling. Most health screening research involves sampling seals that appear healthy. Severely ill or compromised seals are very rarely encountered. Yet such seals may be critical to sample in order to understand the source of their illness and, more importantly, to recognize disease outbreaks that may threaten the broader population. Euthanasia may occur if an experienced on-site veterinarian determines there is a high probability of the death of an animal due to the injury or disease condition. In such instances, seals would be captured, sedated and biologically sampled as described above for health assessments. Thereafter, seals would be injected with a lethal dose of Beuthanasia® (sodium pentobarbital) into the extradural vein at a dose of 1 ml/10 pounds (lb). Immediately after the animal has succumbed, a complete necropsy would be conducted, with samples saved from all major organs. Because of the presence of barbiturates in the carcasses, all soft parts not retained would be collected in plastic bags for subsequent environmentally safe disposal (*e.g.,* incineration).

Mortality or removal from wild population for enhancement activities: As described above, aggressive male monk seals can cause serious injuries or mortality to other seals, most notably adult females and weaned pups. When males are identified as having seriously injured or killed another seal, they may be translocated as described above. However, if translocation is not a preferred option, aggressive males may be brought into permanent captivity or, as a last resort, humanely euthanized following the procedures outlined in the previous section.

Some of the alternatives involve ambitious efforts to enhance Hawaiian monk seal populations, through means such as two-stage translocation, de-worming, vaccination, and behavioral modifications. All of these activities involve increased handling of seals and some involve temporary captivity and transport. These activities would be undertaken to improve monk seal survival, but also entail additional risks. Therefore, there is potential that seals may die unintentionally as a result of these enhancement activities. Since 2000, two monk seals have died in captive facilities during enhancement activities (one weaned pup awaiting disease screen results associated with a translocation, and one juvenile held for captive care).

Mitigate adult male aggression using chemical intervention: Adult male aggression is of particular concern when the perpetrator displays an abnormal focus on young animals, with frequent, repeated, and severely aggressive behavior that threatens the young animals' life. As described above, the NMFS is permitted to mitigate adult male seal aggression by a variety of means. Males identified as aggressors may be hazed, translocated, brought into permanent captivity or as a last resort, lethally removed. Each of these methods has drawbacks.

Translocation works best if the aggressors can be taken somewhere where they do not persist in harming other seals or elicit other problems. In the past, male monk seals were translocated from the NWHI to Johnston Atoll (1984 and 1998) or to the MHI (1994), sites chosen because they harbored few or no other seals. Currently, Johnston Atoll is the only site within the species natural range which has few or no seals. However, past experience suggests that seals taken to Johnston Atoll do not persist there. Permanent captivity is effective; however, captive facilities that are willing and able to indefinitely care for adult male monk seals are rare. Lethal removal is also effective, but the NMFS has used this extreme measure very judiciously and considers it a regrettable last resort. Adult males may be euthanized if they have been identified as killing or seriously injuring a conspecific, and if translocation and permanent captivity were not feasible options.

All the above approaches can also be logistically complex and quite expensive, factors which also limit their viability. Finally, in cases where the identity of male aggressors is suspected, but not unequivocal, permanent removal efforts (captivity and euthanasia) are not appropriate. It would be desirable to develop another tool for mitigating male aggression that was effective, humane, feasible, affordable and reversible.

In the 1990s, some experimentation to chemically alter testosterone levels of adult male Hawaiian monk seals using a gonadotropin-releasing hormone (GnRH) agonist (decapeptyl) was done with both captive and wild seals. The results indicated that treated males usually responded by exhibiting lower testosterone levels (Atkinson *et al*, 1986; Atkinson and Gilmartin, 1992). However, the studies did not address whether aggressive behavior was reduced. Other drugs (*e.g.,* Desolorelin) have also been used in a variety of species to reduce testosterone production and aggression. Alternatives 3 and 4 include research to better elucidate the potential use of GnRH agonists as a tool for mitigating adult male monk seal aggression. Research would likely involve both captive trials and research on free-ranging male seals. If the method proves effective, it could be used as an alternative to temporarily alter aggressive behavior of specific male seals in order to enhance survival of adult females and immature seals.

Captive holding for research and enhancement: Seals may be held in temporary captivity for various reasons. For example, aggressive adult male seals removed from the wild for permanent captivity may be held in temporary holding facilities and cared for until transport to a permanent holding facility occurs. Or, seals may be brought into temporary captivity for specific research studies such as taste aversion trials (as part of the behavioral modification program). Research studies described in this section may also occur on seals already in permanent captivity. As mentioned above, during translocations, seals may be held in temporary pens or facilities prior to transport or for quarantine. However, captive care for purposes of rehabilitation is not included in the alternatives (this type of captive care is covered by the Marine Mammal Health and Stranding Response Program's permit and PEIS; NMFS 2009a).

2.6 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS

The four alternatives carried forward for detailed analysis in Chapter 4 vary by the nature and extent of recovery activities, including the types and level (*i.e.,* number of animals or procedures) of research and enhancement that would be permitted under each different policy. These alternatives represent a reasonable range of research and enhancement options in accordance with the purpose and need described in Chapter 1 and fulfill the NEPA requirements for analyzing the No Action alternative.

There are two broad categories of research and enhancement activities that require permits:

(1) Research and enhancement that does not involve capture, handling or collection of tissue from live animals; and

(2) Research and enhancement that requires capture, handling or intrusive procedures on live animals.

Both categories have some potential for direct and indirect mortality. Table 2.6-1 contains additional detail on what general types of monk seal research and enhancement activities fall into each of these two categories. The type and amount of these activities would vary across the alternatives.

Table 2.6-1 Research and Enhancement Activities Requiring Permits

<table>
<tr><th colspan="2">General Categories of Research and Enhancement Activities</th></tr>
<tr><th>Activities that Do Not Require Capture, Handling, or Collection of Tissue from Live Animals</th><th>Activities that Require Capture, Handling, or Collection of Tissue from Live Animals</th></tr>
<tr><td>• Aerial, vessel, and ground surveys – conducted to count animals, bleach mark and resight animals that have been tagged or bleach-marked, and to document behavioral observations.

• Scat and spew collection – occurs on islands/atolls and is used to identify recent prey consumed and intestinal parasites. Molted fur collected from islands/atolls is used for genetic analysis.

• Collection of tissue samples from animals found dead; used for health/disease studies.

• Hazing animals for their protection or the protection of conspecifics.</td><td>• Collection of morphometric measurements – includes external measurements of an animal (e.g., length and girth).

• Collection of tissue samples – e.g., skin, blubber, or blood. Swabs from the eyes, nose, mouth, anus, genital orifice, and external wounds may be taken for health/disease screening.

• Treatment of abscesses by manually lancing the abscess and flushing with water and hydrogen peroxide or similar disinfectant.

• Treatment for parasites with injectable drugs.

• Permanent or temporary marking of animals – includes plastic tags secured on the rear flippers, which are used to monitor animals, to facilitate recapture of sampled animals, and to determine vital rates.

• Attachment of telemetry instruments – used to collect information on movement patterns and foraging behavior.

• Translocation – transport of animals over ground, by vessel or airplane to areas to improve survival.

• Temporary captivity – e.g., temporary holding for quarantine during translocation.</td></tr>
</table>

Please note: This table is meant to provide a general overview of these activities by category and does not include all activities. Additional detail on the proposed alternatives is provided in Table 2.10-1.

2.7 *ALTERNATIVE 1: STATUS QUO*

Under the Status Quo Alternative, the current NMFS Research and Enhancement Permit (10137, as amended) would continue until its expiration in 2014, and subsequent permits would be issued to continue research and enhancement activities according to the scope and methods currently permitted, with restrictions and mitigation measures required by the MMPA, ESA, and NMFS implementing regulations. In addition to these statutory and regulatory permit restrictions, the impact of proposed research and enhancement activities for Hawaiian monk seals must remain at a level below that which would jeopardize the continued existence of the species or result in adverse modification of critical habitat, as required by Section 7 of the ESA.

The levels and types of research and enhancement activities would be commensurate with what has previously been permitted as defined by the active NMFS permit 10137. New permits or permit amendments for levels and types of research the same as currently permitted would be approved unless it were determined that issuance would exceed the ESA jeopardy or adverse modification threshold when expected impacts were added to existing research, enhancement and other activities in the baseline at the time the application was received.

Research and enhancement activities allowed under the Status Quo Alternative are listed in Table 2.10-1 and include those that have been carried out consistently for decades (*e.g.,* land-based surveys and marking), newer research (*e.g.,* de-worming studies), and ongoing mortality mitigation (*e.g.,* disentanglement). In brief, the Status Quo Alternative activities include:

- Monitoring via ground, vessel, and aerial surveys; marking and photo ID;
- Health screening and instrumentation;
- De-worming research;
- Specimen collection and import/export of specimens;
- Disentanglement and dehooking;
- Adult male removal for enhancement; and
- Translocation for enhancement including:

- Translocating abandoned nursing pups to a prospective foster mother or their natural mother within their birth island or atoll;
- Translocating weaned pups from a high risk area (e.g., known shark predation) to a low risk area within the same island or atoll in the NWHI or Johnston Atoll; translocations in the MHI may be to a different location on the same island or to a different island in the MHI;
- Translocating weaned pups in subpopulations where juvenile survival is low to subpopulations with higher rates of juvenile survival; seals may only be translocated among subpopulations within the NWHI.

No new activities or expanded scope of existing activities would occur under the Status Quo Alternative.

2.8 ALTERNATIVE 2: NO ACTION

The No Action Alternative, which must be considered in an EIS according to CEQ regulations (40 CFR 1502.14), would only allow for status quo research and enhancement activities on Hawaiian monk seals to continue until the current permit (10137) expires in 2014. Thereafter the only research and enhancement activities carried out would be those that either do not require a new permit or are allowed under the provisions of the MMPA's MMHSRP (Title IV, 16 U.S.C. 1421) and the permit held by the MMHSRP. No new permit would be issued to replace Permit No. 10137 when it expires, nor could that permit be amended to allow modifications in research or enhancement activities, sample sizes or objectives.

When the existing permit expires, all research and enhancement activities that require a permit would cease except for those activities covered under the MMHSRP permit as described in Sections 1.4, 1.7, and 1.9.3. Under the MMHSRP permit, NMFS could still respond to stranded or injured wild seals. No research on the wild population would occur under Alternative 2 including population monitoring, genetics, health assessment, and foraging research. Seals could not be approached nor captured to collect any new research data, and activities such as two-stage translocations to enhance survival and vaccination research and enhancement could not be conducted under this program.

Limited enhancement activities such as disentanglements and de-hooking seals, and hazing or translocating seals away from imminently harmful situations could be conducted under the MMHSRP permit. Incidental or intentional mortality due to enhancement activities would only be authorized during emergency response activities under the MMHSRP permit.

Scat and spew samples could be collected from vacant beaches, and seals could only be observed and photographed at distances and under conditions that are not likely to result in takes (and therefore would not require permits). Permits and grants could also be awarded for receipt and use of tissues from animals that have been found dead and collected under the MMHSRP. Analysis of previously-collected samples and data could be conducted.

2.9 *ALTERNATIVE 3: LIMITED TRANSLOCATION (PREFERRED ALTERNATIVE)*

Under Alternative 3, all activities currently permitted under the status quo would continue, and new permits would be granted with expanded scope and methods, with restrictions and mitigation measures required by the MMPA, ESA, and NMFS implementing regulations.

As under Alternative 1, the impact of proposed research and enhancement activities for Hawaiian monk seals must remain at a level below that which would jeopardize the continued existence of the species or result in adverse modification of critical habitat, as required by Section 7 of the ESA.

Alternative 3 includes activities described in Section 2.7 in the Status Quo as well as new and expanded activities. These are provided in more detail in Table 2.10-1. The new and expanded activities include, but are not limited to:

- Vaccination studies and potential implementation of vaccines to mitigate infectious disease.
- Potential implementation of de-worming as an enhancement tool to improve juvenile Hawaiian monk seal survival.
- Expanded scope and number of seal translocations in addition to those in the status quo, including:
    - Taking seals with unmanageable human interactions from the MHI to NWHI.
    - Taking juvenile and older seals from the MHI to NWHI to examine their subsequent survival.
    - Implementing a two-stage translocation program whereby weaned pups are taken from areas of lower survival to areas of higher survival (within the NWHI, within the MHI, or from the MHI to NWHI, **but not from the NWHI to MHI**), with the option of returning them to their natal location or nearest appropriate site at age 2 years and older (see Figure 2.9-1). Note that seals originally born in the MHI and translocated to the NWHI may be returned to the MHI. Under this program, a maximum of 200 weaned seal pups could be translocated over a 10-year period (only 20 pups per year). While this

number is the maximum number of seals allowable under an Alternative 3 permit, the actual number of weaned seal pups potentially translocated as part of this two-stage program would likely be much lower.

  - Details of the translocations would be determined by a decision framework as described in Section 5.3 and Appendix E.

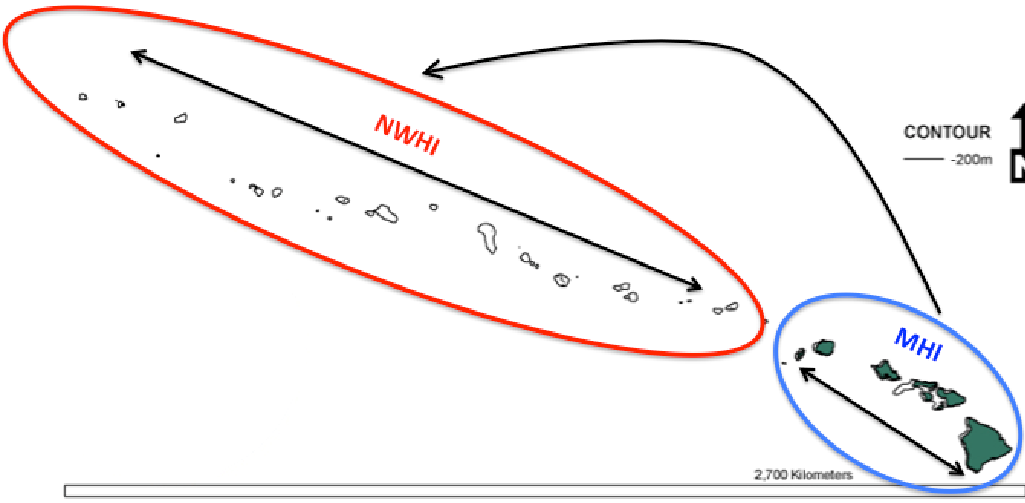
- Supplement monk seal diet using feeding stations in NWHI locations where seals are released after being cared for in captivity.
- Research to develop tools for modifying undesirable Hawaiian monk seal behavior related to interactions with humans and fishing gear in the MHI. If proven effective by research, these tools would be implemented.
- Chemical alteration of aggressive male monk seal behavior using a drug to reduce testosterone.

Relative to the status quo (Alternative 1), the new and expanded elements encompassed by Alternative 3 reflect the perspective of the 2007 Recovery Plan that actions over and above the status quo will be needed if the Hawaiian monk seal population is to stop declining and eventually recover. As such, this alternative maintains the activities currently permitted as well as the above list of new actions. It is important to recognize that all elements of the alternative, both status quo and novel, reflect recommendations of the Recovery Plan. The degree to which each element of this alternative would be implemented would depend upon funding levels and varying needs for specific actions, which will be informed by research and monitoring.

The distinctive feature of Alternative 3 is that while translocation as a tool for conserving Hawaiian monk seals would be expanded, translocations of weaned pups from the NWHI to the MHI would not be permitted. However, seals born in the MHI and previously taken to the NWHI may be returned to the MHI in the second stage of two-stage translocations.

Public notice of receipt of a new 5-year permit application submitted by PIFSC (File No. 16632) was published in the *Federal Register* on March 1, 2013 for a 45 day comment period (78 FR 13863). This permit application includes all activities for Alternative 3 described in Table 2.10-1 and Appendix I. This includes activities in the status quo as well as the new and expanded activities listed above.

Figure 2.9-1 Alternative 3 Limited Translocation Options (Preferred Alternative). Weaned pups may be moved from areas of lower to higher survival within the NWHI, within the MHI, or from the MHI to NWHI. Seals may be returned to their natal area after they are 2 years old.



2.10 *ALTERNATIVE 4: ENHANCED IMPLEMENTATION*

The enhanced implementation alternative would encompass all the activities permitted under Alternative 3 listed in the previous section, with the addition of the option for temporary translocation of weaned pups from the NWHI to the MHI as follows.

- Expanded scope and number of seal translocations, including:
    - Implementing a two-stage translocation program whereby weaned pups are taken from areas of lower survival to areas of higher survival anywhere within the Hawaiian Archipelago, ***including between NWHI and MHI (i.e., greater flexibility than under Alternative 3)***. This could equate to a total of 200 weaned seal pups translocated over a 10-year period with a maximum of 60 translocated seal pups potentially located in the MHI during year 3 of the translocation process. Similar to Alternative 3, while this number is the maximum number of seals allowable under Alternative 4, the actual number of weaned pups potentially translocated as part of this 2-stage program would likely be much lower.
    - At age 2 or 3 years, any surviving translocatees would be returned to the NWHI (see Figure 2.10-1). Details of the translocations would be determined by a decision framework as described in Section 5.3 and Appendix E.

The only difference between Alternative 4 and Alternative 3 (Preferred) is that Alternative 4 would also allow for two-stage translocation of weaned pups from the NWHI to the MHI and their subsequent return at age 2 or 3 yr to the NWHI. This distinction would allow for maximal flexibility to take advantage of the potential benefits of two-stage translocation, because weaned pups could be moved to wherever their survival chances are best. The same, strict quarantine protocols identified in Alternative 3 would be required for returning seals to the NWHI from the MHI, where seals are exposed to domestic and feral mammals.

Figure 2.10-1 ***Alternative 4 Translocation Options. Weaned pups may be moved from areas of lower to higher survival within the NWHI, within the MHI, from the NWHI to the MHI or from the MHI to NWHI. Seals may be returned to their natal area after they are 2 years old. Identical to Alternative 3 options except that weaned pups can be moved from the NWHI to the MHI.***

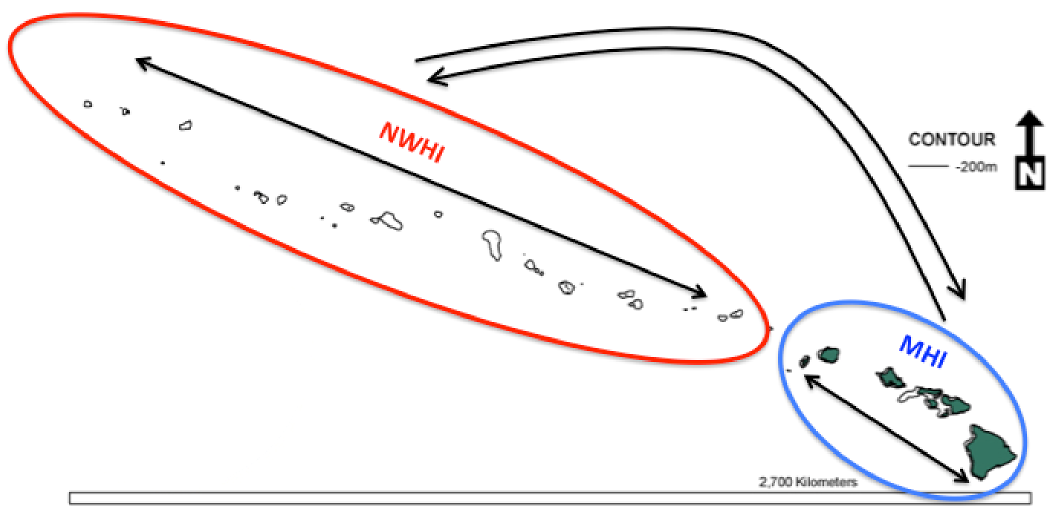


Table 2.10-1 Proposed Alternatives

Classification	Research/Enhancement Activity	Alternative 1 - Status Quo; Currently-permitted activities would continue after 2014 with no increased efforts or new activities allowed.	Alternative 2 - No Action; No Permit after 2014; activities currently permitted would not be authorized after 2014.	Alternative 3 - Limited Translocation (Preferred Alternative)	Alternative 4 - Enhanced Implementation Alternative
Activities that do not involve capture, handling, or collection of tissues from live animals	*Land-based surveys and observations* *(Research)*	• Currently-permitted land-based surveys in the Hawaiian Archipelago and Johnston Atoll would continue after 2014. • Continue annual monitoring, including close approach for observing, counting and photographing marked and unmarked seals, in the NWHI, and analyze and report findings. • Collection of molt, scat, spew and placentae and could continue after 2014. • Up to 1,440 seals may be approached annually (total for aerial-, vessel- and land-based surveys.) • Installation, operation and maintenance of remote cameras to obtain photographs and video images of seals to augment data otherwise requiring researcher presence on site • Use of small, unmanned amphibious vehicles (*e.g.*, rover).	• Same as Status Quo except no new permits or authorizations after 2014.	• Same as Status Quo **plus**: • Additional surveys above number permitted in Status Quo could be authorized.	• Same as Alternative 3
	Sample collection and use of tissues from encountered carcasses *(Research)*	• Currently-permitted necropsies, sample collection, worldwide export/import of necropsy samples for analysis, and studies on carcasses would continue after 2014. • Use salvaged tissue as bait for permitted shark removals.	• Same as Status Quo except no new permits or authorizations issued after 2014.	• Same as Status Quo.	• Same as Status Quo
	Vessel surveys and observations *(Research)*	• Currently-permitted vessel-based surveys in the Hawaiian Archipelago and Johnston Atoll would continue after 2014. • Continue vessel surveys including close approach for observing, counting and photographing marked and unmarked seals. • Up to 1,440 seals may be approached annually (total for aerial-, vessel- and ground-based surveys.)	• Same as Status Quo except no new permits or authorizations after 2014.	• Same as Status Quo, **plus**: • Additional surveys above number permitted in Status Quo could be authorized.	• Same as Alternative 3
	Aerial surveys and observations *(Research)*	• Currently-permitted aerial surveys in the Hawaiian Archipelago and Johnston Atoll would continue after 2014. • Continue aerial surveys including approach from 500 ft for observing, counting and photographing marked and unmarked seals. • Optimize survey techniques using small, unmanned aerial vehicles to conduct aerial surveys (from $\geq$ 10 ft) where access is limited. • Up to 1,440 seals may be approached annually (total for aerial-, vessel- and ground-based surveys.)	• Same as Status Quo except no new permits or authorizations after 2014.	• Same as Status Quo, **plus**: • Additional surveys above number permitted in Status Quo could be authorized. • Approach closer than 500 ft may be authorized based on typically observed lack of seal response to aircraft.	• Same as Alternative 3
	Incidental harassment during any Research or Enhancement Activity	• Currently-permitted incidental harassment in the Hawaiian Archipelago and Johnston Atoll would continue after 2014. • Non-target seals may be harassed incidental to research and enhancement (e.g., during captures, non-target seals nearby may be disturbed). • Up to 200 seals may be incidentally harassed annually.	• Same as Status Quo except no new permits or authorizations issued after 2014.	• Same as Status Quo, **plus**: • Additional harassment above number permitted in Status Quo could be authorized.	• Same as Alternative 3
Activities that require capture, handling, or	*Marking (tagging, bleaching)* *(Research)*	• Currently-permitted marking of seals in the Hawaiian Archipelago and Johnston Atoll would continue after 2014. • Approach seals to mark fur with temporary bleach marks. • Capture, restrain, and sedate (if needed), seals to apply flipper, PIT and	• Same as Status Quo except no new permits or authorizations issued after 2014.	• Same as Status Quo, plus: • Number of animals above that permitted in Status Quo could be authorized for marking. • Pre-weaned pups could be tagged if still nursing at end	• Same as Alternative 3

Classification	Research/Enhancement Activity	Alternative 1 - Status Quo; Currently-permitted activities would continue after 2014 with no increased efforts or new activities allowed.	Alternative 2 - No Action; No Permit after 2014; activities currently permitted would not be authorized after 2014.	Alternative 3 - Limited Translocation (Preferred Alternative)	Alternative 4 - Enhanced Implementation Alternative
procedures on wild seals		sonic tags. • Up to 536 seals of any size or sex (except lactating females and nursing pups) can be tagged. Up to 35 weaned pups at French Frigate Shoals can be tagged with sonic tags annually for up to 3 years. • Up to 1,315 seals may be approached and bleached.		of field season.	

Classification	Research/Enhancement Activity	Alternative 1 - Status Quo; Currently-permitted activities would continue after 2014 with no increased efforts or new activities allowed.	Alternative 2 - No Action; No Permit after 2014; activities currently permitted would not be authorized after 2014.	Alternative 3 - Limited Translocation (only MHI to NWHI or within each region) (Preferred Alternative)	Alternative 4 - Enhanced Implementation Alternative
Activities that require capture, handling, or procedures on wild seals	*Collect measurements to determine body condition* *(Research)*	• Currently-permitted morphometric measurements in the Hawaiian Archipelago and Johnston Atoll would continue after 2014. • Seals may be captured (by hand or net) and restrained to obtain weight, length, girth, and blubber thickness via ultrasound • Performed concurrently with flipper tag marking, health assessments, and de-worming.	• Same as Status Quo except no new permits or authorizations issued after 2014.	• Same as Status Quo, **plus**: • Number of animals above that permitted in Status Quo could be authorized for body condition assessment. • Captive seals could be used to test methods.	• Same as Alternative 3
	Sample collection from captured seals to determine health status and diet *(Research)*	• Currently-permitted sample collection from captured seals in the Hawaiian Archipelago would continue past 2014. • Up to 70 healthy and 30 unhealthy seals (except lactating females and nursing pups) annually may be captured, restrained, handled, sedated and sampled (skin/blubber biopsy, blood, whiskers, swab all orifices). • Flipper tagging and ultrasound performed in conjunction with sampling.	• Same as Status Quo except no new permits or authorizations issued after 2014.	• Same as Status Quo, **plus**: • Additional number of seals, samples/procedures above number permitted in Status Quo could be authorized. • Captive seals could be sampled.	• Same as Alternative 3
	Infectious Disease Mitigation *(Research and enhancement)*	• Currently-permitted mitigation of infectious disease would continue after 2014. • Lance and treat abscesses on up to 30 seals annually. • Monitor for disease as part of other tissue collection and morphometric studies as described above.	• Same as Status Quo except no new permits or authorizations issued after 2014.	• Same as Status Quo, **plus:** • Conduct vaccination studies including research on safety and efficacy of vaccines for infectious diseases. • Studies could include captive studies with surrogate species, captive studies with Hawaiian monk seals and free-ranging Hawaiian monk seals. • If research indicates vaccination is safe, conduct wide-spread vaccination of wild seals as either a stand-alone activity or in conjunction with translocation and deworming, or with captive care for rehabilitation under the Marine Mammal Health and Stranding Response Program. • Treat injured seals in the wild with antibiotics. • Additional samples/screening above number permitted in Status Quo could be authorized as deemed necessary.	• Same as Alternative 3

	Conduct Genetic Sampling *(Research)*	• Currently-permitted genetic sampling in the Hawaiian Archipelago and Johnston Atoll would continue after 2014. • Skin samples may be obtained during flipper tagging and tissue sampling activities, and shed molted skin may be collected.	• Same as Status Quo except no new permits or authorizations issued after 2014.	• Same as Status Quo **plus**: • Number of animals above that permitted in Status Quo could be authorized for genetic sampling. • Captive seals could be sampled.	• Same as Alternative 3
	Attachment of scientific instruments *(Research and enhancement)*	• Currently-permitted attachment of scientific instruments in the Hawaiian Archipelago would continue after 2014. • Capture, restrain, and sedate seals to attach (glue to pelage) telemetry devices, including but not limited to: GPS, satellite trackers, dive recorders, VHS tags and "Crittercams". • Up to 60 healthy seals (except lactating females and nursing pups) can be instrumented in conjunction with health and disease studies. • Some translocated seals may be instrumented.	• Same as Status Quo except no new permits or authorizations issued after 2014.	• Same as Status Quo, **plus:** • Additional instrumentation above number and type permitted in Status Quo could be authorized. • Captive seals could be used to test instruments.	• Same as Alternative 3

Classification	Research/Enhancement Activity	Alternative 1 - Status Quo; Currently-permitted activities would continue after 2014 with no increased efforts or new activities allowed.	Alternative 2 - No Action; No Permit after 2014; activities currently permitted would not be authorized after 2014.	Alternative 3 - Limited Translocation (only MHI to NWHI or within each region) (Preferred Alternative)	Alternative 4 - Enhanced Implementation Alternative
Activities that require capture, handling, or procedures on wild seals	*De-worming* *(Research and enhancement)*	• Currently-permitted studies and treatment (through topical treatment, injections or oral treatment) for intestinal parasites in the Hawaiian Archipelago would continue after 2014. • Capture (by hand or net) and restrain seals to weigh and measure, treat for intestinal parasites, fecal sample, and conduct ultrasound measurements to determine if treatment is effective. • Up to 200 seals (up to age 3 years) can be treated for intestinal parasites.	• Same as Status Quo except no new permits or authorizations issued after 2014.	• If treatment for intestinal parasites is deemed effective, conduct widespread treatment of young seals to reduce overall parasite loads with additional treatments above number permitted in Status Quo. • New treatments could be used as they become available. • Could be done in conjunction with translocation and vaccination. • Captive seals could be treated.	• Same as Alternative 3
	Translocate seals to improve survival or alleviate male aggression *(Enhancement)*	• Currently-permitted translocation to aid abandoned nursing pups, mitigate shark predation or human interaction, or mitigate male aggression would continue after 2014. • Capture (net or hand), restrain, handle, transport, and release seals by various methods. • Up to 20 nursing pups annually that have been abandoned or have been switched between two lactating females may be captured, restrained by hand or net, and relocated to a prospective foster mother or back to their natural mother, respectively. • Up to 35 weaned pups annually may be captured, restrained, sedated, sampled, instrumented, and translocated via boat, vehicle or aircraft from a high risk area (*e.g.*, shark predation or anthropogenic threats) to a low risk area within the same island or atoll in the NWHI or Johnston Atoll, or within the MHI. • Up to 6 weaned pups annually may be translocated (using methods as described above) within the NWHI from areas of poor juvenile survival to	• Same as Status Quo except no new permits or authorizations issued after 2014.	• Same as Status Quo **with following differences:** • Translocate seals with unmanageable human interactions out of the MHI as needed. • Translocate ≥2-year-old seals from the MHI to NWHI to evaluate survival rates. • Additional translocations within the NWHI or within the MHI above number permitted in Status Quo could be authorized. • Translocate up to 20 weaned pups annually from areas with low prospective juvenile survival to areas with higher juvenile survival within the NWHI, within the MHI or from the MHI to NWHI (instead of only within the NWHI as under Status Quo). **This *excludes* moving seals born in the NWHI to MHI**. This could equate to a total of 200 weaned seal pups translocated over a 10-year period though this number is not likely to be reached	• Same as Alternative 3 **with following differences**: • Translocate up to 20 weaned pups annually from areas with low prospective juvenile survival to areas with higher juvenile survival **anywhere within the Hawaiian Archipelago, *including* from the NWHI to MHI** (*i.e.*, greater flexibility than under Alternative 3). This could equate to a total of 200 weaned seal pups translocated over a 10-year period with a maximum of

		areas with higher rates of juvenile survival. • Up to 10 aggressive adult males over a 5-year period may be captured, restrained, sedated, sampled, instrumented and translocated via boat, vehicle or aircraft or placed in permanent captivity to improve survival of immature seals and females.		(see Section 2.9). • For two-stage translocations, NMFS will use a decision framework for determining the source and recipient sites as well as other aspects of translocations, *with a prohibition* on translocation of weaned pups from the NWHI to the MHI. • Option to return previously translocated seals ≥2 years old back to their original site or nearest appropriate alternative site. Note that seals born in the MHI and previously translocated to the NWHI may be returned to the MHI in the second stage of two-stage translocations.	60 translocated seal pups in the MHI during year 3 of the translocation process. While this could be the maximum number permitted, it is not likely this many weaned seal pups would be translocated (see Section 2.10). • NMFS will use a decision framework for determining the source and recipient sites (see Appendix E) as well as other aspects of translocations. • Option to return previously translocated seals ≥2 years old back to their original site or nearest appropriate alternative site.
	Supplemental Feeding	• Not authorized.	• Not authorized.	• Supplement monk seal diet using feeding stations in NWHI locations where seals are released after being cared for in captivity.	• Same as Alternative 3.
	Mitigate Fishery and Human/Domestic Animal Interactions and alter aggressive male behavior *(Research and enhancement)*	• Currently-permitted approach and disentanglement of any seals in the Hawaiian Archipelago or Johnston Atoll from marine debris would continue after 2014. • Fishing hooks embedded in seals may also be removed. • Restraint and sedation may be used as necessary to accomplish these tasks on an unlimited number of seals (*i.e.,* as warranted). • Translocating seals away from high risk areas such as where human/domestic animal interactions or adult male aggression threaten a seal is covered above in Translocations.	• Same as Status Quo except no new permits or authorizations issued after 2014.	• Conduct research to develop tools for modifying undesirable Hawaiian monk seal behavior related to interactions with humans, domestic animals, and fishing gear in the MHI. This includes research on captive and wild seals. • If research indicates that aversive conditioning or other methods are effective in reducing interactions with humans, domestic animals, and fishing gear, then implement these tools, particularly in the MHI as needed. • Chemically alter aggressive male monk seal behavior using a testosterone agonist. This includes research on captive and wild seals. If research indicates methods are effective, implement in the wild as needed. • Additional disturbances/harassment above number permitted in Status Quo could be authorized as needed.	• Same as Alternative 3

Classification	**Research/Enhancement Activity**	**Alternative 1 - Status Quo; Currently-permitted activities would continue after 2014 with no increased efforts or new activities allowed.**	**Alternative 2 - No Action; No Permit after 2014; activities currently permitted would not be authorized after 2014.**	**Alternative 3 - Limited Translocation (only MHI to NWHI or within each region) (Preferred Alternative)**	**Alternative 4 - Enhanced Implementation Alternative**
Potential direct and indirect mortality from research and enhancement	*Mortality incidental to research and enhancement activities*	• Currently-permitted incidental mortality during authorized research and enhancement not to exceed two seals any age or sex annually, up to four over five years would be authorized after 2014.	• Same as Status Quo except no new permits issued after 2014.	• Additional mortality incidental to enhancement (but not research) activities may be authorized.	• Same as Alternative 3
	Intentional lethal collection and permanent removal of seals from the wild for	• Currently-permitted euthanasia of aggressive adult males and any moribund seals in the Hawaiian Archipelago or Johnston Atoll could continue after 2014. • Up to 10 aggressive adult males may be euthanized over a 5-year period to	• Same as Status Quo except no new permits issued after 2014.	• Same as Status Quo	• Same as Status Quo

	research (moribund seals) or enhancement (adult males)	improve survival of immature seals and adult females (total includes translocating aggressive males). • Up to 10 moribund seals of any age/sex may be humanely euthanized and sampled for diagnosis over a 5-year period.			

2.11 ELEMENTS COMMON TO ALL ALTERNATIVES

Some elements of the alternatives, such as the use of new technology, can be applied under any of the alternatives[1] as appropriate. The following methods would be common to all research and enhancement permits:

- Protocols for capture and handling of monk seals;
- Application of new technologies, as appropriate, to improve results or minimize disturbance;
- Optimization of survey techniques including, but not limited to, timing and coordination;
- Research on existing data sets such as population modeling, etc.;
- Research on existing tissue samples including skin, muscle, blubber, blood, swabs, placentae, etc.; and
- Collection of samples from prey species for potential contaminant monitoring.

Additionally, there are statutory and regulatory requirements for MMPA/ESA permits common to all alternatives, such as:

- Regulatory requirements for issuing and amending permits;
- General permit terms and conditions;
- Mitigation measures to minimize impacts and ensure compliance with the MMPA and ESA;
- Monitoring requirements to determine the status of individual animals after they have been handled and the effects of research related disturbance on the island or atoll, especially in relation to the incidence of serious injury and mortality;
- Requirements for timely dissemination of research results and notification of publications;
- Types of information required in annual and final reports; and

[1] Note that under Alternative 2, No Action, the current MMPA/ESA Research and Enhancement Permit would expire in June 2014.

- Duration of permits.

This section presents requirements for permits common to all alternatives.

2.11.1 *General Permit Issuance Requirements (50 CFR 216.34)*

- Permit applicants must demonstrate that the proposed activity is:
    - Humane[2] and does not present unnecessary risks to the health and welfare of marine mammals;
    - Consistent with all restrictions in 50 CFR 216.41;
    - Conducted consistent with the purposes and policies in section 2 of the ESA; and
    - By itself or with other activities, will not likely have a significant adverse impact on the species.
- The applicant's expertise, facilities, and resources must be adequate to successfully accomplish the objectives and activities stated in the application.
- If a live animal will be held captive or transported, the applicant's qualifications, facilities, and resources must be adequate for the proper care and maintenance of the marine mammal.
- Any import or export of marine mammals or parts will not result in the taking of marine mammals or marine mammal parts beyond those authorized by the permit.
- The opinions or views of persons knowledgeable of the marine mammals that are the subject of the application or of other matters germane to the application will be considered.

2.11.2 *Scientific Research and Enhancement Permit Issuance Requirements (50 CFR 216.41)*

- Permit applicants must demonstrate that:

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[2] Humane means the method of taking, import, export or other activity that involves the least possible degree of pain and suffering practicable to the animal involved (50 CFR 216.3).

    - The proposed activity furthers a bona fide scientific or enhancement purpose.
    - If the lethal taking of marine mammals is proposed:
        - Non lethal methods for the research are not feasible; and
        - For depleted, endangered, or threatened species, the results will directly benefit that species, or will fulfill a critically important research need.
    - Any permanent removal of a marine mammal from the wild is consistent with any applicable quota established by the Director, NMFS Office of Protected Resources.
    - The proposed research will not likely have significant adverse effects on any other component of the marine ecosystem of which the affected species is a part.
- For endangered species:
    - The proposed research cannot be accomplished using a species that is not endangered.
    - The proposed research, by itself or in combination with other activities will not likely have a long term direct or indirect adverse impact on the species.
    - The proposed research will either:
        - Contribute to fulfilling a research need or objective identified in a species recovery or conservation plan;
        - Contribute significantly to understanding the basic biology or ecology of the species, or to identifying, evaluating, or resolving conservation problems for the species; or
        - Contribute significantly to fulfilling a critically important research need.
- For proposed enhancement activities:
    - Only living marine mammals and marine mammal parts necessary for enhancement of the survival, recovery, or propagation of the affected species may be taken, imported, exported, or otherwise affected under an enhancement permit. Marine mammal parts include clinical specimens or other biological samples required for the conduct of breeding programs or the diagnosis or treatment of disease.
    - The activity must likely contribute significantly to maintaining or increasing distribution or abundance, enhancing the health or welfare of the species, or ensuring the survival or recovery of the

species in the wild.

  - o The activity must be consistent with an approved recovery plan developed under section 4(f) of the ESA.

- An enhancement permit may authorize the captive maintenance of an endangered marine mammal only if NMFS determines that:
  - o The proposed captive maintenance will likely contribute directly to the survival or recovery of the species by maintaining a viable gene pool, increasing productivity, providing necessary biological information, or establishing animal reserves required to support directly these objectives; and
  - o The expected benefit to the species outweighs the expected benefits of alternatives that do not require removal of marine mammals from the wild.

- NMFS may authorize the public display of marine mammals held under the authority of an enhancement permit only if:
  - o The public display is incidental to the authorized captive maintenance;
  - o The public display will not interfere with the attainment of the survival or recovery objectives;
  - o The marine mammals will be held consistent with all requirements and standards that are applicable to marine mammals held under the authority of the Acts and the Animal Welfare Act, unless the Office Director determines that an exception is necessary to implement an essential enhancement activity; and
  - o The marine mammals will be excluded from any interactive program and will not be trained for performance.

- NMFS may authorize non-intrusive scientific research to be conducted while a marine mammal is held under the authority of an enhancement permit, only if such scientific research:
  - o Is incidental to the permitted enhancement activities; and will not interfere with the attainment of the survival or recovery objectives.

2.11.3 Duration of Permits (50 CFR 216.35 and 216.39)

Scientific research and enhancement permits may be valid for a maximum of five years from the date of issuance (50 CFR 216.35[b]). The five-year period may be extended up to 12 months beyond that established in the original permit via a minor amendment (50 CFR 216.39).

2.11.4 *Reporting Requirements (50 CFR 216.38)*

Permit Holders must submit annual, final, and special reports. Annual reports must be submitted to the Chief, Permits and Conservation Division (hereinafter "Permits Division"), Office of Protected Resources at the conclusion of each year for which a permit is valid. Annual reports are due 90 days after the end of each reporting period (either a calendar year or a 12-month period determined by field seasons). Each annual report must include the following:

- A table reporting the number of animals taken, by activity and location;
- Non-permitted species taken and observed effects;
- Problems or unforeseen effects encountered and steps to resolve such problems;
- Measures taken to minimize effects on animals and the effectiveness of these measures;
- Circumstances surrounding unintentional injuries or deaths of animals, and a description of how the animals were disposed;
- The physical condition of animals taken;
- The effects permitted activities had on animals;
- Steps taken to coordinate the activities with other permit holders;
- Preliminary findings and whether the goals were accomplished;
- Titles of reports, publications resulting from the reporting period; and
- Any incidental use of photographs, film, or other images.

Special or "incident" reports are required for events such as serious injury, mortality, and exceeding authorized take. Incident reports must be submitted to within two weeks of the incident and describe the events and steps that will be taken to reduce the potential for additional incidents.

Final reports must be submitted within 180 days after conclusion of research or expiration of the permit. Final reports must include the following:

- A description of how project goals were accomplished or an explanation of why they were not accomplished;
- A description of how the research or enhancement benefited the species, promoted recovery, or conserved the target species and fulfilled objectives listed in the Recovery Plan;
- Any problems or unexpected outcomes; and if permitted to use different methods, which worked best and why;
- A qualitative and quantitative description of the types of reactions target and non-target animals had, and whether the activities had any effects on habitat;
- Whether the mitigation measures employed were successful in minimizing or avoiding adverse impacts to target and non-target species, and any additional measures that might further minimize reactions;

- Efforts made to share data or collaborate with other researchers and a description of how the collaborations occurred;
- Publications or reports not listed in annual reports;
- Any new directions for future studies identified as a result of the research or enhancement;
- Any new or emerging technologies that could be used to further the research or enhancement; and
- An explanation of whether any permit conditions were difficult to comply with or were unclear; and whether the take numbers requested in the permit application were accurate and realistic.

2.11.5 Mitigation and Conditions of Permits and Authorizations

Scientific research and enhancement permits issued under the MMPA and ESA require researchers to abide by general terms and conditions based on requirements of the statutes and regulations.

Activities authorized in a permit must occur by the means, in the areas, and for the purposes set forth in the permit application, and are limited by the terms and conditions in a permit. Permit noncompliance constitutes a violation and is grounds for permit modification, suspension, or revocation, and for enforcement action.

MMPA and ESA research and enhancement permits contain the following types of permit terms and conditions:

- Duration of permit;
- Number and kinds of protected species, locations and manner of taking;
- Qualifications, responsibilities, and designation of personnel;
- Possession of permit;
- Reports;
- Notification and coordination;
- Observers and inspections;
- Permit modification, suspension, and revocation; and
- Penalties and permit sanctions; and Acceptance of permit.

Descriptions of how mitigation measures would be incorporated into the research and enhancement programs must be included in the permit applications and are presented in Section 2.6 for the various alternatives. Incorporation of terms and conditions in a permit also helps to mitigate possible adverse impacts to animals from the permitted activities.

In addition to general terms and conditions common to all research and enhancement permits, there are a number of special conditions for activities conducted on pinnipeds, and specifically on Hawaiian monk seals. These are found within the conditions pertaining to the manner of taking. The section below details both the general and special terms and conditions common to permits issued under each alternative.

2.11.5.1 *Duration of Permit*

As described above, permits may be valid for a 5-year period. The Director, NMFS Office of Protected Resources, may extend the permit by one year via a minor amendment. Each permit has a specified expiration date.

Researchers are required to suspend permitted activities if serious injury or mortality of protected species reaches that allowed in the permit, or if authorized take is exceeded.

2.11.5.2 *Number and Kinds of Protected Species, Locations and Manner of Taking*

Each permit contains a table outlining the number of animals authorized to be taken (by species and stock), and the locations, manner, and time period in which they may be taken.

Researchers working under a permit may take photographs and video incidental to research or enhancement, provided it does not result in takes. Photos and other media may be used in printed materials (including commercial or scientific publications) and presentations; a statement citing the permit number must accompany the images.

The Chief, Permits Division may authorize non-essential activities (*e.g.*, a documentary film crew). These activities must not influence the research or enhancement or result in takes. The Permit Holder and researchers cannot require compensation in return for allowing non-essential personnel to accompany researchers.

Researchers must comply with the following special conditions related to the manner of taking Hawaiian monk seals (these conditions pertain to the current research and enhancement Permit No. 10137):

- Carry out activities efficiently and use biologists experienced in capture and sampling techniques to minimize handling time and disturbance.
- Whenever feasible, take target animals or collect samples when no other seals are near, particularly mother/pup pairs.
- Immediately stop activities if the actions may be life threatening to a seal; if a seal has an adverse reaction, monitor and treat the animal as determined by the attending veterinarian, principal investigator (PI) or a co-investigator (CI).

- Minimize disturbance when approaching seals, particularly mother/pup pairs, and stop if there is evidence that the activity is interfering with vital functions of any animal.
- If a pup is orphaned as a result of permitted activities, the pup must be humanely provided for (*i.e.*, placed in a Stranding facility for rehabilitation or humanely euthanized).
- Only experienced, well-trained personnel may perform intrusive procedures. For activities involving the use of sedatives, an experienced marine mammal veterinarian must be present.
- Use sterile disposable needles, biopsy punches, and other sampling tools or clean and disinfect non-disposable equipment.
- Monitor seals after disturbance or capture to ensure they resume normal behavior.
- The Permit Holder must provide updates on how deworming trials proceed and halt treatments if the health and welfare of the seals is compromised.
- An experienced veterinarian must conduct humane euthanasia and after necropsy, all parts not retained must be collected for environmentally safe disposal.
- Hawaiian monk seals used in captive research must be maintained and transported in compliance with the provisions of the Animal Welfare Act (AWA) and AWA implementing regulations.
- Contingency plans must be in place to prevent escape from temporary pens (*e.g.*, during extreme weather events) and to respond to escape (*e.g.*, search surveys).
- Prior to removing adult male seals from the wild into permanent captivity, a facility to permanently house the seal(s) must be identified,, and plans for temporary care of the animals prior to transfer to the permanent facility, if needed, must be submitted.

The above or similar conditions would apply to future permits (including File No. 16632; see Section 2.9), as deemed appropriate by the Director, Office of Protected Resources (50 CFR 216.36[b]).

The following are U. S. Fish and Wildlife Service (USFWS) conditions for researchers working in the NWHI (USFWS 2009c):

- Walking is prohibited on all beaches, from dusk to dawn, where adult sea turtles rest.
- All field camps must use maximum light control (shading, minimum wattage, etc.).
- All field camps must avoid disorienting hatchling turtles.

All research and enhancement permits authorizing sample collection have requirements for the disposition of marine mammal parts/biological samples, outlined in Appendix H.

2.11.5.3 *Qualifications, Responsibilities, and Designation of Personnel*

All research and enhancement permits identify by name the researchers (Principal Investigator [PI] and Co-investigators [CIs]) authorized to participate in the permitted activities. Individuals conducting permitted activities must possess qualifications commensurate with their roles and responsibilities. The roles and responsibilities of personnel operating under a permit are as follows:

- The Permit Holder is ultimately responsible for activities of individuals operating under the permit. Where the Permit Holder is an institution, the Responsible Party is the person at the institution who is responsible for the supervision of the Principal Investigator (PI).
- The PI is the individual primarily responsible for the taking, import, export and related activities conducted under the permit. The PI must be on site during activities conducted under this permit unless a Co-investigator (CI) is present to act in place of the PI.
- CIs are individuals who are qualified to conduct activities authorized by the permit without the on-site supervision of the PI. CIs assume the role and responsibility of the PI in the PI's absence.
- Research Assistants (RAs) work under the direct and on-site supervision of the PI or a CI. RAs cannot conduct permitted activities in the absence of the PI or a CI and are not named in the permit.

Personnel involved in permitted activities must be reasonable in number and essential to conduct of the permitted activities. Essential personnel are limited to:

- Individuals who perform a function directly supportive of and necessary to the permitted activity (including operation of vessels or aircraft);
- Individuals included as backup for essential personnel; and
- Individuals included for training purposes.

Persons who require state or Federal licenses to conduct activities authorized under a permit (*e.g.*, veterinarians, pilots) must be duly licensed when undertaking such activities.

Permitted activities may be conducted on vessels or aircraft or in cooperation with individuals engaged in commercial activities, provided the commercial activities are not conducted simultaneously with the permitted activities, except with written approval of the Chief, Permits Division (*e.g.*, for documentary film making).

The Permit Holder cannot require or receive direct or indirect compensation from persons requesting to conduct activities under the permit. The Permit Holder or PI may designate additional CIs and must provide a copy of the letter designating the individual to the Permits Division on the day of designation.

2.11.5.4 Possession of Permit

Permits cannot be transferred or assigned to any other person. The Permit Holder and persons operating under the authority of a permit must possess a copy of the permit when engaged in a permitted activity. A copy of the permit must be attached to any means of containment in which a protected species or protected species part is placed for purposes of storage, transit, supervision or care.

2.11.5.5 Reports

As described in Section 2.11.4 above, Permit Holders must submit annual, final, and incident reports, and papers or publications resulting from the activities authorized by a permit. Incident reports (e.g., for serious injury, mortality, or exceeding authorized take) are due within two weeks of the incident. Annual reports are due 90 days after the end of each permit year, and final reports are due 180 days after the expiration of the permit or conclusion of research or enhancement. Section 2.11.4 presents information required in permit reports. Research results must be published or otherwise made available to the scientific community in a reasonable period of time.

2.11.5.6 Notification and Coordination

Permit Holders must provide written notification of planned fieldwork to the Pacific Islands Assistant Regional Administrator for Protected Resources at least two weeks prior to initiation of a field trip/season and must include the locations of the intended field study and/or survey routes, estimated dates of research, and number and roles of participants.

Permit Holders must coordinate activities with other Permit Holders conducting the same or similar activities on the same species, in the same locations, or at the same times of year to avoid unnecessary disturbance of animals.

2.11.5.7 Observers and Inspections

At the request of NMFS, the Permit Holder must allow an employee of NOAA or another designated other person to observe permitted activities. The Permit

Holder must provide documents or other information relating to the permitted activities upon request.

2.11.5.8 *Modification, Suspension, and Revocation*

Permits are subject to suspension, revocation, modification, and denial in accordance with the provisions of subpart D [Permit Sanctions and Denials] of 15 CFR part 904.

The Director, NMFS Office of Protected Resources may modify, suspend, or revoke a permit in whole or in part:

- To make the permit consistent with a change in the regulations prescribed under section 103 of the MMPA and section 4 of the ESA;
- In a case in which a violation of the terms and conditions of the permit is found;
- In response to a written request from the Permit Holder;
- If NMFS determines that the application or other information pertaining to the permitted activities includes false information; and
- If NMFS determines that the authorized activities will operate to the disadvantage of threatened or endangered species or are otherwise no longer consistent with the purposes and policy in Section 2 of the ESA.

Issuance of a permit does not guarantee or imply that NMFS will issue or approve subsequent permits or amendments for the same or similar activities requested by a Permit Holder, including those of a continuing nature.

2.11.5.9 *Penalties and Permit Sanctions*

A person who violates a provision of a permit, the MMPA, ESA, or the regulations at 50 CFR 216 and 50 CFR 222-226 is subject to civil and criminal penalties, permit sanctions, and forfeiture as authorized under the MMPA, ESA, and 15 CFR part 904.

NMFS is the sole arbiter of whether a given activity is within the scope and bounds of the authorization granted in a permit. The Permit Holder must contact the Permits Division for verification before conducting an activity if they are unsure whether an activity is within the scope of the permit. Failure to verify, where NMFS subsequently determines that an activity was outside the scope of the permit, may be used as evidence of a violation of the permit, the MMPA, the ESA, and applicable regulations in any enforcement actions.

2.11.5.10 *Acceptance of Permit*

When a permit is issued by signature of the Director, Office of Protected Resources, the Permit Holder must date and sign the permit, and return a copy of the original signature to the Office Director. The permit is effective upon the Permit Holder's signing of the permit.

In signing a permit, the Permit Holder:

- Agrees to abide by all terms and conditions set forth in the permit, all restrictions and relevant regulations under 50 CFR Parts 216, and 222-226, and all restrictions and requirements under the MMPA, and the ESA;
- Acknowledges that the authority to conduct certain activities specified in the permit is conditional and subject to authorization by the Office Director; and
- Acknowledges that the permit does not relieve the Permit Holder of the responsibility to obtain any other permits, or comply with other Federal, State, local, or international laws or regulations.

2.11.6 Monitoring

All NMFS permits for research on pinnipeds require permit holders to conduct post-activity monitoring without causing further disturbance. As indicated above, Permit Holders conducting research on Hawaiian monk seals are required to monitor animals after disturbance or capture (e.g., for signs of acute stress or injury, effects of administering drugs). The results of such observations are included in reports submitted to the Permits Division. Monitoring protocols designed for the proposed research and enhancement activities are presented in Sections 2.6, 5.2 – 5.4, and Appendix E.

2.11.7 Institutional Animal Care and Use Committee

Federal mandates, including the United States Department of Agriculture (USDA) Animal Welfare Act (AWA) of 1966 as amended (1985), and the Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals established the requirements for oversight of animal research by an Institutional Animal Care and Use Committee (IACUC).

NMFS researchers applying for permits must submit with a permit application verification of IACUC approval and the protocols reviewed by the IACUC. The NMFS PIFSC submitted with their application File No. 16632 such verification.

The IACUC must be composed of at minimum three members, one of which must be a veterinarian "with experience in laboratory animal science and medicine who has direct or delegate program responsibility for activities involving animals at the research facility," and another who is not affiliated in any way with the facility other than being a member of the committee (9 CFR 2.31). If the committee consists of more than three members, no more than three members may be of the same administrative unit of the facility (9 CFR 2.31). The purpose and functions of the IACUC are to:

- Review, inspect, and prepare a report on the facility's program for humane care and use of animals and animal facilities at least once every 6 months;
- Review and investigate (if warranted) complaints concerning the care and use of animals at the facility;
- Make recommendations to the institutional office concerning the facility's animal program, facilities, or personnel training;
- Review, approve, require modifications to, or withhold approval of, any components, activities, or significant proposed changes in activities related to the care and use of animals, and;
- Be authorized to suspend any activities related to the care and use of animals (9 CFR 2.31).

While the AWA exempts field studies from full IACUC review and approval by an animal use committee, the field study exemption does not apply to any study that involves "an invasive procedure or that harms or materially alters the behavior of the animal under study" (NMFS 2010a).

To ensure adherence to the AWA and U.S. Government Principals for the Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training, NMFS established in 2010 three regional IACUC's as well as incorporated the IACUC review and approval process into any field studies not excluded from AWA exemption including any future permit requests for Hawaiian monk seal research and enhancement activities (NMFS 2010a; NFMS 2010b; Personal comm. with NMFS 2011).

NMFS IACUC standards require that any research conducted by a NMFS Principal Investigator be reviewed and approved by the regional NMFS IACUC (NMFS 2010b). NMFS IACUC standards also apply to any research conducted by a Co-Investigator under a NMFS Principal Investigator, research funded by NMFS, and non-NMFS funded research (NMFS 2010b).

For Hawaiian monk seal research, NMFS uses the IACUC established by the University of Hawai'i (UH) in addition to the NMFS IACUC as a form of independent review and because UH personnel are involved in much of the research as Co-investigators. The use of the UH IACUC by NMFS does not preclude the need for NMFS IACUC oversight (Personal comm. with NMFS 2011).

The UH IACUC is a body composed of volunteers consisting of veterinarians, biological and non-biological scientists, and local community representatives who are responsible for the oversight and evaluation of university activities involving vertebrate animals (UH IACUC 2000). The committee is responsible for:

- Reviewing activities involving vertebrate animals;
- Conducting semiannual inspections and program reviews;
- Investigating, reviewing and addressing concerns brought to the committee; and
- Managing issues concerning humane care, use, and alleged noncompliance (UH IACUC 2002).

The UH IACUC requires that vertebrate animal use be reviewed and approved by the committee prior to use occurring (UH IACUC, 2002). The UH IACUC requires all applicants to submit to the committee:

- The species, number, and justification for the use of animals;
- A non-technical description of the project;
- A description of the procedures to be performed including use of anesthetics/analgesics, paralytic agents, surgeries, methods of restraint and euthanasia;
- A list of precautions to ensure humane care;
- A description of animal holding facilities, and;
- The final disposition of the animals (UH IACUC 2002).

2.12 ALTERNATIVES NOT CARRIED FORWARD FOR ANALYSIS

2.12.1 Reduction of Competition and Predation in the Northwestern Hawaiian Islands

Comments were submitted during scoping and public comment period requesting that an alternative to reduce populations of large predatory fish in the NWHI (Papahānaumokuākea Marine National Monument [Monument]) as a way to increase survival of Hawaiian monk seals be considered in the PEIS. This proposal is based on the hypothesis that one of the primary factors limiting monk seal recovery in the NWHI is shark predation and direct or indirect competition with other top predators (*e.g.*, sharks and jacks). Mitigation of shark predation on monk seals is an ongoing activity that has been subject to previous NEPA analysis (NMFS 2012). The competition hypothesis is consistent with dietary information for these species that indicates a probable overlap with that of monk seals. Further, observations from Critter Cam deployments have revealed direct competition between monk seals and sharks and jacks (*i.e.*, harvesting prey items flushed by monk seals, also known as kleptoparasitism) (Parrish *et al.* 2008). One possibility is that the abundance of top-level predators in the NWHI may be unnaturally high due in part to supplemental food provided in discarded bait and bycatch from commercial fisheries that operated in the NWHI. However, the latter theory is largely conjectural and has yet to be fully validated by scientific research.

NMFS has considered reduction of competition and predation to benefit monk seals. There is currently a lack of sufficient information on NWHI food web dynamics to reliably predict whether predator reduction would be an effective method for improving juvenile monk seal survival without unintended consequences. Undesirable changes in predator-prey dynamics could potentially be caused by fishing and therefore a more complete understanding of the system's trophic dynamics is required prior to undertaking any predator reduction experiment, whether locally or system wide. Compared to all other actions proposed in the alternatives carried forward for analysis, the result of large-scale predator management/removal is far more uncertain. It is not the ability to remove fish that is uncertain, but rather whether it would necessarily benefit monk seals without having other unanticipated and undesirable environmental consequences. The time required to gather sufficient data in order to understand the impacts and effectiveness of reducing predatory fish populations would not be timely for the recovery of the monk seal – which makes predator reduction inconsistent with the Purpose and Need of this PEIS.

NMFS is not dismissing this concept indefinitely, and plans to investigate it further with other agency and independent scientists outside the context of the PEIS. If after obtaining sufficient data to determine such action is warranted, we would conduct a separate NEPA analysis to fully address the potential effects of such environmental manipulation. However, given the currently available information, this alternative is not practical or feasible and will not be carried forward for analysis.

2.12.2 *Build a Hawaiian Monk Seal Research Facility or Aquarium in the Northwestern Hawaiian Islands*

Comments were submitted during scoping and public comment period requesting that an alternative to build a research facility or aquarium for breeding, rearing and feeding monk seals in the NWHI be considered in the PEIS. The infrastructure necessary for constructing and operating such a facility in the NWHI would be expensive and logistically very challenging due to the remote nature of the NWHI. The NWHI are a U.S. Marine National Monument, as well as a United Nations World Heritage Site. Human impacts in the Monument are minimized and heavily regulated to protect the native ecosystem. The current NMFS researchers in the field live in tents, bring up all food and water (stored in sealed buckets) to survive for several months, have only limited electricity from small solar systems, and no running water. Construction of a facility to hold monk seals in captivity in the NWHI could be possible at a site such as Midway Atoll, which has a working runway and considerable infrastructure. However the costs of constructing a holding facility with appropriate refrigeration for seal diet (and ability to have that diet delivered), adequate water filtration, staff accommodations, cost of transport, etc. would be several orders of magnitude more than the current NMFS research program budget. While a monk seal care facility is under construction by a non-government entity (The Marine Mammal Center) on Hawaii Island in the MHI, building, operating and maintaining a facility on a scale sufficient for research, breeding, rearing and feeding captive monk seals in the NWHI is not reasonable..

2.13 ONGOING NOAA ACTIVITIES THAT ARE NOT PART OF THE PEIS ALTERNATIVES

Currently, the Pacific Islands Regional Office (PIRO) of NMFS implements activities that indirectly affect Hawaiian monk seals but are not considered elements of the PEIS alternatives evaluated herein either because they have been evaluated under separate NEPA compliance documents or are not considered part of the research and enhancement program (*e.g.*, education and outreach). Table 2.12-1 provides a list of these activities and links where additional information is available. These activities are considered in the analysis of cumulative effects presented in Chapter 4 (see Table 4.5-1).

Table 2.12-1 Ongoing NOAA Activities That Are Not Part of Alternatives

Classification	Activity
Sightings Network	• Opportunistic sightings and volunteer observation programs for Hawaiian monk seals in the MHI
Marine Mammal Health and Stranding Response Program	• Rehabilitation and release of stranded seals; • Health-related research on captive and rehabilitating seals (excluding vaccination research); and • Responding to unusual mortality events
Ecological studies	• Continue demographic and ecosystem modeling • Using LIDAR to collect elevation and bathymetry data for the NWHI • Conduct oceanographic studies to determine effects of oceanographic variability on prey abundance availability and foraging success
Habitat protection, loss mitigation and restoration	• Maintain current habitat protection or ensure that if status or jurisdiction changes protection is not diminished • Investigate rebuilding pupping habitat and evaluate possible colonization of Johnston Atoll • Ensure that monk seal concerns are included in all vessel grounding response plans • Provide rapid response, removal and monitoring of vessel groundings
Education/Outreach programs	• Hawaiian Monk Seal Recovery Team • Main Hawaiian Islands Management Plan • Outreach plan • Partnership grants for Hawaiian monk seal recovery • Incorporating community feedback into research and enhancement activities
Program to Remove Marine Debris	• Removal of hazardous debris from high entanglement risk zones • Develop working groups and education to help reduce the amount of debris

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter provides a description of the physical, biological and socioeconomic environment within the project area that may be affected by research and enhancement on Hawaiian monk seals (*Monachus schauinslandi*) or that may be a factor in the species' decline. The objective of this section is to provide a baseline against which the alternatives may be evaluated and compared (Chapter 4).

The project area for the analysis encompasses the Hawaiian Archipelago and Johnston Atoll as shown in Figure 1.3-1. The time frame for this analysis is defined as 1958 through approximately 2024. As described in more detail in Section 3.3.1, 1958 marks the point in time when the first beach counts of Hawaiian monk seals were conducted in all the primary Northwestern Hawaiian Islands. That year is considered a benchmark for the species' known historic high point of abundance. By the year 2024, National Marine Fisheries Service (NMFS) will have completed two five-year permit cycles authorizing Hawaiian monk seal research and enhancement activities.

3.2 PHYSICAL ENVIRONMENT

The Hawaiian Archipelago is a part of the Hawaiian Ridge-Emperor Seamounts chain in the central North Pacific Ocean. The Hawaiian Ridge-Emperor Seamounts chain is comprised of more than 80 volcanoes and is the result of the Pacific Plate traveling northward then northwestward over the stationary Hawaiian oceanic "hot-spot" (currently located underneath the Island of Hawai`i) over the past 70 million years (United States Coast Guard [USGS] 1999). The Hawaiian Ridge-Emperor Seamounts chain extends approximately 6,000 kilometers from the main Island of Hawai`i (the youngest of the islands) to the Aleutian Trench, which parallels the Aleutian Islands of Alaska. The Hawaiian Ridge section of this chain is approximately 2,600 kilometers in length (the equivalent distance of Washington D.C. to Denver, CO) extending from the Island of Hawai`i to Kure Atoll (USGS 1999).

The Archipelago is comprised of two island groups: The "Main" Hawaiian Islands (MHI) and the "Northwestern" (or "Leeward") Hawaiian Islands (NWHI). The eight Main Islands are grouped at the southeastern end of the Archipelago and occupy about 600 km (approximately 373 miles) of its total length, while the NWHI extend another 1,100 km (approximately 684 miles) to the west-northwest. The capital city of Hawai`i, Honolulu, on the island of O`ahu, is located 3,800 kilometers (km) (approximately 2,361 miles) from the west coast of the Unites States (U.S.) mainland, about 6,000 km (approximately 3,728 miles) east of Japan, and 4,400 km (approximately 2,734 miles) due south of Anchorage, Alaska (Friedlander *et al.* 2009; USGS 1999).

3.2.1 *Main Hawaiian Islands*

The MHI are the youngest of the Hawaiian Island Archipelago. The MHI are comprised of eight large islands (O`ahu, Kaua`i, Maui, Hawai`i, Moloka`i, Lāna`i, Ni`iahu, Kaho`olawe) as well as numerous minor islands, islets and stacks (Hawaii Department of Business, Economic Development and Tourism [DBEDT] 2010). The MHI comprise approximately 12,548 square kilometers of land and 1,431 km of coastline (Coastal Geology Group 2011; DBEDT 2010). Hawaiian monk seals can be found in small numbers throughout MHI (Antonelis *et al.* 2006). Physical attributes of the MHI are presented in Table 3.2-1 below.

Table 3.2-1 Key Physical Attributes of the Main Hawaiian Islands

Island	Land area (miles^2)	Shoreline (miles)	Max Elevation (feet) (location on island)	Lat/Long	Special Features
O`ahu	597	112	4,003 (Mt. Ka`ala)	21°28'North (N) 157°59'West (W)	Most populous island; 3rd largest; Waianae and Koolau, mountain ranges
Kaua`i	562	136	5,243 (Kawaikini)	22°05'N 159°30'W	4th largest island; Waimea Canyon; "Barking Sands" Pacific Missile Range
Maui	727	86	10,238 (Haleakalā)	20°48'N 156°20'W	2nd largest island; wintering area for humpback whales in Au`au Channel
Hawai`i	4028	266	13,796 (Mauna Kea)	19°34'N 155°30'W	Largest island; The Great Crack 9 8 mi long deep fissure; active volcano, Kilauea
Moloka`i	206	88	4961 (Kamakou)	21°08'N 157°02'W	5th largest island
Lāna`i	141	121	3,366 (Lānaihale)	20°50'N 156°56'W	6th largest island
Ni`iahu	70	90	1250 (Mt. Pānī`au)	21°54'N 160°10'W	7th largest island; mostly private with limited public access
Kaho`olawe	45	30	1,438 (Pu`u Moaulanui [Lua Makika])	20°33'N 156°36'W	8th largest island; Kaho`olawe Island Reserve; commercial uses are prohibited

All data approximate
Source: Coastal Geology Group (2011)
Website: http://www.soest.hawaii.edu/coasts/data/

3.2.2 *Northwestern Hawaiian Islands*

The NWHI extend from Nihoa Island (located 249 km [approximately 155 miles] Northwest [NW] of Kaua`i) for 1,931 km (approximately 1,200 miles) to Kure Atoll. The NWHI are a conglomerate of atolls, shoals, and emergent land totaling 13.6 square kilometers (km^2) (approximately 5.2 miles^2) with none of the island groups totaling more than 6 km^2 (approximately 4 miles).

The mean elevation of the islands is less than 33 feet (ft) (10 meters [m]) with the highest point on Nihoa Island (275 m) (Juvik and Juvik 1998). The NWHI are surrounded by over 30 submerged ancillary banks and seamounts. The majority of the islands are uninhabited, with the exception of Midway Atoll, Kure Atoll, Laysan Island, and French Frigate Shoals, which have been occupied by various government agencies for extended periods over the last century (Friedlander *et al.* 2009).

Hawaiian Monk Seals are found predominantly throughout the NWHI with six of the population's reproductive sites being located at Kure Atoll, Midway Atoll, Pearl and Hermes Reef, Lisianski Island, Laysan Island, and the French Frigate Shoals (Antonelis *et al.* 2006; Reeves *et al.* 2002). Key physical attributes of the NWHI are presented in Table 3.2-2.

Table 3.2-2 Key Physical Attributes of the Northwestern Hawaiian Islands

Island / Atoll	Area (mi^2)	Area (mi^2) < 10 fathoms	Max Elevation (feet)	Lat / Long	Special Features
Nihoa Island	<1	2.0	903 (Miller's peak)	23° 03′38″N 161° 55′W	Much of the shoreline is rocky and inaccessible due to turbulent nearshore waters, but there is a small sandy beach with suitable habitat for Hawaiian monk seal (NMFS 2007; United States Fish and Wildlife Service [USFWS] 2008)
Necker Island (Mokumanamana)	<2	4.0	102 (Summit Hill)	23° 34′N 164° 42′W	Rocky inaccessible shoreline; turbulent nearshore waters (NMFS, 2007; USFWS, 2008). Surrounded by 603 miles^2 (1,558 km^2) of reef habitat; second largest in NWHI ([PIBHMC] 2009)
French Frigate Shoals	<3	181.0	-	23° 52.134′N 166° 17.16′W	Enclosed by an 18 mile (28.9 kilometers [km]) long crescent-shaped reef. Provides highly important habitat for the largest breeding colony of Hawaiian monk seals (NMFS 2007; USFWS 2008)
Gardner Pinnacles	<4	<1	190	25° 01′N 167° 59′W	Oldest high islands in Hawaiian chain; access limited to calm ocean conditions.
Maro Reef	open atoll; awash	84.0	(Awash)	25° 30.2′N 170° 38.34′W	One of the largest reef habitats in NWHI covering 582 miles^2 (1,508 km^2)
Laysan Island	2.0	10.0	40	25° 0.04′N 167° 59.82′W	Partially surrounded by fringing reef (NMFS 2007; USFWS 2008) surrounded by extensive sand beds
Lisianski Island	<1	83.0	40	26° 4.2′N 173° 58.12′W	Surrounded by extensive reef, Neva Shoals; open atoll with surface area of 378 miles^2 (979 km^2)
Pearl and Hermes Reef	<1	145.0	10	27° 51.37′N 175° 51.09′W	True atoll fringed with shoals, permanent emergent islands, and ephemeral sandy islets which provide essential dry land for Hawaiian

Island / Atoll	Area (mi^2)	Area (mi^2) < 10 fathoms	Max Elevation (feet)	Lat / Long	Special Features
					monk seal (NMFS 2007; USFWS 2008)
Midway Atoll	25.0	33.0	12	28° 14.28'N 177° 22.01'W	Consists of three sandy islets: Sand, Eastern and Spit which lie within an elliptical barrier reef measuring approximately 5 miles (8 km)
Kure Atoll	<1	35.0	20	28° 25.28'N 178° 19.55'W	World's northernmost coral atoll; Consists of two islets; atoll is circular with a reef 6 miles (9.6 km) in diameter (NMFS 2007; USFWS 2008) covering approximately 64 $miles^2$ (167 km^2) (PIBHMC 2009)

Source: Friedlander et. al. (2009);
County of Hawai`i Data Book Retrieved from http://www.co.hawaii.hi.us/databook_current/Table%205/5.5.pdf. March 2011

3.2.3 *Meteorology and Air Quality*

The so-called "Trade Winds," which blow from northeast to east-northeast direction, account for about 70 percent (%) of all winds in Hawai`i. Winds blow from each of the other quadrants (Northwest [NW], Southwest [SW], and Southeast [SE]) about 10% of the time. During summer trade winds may prevail as much as 90% of the time, while in winter they may occur only 40-60% of the time, giving way stormy and rainy weather.

Concentrations of pollutants fall well below the state and federal ambient air quality standards and air quality in the Hawaiian Islands is better than most other parts of the nation (Department of Health [DOH], 2007). Hawai`i's clean air can be attributed partially to abundant wind and rain, as well as a relatively low population and lack of heavy industry (Rubin 2009).

3.2.4 *Pacific Ocean Around the Hawaiian Archipelago*

The islands of Hawai`i are set in a dynamic oceanographic and meteorological regime in the northern/central subtropical region of the Pacific Ocean and, as such, are influenced by the transition zone between the nutrient-poor surface waters of the North Pacific Subtropical Gyre and the nutrient–rich surface waters of the North Pacific Subpolar Gyre (Kazmin and Rienecker 1996; Leonard *et al.* 2001; Polovina *et al.* 2001; Friedlander *et al.* 2009). Colder, nutrient-rich waters are brought to the region by seasonal shifts and interannual migrations of this front. These waters are important to the productivity and ecology of the region (Polovina and Haight 1999; Nakamura and Kazmin 2003; Polovina 2005; Friedlander *et al.* 2009).

Low day-to-day and month-to-month variability in climate is characteristic of the Hawaiian Archipelago. The climate features mild year-round temperatures, moderate humidity, persistent northeasterly trade winds and infrequent severe storms (Giambelluca and Schroeder 1998; USFWS 2008a). The climate is influenced by either marine tropical or marine Pacific air masses, depending on the season. During summer, the Pacific High Pressure System dominates, placing the region under the influence of easterly winds with marine tropical and trade winds prevailing. In winter, the area is influenced by the southward movement of the Aleutian Low over the North Pacific (Grigg *et al.* 2008; USFWS 2008a). The surrounding ocean has a dominant effect on the weather of the entire archipelago.

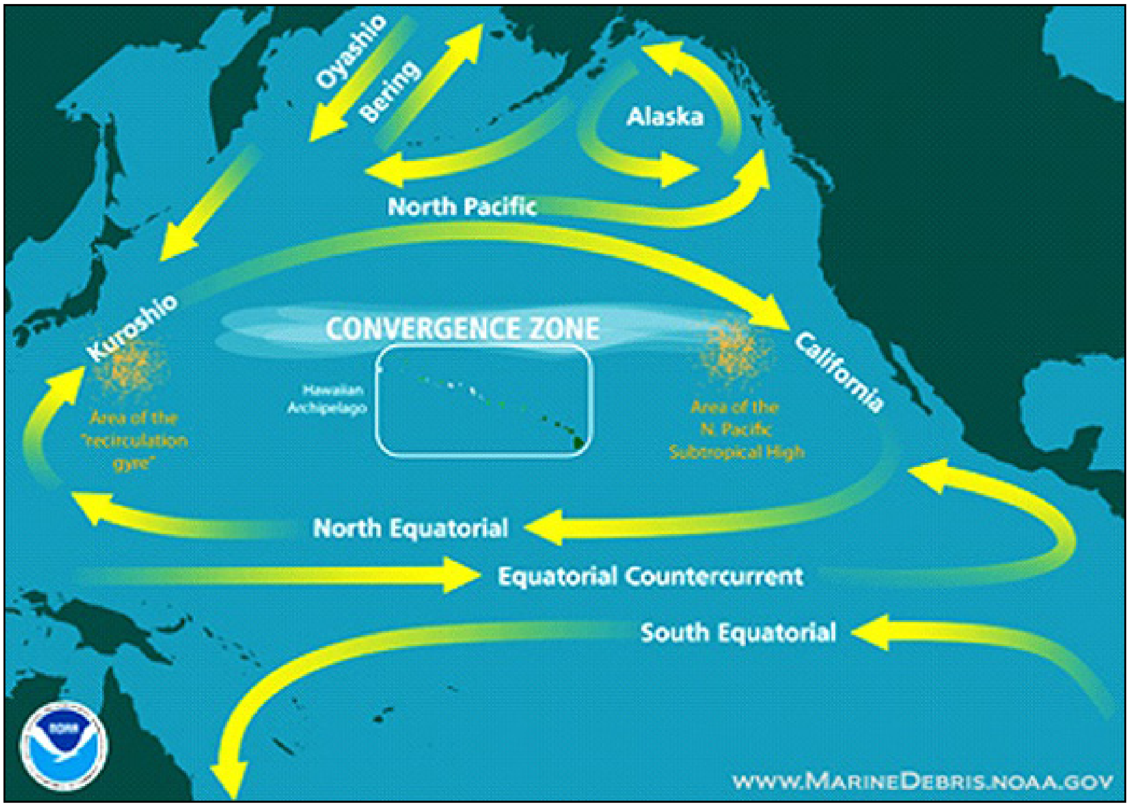
3.2.4.1 *Ocean Circulation and Currents*

Surface currents in the Pacific Ocean are driven by the trade winds and westerlies, such that surface flows are predominantly westward in low latitudes and eastward in high latitudes. When these flows encounter the continents they are diverted both north and south to form coastal currents, which further serve to establish rotating water masses ("gyres") that characterize the overall circulation patterns of the ocean.

The Hawaiian Archipelago is in the central subtropical region of the North Pacific Ocean, near the middle of the North Pacific gyre. In this region the large-scale circulation is generally clockwise (*i.e.*, anti-cyclonic) as depicted in Figure 3.2-1. Near the Hawaiian Islands, oceanic flows are generally from east to west, with vigorous eddies forming on the leeward side of the islands (Flament *et al.* 1998). To the south of Hawai`i, the North Equatorial current flows westward, completing the circuit of the North Pacific gyre.

Eastward-flowing currents carry planktonic larvae from the species-rich western Pacific, and the eastward-spiraling Kuroshio Current facilitates the natural transport of many Japanese organisms to Hawaiian waters (Juvik and Juvik 1998). The archipelago spans such a great distance that its opposite ends often experience different oceanographic and meteorological conditions (Friedlander *et al.* 2009). Surface currents in the NWHI are highly variable in both speed and direction (Firing and Brainard 2006) with the average long-term surface flow being from east to west due to the prevailing northeasterly winds. Eddies created by local island effects on large-scale circulation contribute to the highly variable nature of the surface currents (USFWS 2008a).

Figure 3.2-1 North Pacific Ocean Circulation and Major Currents



Seas offshore of the Hawaiian Islands can be rough, with wave heights of several meters and winter large swell events having waves up to 10 – 12 m in height. The seas are rougher between the islands due to the funneling of wind, and calmer on the leeward side where the surface is shielded from the winds (Flament *et al.* 1998). The Hawaiian Islands are typically not impacted by tropical storms, but do experience annual extratropical storms (storms that originate outside of tropical latitudes) creating high waves during winter. These waves shape the ecosystem by limiting the growth and abundance of coral communities, and lead to species and growth forms that are adapted to these dynamic wave energy environments (Grigg *et al.* 2008).

The transition zone between the nutrient-poor surface waters of the North Pacific Subtropical Gyre and the nutrient-rich surface waters of the North Pacific Subpolar Gyre shifts 15 degrees (°) (between 30° and 45°N) seasonally. This shifts far enough south in winter that it encompasses the three northern most atolls (Kure Atoll, Midway Atoll, and Pearl and Hermes Reef). The front brings colder and nutrient rich waters into the area that are important to the productivity and ecology of the ecosystems (Leonard *et al.*, 2001; Polovina *et al.* 2001; Friedlander *et al.* 2009).

3.2.5 *Water Column*

Biological productivity in the pelagic zone is highly dynamic. Physical conditions present in the water column, such as isotherm and isohaline (temperature and salinity) boundaries, often determine what species will be present in the surrounding waters (USFWS 2008a). A mixed layer is present below the surface and ranges in depth from 120 m (400 ft) in winter to less than 30 m (100 ft) in summer. Below this layer there is a thermocline (sharp decrease in temperature) from 25° Celsius (C) at the surface to 5°C at 700 m (2,300 ft), then decreases to 1.5°C at the bottom.

Surface salinities range from 35.2 parts per thousand (ppt) at 26°N to 34.3 ppt at 10°N. Salinity reflects the balance between precipitation and evaporation so the decrease in salinity at the southern end of the Hawaiian Islands reflects the higher amount of precipitation near the Inter-Tropical Convergence Zone. Salinity tends to decrease with depth, indicating the sinking of lower salinity water from the northern ocean. Higher salinity water (35.2 ppt) is present at the surface down to 150 m (500 ft), lower salinity (34.1 ppt) down to 500 m (1670 ft), and then the salinity increases slightly to 34.7 ppt for very deep abyssal waters (Flament *et al.* 1998).

3.2.6 *Temperature and Nutrient Regimes*

The distribution of many species is influenced by the temperature gradient along the Hawaiian Archipelago (DeMartini and Friedlander 2004; Friedlander *et al.* 2009). Water temperatures in the area are several degrees lower than in the tropical western Pacific, leading to a decrease in diversity of aquatic species (Juvik and Juvik 1998). Average water temperatures surrounding the Hawaiian Archipelago vary from 22° C (71.6° Fahrenheit [F]) in March to 27 °C (80.6°F) in September. The northernmost atolls of the islands are occasionally affected by an eastward expansion of the Western Pacific warm pool, which can cause higher ocean temperatures during the summer at Kure Atoll than the more "tropical" waters of the islands further south (USFWS 2008a). Therefore, the temperature variation at French Frigate Shoals (74 to 81.5°F [23.3 to 27.5°C]) is much less than at Kure Atoll, in the northernmost part of the chain (66.2 to 80.6°F [19 to 27°C]).

Nutrient conditions in the Hawaiian Islands are influenced by both local and regional factors. The concentration of nutrients (such as nitrate, nitrite, phosphate, silicate) is small at the surface, but increases with depth (Flament *et al.* 1998). Localized wind and bathymetric features may cause upwelling to occur, bringing the cooler, nutrient-rich deep water closer to the surface. Circulation cells and wake eddies found downstream of oceanic islands may concentrate plankton, enhancing productivity near those islands (Ashmole and Ashmole 1967; Boehlert 1993; USFWS 2008). Regional factors include subtropical fronts and the high chlorophyll content of the associated waters north of the front. A major ecological transition zone in the northern Pacific known as the "Transition Zone Chlorophyll Front" seasonally migrates and influences the primary productivity of the northern portion of the NWHI (Polovina et al. 2001; Bograd et al. 2004). This influx of nutrients increases ocean productivity and therefore recruitment of aquatic life, such as Hawaiian monk seals (Polovina *et al.* 1994; USFWS 2008).

3.2.7 *Marine Water Quality*

While water offshore around Hawai`i is remarkably clean, nearshore localized concentrations of pollutants occur near populated areas due to stormwater discharges and permitted sanitary outfalls.

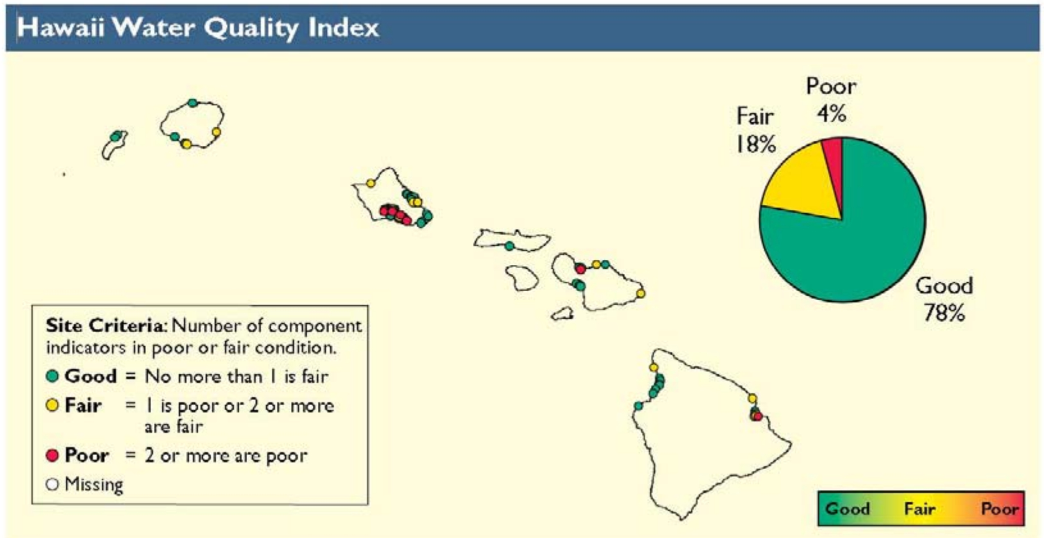
Water quality has been assessed in 99% of Hawaiian estuaries. Of this percentage, 57% are impaired and 43% are fully supporting designated uses. Eighty-three percent of shoreline waters have been assessed. Two percent of shoreline waters are impaired, 1 % is threatened, and 97% is fully supporting designated uses (EPA 2005, National Oceanic and Atmospheric Administration [NOAA] 2009a).

Hawai`i does not monitor all coastal areas. However, the Clean Water Branch (CWB) of the State of Hawai`i's DOH is responsible for monitoring the State's waters, identifying sources of water pollution, and evaluating the data (CWB 2011). The Polluted Runoff Control Program (PRCP) administers grant money it receives from the Environmental Protection Agency (EPA) through Section 319(h) of the federal Clean Water Act to address Hawai`i's polluted runoff (CWB 2011). Key PRCP coastal priority projects monitoring sites include (CWB 2010 PRCP):

- Kaua`i
    - Port Allen Pier
    - Nawiliwili Harbor
- Island of Hawai`i
    - Wailoa River Mouth
    - Hilo Bay Lighthouse
    - Pelkane Bay
    - Waiulaula Bay

According to the latest available data from Environmental Protection Agency's (EPA's) National Coastal Assessment program, the overall quality of Hawai`i 's coastal waters, based on the Water Quality Index, is rated 78% good, 18% fair and 4% poor (EPA 2008) (Figure 3.2-2).

Figure 3.2-2 Hawai'i Water Quality Index



Source: National Coastal Condition Report III. Chapter 8 Part B Alaska, Hawaiian Island Territories (EPA 2008).

3.2.8 *Climatic Variability and Change*

3.2.8.1 *Atmosphere-Ocean Time Scales and Forcing Mechanisms*

Atmospheric and oceanic parameters in the North Pacific vary on several time scales and are due to many different forcing mechanisms (Table 3.2-3). Short-term (daily to annual) fluctuations in atmospheric and oceanic conditions are familiar and generally well-understood, to the extent that cause-and-effect relationships are generally well-established. Fluctuations having longer (interannual) time scales are becoming better documented, thanks to extensive environmental monitoring activities, but definition of causal relationships for most remains an elusive challenge. The focus of this section is on atmosphere-ocean interactions that occur on time scales of several months to several years, or even decades. No attempt is made to catalogue all possible sources of variability. Rather, only the few that are well-known are identified and their possible influences are described.

Table 3.2-3 Atmosphere-Ocean Variability – Time Scales and Forcing Mechanisms

Period	Forcing Mechanism
Diurnal/Semidiurnal	Lunar & solar tides
3-10 days	Atmospheric storms
Seasonal	Solar declination
Interannual (years)	
0.5 – 1+	Mesoscale ocean eddies
3-7	El Niño – Southern Oscillation (ENSO) events
6-7	Mid-latitude atmospheric events
10+	"Regime shift"
11	Sunspots
18.6	Lunar Declination
22	Sunspots

*After National Research Council 1996. The Bering Sea Ecosystem

3.2.9 *Interannual Variability*

The phenomenon known as El Niño – Southern Oscillation (ENSO) has long been recognized as a significant factor in the interannual variability of atmospheric-oceanic response. ENSO events radiate from the equatorial regions at irregular intervals, which range most commonly from three to seven years between events. The two distinct forms of ENSO in the Pacific Ocean are known as El Niño and La Niña. During El Niño events, the Aleutian Low pressure system tends to be more intense and is positioned further to the south (closer to the NWHI), thereby producing stronger winds, larger waves and cooler water temperatures in the NWHI (Bromirski *et al.* 2005). Large-scale oceanographic events such as El Niño change the characteristics of water temperature and productivity across the Pacific, and these events have a significant effect on the habitat range and movements of pelagic species (USFWS 2008). During La Niña, sea surface temperatures in the eastern tropical Pacific are below average, and temperatures in the western tropical Pacific are above average (Friedlander *et al.* 2009).

3.2.9.1 *Interdecadal Variability*

A chronology of interdecadal climatic changes affecting the North Pacific Ocean was compiled from available measured atmospheric pressure data by Minobe (1997) for the period 1899-1997. A climatic regime shift was defined as a transition from one climatic state to another within a period substantially shorter than the lengths of the individual epochs of each of the (two) climatic states. Data used by Minobe included the North Pacific index, the area- and time-averaged sea level pressure anomalies in the region of 160°E to 140°W by 30° to 60°N for winter to spring (December to May), which provided examples of rapid strength changes in the Aleutian Low in the winter and spring seasons. Bidecadal pressure averages during 1899-1924 showed that the Aleutian Low was about 1 millibar (mb) weaker than average, then strengthened to 1 mb below normal during 1925-1947. Similar behavior occurred in the latter part of the 20th century as the Aleutian Low shifted back to 1 mb above normal from 1948 to 1976, then strengthened back to 1 mb below normal during 1977-1997.

Using late-nineteenth century data for spring air temperature in western North America, Minobe (1997) then identified 1890 to be the first regime shift. This extended the length of the first period to 34 years in comparison to the 22-, 26-, and 20+ year regimes to follow. The 50- to 70-year interdecadal variability (a two-regime cycle) has been prevalent from the nineteenth century to the present in North America. Minobe (1997) speculated that the likely cause of this variability is an internal oscillation in the coupled atmosphere-ocean system.

Long-term changes in fish populations around the North Pacific have apparently been influenced by climatic change of the same 50- to 70-year variability. Alaska salmon catches decreased in the 1940s and increased in the 1970s. Larger Japanese sardine catch amounts occurred in the regimes with the deepened Aleutian Low. Baumgartner *et al.* (1992) found evidence of an approximately 60-year variability in sardine and anchovy populations in eastern North Pacific from sediments in the Santa Barbara basin dating back to A.D. 270.

Dubbed the Pacific Decadal Oscillation (PDO), this cyclical behavior is an El Niño-like pattern of Pacific climate variability. PDO differs from ENSO in that it persists for much longer (20 to 30 years versus 6 to 8 months) and is most visible in the North Pacific with secondary signatures in the tropics, while the opposite happens during ENSO (Friedlander *et al.* 2009).

3.2.9.2 Regime Shifts

In the late 1970s a step change in climate, referred to as a “regime shift,” occurred in the North Pacific Ocean. While there is evidence to suggest that there have been previous regime shifts, as noted above, it was the 1970s regime shift that stimulated extensive research on the topic and, especially, how oceanic ecosystems were responding to these phenomena. Although more than a decade was required to recognize the pattern, the regime shift of 1976/1977 is now widely acknowledged, as well as its associated far-reaching consequences for the large marine ecosystems of the North Pacific Ocean.

The most recent regime shift (1989) has been studied extensively by Hare and Mantua (2000), who assembled and examined 100 environmental time series of indices (31 climatic and 69 biological) to obtain evidence of regime shift signals. Although their focus was on the Gulf of Alaska and Bering Sea, there is no reason to preclude the applicability of their findings as far south as the Hawaiian Archipelago.

Abundant evidence suggests that the coupled atmospheric-oceanic system of the North Pacific is subject to multiple forcing factors, each having characteristic behaviors and different frequencies of occurrence. The evidence also indicates that, rather than there being a single average or “normal” condition, the overall system appears to stabilize periodically around two or more “normal” states, changing from one to another abruptly in what has been termed a “regime shift.”

These are the characteristics of systems whose dynamics are addressed by "chaos" theory, which is a body of mathematical theory that focuses on systems that have multiple states of equilibrium. Chaos theory attempts to define the mechanisms that cause the systems to change from one equilibrium state to another and to predict all such equilibrium conditions.

Use of the word "chaos" in this context is not to imply the more common definition of great confusion or disorder. Rather, its use invokes the mathematical implication that there is order behind the irregularity of the system. A chaotic model may lead to a better understanding of the low-frequency relationship between the physical and biological systems in the North Pacific. One characteristic of a chaotic system is that, near the time of major interdecadal transition, there could be several years of extreme and perhaps opposite, anomalies in the physical system. These extremes provide opportunities for change in the biological system. Recent experience with North Pacific fisheries and marine mammal populations may provide examples of such transition periods.

3.3 BIOLOGICAL ENVIRONMENT

3.3.1 Hawaiian Monk Seals

3.3.1.1 Distribution

Hawaiian monk seals occur on lands (islands, atolls, emergent reefs) throughout the Hawaiian Archipelago, from Kure Atoll to Hawai`i Island, a distance of over 2,500 km (approximately 1,553 miles). Seals forage (search for food) in and transit the waters surrounding and between all land areas. Additionally, intermittent sightings of Hawaiian monk seals have occurred at remote Johnston Atoll approximately 800 km (about 500 miles) south of the Hawaiian Archipelago. Although seals are perhaps not continuously present at this site, they do occur there naturally so Johnston Atoll is considered part of the species range. Historically, most Hawaiian monk seals have been located in the remote NWHI, with subpopulations at Kure Atoll, Midway Atoll, Pearl and Hermes Reef, Lisianski Island, Laysan Island, French Frigate Shoals, Necker Island and Nihoa Island. Seals are also seen at Gardner Pinnacles and Maro Reef in the NWHI; however, these sites have limited areas where seals can haul out. A historically small, but currently growing portion of the seals occur in the MHI, including the islands of Ni`ihau, Kaua`i, O`ahu, Molokai`i, Lāna`i, Kaho`olawe, Maui, and Hawai`i. Seals also land on smaller islands (for example, Kaula Rock, Lehua Rock) and offshore islets that occur throughout the MHI. A research report released at the time this Draft PEIS was being prepared for printing offers additional information on the historical distribution and occurrence of Hawaiian monk seals in the NWHI and MHI. The 2011 report, *Historical and Contemporary Significance of the Endangered Hawaiian Monk Seal in Native Hawaiian Culture*, is included as Appendix K.

The species is structured in a metapopulation consisting of multiple subpopulations, which display varying degrees of demographic independence but are linked through regional environmental correlation as well as migration (Baker *et al.* 2007; Baker and Thompson 2007; Schultz *et al.* in press).

Hawaiian monk seal population monitoring is based upon long-term marking and resighting of individuals. This is a powerful approach, which facilitates tracking abundance, age and sex structures (because age and gender of most individuals are known), survival rates, reproductive rates and movement between subpopulations.

3.3.1.2 *Physical Description and Life Cycle*

Male and female Hawaiian monk seals are similar in size. Sex is determined by observing the ventral side of a seal (Kenyon and Rice 1959). Females have two pairs of teats, often appear larger and fatter than adult males (Kenyon and Rice 1959), and may have dorsal mating scars (Hiruki *et al.* 1993). Males have a penile opening, often have scars along their necks inflicted by other males (Hiruki *et al.* 1993), and may be darker than females (Kenyon and Rice 1959). Adults weigh up to 270 kilograms (kg) and may be more than 7 ft long (Kenyon and Rice 1959).

Hawaiian monk seals do not form dense breeding colonies (Kenyon and Rice 1959; Johanos *et al.* 1994); rather, they tend to haul out alone or in sparse clusters on the beach. Mating, which occurs in the water and is rarely observed, is inferred from male-female association patterns and from mounting injuries (Johanos *et al.* 1994). Hawaiian monk seal births may occur any time of year, but there is a broad peak in pupping from March to August (Johanos *et al.* 1994). The mean interval for births in consecutive years is 381 days, which results in the prolonged pupping season (Johanos *et al.* 1994). When females give birth in consecutive years they do so later each season. When they skip a year or more their subsequent birth occurs earlier in the year. Birth rates vary depending on breeding location and year, with approximately 30-70% of all adult females giving birth in any given year (Johanos *et al.* 1994; Harting *et al.* 2007). Hawaiian monk seals tend to give birth on secluded beaches adjacent to shallow, protected waters, apparently to afford protection to the pup (Westlake and Gilmartin 1990).

Newborn pups weigh 15-17 kg and measure 95-100 centimeters (cm) long (Kenyon and Rice 1959). Pups are black at birth and undergo a post-natal molt (shedding) late in the nursing period. Nursing lasts, on average, 39 days (Johanos *et al.* 1994), during which time the mother remains constantly near her pup in and out of the water (Kenyon and Rice 1959). The mother apparently fasts and rapidly loses weight through lactation. At the end of lactation, she leaves her pup and swims offshore to feed (Kenyon and Rice 1959; Wirtz 1968; Johnson and Johnson 1984). At weaning, pups normally weigh between 59-90 kg (Kenyon and Rice 1959).

3.3.1.3 *Population Status and Trends*

The Hawaiian monk seal was listed as endangered throughout its range under the Endangered Species Act (ESA) in 1976 (41 Federal Register [FR] 51611; November 23, 1976). The Hawaiian monk seal is the most endangered pinniped species in U.S. waters and the second most endangered pinniped in the world; only the Mediterranean monk seal, also critically endangered, is rarer. Their cousin, the Caribbean monk seal, is extinct.

Hawaiian monk seals probably occurred throughout the Hawaiian Archipelago when Polynesian colonizers arrived 1500–1600 years ago, after which the seals were likely extirpated from the MHI (Bellwood 1978; Baker and Johanos 2004). The NWHI provided a refuge for the species until European sailors arrived in the 19th century and hunted subpopulations to near extinction (Ragen 1999).

Although historical counts of total population size are not available, records indicate an abundance of seals up to the year 1857 (Hiruki and Ragen 1992), no or few seals at most islands by 1893 (Ragen 1999), and a ''large number'' at Kure Atoll and Pearl and Hermes Reef by 1915 (Hiruki and Ragen 1992). In 1958, mean counts of seals on the beach at the six main NWHI subpopulations (French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll and Kure Atoll) had recovered to 916 individuals, age 1 year or older (non-pups; Rice 1960). A "beach count" is an index of abundance, rather than total abundance as it represents the average number of seals counted on the beach at any given time, thereby it doesn't include seals in the water. Because total abundance was not estimable until the past decade or so at most sites, the beach count index provides the best indicator of abundance trends over time.

The counts conducted in 1958 are a benchmark for the species' known historic high point of abundance. Certainly it is likely that the species was far more abundant prior to human contact, but there is no reliable figure for abundance or even an abundance index prior to 1958. Though 1958 was unique in that counts were conducted at all six main subpopulations in that year, counts at individual subpopulations within a few years of 1958 substantiate the relatively high abundance in that period. The mean of comparable counts summed for the same six locations in 2010 was 268 non-pups, representing a decline of over 70% in just over five decades. The most recent published best estimate of total abundance is 1,212 seals (Carretta *et al.* 2013) in 2010, and the number was estimated to be declining at approximately 4.0% per year.

The general decline in total abundance since the late 1950's masks complex spatial dynamics in population trends. Regional trends are described separately in the following sections.

<u>NWHI Abundance and Trends</u>

The six NWHI subpopulations listed above have been the subject of consistent, thorough long-term monitoring. Beach counts have been conducted in most years at these sites since 1958 and since the early to mid-1980's more thorough population studies have been conducted annually. Necker and Nihoa Islands have historically hosted a relatively small portion of the total species abundance and are especially logistically difficult places to work, therefore the data from these sites is mostly limited to zero to a few opportunistic counts per year.

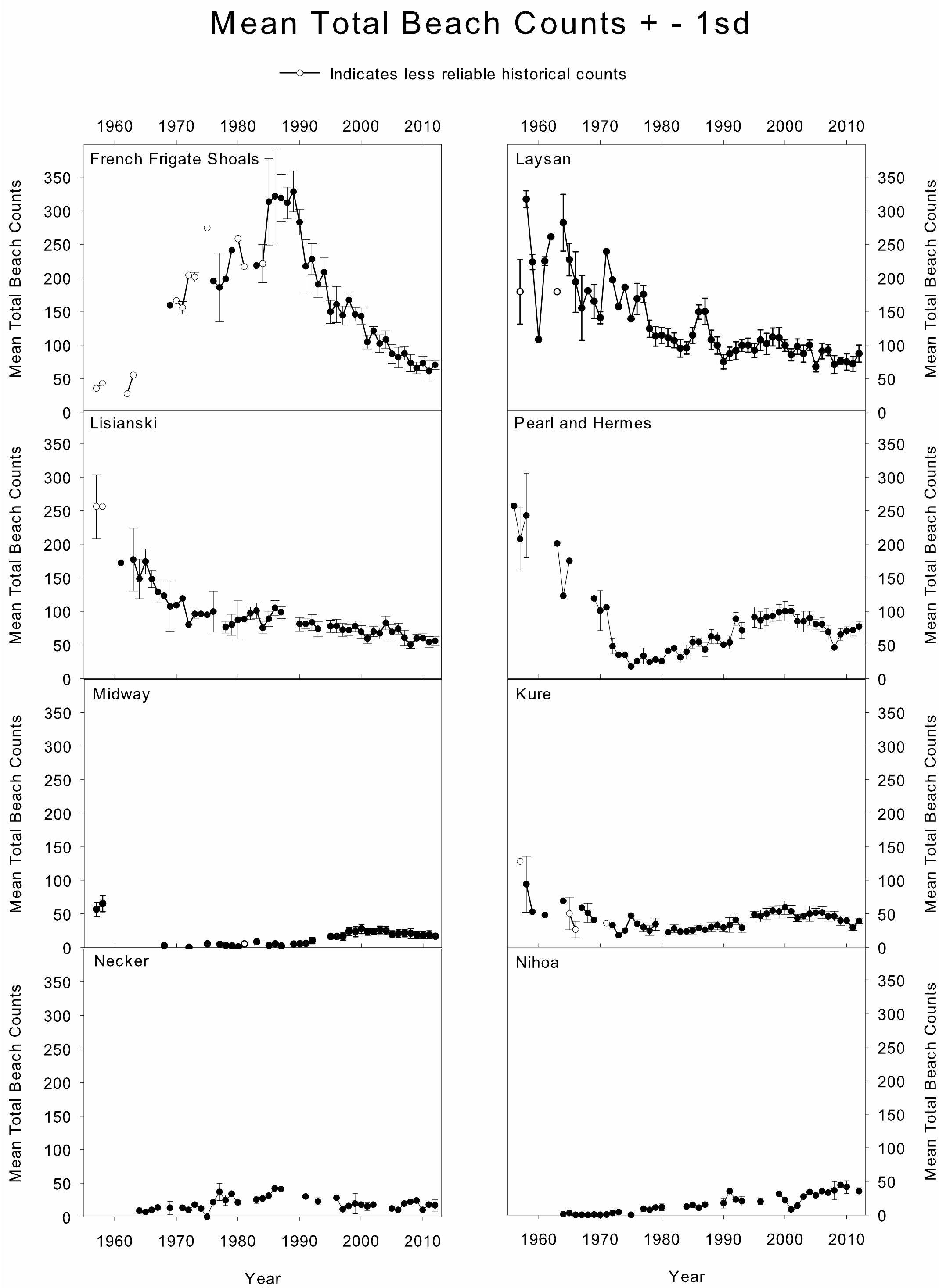
Figure 3.3-1 shows the trend in mean non-pup beach counts at the various sites in the NWHI, updated with preliminary (unpublished) data through 2012. While the other main subpopulations had their documented high counts in the late 1950's, French Frigate Shoals was highly reduced at that time, likely due to human impacts and harassment. However, after human disturbance was curtailed that population grew rapidly and reached a peak in the late 1980's, followed by a dramatic crash which continues to the present. Laysan and Lisianski Islands have demonstrated an overall declining trend since the late 1950's, though the rate of decline was most rapid in the early part of the time series. The three western subpopulations (Pearl and Hermes Reef, Midway Atoll and Kure Atoll) all declined precipitously after the late 1950's and then at different time points ranging from the 1970's to the 1990's, each subpopulation began to recover, but then each experienced renewed decline over approximately the past decade. Finally, Necker and Nihoa Islands counts remained very low into the 1970's, and thereafter have been fairly stable at Necker Island, whereas Nihoa Island has demonstrated increasing trends over the past decade.

Total population abundance is estimated in a variety of ways; each year, the most appropriate method for each site is determined according to the available data for that site. For example, at some sites and years, total enumeration is achieved (Baker *et al.* 2006). If all seals are not demonstrably identified, then capture-recapture methods are used as an alternate method (Baker 2004). If no capture-recapture estimator is appropriate for the data available, minimum abundance estimates are used. Finally, at Necker and Nihoa Islands, where at most a few beach counts are available each year, a correction factor is applied to counts to estimate abundance (Carretta et al. 2013). Table 3.3-1 presents abundance estimates in the NWHI in 2010, the most recent year for which a published stock assessment report is available (Carretta et al. 2013). The abundance of the six thoroughly monitored NWHI subpopulations has been falling 4.0% per year during recent years (Carretta et al. 2013).

Table 3.3-1 Abundance Estimates of Hawaiian Monk Seals in the NWHI in 2010 and Method Used to Estimate Abundance At Each Site As Indicated

Location	Abundance	Method
Kure Atoll	100	Capture-recapture
Midway Atoll	52	Total Enumeration
Pearl and Hermes Reef	179	Capture-recapture
Lisianski Island	174	Capture-recapture
Laysan Island	207	Total enumeration
French Frigate Shoals	195	Minimum
Necker Island	49	Corrected counts
Nihoa Island	102	Corrected counts

Figure 3.3-1 Hawaiian Monk Seal Mean Total Beach Counts 1958 - 2012



MHI Abundance and Trends

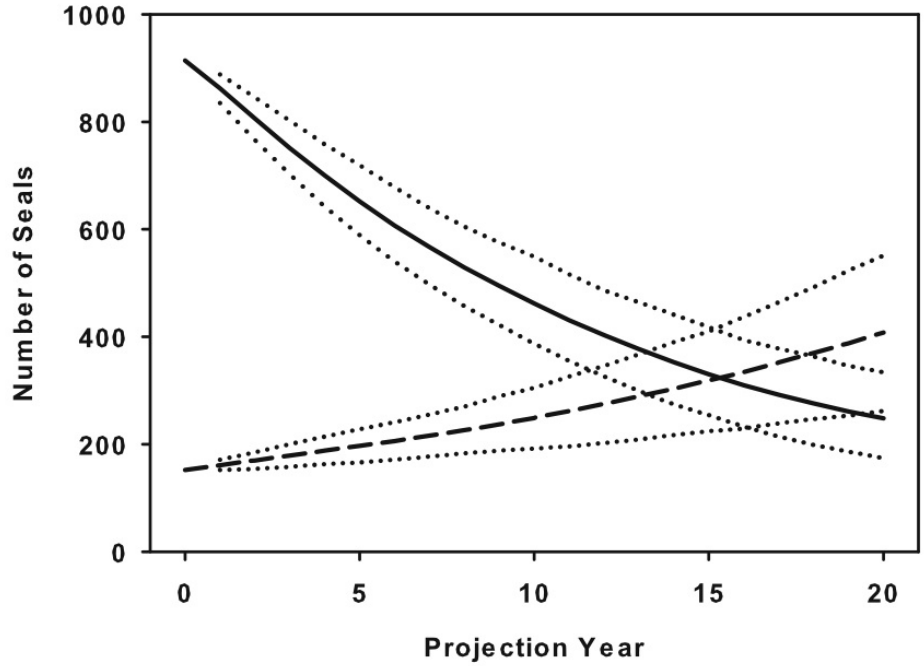
While most of the existing Hawaiian monk seals still live in the NWHI where abundance is falling, a smaller portion lives in the in MHI, and numbers in this region are on the rise. Prior to 2000, no systematic surveys of seals had been conducted in the MHI owing to the rarity of seals in the region. Kenyon and Rice

(1959) present a handful of MHI seal sightings from the first half of the 20th century. A seal was reportedly killed in 1900 in Hilo Bay on the island of Hawai`i, and subsequently eaten (H.W. Henshaw in Dill and Bryan 1912). Earlier reports of monk seal sightings in the MHI documented by Westerners have not been found. However, Rosendahl (1994) reported finding monk seal remains dating to between 1400 and 1760 on the island of Hawai`i, and there have been at least two other archeological findings indicating the presence of monk seals in the MHI. See Section 3.4.7.2 and Appendix M for more information on the significance of Hawaiian monk seals in Hawaiian archeology and Hawaiian culture.

Reports of seal sightings and births were increasing by the mid-1990's, which motivated the first systematic surveys in 2000 and 2001, when 45 and 52 seals, respectively, were counted from aircraft in the MHI (Baker and Johanos 2004). These counts were considered well below total abundance because like the beach counts described above, they did not account for animals in the water, and not every seal on land could be detected.

More recently, MHI monk seal population data have been collected by a network of individual volunteers, volunteer groups, partner agencies, and directed efforts by NMFS. Total seal abundance in the MHI is still not reliably estimated; however, the most recent published estimate was 152 seals in 2008 (Baker *et al.* 2011*a*). A population model estimates that the MHI population may be growing at 7% per year (Baker *et al.* 2011*a*). While the MHI monk seals still comprise a relatively small portion of the total species, their numbers are on the rise, whereas NWHI abundance is falling. Projections using a stochastic simulation model indicate that if current demographic trends continue, abundance in the NWHI and MHI will equalize in approximately 15 years (see Figure 3.3-2).

Figure 3.3-2 Stochastic Projection Simulation - Dotted lines indicate 95% confidence intervals for projections



Key: NWHI Projection
MHI Projection

Survival Rates

Survival rates of Hawaiian monk seals in the NWHI are very well-characterized because for well over two decades, most of the seals born have been tagged in their year of birth and resighted throughout their lives. Baker and Thompson (2007) characterize temporal and spatial variation in survival rates at six NWHI subpopulations. Because Necker and Nihoa Islands have been rarely visited, minimal marking and resighting of seals means that no survival rate information is available for these sites. Recently, sufficient numbers of seals have been studied in the MHI to obtain reliable estimates of survival in this region (Baker *et al.* 2011*a*).

The general lifetime pattern of survival for Hawaiian monk seals is as follows. After they are born, pups spend 5-7 weeks being nursed and cared for by their mothers. Pups are weaned abruptly when the mother leaves the pup on the birth island. From weaning on, the pups are entirely independent. Thus, the first interval for which survival is measured is from birth to weaning. Throughout most of the species range, pup survival during the nursing period is quite high—over 90% of pups born survive to weaning. The exception is at French Frigate Shoals, where for over a decade, typically a quarter to a third of pups has died each year prior to weaning. This anomalously high mortality is largely attributed to Galapagos shark predation (Gobush 2010).

In order to survive the first year after weaning, monk seal pups must learn to forage successfully, while avoiding predators and other risks. The first few years post-weaning is when survival rates are lowest, and in fact juvenile survival rates exert the most influence on overall population trends in the long term (Harting 2002).

First year cohort survival (the survival of a group of seals born all in the same year) in Hawaiian monk seals are highly variable, with observed rates spanning from only a few percent to 100 percent at given sites and year. Survival tends to rise as seals mature until they reach a peak "adult" survival rate at approximately age 3 years or older (this varies over space and time). Thereafter, seals enjoy high survival rate (typically over 90%) for most of the rest of their lives. After approximately age 17 years, a drop in survival rates, or senescence, occurs. Unlike in many other species, male and female monk seals tend to have equal survival. The one exception is that historically, survival rates of female seals at French Frigate Shoals tend to be slightly higher than that of males.

The foregoing describes the general pattern for the species; however, there has been a great deal of variability observed in survival rates over time and between subpopulations. At present, of utmost importance is that while juvenile survival rates are variable, they have been chronically low at all of the six best-studied NWHI subpopulations, which comprise the majority of the species. The low juvenile survival in the NWHI has indirectly contributed to further declines in abundance through a degradation of the age structure -- because few seals are maturing to reproductive age, the number of pups born has also been falling. Further, because low juvenile survival has prevailed sufficiently long to winnow the age structures, these declining trends will continue for years into the future even if juvenile survival improves.

In contrast to the low juvenile survival rates in the NWHI, young seals in the MHI are doing much better. For example, in recent years, survival from weaning to age 1 year in the MHI has averaged 77%, compared to only 42-57% in the NWHI (Baker *et al.* 2011*a*). It is important to note that, while this discrepancy in juvenile survival exists, adult survival rates are comparable and relatively high throughout the species range.

<u>Reproductive Rate</u>

As noted above, Hawaiian monk seals, like all pinnipeds, give birth at most annually to a single pup. Seals do have twins on rare occasions, though one or both twins typically do not survive (Schultz *et al.* 2011). Gross reproductive rates (the ratio of number of pups to number of adult females) vary from about 30% to 70%, and there is considerable variability between years and subpopulations (Harting *et al.* 2007). Age-specific reproductive (or fecundity) curves have been estimated for three NWHI subpopulations. Females in the NWHI typically have their first pup when they are 5 to 9 years old. Pupping rates rise to a plateau after about age 10 years, and then begin to decline in the late teens or later (Harting *et al.* 2007). Some variability in the age-specific curves amongst subpopulations appears to correlate with growth rates. That is, at sites where female seals grow to adult size more slowly, the onset of reproduction is also delayed. Consistent with this pattern, in the MHI where body condition and growth tends to be superior to the NWHI, sparse data suggest that females begin reproducing at a younger age and may achieve higher reproductive rates (Baker *et al.* 2011*a*).

<u>Genetics, stock structure, site fidelity and movement among subpopulations</u>

Hawaiian monk seals exhibit extremely low genetic diversity according to a variety of measures (Schultz *et al.* 2008). This is probably due in part to a population bottleneck associated with overexploitation in the 19th Century, but genetic diversity appears to have been low even prior to that time (Schultz *et al.* 2008). There is little indication of contemporary inbreeding, and Hawaiian monk seal subpopulations have exhibited robust growth at various times despite their low genetic diversity. Further, although the species is distributed in a metapopulation, there is no evidence of genetic population structure. That is, the species is comprised of a single, panmictic (unstructured) population (or "stock") (Schultz *et al.* 2011).

The lack of genetic population structure is consistent with movement patterns of seals amongst subpopulations. While the majority of seals prefer to stay in the subpopulation where they were born, some 4% to 18% of seals born in the NWHI have been observed at more than one subpopulation (Schultz *et al.* 2011). Seals tend to move more between relatively nearby subpopulations than between distant ones. Also, juveniles appear to range less widely compared to adults (Schultz *et al.* 2011). Though data are limited, there have been several observations of individual seals moving between the NWHI and MHI, and also the NWHI to Johnston Atoll (NMFS unpublished data). This mixing of seals from different subpopulations has resulted in sufficient gene flow to maintain panmixia (in other words, the species genes are fully mixed throughout its range) (Schultz *et al.* 2011).

3.3.1.4 Habitat Requirements

The Hawaiian monk seal requires both marine and terrestrial environments. While Hawaiian monk seals spend a majority of their time in the water, the terrestrial component of their habitat plays a vital role throughout all life stages. Monk seals use terrestrial habitat to haul-out for resting, molting, parturition (birthing), nursing and avoiding predators. Since monk seals may remain at sea for several days or more at a time, resting on land is essential to conserve energy. Resting commonly occurs on sandy beaches, but may also occur on rocky shores, rock ledges, emergent reefs, and even shipwrecks (Antonelis *et al.* 2006). While on shore, monk seals may take shelter from wind and rain under shoreline vegetation. Resting on land may last from a few hours to several days at a time (Antonelis *et al.* 2006).

Terrestrial habitat is essential for parturition (pupping) and nursing of pups. Pupping and nursing areas are usually sandy beaches adjacent to shallow protected water (Westlake and Gilmartin 1990). Individual females appear to favor certain pupping locations, returning to them year after year. Although the pup is able to swim at birth, nursing occurs on land and the mother-pup pair usually remains on land for the first few days after the pup is born. The mother gradually begins swimming with her pup in the shallows, returning to the general area around the pupping site. As weaning approaches, the mother-pup pair spends more time in the water, venturing further away from the pupping site. After weaning, pups typically remain in the shallows near their nursing areas for several weeks before venturing into deeper foraging areas (Kenyon and Rice 1959; Henderson 1988). During the annual one- to two-week molt period, seals spend most of their time on land shedding their skin and fur (Kenyon and Rice 1959).

Hawaiian monk seals use the marine environment for foraging, resting, thermoregulation, and social interaction, including mating. Observation of seals with animal-borne video cameras showed that nearly one-half of the time spent underwater was spent resting or interacting with other seals (Parrish *et al.* 2000). Resting may occur at sea or in shallow, submerged caves. Satellite-linked and other tracking technology indicate that monk seals are primarily, though not exclusively, benthic (bottom) foragers. They forage in marine habitats anywhere from 1-500 m depth and seem to prefer low-relief substrates such as sand and talus in areas of habitat uniformity. The seals appear to use all submerged habitat at least up to 500 m depth, including sea mounts, banks, marine terraces and a variety of reef habitats.

Critical Habitat

In 1986, critical habitat for the Hawaiian monk seal was designated at all beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reef waters, and ocean waters out to a depth of 10 fathoms (18.3 m) around Kure Atoll, Midway Atoll (except Sand Island), Pearl & Hermes Reef, Lisianski Island, Laysan Island, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island in the NWHI (51 FR 16047; April 30, 1986). In 1988, critical habitat was expanded to include Maro Reef and waters around previously designated areas out to the 20 fathom (36.6 m) isobath (53 FR 18988; May 26, 1988).

In 2008, NMFS received a petition to revise the Hawaiian monk seal critical habitat designation under the ESA. The petitioners sought to revise critical habitat by adding the following area types in the MHI: key beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reef waters, and ocean waters out to a depth of 200 m. In addition, the petitioners requested that designated critical habitat in the NWHI be extended to include Sand Island at Midway Atoll, as well as ocean waters out to a depth of 500 m (Center for Biological Diversity 2008).

In accordance with procedures outlined in the ESA (16 U.S.C. 1533), NMFS found that a revision was warranted and announced its intent to revise Hawaiian monk seal critical habitat on June 12, 2009 (74 FR 27988). Critical Habitat is defined under the ESA (16 U.S.C. 1532) and may include the following:

- Specific areas within the geographical area occupied by the species at the time of listing, on which are found those physical or biological features essential to conservation, and which may require special management considerations or protection; and
- Specific areas outside the geographical area occupied by the species if the areas are determined essential for conservation.

On June 2, 2011 (76 FR 32026) NMFS proposed to revise critical habitat for the Hawaiian monk seal by extending the current designation in the NWHI and by designating new areas in the MHI. Specific areas proposed for designation in the NWHI includes all beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reef waters and ocean waters out to the 500 meter (m) bathymetry line around the following: Kure Atoll, Midway Islands (not including Midway Harbor), Pearl and Hermes Reef, Lisianski Island, Laysan Island, Maro Reef, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island. Specific areas proposed for designation in the MHI includes marine habitat from 500 m depth bathymetry line (relative to mean lower low water), through the water's edge into the terrestrial environment where the inland boundary extends 5 m inland from the vegetation line.

3.3.1.5 *Foraging Ecology*

Foraging Behavior

Hawaiian monk seals feed on the sea floor from the shallows to over 500 m depths. Seal-mounted video camera ("Crittercam") images reveal that adult seals move large, loose talus fragments to capture prey underneath (Parrish *et al.* 2000). Seals appear to prefer this type of uniform habitat because of the prey available in those areas (Parrish *et al.* 2000). Studies in the NWHI (Parrish *et al.* 2002; Stewart 2006) have also shown that adult monk seals may forage at 300 – 500 m, sometimes visiting patches of deep corals (Parrish *et al.* 2002). The use of these deeper habitats may reflect monk seals taking advantage of readily available prey in a habitat with decreased interspecific competition (Parrish *et al* 2008).

Juvenile monk seals (1 – 3 years old) in the NWHI exhibit foraging behavior similar to that of adult monk seals. Feeding occurs both within shallow atoll lagoons (10 – 30 m) and on deep reef slopes (50 – 100 m), usually over sand rather than talus (Parrish *et al.* 2005). Video footage of juvenile seal foraging showed seals moving along the bottom flushing prey with a variety of techniques including probing the bottom with their nose, using their mouth to squirt streams of water at the substrate, and flipping small rocks with their heads and shoulders (Parrish *et al.* 2005). While juvenile seals are able to dive to depths similar to adults, the smaller seals likely do not yet have the size or experience to engage in the successful large talus-foraging behavior exhibited by adults (Parrish *et al.* 2005).

Use of satellite-linked telemetry and time-depth recorders has shown that Hawaiian monk seals primarily forage in areas of high bathymetric relief within 40 km (approximately 25 miles) of the atoll or island center and there is substantial overlap in the habitat use of monk seals at each site (DeLong *et al*. 1984; Abernathy and Siniff 1998; Parrish *et al*. 2000, 2002; Stewart *et al*. 2006). Submerged banks and reefs 24-322 km away from the breeding sites also are used by monk seals (Stewart *et al*. 2006). Foraging monk seals typically have dive durations of less than 8 minutes but some dives exceeding 20 minutes also have been observed (Abernathy and Siniff 1998; Littnan *et al*. 2004; Stewart and Yochem 2004a, b, c; Stewart *et al*. 2006). Foraging trip durations are highly variable with ranges from 13 hours to around 3 wks (Abernathy and Siniff 1998, Littnan *et al*. 2004).

Telemetry studies have revealed that seals in the MHI exhibit similar foraging behavior and habitat selection as seals in the NWHI (Littnan *et al*. 2006). However, MHI seals appear to have smaller home ranges, travel shorter distances to feed and spend less time foraging on average compared to NWHI seals.

Prey Species and Size

Hawaiian monk seals are foraging generalists, with a wide variety of prey taxa identified from fecal (scat) and regurgitate analysis. Some 31 families of teleost (bony) fishes and 13 families of cephalopods (octopus, squids and related species) were identified by Goodman-Lowe (1998) in monk seal scat. The prey families Congridae, Muraenidae, Holocentridae, Labridae, Scaridae, Acanthuridae, Balistidae, and Tetraodontidae are the most frequently occurring in monk seal scat and regurgitate samples (Goodman-Lowe 1998; Longenecker 2010). Monk seals consume a variety of crustaceans including multiple species of crab and lobster. A recent study found similar diets were consumed by monk seals in the NWHI and MHI (Cahoon et al. in press).

Fatty acid analysis of the monk seal diet has begun to identify an even broader number of prey species consumed by the Hawaiian monk seal (Iverson 2006). Fatty acid analysis studies have also demonstrated substantial variation in diet among individuals, demographic groups (between juveniles and adults/sub adults) and locations (Iverson 2006); indicating that individual monk seal foraging preferences and capabilities play a role in selection of foraging habitat. Scat and regurgitate analysis from the MHI indicate that the prey taxa selected by seals is similar throughout the archipelago (Cahoon *et al.* in press).

Studies of monk seal prey selection based upon scat/spew analysis and seal-mounted video revealed some evidence that monk seals fed on families of bottomfish which include commercial species (many prey items recovered from scats and spews were identified only to the level of family; Goodman-Lowe 1998; Longenecker *et al*. 2006; Parrish *et al*. 2000). Recent quantitative fatty acid signature analysis results support previous studies illustrating that monk seals consume a wide range of species (Iverson 2006). However, deepwater-slope species, including two commercially targeted bottomfishes and other species not caught in the fishery, were estimated to comprise a large portion of the diet for some individuals. Similar species were estimated to be consumed by seals regardless of location, age or gender, but the relative importance of each species varied. Diets differed considerably between individuals.

3.3.1.6 *Carrying Capacity*

The concept of carrying capacity (also known as K), refers to the stable number of individuals that a habitat or area is capable of supporting on a relatively long-term basis. In the classical sense, a population will begin to decline in abundance when it exceeds K and will grow when it is below K, thereby maintaining an average abundance of approximately K. A related concept, "density dependence", refers to changes in survival or reproductive rates that cause the population to grow or decline, respectively, when it is below or above K.

The ability of an area to support a population is a function of all of the resources and environmental attributes that characterize the habitat. For the Hawaiian monk seal, this would include terrestrial and marine foraging habitats, predator abundance, competition from other species, and all other factors that jointly influence the ability of an area to support seals.

There is a considerable body of scientific theory and literature pertaining to the concepts of carrying capacity and density dependence. However, with most species, including the monk seal, it can be exceedingly difficult to determine K with confidence. One approach is to observe how the population has historically grown or declined at various population sizes and infer where carrying capacity lies based on those observations. Alternatively, if much is known about the habitat requirements of a species, it may be possible to quantify habitat resources in terms of their ability to support that species (for example, the prey biomass required to sustain each seal) and estimate how many individuals can be supported by the available resources in a given area. This approach requires a very complete knowledge about the resource requirements of the species. Much is known about monk seal resource use from observation, at-sea tracking and dietary studies. Yet, there is insufficient knowledge to reliably predict how many seals can be supported in either the NWHI or the MHI.

Another factor which can confound estimation of carrying capacity is that it can change over time due to environmental fluctuations, human manipulation or other factors. Historically, we have seen a number of phases of growth and decline at all of the NWHI breeding sites. It is normal to expect some variation in how well a population performs due to random chance or normal environmental events. This is often referred as stochastic variation. However, extended periods of population growth or decline may reflect a long-term, persistent change in habitat capability or carrying capacity. This may be what has happened in the NWHI, where demographic rates, especially juvenile survival, have declined and remained low on average over the last decade. The environmental drivers responsible for these trends appear to be expressed most strongly through effects on juvenile survival.

Although carrying capacity of monk seals cannot be reliably estimated, observing certain indicators can suggest whether a population's size is above or below K. Eberhardt (1977) suggested a pattern in how long-lived species, such as the monk seal, regulate their abundance in accordance with habitat capability:

- The first demographic to change as a population approaches the size where it is limited by available resources is newborn or juvenile survival.
- This is followed by changes in the age of first birth, changes in the reproductive rates of mature animals, and finally changes in adult survival rates.

Whether monk seal populations fully adhere to this pattern is uncertain, but several observations do seem consistent with it. Survival of young animals has been the most volatile feature of the species' demographics. Age of first birth and reproductive rates have also varied among sites. Finally, adult survival is the one demographic measure that does not seem to have varied markedly; it is fairly good system-wide and it has historically been relatively stable. Consistent monitoring of all of these variables can suggest whether a population is above or below K and thereby help determine what interventions are most appropriate. Gradual changes in any of these population measures may suggest that population abundance is nearing K, but it can be difficult to distinguish normal annual variability from density dependent regulation of population size.

3.3.1.7 *Crucial and Serious Environmental and Anthropogenic Stressors/Threats*

<u>Prey Limitation</u>

Numerous lines of evidence indicate that prey limitation is the primary cause of poor juvenile survival in the NWHI, which is driving the current population decline. Phocid pup condition at weaning reflects how much mass and energy mothers are able to impart to their offspring both *in utero* and during the nursing period. Hawaiian monk seal girth at weaning indicates body condition at this key life stage. Larger girth (fatter) pups have a higher probability of surviving their first year of life post-weaning (Craig and Ragen 1999; Baker 2008). The monk seal population on French Frigate Shoals began to exhibit declining and then chronic poor juvenile survival by the early 1990's. Craig and Ragen (1999) found that pups weaned at French Frigate Shoals were smaller in girth and mass than those at Laysan Island, indicating that perhaps their mothers were not able to forage as efficiently. Weaned pups in the MHI, where food limitation is not thought to be a problem for seals, tend to be very much larger than those weaned in the NWHI (Baker and Johanos 2001).

Thin and emaciated juvenile seals are commonly observed in the NWHI indicating that these seals are unable to forage successfully. Most seal carcasses are not recovered; however when juvenile seals are found dead, they are often in poor body condition indicating food stress. Baker (2008) presented evidence that in years with poor survival of NWHI subpopulations, size-selective mortality was intensified, also suggesting that poor juvenile survival is related to food limitation of juveniles.

It is counterintuitive that seals should starve in this large no-take marine protected area known for its abundant and diverse marine life. There are a number of hypotheses regarding why juvenile monk seals struggle to find sufficient prey in the NWHI. Climate-ocean conditions appear to lead to variable primary productivity and, consequently, variable prey for top predators such as monk seals (Polovina *et al*. 1994; Antonelis *et al*. 2003; Baker *et al*. 2007; Polovina *et al*. 2008a; Baker *et al*. 2012).

In addition to the possibility that less total prey is available, it has been hypothesized that juvenile monk seals may be disadvantaged by competition with other species of top predators. Large sharks and jacks (*Caranx sp.*) are extremely abundant in the NWHI compared to the MHI (Friedlander and DeMartini 2002). There is a dietary overlap between these apex predator fishes and monk seals, and direct competition of seals and these fishes has been documented on video (Parrish *et al*. 2008). Baker and Johanos (2004) hypothesized that both low intra- and inter-specific competition might explain why monk seals in the MHI seem to enjoy higher juvenile survival and better body condition.

Food limitation may limit monk seal populations not only through its effects on survival, but also through reproductive effects. It is thought that when food is more limited, animals grow more slowly and reach maturity at a later age. They may also continue to reproduce at a lower frequency when food is limited. Observed monk seal reproductive patterns are consistent with food limitation in the NWHI. Harting *et al*. (2007) found that patterns in age-specific reproductive curves amongst NWHI subpopulations were coherent with overall population trends. For example, at French Frigate Shoals (rapidly declining population), female seals start having pups later and achieve lower reproductive rates than at Laysan Island (until recently a more stable population). More recent evidence suggests that seals in the MHI mature earlier and may have higher reproductive rates than in the NWHI (Baker *et al*. 2011 *a*). Consistent with this, seals in the MHI tend to grow to adult size at a younger age than those in the NWHI (Baker *et al*. 2011*a*).

<u>Entanglement</u>

Most of the derelict fishing gear and marine debris collected and documented in the NWHI is from fishing or other maritime industries, and most net debris appears to be trawl webbing. Because no trawl or gillnet (other than reef lay gillnet) fishing occurs in the NWHI, it is assumed that virtually all derelict fishing debris has been transported by ocean currents from distant fisheries around the North Pacific Ocean. The Hawaiian Archipelago is situated in the convergence zone of the North Pacific subtropical gyre, and debris is carried towards the islands by wind-driven currents and circulation of water from the eastward flowing North Pacific Current to the westward flowing North Equatorial Current (Donohue *et al*. 2001). More debris is deposited by a strengthening of the convergence zone in Hawaiian waters during ENSO events (Donohue and Foley 2007).

Marine debris and derelict fishing gear have been well documented to entangle monk seals, and monk seals have one of the highest documented entanglement rates of any pinniped species (Henderson 2001). Entangled seals may drown, strangle, sustain severe wounds, or be immobilized by debris anchored to substrate. Entangled seals also experience increased hydrodynamic drag when traveling and foraging, thus increasing their energy use and reducing foraging efficiency. They may also be more vulnerable to shark attack. Some seals free themselves or are disentangled by human responders. Estimates of entanglement rates are based almost exclusively on observations of animals encountered on shore. However, interactions between monk seals and marine debris occur at sea and at times of the year when researchers are not in the field. Therefore, observed entanglement rates underestimate the actual rate.

Proportionally, pups and juveniles, probably because of their inquisitive nature, are more likely than older seals to become entangled (Henderson 2001). From 1982 to 2010, a total of 311 cases of seals entangled in fishing gear or other debris have been observed, many of which involved injuries and eight of which resulted in confirmed mortalities (Carretta et al. 2013). Most of the entangled seals were either released by researchers or escaped on their own. As there is no basis for estimating the frequency of undetected entanglements, it is not possible to estimate total mortality attributable to entanglement.

Despite ongoing efforts to remove entanglement hazards from the beaches and waters of Hawai`i, entanglement rates remain variable but show no signs of declining. Of the six main NWHI subpopulations, Lisianski Island tends to suffer the highest rates of entanglement, whereas debris entanglement in the MHI appears to be rarer. Though over 500 metric tons of marine debris has been removed from the reefs and beaches in the NWHI, accumulation of incoming debris poses a persistent hazard for monk seals and other NWHI biota (Dameron *et al*. 2007).

Shark Predation

Sharks are the only known predators of Hawaiian monk seals. Shark injuries and scars from old injuries can be seen on many monk seals, and shark predation has been observed occasionally (Bertilisson-Friedman 2006; Wirtz 1968; Balazs and Whittow 1979; Alcorn and Kam 1986; Hiruki *et al*. 1993a). These incidents of predation or wounding of monk seals of all ages have been attributed to tiger sharks. Because tiger shark predation on monk seals occurs at sea, where the prey is also consumed, it is not possible to quantify the amount of mortality attributable to tiger sharks. Seals that survive attacks and are wounded and observed on shore constitute the only observable evidence of tiger shark predation.

However, beginning in 1997 a marked increase in shark predation on nursing and recently weaned monk seal pups at French Frigate Shoals has been noted. At Trig and Whaleskate Islands (small islets within French Frigate Shoals), the number of predation mortalities from sharks (including both confirmed and inferred losses) peaked between 1997 and 1999 (Gobush 2010). Additional pups were permanently maimed by severe shark bites that likely reduced the seals' ability to dive, forage and reproduce. After 1999, pre-weaned pup mortalities from sharks declined but pups were still being killed at an unsustainable level. Between 2000 and 2009, the number of pup losses (confirmed and inferred) at French Frigate Shoals atoll-wide was at 6–11 pups per year. As fewer pups have been born each year for the last several years, the numbers of pups lost to predation has exacted an increasingly heavy toll. Since 2000, 15–28% of the incoming French Frigate Shoals cohort has been lost each year to shark predation. From 1997 through 2009, 205 of 835 pups born at French Frigate Shoals (24.6%) were involved in shark incidents (Gobush 2010). Periods of intensive observation over more than a decade have confirmed that the Galapagos shark is the primary species predating nursing monk seal pups at French Frigate Shoals although some pups may also be taken by tiger sharks (Gobush 2010).

Observations at other subpopulations in the NWHI indicate that shark related injury and mortality of nursing and recently weaned pups occurs primarily at French Frigate Shoals. As was noted, the degree of threat posed by tiger shark predation is unknown, but prevailing levels of Galapagos shark predation are a severe threat to the French Frigate Shoals subpopulations. The number of seals at this atoll has been declining for over 20 years due to poor juvenile survival, largely attributable to food limitation. As recruitment of new adults has been chronically low, the number of pups born at French Frigate Shoals has fallen from nearly 120 per year to less than 40 per year. NMFS has pursued a variety of means of reducing Galapagos shark predation at this atoll, including deterrence, harassment, targeted removals of sharks preying on seals, and within-atoll translocation of weaned pups to areas where predation is rare (Gobush 2010). Nevertheless, unsustainable levels of predation continue.

Climate Change

Sea-level rise poses the most compelling threat to Hawaiian monk seals that is associated with climate change. Terrestrial habitats in the NWHI consist largely of low-lying oceanic sand islands (cays) and atolls, which are required for monk seal pupping, nursing, resting and molting.

The low-lying land areas of the NWHI are highly vulnerable to sand erosion due to storms and sea-level rise. Global sea-level rise reduces cays by passive flooding, active coastal erosion, and in concert with seasonal high swell. As a result, the subaqueous land area supporting these important littoral and coastal ecologies is at risk. Demonstrating this, islands at one NWHI atoll, French Frigate Shoals, have been greatly reduced in size during roughly the past 40 years for reasons not well understood, as this occurred during a period when sea level rose relatively little (Antonelis *et al*. 2006). An example of this is the effective disappearance of Whaleskate Island, which had been important habitat for turtles and seals.

Concerns about sea level rise in the NWHI motivated a study to project what might happen as global sea level increases in the future. Baker *et al*. (2006b) produced the first NWHI topographic maps in three locations (Lisianski Island, Pearl and Hermes Reef, and French Frigate Shoals). They then used passive flooding scenarios to estimate the area that would be lost if islands maintained their current topography and the sea were to rise by various amounts predicted by the Intergovernmental Panel on Climate Change (IPCC) (Church *et al*. 2001). The projected effects of sea level rise on surface area varied considerably among the islands examined and depending upon the sea level rise scenario. For example, Lisianski Island is projected to be the least affected of the islands surveyed, losing only 5% of its area even under the maximum rise scenario examined. In contrast, the islets at French Frigate Shoals and Pearl and Hermes Reef are projected to lose between 15 and 65% of their area under the median sea level rise scenario.

The uncertainty of predictions increases over time, but the expectation is that sea level will continue to rise beyond 2100 (Church *et al*. 2001). Moreover, recent evidence suggests that sea level may rise more rapidly than previous models have predicted, due in part to an accelerated rate of ice loss from the Greenland Ice Sheet (Rignot and Kanagaratnam 2006). The loss of key terrestrial habitats could lead to declines and shifts in distribution of monk seals in the NWHI.

A new set of high resolution topographic maps and estimation of potential sea level rise impacts was recently published by Reynolds et al. (2012).

Other aspects of climate change could impact Hawaiian monk seals either positively or negatively, and the balance of future such effects cannot be predicted at this time. However, some effects of climate-ocean variability on monk seals have been documented. Antonelis *et al*. (2003) found evidence that El Niño events may enhance foraging conditions for monk seals as reflected in weaned pup condition. However, Donohue and Foley (2007) found that monk seal entanglement rates tended to increase in El Niño years. Baker *et al*. (2007) found that juvenile monk seal survival in the northern portion of the NWHI was related to variability in the southern extent of the Transition Zone Chlorophyll Front, a large-scale seasonal oceanographic feature that brings relatively productive waters into the region in winter. Baker et al. (2012) also found that trends in abundance of several NWHI subpopulations were associated with Pacific Decadal Oscillation regimes. Polovina *et al*. (2008b) present evidence that low productivity areas of the worlds oceans, including a region encompassing the NWHI, appear to have expanded in recent years.

Male Aggression

During the 1980s and early 1990s, injuries and deaths of female monk seals caused by multiple-male aggression (or "mobbing") attacks inhibited population recovery at Laysan Island (Banish and Gilmartin 1992). These attacks occur when several adult males aggregate and attempt to mount and mate with a single seal. The frequency of multiple-male aggression appears to be related to an imbalance in adult sex ratios, with males outnumbering females. Prior to 1994, the sex ratio at Laysan Island was skewed to males at a time when Hiruki *et al*. (1993a) showed females at Laysan Island were injured by males at three to four times the frequency of that observed at French Frigate Shoals. Hiruki *et al*. (1993b) reported that adult male inflicted injuries on females resulted in increased mortality. Additionally, a wounded female's reproductive success in the year of injury appeared to be influenced by the severity of her injuries.

To mitigate multiple-male aggression, two groups of adult male seals were translocated from Laysan Island (Johanos *et al*. 2010). During 1984-1994, a total of 37 adult males were selectively removed and either translocated to Johnston Atoll, taken into permanent captivity or translocated to the MHI (two of the males died either in the capture or holding process at Laysan Island). Mitigation of male aggression may also involve researchers intervening to drive a male off if an attack is observed and judged to pose sufficient risk to the pup. Three males known to have killed one or more pups at French Frigate Shoals have been removed (one male lethally removed in 1991, two males translocated to Johnston Atoll in 1998). None of the translocated males have returned to their original locations (Baker *et al*. 2011*b*). Following the 1998 translocations, a marked drop in pup losses to male aggression occurred (Baker *et al.* 2011*b*). Again at Kure Atoll in 2011, a high degree of male aggression against pups was observed. A known Kure male aggressor was captured and brought into captivity in early 2012; subsequently no pups were observed injured in 2012 beyond normal scratches weaned pups often exhibit.

Another mitigation approach for multiple male aggression using a drug to reduce testosterone levels in males was investigated in both captive and field settings (Atkinson and Gilmartin 1992; Atkinson *et al*. 1993, 1998). Captive trials demonstrated effective testosterone suppression and a pilot field trial was subsequently performed (Atkinson *et al*. 1998). However, translocation was chosen as the preferred mitigation measure for a number of reasons. Each male had to be captured and injected a number of times over the course of the breeding season in order to maintain low testosterone levels, which would have resulted in an unacceptable level of disturbance to the general seal population. Also, it was not determined whether the reduction in testosterone led to the desired reduction in aggression. This approach may be pursued further, perhaps with more long-acting drugs in the future.

Prior to 1984, there were more than two adult males for each adult female at Laysan Island. Male removals and natural processes reduced the sex ratio to just under one male per female after 1994. Before the removals, an average of 4.1% (range 0 to 12.9%) of adult females died from male aggression annually. Up to eight females were being killed per year. Both the proportion and the absolute number of injuries and deaths declined after this date. Although some adult females continue to sustain severe mounting injuries, the proportion of females that were lost decreased to 0.3% per year (range 0 to 2.6%), and only three females are believed to have been killed through 2005. From 2008 to 2010 one or two adult females per year apparently died due to male aggression at Laysan Island. The loss of any adult females is considered a serious threat to population recovery and death due to male aggression are still occurring at Laysan Island. Even though the sex ratio is approximately even at this time, multiple male aggression remains a concern.

Attacks by single adult males have resulted in several monk seal mortalities. This form of single male aggression occurs at most or all locations and appears to involve behavior which ranges from normal pinniped male harassment of younger animals, to an aberrant level of focused aggression, especially directed toward weaned pups. This was most notable at French Frigate Shoals in 1997, where at least eight pups died as a result of adult male aggression (Carretta *et al*. 2005). Many more pups were likely killed in the same way, but the cause of their deaths could not be confirmed. When single male aggression results in deaths, it is typically due to drowning when pups are mounted in the water, or from infection of bite wounds.

Infectious Disease and Parasites

Infectious Disease

Historically, infectious diseases have not been recognized as a major mortality factor for Hawaiian monk seals. NWHI baseline epidemiological surveys were conducted between 1997 and 2001 at all six major sub-populations (Gilmartin *et al*. 1980; Aguirre *et al*. 1999; Aguirre 2000; NMFS unpublished data). Biomedical sampling and epidemiological investigations through 2001 have demonstrated evidence of exposure to some potential pathogens. Annual monitoring of seal survival, as well as evaluation of pathology through necropsies and histology, have not identified evidence of significant infectious disease related mortality.

To date, there has been limited investigation of the health and disease of monk seals in the MHI (Littnan *et al*. 2006). Relative to the NWHI, Hawaiian monk seals in the MHI may be at risk of increased exposure to several infectious disease agents associated with terrestrial animals that are known to cause disease in other marine mammals and to contaminate marine habitats via runoff. Infectious diseases considered to pose the highest risk to the MHI monk seal population are toxoplasmosis, *Leptospira sp*., marine *Brucella spp*. and possibly canine distemper virus (morbillivirus). The emergent threat of West Nile Virus (WNV) is a serious concern: although this disease has yet to be detected in Hawai`i. There remains a high risk for exposure and there is a case report of WNV killing a captive monk seal in Texas. Other phocids are also susceptible to WNV morbidity and mortality. *Salmonella* and several potentially pathogenic agents found in domestic animals also could have the capacity to infect monk seals in the MHI. Further, seals overlap substantially in their use of coastal habitats and are seen on beaches near each other. For example, adult male seals cruise shorelines in search of potential female mates. This suggests that diseased seals could infect healthy seals throughout the MHI.

Monk seals at any location in the archipelago could be exposed to diseases such as morbilliviruses via contact with infected marine mammals. Migrating cetaceans are known to travel from areas of endemic morbillivirus to monk seal habitat, and one recently stranded cetacean in Hawai`i tested positive for morbillivirus (NMFS unpublished data). There are two confirmed records of juvenile northern elephant seals in the MHI, one in the NWHI (Midway Atoll) and other reported sightings (Tomich, 1986; NMFS unpublished data). Elephant seals are known to carry lungworm and other parasites and pathogens that could result in disease in monk seals. In 2012, a northern fur seal was found in the MHI. NMFS captured the animal and it was flown to a rehabilitation facility in California and released there. The seal tested negative for morbillivirus (NMFS unpublished data).

In summary, infectious diseases do not appear to be currently limiting recovery of the monk seal. However, the threat they pose has high potential for causing devastating impacts should a disease outbreak occur. Monk seals and Hawaiian hoary bats are the only native mammals that occur on the islands. Until humans and the mammals they brought with them arrived, monk seals had likely been isolated from many terrestrial mammalian diseases. This fact, plus the lack of genetic variation in the monk seal (Schultz *et al*. 2009), may make the species highly vulnerable to new disease outbreaks (Yochem *et al*. 2004). Coupled with this, the mobility of seals could facilitate the spread of any outbreak of a disease or pathogen transmissible from seal to seal throughout the archipelago.

To prepare for an infectious disease outbreak or other contingencies, an Unusual Mortality Event (UME) plan has been prepared (Yochem *et al*. 2004). Protocols have been developed for a variety of procedures including anesthesia, sample collection and banking, and necropsy examinations, and training has been instituted for field staff. Archives of tissues and samples have been developed by sampling all animals sedated for research purposes and by performing complete necropsies on all dead animals found. Cell cultures of skin, brain, lung, kidney and spleen have been established in laboratories for potential future analysis and isolation of pathogens.

Parasites

The predominant parasites identified in monk seals are gastrointestinal: tapeworms (*Diphyllobothrium spp.*), nematodes (*Contracaecum spp.*), and an acanthocephalan species (Rausch 1969; Dailey *et al*. 1988). Gastrointestinal parasites are very common in wildlife, including pinnipeds, and their presence is not necessarily indicative of poor health. However, Reif *et al*. (2006) reported that young seals infected with *Diphyllobothrium spp*. (tape worms) tended to be in poorer body condition than those uninfected, and proposed that "intervention strategies to reduce the gastrointestinal parasitic worm (helminth) burdens in immature animals should be considered as a conservation measure." Ulceration of the stomach associated with nematode infection has been reported (Whittow *et al*. 1980) and is a common finding (Braun, NMFS, personal communication). Even though internal parasites are not identified as a cause of death, they have been shown to be significant stressors in many other species, and survival rates as well as body condition are known to improve in most domestic species with anthelminic treatment. In 2009, field studies to test the effectiveness of deworming medications to reduce parasite burden, improve body condition and ultimately improve survival of juvenile seals were initiated (Gobush *et al.* 2011). These studies are ongoing.

Contaminants

Persistent organic pollutants (POPs) originate from anthropogenic substances such as pesticides, industrial chemicals, and flame retardants, or occur as chemical byproducts (Bard *et al*. 1999). Although many POPs have been banned from use in North America and Western Europe, some nations still use these substances. POPs are persistent in the environment due to their long half-lives and resistance to degradation. POPs are lipophilic and tend to accumulate in the blubber and other fatty tissues of animals. Contaminants are often measured in blubber, liver, and blood of animals because these are tissues in which the contaminants concentrate or which are relatively easy to obtain from live animals. Hawaiian monk seals, like other mammals, accumulate POPs such as polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), and polybrominated diphenyl ethers (PBDEs) in their tissues through nursing when young and through their diet later in life.

Three studies have quantified POPs in Hawaiian monk seal tissue but none have yet assessed effects of these compounds on the seals. The first study investigated PCB and DDT levels in the serum and blubber of 46 individual seals from French Frigate Shoals (Wilcox *et al*. 2004). The presence and levels of 14 PCB congeners, DDT and DDT metabolites was examined. This study found patterns in contaminant level associated with the sex and age-class of the seals. Adult males had significantly higher PCB levels than reproductive adult females and immature seals of both sexes. Only one DDT metabolite (p,p'-DDE) was detected in the blubber, and none in any serum samples. Age, sex, reproductive history, and minimum number of pups were not significantly correlated with PCB levels in the blood or blubber (Wilcox *et al*., 2004). The second study investigated contaminant levels in whole blood and blubber of 158 individual seals from four NWHI populations (French Frigate Shoals, Laysan Island, Pearl and Hermes Reef, and Midway Atoll). This study also found patterns in contaminant levels relating to life history traits of the seals. Adult males and juveniles from Midway Atoll were found to have higher total PCB levels compared to individuals of the same age and sex from the three other NWHI sites tested (Ylitalo *et al*. 2008). The most recent study measured persistent organochlorine pollutants in MHI monk seals (Lopez *et al.* 2011).

Multiple studies have shown links between contaminant exposure and detrimental health effects such as reproductive impairment, immune dysfunction, and cancer in several pinniped species (northern fur seals: Beckmen *et al*. 2003, harbor seals: De Swart *et al*. 1994, California sea lions: Ylitalo *et al*. 2005 and DeLong *et al*. 1973). Although contaminant exposure is often discussed as a correlate to these sub-lethal effects, a causative relationship can be difficult to determine without experimental data. Of the studies above in which contaminant effects (or correlations with contaminant levels) were detected, only the Ylitalo *et al.* (2005) study was comparable (in terms of tissue, age class, and units measured) to the monk seal studies. Summed PCB and DDT levels were approximately one or two orders of magnitude higher in the California sea lions Ylitalo *et al.* (2005) analyzed compared to the contaminant levels measured in the two NWHI monk seals studies.

<u>Human –Caused Mortality and Serious Injury</u>

Human-related mortality has caused two major declines of the Hawaiian monk seal (Ragen 1999). In the 1800s, this species was decimated by sealers, crews of wrecked vessels, and guano and feather hunters (Dill and Bryan 1912; Wetmore 1925; Bailey 1952; Clapp and Woodward 1972). Following a period of at least partial recovery in the first half of the 20th century (Rice 1960), most subpopulations again declined. This second decline has not been fully explained, but long-term trends at several sites appear to have been driven both by variably oceanic productivity (represented by the Pacific Decadal Oscillation, or PDO) and by human disturbance (Baker et al. 2012, Ragen 1999; Kenyon 1972; Gerrodette and Gilmartin 1990).

Currently, human activities in the NWHI are limited and human disturbance is relatively rare, but human-seal interactions, have become an important issue in the MHI. Intentional killing of seals in the MHI is a relatively new and alarming trend. In 2009, three seals (including a pregnant female) were shot and killed in the MHI (Baker et al. 2011). In 2010, a juvenile female seal died on Kauai due to multiple skull fractures caused by blunt force trauma. Whether this was an intentional killing or an accidental occurrence (e.g., boat strike) is not known. In 2011, two seals were found on the same general area of Molokai dead with skull fractures from blunt force trauma. Recently a new law was passed imposing strict penalties of up to $100,000 fine and 40-year imprisonment term for conviction of intentionally killing or harming monk seals, now a Class C Felony (Hawai`i Senate Bill 2441, sponsored by Kaua'i Senator Gary Hooser).

In contrast to directed killing, repeated disturbance of seals on MHI beaches might cause individuals to avoid habitats they might otherwise use. Seals have also been attacked by pet dogs, posing a risk of trauma to both animals as well as a risk of disease transmission. Finally, at least three young Hawaiian monk seals in the MHI became socialized to humans to the point where they sought out people in the water and on land for social interaction, including play. Seals have also been fed by people. When these situations became unmanageable risks to public safety, two of the seals were translocated away from the MHI, and a third was placed in captivity (Baker *et al.* 2011*b*). In each case, the seals involved were lost from the MHI population. Many other stories of these and other types of human-seal interactions in the MHI have been reported, though the frequency and nature of these events is essentially unknown.

Fishery interactions with monk seals can include direct interaction with gear (hooking or entanglement), seal consumption of discarded catch, seals being fed by divers, and seals taking fishers' catch from lines, nets and spears. Entanglement of monk seals in derelict fishing gear, which is believed to originate outside the Hawaiian Archipelago, was already described above. Fishery interactions are a serious concern in the MHI, especially involving State of Hawaii managed nearshore fisheries. Nearshore gillnets have become a more common source of mortality in recent years. Three seals have been confirmed dead in these gillnets in recent years (2006, 2007, and 2010), and one additional seal in 2010 may have also died in similar circumstances but the carcass was not recovered. Several cases of seals with embedded hooks are observed each year in the MHI, many of which involve hooks used to catch ulua (jacks, *Caranx* spp.). Most reported hookings and gillnet entanglements have occurred since 2000 (NMFS unpubl. data). NMFS received public comments during the scoping period for this Programmatic Environmental Impact Statement (PEIS) stating that monk seal interactions with fisheries or fishing gear are on the rise in the MHI (see Appendix B, Scoping Report). Consistent with this, in 2011, 9 seals were observed hooked, and in 2012, 14 seals were observed hooked (3 of which died as a result), and 1 was entangled in gillnet. In 2013, by 20 March, 5 seals were already observed hooked (1 of which died) and another had a fishing spear embedded in its head.

No mortality or serious injuries have been attributed to the MHI bottomfish handline fishery. Yet total fishery mortality and serious injury cannot be considered to be insignificant and approaching a rate of zero. Monk seals are being hooked and entangled in the MHI at a rate which has not been reliably assessed. The information above represents only reported direct interactions, without purpose-designed observation effort the true interaction rate cannot be estimated.

There are currently no fisheries operating in or near the NWHI. In the past, interactions between the Hawai`i -based domestic pelagic longline fishery and monk seals were documented (NMFS 2002). This fishery targets swordfish and tuna and does not compete with Hawaiian monk seals for prey. In October 1991, in response to 13 unusual seal wounds thought to have resulted from interactions with this fishery, NMFS established a Protected Species Zone extending 50 nautical miles around the NWHI and the corridors between the islands. Subsequently, no additional monk seal interactions with either the swordfish or tuna components of the longline fishery have been observed. Possible reduction of monk seal prey by the NWHI lobster fishery has also been raised as a concern, though whether the fishery indirectly affected monk seals remains unresolved. However, the NWHI lobster fishery closed in 2000. In 2006, the NWHI (later renamed Papahānaumokuākea) Marine National Monument was established. Subsequent regulations prohibited commercial fishing in the

Monument, except for the bottomfish fishery (and associated pelagic species catch), which is authorized until June 2011 but has been voluntarily closed since 2009.

Hawaiian monk seal research and enhancement efforts have also resulted in mortalities. From 1982 to 1994, 23 seals died during rehabilitation efforts. Most of these involved seals brought into captivity for rehabilitation when they were already in exceedingly poor health. Thus, some portion of these seals would have certainly also died if they had not been brought into captivity. Additionally, two other seals have died in captivity, two adult males died when captured for translocation to mitigate male aggression, one was euthanized (an aggressive male known to cause mortality), four died during captive research and four died during field research (Baker and Johanos 2002; Carretta et al. 2013).

3.3.1.8 Hawaiian Monk Seal Recovery Plan

In 1976, the Hawaiian monk seal was listed depleted under the MMPA of 1972 and as endangered under the ESA of 1973. Section 4(f) of the ESA directs the responsible agency to develop and implement a Recovery Plan, unless such a plan would not promote the conservation of a species. NMFS determined that a recovery plan would promote the conservation of the Hawaiian monk seal. The first recovery plan was completed in March 1983 (Gilmartin 1983) by the Hawaiian Monk Seal Recovery Team (HMSRT), which included experts on marine mammals from the private sector, academia, and government, as well as experts on endangered species conservation and other stakeholders such as fisheries managers. In 1989, the HMSRT was reconstituted and reconvened, and it met nearly every year through spring 2001, with its primary function to review management and research activities aimed at recovery and to make recommendations to NMFS. A new HMSRT was appointed in fall 2001 and charged with preparing a revised recovery plan (NMFS 2007).

1983 Hawaiian Monk Seal Recovery Plan

The 1983 Hawaiian Monk Seal Recovery Plan (Gilmartin 1983) outlined five objectives: 1) identification and mitigation of factors causing decreased survival and productivity; 2) characterization of habitat, including foraging areas; 3) assessment and monitoring of population trends; 4) documentation and mitigation of negative effects from human activities; 5) implementation of conservation oriented management actions; and 6) development of educational programs to enhance public conservation efforts. The plan also assessed the threats and set research priorities.

Despite these efforts, the population continued to decline and the plan was revised in 2007.

2007 Revised Hawaiian Monk Seal Recovery Plan

The 2007 Recovery Plan contains: 1) a comprehensive review of Hawaiian monk seals status and ecology; 2) a review of previous conservation actions; 3) a threats assessment; 4) biological and recovery criteria for downlisting and delisting; 4) actions necessary for the recovery of the species; and 5) estimates of time and cost to recovery.

The threats impacting Hawaiian monk seals were assessed based on severity and magnitude, as well as the scope and geographic range and have been described in more detail in Section 3.3.1.7. Determining which threat had higher concern regarding its current and potential impact to Hawaiian monk seals was intended to improve the ability to implement effective management actions and increase the probability for a successful recovery. Threats were classified into the following categories:

Crucial threats are ongoing sources of mortality that are apparent at most sites in the NWHI, and include:

- Food limitation;
- Entanglement; and
- Shark predation.

Serious threats are ongoing impacts with the potential for a range-wide concern, and include:

- Infectious diseases;
- Habitat loss;
- Fishery interaction;
- Male aggression; and
- Human interaction.

Moderate threats have possible, localized impacts, but are not considered to be a serious or immediate cause of concern.

- Biotoxins;
- Vessel groundings; and
- Contaminants.

The Recovery Program identified over 100 actions required to alter the trajectory of the Hawaiian monk seal population, grouped into 14 categories (Table 3.3-2). Please see the executive summary of the 2007 Hawaiian Monk Seal Revised Recovery Plan, as well as the document itself, for further details.

Priorities were assigned to each action in the implementation schedule. In compliance with NMFS' Endangered and Threatened Species Listing and Recovery Priority Guidelines (55 FR 24296), all recovery actions were assigned priorities based on three categories: (P) actions necessary for protection; (I) interventions, and; (R) research needs.

Priority 1 actions are, by definition, those actions "that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future." Priority 2 actions are defined as "an action that must be taken to prevent a significant decline in species population/habitat quality or some other significant impact short of extinction." Priority 3 actions are defined as "all other actions necessary to provide for full recovery of the species."

The implementation schedule identified 57 Priority 1 actions: 28 research, 23 intervention, and 14 protection. (Some actions are assigned to more than 1 or more categories). For a complete list of the actions and priorities, please see the table in Section V of the 2007 Hawaiian Monk Seal Revised Recovery Plan.

Current Research and Enhancement Priorities

Table 3.3-2 lists the 14 major recommended action categories identified in the 2007 Recovery Program. Each recommended action has a number of sub-actions that detail specific research programs, intervention actions and/or protection measures for that action. Actions 1-11 are short-term actions; Actions 12 and 13 are recommended essential long-term actions. The 2007 Revised Hawaiian Monk Seal Recovery Plan provides a narrative description of each action/sub-action and a discussion of the issues for each.

Table 3.3-2 All Recovery Action Categories for Hawaiian Monk Seals

Action Number	Action Description
1)	**Investigate and Mitigate Factors Affecting Food Limitation**
2)	Prevent entanglements of monk seals
3)	**Reduce shark predation**
4)	**Prevent introduction and spread of infectious decrease**
5)	**Conserve Hawaiian monk seal habitat**
6)	**Reduce Hawaiian monk seal interactions with fisheries**
7)	**Reduce male aggression toward pups/immature seals and adult females**
8)	Reduce the likelihood and impact of human disturbance
9)	Investigate and develop response to biotoxin impacts
10)	Reduce impacts from compromised and grounded vessels
11)	Reduce the impact of contaminants
12)	**Continue population monitoring and research**
13)	**Create a Main Hawaiian Islands Hawaiian Monk Seal Management Plan**
14)	Implement the Hawaiian Monk Seal Recovery Program

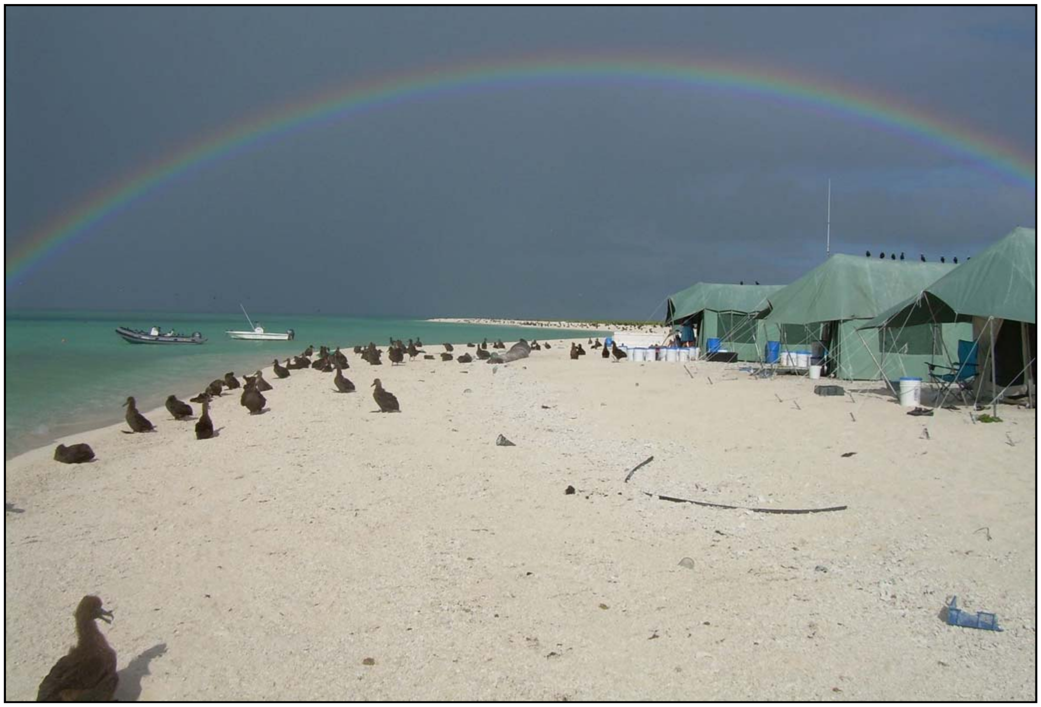
Note: Actions in **BOLD** type have sub-actions with Research Priority 1. See text for description of priority level.
Source: NMFS 2007

3.3.1.9 Field Camps Associated with Hawaiian Monk Seal Research and Enhancement Activities

NMFS conducts Hawaiian monk seal research and enhancement activities at remote field stations in the NWHI (Papahāunamokuākea Marine National Monument [Monument]), typically between April and August each year, though timing varies depending on program funding, logistics and program goals. There are a total of six field stations located at Kure Atoll (Green Island), Midway Atoll (Sand Island), French Frigate Shoals (Tern Island), Pearl and Hermes Reef (Southeast Island), Lisianski Island and Laysan Island (see Figure 3.3-4). The field camps located at Pearl and Hermes Reef, French Frigate Shoals, and Laysan and

Lisianski Islands are operated out of temporary seasonal tents while camps at the other locations are operated out of permanent buildings that were previously used for other purposes. The number of people at each location varies from project to project and year to year but the total number in all camps averages approximately 15 – 17 people total.

Figure 3.3-3 Seasonal Field Camp of South East Island Pearl & Hermes Reef



Source: Jessica Lopez, NMFS 2010

Transportation of personnel, equipment, and supplies to and from the field camps is usually provided by one of two vessels (based on availability), NOAA ship Oscar Elton Sette or the M.V. Kahana. Visits by these large (approximately 200 ft) ships to the NWHI field camps are typically limited to twice per year, deployment (April or May) and demobilization (August), except for special projects and emergencies. In case of an emergency, vessels or a charter plane may be used. There are air strips located on Midway Atoll, and Tern Island (French Frigate Shoals).

Access to the Monument requires a permit issued by the Monument's Co-trustees. NMFS conducts research and enhancement in the Monument under permit PMNM-2011-001 (see Appendix G). The Monument permit General Terms and Conditions sets out protocols and procedures to ensure protection of the Monument and specified Best Management Practices (BMPs) are employed by NMFS staff according to directives provided by the Monument. Copies of the BMPs relevant to Hawaiian monk seal research are also included in Appendix G. NAO 217-103 (Management of NOAA Small Boats) sets the policy and requirements for NOAA programs that utilize small boats (less than 300 gross tons) such as those used in monk seal research.

3.3.2 *Sea Turtles*

There are five species of sea turtles that occur in the waters of the Hawaiian islands (see Table 3.3-3), all of which are listed under the ESA including green, hawksbill, loggerhead, olive ridley, and leatherback turtles. Critical habitat has not yet been designated for any of these species in the U.S. Pacific. Most of the sea turtle species do not often occur where Hawaiian monk seals are found and would not be affected by the proposed action.

Hawksbill, loggerhead, olive ridley, and leatherback turtles would not be affected by the proposed activities because appropriate mitigation would be implemented to avoid activities co-occurring in locations with these turtles and/or to avoid disturbance. Loggerhead, olive ridley, and leatherback turtles are typically found offshore and would not likely be encountered. Hawksbill turtles occur in nearshore waters in the MHI and are known to nest in the MHI. Researchers do not work at night so no nesting animals would be disturbed. If these species are sighted during the day, research activities would not occur in that area. Boat drivers would watch for turtles to avoid disturbance or collision.

Green sea turtles are found in similar habitat as Hawaiian monk seals in the NWHI and MHI and are known to be present on beaches where monk seal researchers conduct their work; therefore, additional detail on green sea turtles is provided below.

Table 3.3-3 Sea Turtle Species of Hawai'i

Common Name	Scientific Name
Green Sea Turtle	*Chelonia mydas*
Hawksbill Turtle	*Eretmochelys imbricate*
Leatherback Turtle	*Dermochelys coriacea*
Loggerhead Turtle	*Caretta caretta*
Olive Ridley Turtle	*Lepidochelys olivacea*

Source: Hawaii Department of Land and Natural Resources (HDLNR) 2011

<u>Green Turtle (Chelonia mydas)</u>

Green turtles are listed as threatened under the ESA, except for breeding populations found in Florida and the Pacific coast of Mexico, which are both listed as endangered. Green turtle populations are in serious decline throughout most of the rest of the Pacific Ocean, except for the Hawaiian population. The Hawaiian green sea turtle population is generally comprised of one genetic stock (Balazs and Chaloupka 2006).

Green turtles occur in the coastal waters surrounding the MHI throughout the year and also migrate seasonally to the NWHI to reproduce (Thompson 2003). The largest nesting colony in the central Pacific Ocean occurs at French Frigate Shoals in the NWHI, where about 200 to 700 females nest each year (Balazs 1976, as cited in Balazs and Chaloupka 2006). On occasion, green turtles also nest in the MHI; and, they haul out on shore during the day to rest. Nesting in the MHI has occurred along the north shore of Molokai`i, the northwest shore of Lāna`i, and the south, northeast, and southwest shores of Kaua`i.

The Hawaiian green turtles' nearshore benthic foraging pastures and associated underwater habitats are among the best known in the Pacific. Important resident areas have been identified and are under study along the coastlines of O`ahu, Molokai`i, Maui, Lāna`i, Hawai`i, as well as at Lisianski Island and Pearl and Hermes Reef (Balazs *et al.* 1987; Balazs 1979, 1980, and 1982b). The available evidence indicates that the range of adult green turtles using French Frigate Shoals is confined to the 2,400 km expanse of the Hawaiian Archipelago (Balazs 1976, as cited in Balazs and Chaloupka 2006) and to Johnston Atoll immediately to the south, where algal foraging pastures occur (Balazs 1985).

In the NWHI, and especially at French Frigate Shoals, adult male and female green turtles regularly haul out during the daytime to bask along the shoreline, a behavior not common in other Pacific green sea turtle populations (Balazs 1980; Whittow and Balazs 1982).

Following harvest restrictions in 1978 (50 Code of Federal Register [CFR] 17.11), the population of green sea turtles endemic to the Hawaiian Archipelago has increased in abundance (Balazs and Chaloupka 2006). The population has also shown a distinct 3-4 year periodicity in nesting abundance, which may indicate synchronized breeding behavior throughout the Archipelago.

In terms of health, green sea turtles residing in certain benthic habitats of the Hawaiian Islands are afflicted by tumors (*fibropapillomas*) on their skin, scales, scutes, eyes, oral cavities, and viscera (Balazs and Pooley 1991). The tumors begin as small, localized lesions that rapidly grow to exceed 30 cm in diameter, greatly interfering with or even prohibiting swimming, feeding, breathing, or seeing. The lesions have been classified as fibropapillomas, based on established histologic criteria for tumor classification. The cause of this disease is unknown, but a herpes virus is thought to be responsible (Herbst 1994). The disease has increased to epidemic proportions in Hawai`i since the mid-1980s. The Recovery Plan for U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*) (NMFS and USFWS (1998) identifies the fibropappilloma disease as one of the highest priorities for ongoing research and conservation of the species.

The 1998 Recovery Plan (NMFS and USFWS) also outlines key recovery strategy priorities for green turtles, including measures to protect turtles in their nesting environment on beaches and in the marine environment.

3.3.3 Cetaceans

There are 23 species of cetaceans that occur in the vicinity of the Hawaiian Archipelago (Table 3.3-4). Many of these species do not occur close enough to the shoreline to be affected by the proposed action. Additionally, because the proposed alternatives include measures to avoid marine mammals during aerial and boat surveys, most cetaceans would not be affected by the project.

Table 3.3-4 Cetaceans Occurring in Hawaiian Archipelago

Cetaceans		
Common Name	**Scientific Name**	**Status[a]**
North Pacific right whale	*Eubalaena japonica*	E
Humpback whale	*Megaptera novaeangliae*	
Minke whale	*Balaenoptera acutorostrata*	
Sei whale	*Balaenoptera borealis*	E
Fin whale	*Balaenoptera physalus*	E
Blue whale	*Balaenoptera musculus*	E
Bryde's whale	*Balaenoptera edeni/brydei*	
Sperm whale	*Physeter macrocephalus*	E
Pygmy sperm whale	*Kogia breviceps*	
Dwarf sperm whale	*Kogia sima*	
Cuvier's beaked whale	*Ziphius cavirostris*	
Blainville's beaked whale	*Mesoplodon densirostris*	
Longman's beaked whale	*Indopacetus pacificus*	
Rough-toothed dolphin	*Steno bredanensis*	
Pantropical spotted dolphin	*Stenella attenuata*	
Spinner dolphin	*Stenella longirostris*	
Striped dolphin	*Stenella coeruleoalba*	
Risso's dolphin	*Grampus griseus*	
Melon-headed whale	*Peponocephala electra*	
Fraser's dolphin	*Lagenodelphis hosei*	
Pygmy killer whale	*Feresa attenuata*	
False killer whale	*Pseudorca crassidens*	
False killer whale (Main Hawaiian Islands Insular)	*Pseudorca crassidens*	E
Killer whale	*Orcinus orca*	

[a] E = Endangered under the ESA

In 1992, the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) was established to protect humpback whales (*Megaptera novaeangliae*) and their habitat (see Section 3.4.11.1). Given that monk seals also inhabit this area and some research and enhancement activities may occur within the HIHWNMS where humpback whales occur, humpback whales are discussed in more detail in this section. The MHI insular stock of false killer whales (*Pseudorca crassidens*) also may occur in the nearshore environment in the MHI and could be affected by the proposed activities. In addition, spinner dolphins (*Stenella longirostris*) and bottlenose dolphins (*Tursiops truncatus*) may occur in close enough proximity to monk seals to be affected by certain proposed actions; thus, additional detail on these species is provided below.

Humpback Whale (Megaptera novaeangliae)

The humpback whale is listed as endangered under the ESA. There is no designated critical habitat for this species in the North Pacific. Humpback whales and other marine mammals are of interest from a cultural perspective to some Native Hawaiians and other people (NOAA 2003).

Abundance of humpback whales for the entire North Pacific Ocean is estimated to be 18,302 individuals, with over 50% of the population (approximately 10,000) estimated to winter in Hawaiian waters (Calambokidis et al. 2008). Humpback whales use Hawaiian waters as a major breeding ground during winter and spring (November through April). Peak abundance around the Hawaiian Islands is from late February through early April (Mobley *et al.* 2001). During the fall–winter period, primary occurrence is expected from the coast to 50 nm offshore, which takes into consideration both the available sighting data and the preferred breeding habitat (shallow waters) (Mobley *et al.* 1999, 2000, 2001). The greatest densities of humpback whales (including calves) are in the four-island region consisting of Maui, Molokai`i, Kaho`olawe, and Lāna`i, as well as Penguin Bank (Baker and Herman 1981; Mobley *et al.* 1999; Maldini 2003) and around Kaua`i (Mobley 2005).

Humpback whales return to the feeding grounds of near northern California to the Aleutian Islands as determined by comparing songs (McSweeney *et al.* 1989) and recording the migration path of animals with satellite tags (Mate *et al.* 1998). Many of the Central North Pacific stock of humpback whales migrate south to Hawai`i in winter for breeding and calving from December through April (Clapham and Mead 1999; Mobley *et al.* 2001). Recent studies (Lambert *et al.* 2011) have found wintering activity in the Northwestern Hawaiian Islands. Monitoring of song activity indicates that humpback whales are common in the NWHI from late December until mid-May. A comparison of song activity with the main Hawaiian Islands found that song length and volume was comparable between O`ahu locations (known to provide wintering habitat) and the NWHI locations at Maro Reef, Lisianski Island, and French Frigate Shoals.

False Killer Whale (Pseudorca crassidens) Main Hawaiian Islands Insular Stock

The Hawaiian Islands Stock Complex of false killer whales includes (1) the MHI insular stock, which includes animals inhabiting waters within 140 km (approx. 75 nmi) of the MHI, (2) the MWHI stock, which includes animals inhabiting waters within 93 km (50 nmi) of the NWHI and Kauai, and (3) the Hawaii pelagic stock, which includes false killer whales inhabiting waters greater than 40 km (22 nmi) from the MHI (Carretta et al. 2013).

The MHI insular stock of false killer whales was listed as endangered in 2012 (77 FR 70915). The minimum population estimate for the MHI insular stock of false killer whales is 129 false killer whales (Carretta et al. 2013). The population is thought to have been in decline over the past two decades (Reeves et al. 2009 and Baird 2009).

The MHI insular stock of false killer whales may occur in include a wide range of depths (<50 to >4,000 m) and can move widely and rapidly among the MHI (Baird et al. 2010). Anthropogenic threats to this stock include competition with fisheries for prey, bioaccumulation of contaminants, live captures for aquaria, and injury from longline fisheries (Wearmouth and Sims 2008).

Spinner Dolphin (Stenella longirostris)

The spinner dolphin is found in tropical and subtropical waters worldwide. In the Hawaiian Islands, spinner dolphins occur along the leeward coasts of the MHI and at several NWHI. Long-term site fidelity has been noted for spinner dolphins along the Kona coast of Hawai`i, along O`ahu, and off the island of Moorea in the Society Islands (Norris et al, 1994; Östman 1994; Poole 1995; Marten and Psarakos 1999). Spinners spend their daylight hours in coastal waters, generally in calm bays. They use these areas to rest, care for their young and to avoid predators, before traveling to deeper water at night to hunt for food. Spinner dolphins form large schools of hundreds of animals when feeding at night and split off into much smaller groups, sometimes of only a dozen individuals, when socializing and resting during the day (NMFS 2011).

Spinner dolphins (subspecies *S. longirostris longirostris*) that may be affected by the proposed action are part of the Hawaiian Islands stock complex, which is comprised of 6 stocks (Carretta et al. 2013). The most current population estimate for the overall abundance in Hawaiian waters is 2,805 based on a 2002 ship survey (Barlow 2006). However, this estimate is out of date and may have been an underestimate because limited effort was expended in nearshore areas where spinners are common (Barlow 2006). Individual Hawaiian spinner dolphin stock abundance estimates are either unavailable or considered unreliable due their age or suspected biases (Carretta et al. 2013).

In recent years, the increase in human-spinner dolphin interactions in the MHI including from "swim with wild dolphin" tours, and individuals that swim or kayak from shore to seek out dolphins, has resulted in disturbance of this species during times of rest. Under a separate project, NMFS is drafting an EIS on the potential rulemaking under the MMPA to provide more protection to Hawaiian spinner dolphins. Additional information can be found at: http://www.fpir.noaa.gov/PRD/prd_spinner_EIS.html.

Bottlenose Dolphin (Tursiops truncatus)

Bottlenose dolphins occur in the Hawaiian Archipelago and may be affected by the proposed activities. The Hawaiian Islands stock complex of bottlenose dolphin includes Kauai/Niiahu, Oahu, 4-island, Hawaii Island, and the Hawaii Pelagic stock. This stock complex is not listed as threatened or endangered under the ESA nor depleted under the MMPA. They are listed on Appendix II under CITES and as low risk under the IUCN.

Bottlenose dolphins occur throughout the Hawaiian Archipelago in the MHI and NWHI. The abundance estimates are as follows: Kauai-Niihau – 147; Oahu – 594; 4-islands region – 153; Hawaii Island - 102; and Hawaii Pelagic (deep water and NWHI) - 3, 178 (Carretta et al. 2013).

3.3.4 *Sharks*

Approximately 40 species of sharks occur in Hawaiian waters (HDLNR 2011) (see Table 3.3-5). Inshore species of sharks include the Galapagos shark, blacktip reef shark, gray reef shark, bignose shark, blacktip shark, sandbar shark, tiger shark, scalloped hammerhead shark, smooth hammerhead shark, and whitetip reef shark.

The four most common shark species in the coastal waters surrounding the Hawaiian Islands are sandbar sharks, tiger sharks, Galapagos sharks, and gray reef sharks (Wetherbee *et al.* 1994).Tiger sharks and Galapagos sharks have been found to be more abundant in the northern Hawaiian islands (Papastamatiou *et al.* 2006), consistent with diver-based surveys that have found increasing abundance of large, predatory sharks from south to north in the Hawaiian islands (Friedlander and DeMartini 2002).

Table 3.3-5 Inshore Shark Species of Hawai'i

Common Name	Scientific Name
Galapagos shark	*Carcharhinus galapagensis*
Blacktip reef shark	*Carcharhinus melanopterus*
Gray reef shark	*Carcharhinus amblyrhynchos*
Bignose shark	*Carcharhinus altimus*
Blacktip shark	*Carcharhinus limbatus*
Sandbar shark	*Carcharhinus plumbeus*
Tiger shark	*Galeorcerdo cuvier*
Scalloped hammerhead shark	*Sphyrna lewini*
Smooth hammerhead shark	*Sphyrna zygaena*
Whitetip reef shark	*Triaenodon obesus*

Source: HDLNR 2011

Acoustic monitoring conducted at French Frigate Shoals in the NWHI was used to assess movement patterns of tagged tiger and Galapagos sharks within the atoll, particularly at locations where monk seal pups had been preyed upon (Lowe *et al*. 2006). Tiger sharks were detected at French Frigate Shoals throughout the year, but there was a strong seasonal trend in area use through the atoll, with tiger sharks spending more time around East Island in the summer months, but more time around the northern islands (Tern, Trig, and Shark Islands) in winter months (Lowe *et al*. 2006). A smaller number of Galapagos sharks was tagged at French Frigate Shoals (four adults), but available data indicate that the presence of the sharks at Trig Island varied within the diel cycle, within annual cycles, and among individual sharks. The Galapagos sharks were most common at islands close to the outer reef of French Frigate Shoals (Tern, Trig, and Shark), and were not frequently found within the interior of the atoll (Lowe *et al*. 2006).

Additionally, information regarding confirmed shark attacks is provided in Table 3.3-6 below. As illustrated the number of shark attacks in Hawaii has been quite variable over the 2000 – 2012 period with no apparent trends in the shark attack data. The average number of shark attacks in Hawaii over the 2000 – 2012 period has been 4.2 attacks annually.

Table 3.3-6 Number of Confirmed Shark Attacks in Hawaii (2000-2012)

Year	Total Attacks	Fatal	Non-fatal
2000	2	0	2
2001	3	0	3
2002	6	0	6
2003	5	0	5
2004	3	1	2
2005	4	0	4
2006	3	0	3
2007	7	0	7
2008	1	0	1
2009	3	0	3
2010	4	0	4
2011	3	0	3
2012	10	0	10

Source: International Shark Attack File, ISAF Statistics for the USA Locations with the Highest Shark Attack Activity Since 2000,
Website: (http://www.flmnh.ufl.edu/fish/sharks/statistics/statsus.htm) accessed April 5, 2012.

3.3.5 *Other Fish Species*

The Hawaiian Archipelago distinguishes itself as a subprovince of the spacious tropical and subtropical Indo-Pacific region, which extends from the Red Sea and coast of East Africa to the easternmost islands of Oceania (Hawai`i and Easter Island). The composition of the Hawaiian marine life varies enough from the rest of the Indo-Pacific to be treated as a distinct faunal subregion. Hawai`i's unique fish fauna can be explained by its geographical and hydrographical isolation (Randall 1998). Pelagic fishes such as the larger tunas, the billfishes, and some sharks are able to traverse the great distance that separates the Hawaiian Islands from other islands or continents in the Pacific Ocean; however, shore fishes are dependent on passive transport as larvae in ocean currents for distribution. As would be expected, the fish families that have a high percentage of species in the Hawaiian Islands compared to elsewhere tend to be those with a long larval life stage, such as the moray eels and surgeonfishes (*Acanthurus spp*.). Families that contain mainly species with short larval life stages, such as the gobies, blennies, and cardinal fishes, are not as well represented in Hawai`i as in the rest of the Indo-Pacific region (Randall 1995).

3.3.5.1 *Essential Fish Habitat*

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) defines Essential Fish Habitat (EFH) as those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity (16 United States Code [U.S.C.]§ 1802). These waters include aquatic areas and their associated physical, chemical, and biological properties used by fish, and may include areas historically used by fish. Substrate types include sediment, hard bottom, structures underlying the waters, and associated biological communities. EFH can consist of both the water column and the underlying surface (for example, seafloor) of a particular area. Certain properties of the water column such as temperature, nutrients, or salinity are essential to various species. Some species may require certain bottom types such as sandy or rocky bottoms, vegetation such as sea grasses or kelp, or structurally complex coral or oyster reefs. EFH also includes those habitats that support the different life stages of each managed species, as a single species may use many different habitats throughout its life to support breeding, spawning, nursery, feeding, and protection functions.

Fisheries managed by the Western Pacific Regional Fishery Management Council (WPRFMC) and the state of Hawai`i units include 22 bottom fish species, 32 pelagic species, 5 crustacean species, and 13 precious corals and coral reef ecosystem species. Currently, no data are available to determine potential overfishing of pelagic species except for the bigeye tuna (*Thunnus obesus*) (NMFS 2004), which is declining throughout its range.

In 2009, the WPRFMC published a Fishery Ecosystem Plan (FEP) for the Hawaiian Archipelago, which establishes the framework under which the Council will manage fishery resources, and begin the integration and implementation of ecosystem approaches to management in the Hawaiian Archipelago. The Hawaiian Archipelago FEP is intended to consolidate, rather than replace existing fishery regulations for demersal species. Pelagic fisheries will continue to be managed by NMFS based on recommendations from the WPRFMC under a separate FEP (WPRFMC 2009).

3.3.5.2 *Commercially Harvested Species*

Among the various categories of fisheries, the pelagic fishing industry is the largest and most valuable one, accounting for almost 96% of commercial landings with 25.7 million pounds of pelagic fish caught commercially in 2009 (WPacFin 2010). Key fishery categories include the pelagic, coral reef fishery, bottomfish, precious corals, and crustacean fisheries. Tunas (especially bigeye tuna) and billfish (especially blue marlin, striped marlin, swordfish) are the main target species for pelagic fishing, but other species, such as mahimahi, ono (wahoo), and moonfish, are also important (NMFS 2005). Popular commercial coral reef fish species include akule (which dominates nearshore commercial landings), soldierfishes, surgeonfishes, goatfishes, squirrelfishes, unicornfishes, and parrotfishes (WPRFMC 2010b).

The most commonly harvested species of coral reef-associated organisms include the following: surgeonfishes (*Acanthuridae*), triggerfishes (*Balistidae*), jacks (*Carangidae*), parrotfishes (*Scaridae*), soldierfishes/squirrelfishes (*Holocentridae*), wrasses (*Labridae*), octopus (*Octopus cyanea, O. ornatus*), and goatfishes (*Mullidae*). A small-scale harvest of crustaceans occurs throughout the inhabited islands of the Western Pacific Region. The most common harvests include lobster species of the taxonomic groups Palinuridae (spiny lobsters) and Scyllaridae (slipper lobsters) (WPRFMC 2009).

The families of bottomfish and seamount fish that are often targeted by fishermen include snappers (*Lutjanidae*), groupers (*Serranidae*), and jacks (*Carangidae*). Distinct depth associations are reported for certain species of snappers and groupers (WPRFMC 2009).

Currently, there are minimal harvests of precious corals in the Western Pacific Region. However, in the 1970s to early 1990s, both deep- and shallow-water precious corals were targeted in waters around Hawai`i. The commonly harvested precious corals include pink coral (*Corallium secundum, Corallium regale, Corallium laauense*), gold coral (*Narella spp., Gerardia spp., Calyptrophora spp.*), bamboo coral (*Lepidisis olapa, Acanella spp.*), and black coral (*Antipathes dichotoma, Antipathes grandis, Antipathes ulex*) (WPRFMC 2009).

Additional information about commercial fisheries is provided in Section 3.4.3 Commercial Fishing.

3.3.5.3 Nearshore Species

The diversity of fish species in shallow marine habitat in Hawai`i is considered relatively low compared to other tropical areas of the Pacific, due to the isolation and northerly geographic setting. There are about 450 species of inshore fishes (Gosline and Brock 1960; Randall 1980). Common species of fish include moray eels (*Muraenidae*), squirrelfishes (*Holocentridae*), aholehole (*Kuhlia sandvicensis*), aweoweo (*Priacanthus cruentus*), upapalus (*Agoponidae*), nenue (*Kyphosus bigibius*), omilu (*Caranx melampygus*), papios (*Carangidae*), lai (*Scombroides lysan*), amaama (*Mugil cephalus*), nehu (*Stolephorus purpureus*), and needlefishes and halfbeaks (*Belonidae* and *Hemiramphidae*)(Gosline and Brock 1960).

3.3.6 Birds

The Project area includes the waters and shorezone (beaches and rocky shores) of the NWHI, MHI, and Johnston Atoll (see Section 1.3). Seabirds and shorebirds dominate the coastal bird life within the Project area. Millions of resident and migratory seabirds and overwintering shorebirds depend on the roosting, breeding, migratory, and overwintering habitats found here (USFWS 2005). In addition to the terrestrial environment, the waters surrounding the Hawaiian

Archipelago and Johnston Atoll are essential habitat for pelagic seabirds since most rely on fish to feed their young (National Audubon Society 2008).

As described in Chapter 1, under the Migratory Bird Treaty Act (MBTA) (16 USC 703–712; 40 Stat. 755 as amended) and Executive Order (EO) 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, NMFS is required to analyze the potential impacts its actions may have on migratory birds. The MBTA prohibits the take of any migratory bird without authorization from USFWS.

The NWHI Important Bird Area (IBA) coincides with the Monument and provides critical foraging grounds for seabirds (National Audubon Society 2008). Because most seabirds breeding there are pelagic feeders that also rely on the waters surrounding the islands for fish to feed their young, both the terrestrial and the aquatic habitats in the NWHI are integral components of the IBA.

3.3.6.1 Seabirds

Surveys around the Hawaiian Islands in 2002 documented 40 resident and migrant seabird species (USFWS 2005). Most migratory seabirds arrive to breed in February and March, and leave by the late summer or fall. The exceptions are the albatross, which breed in winter and spring (USFWS 2005). All seabird species that regularly breed within the Hawaiian Archipelago have been identified as Hawai`i's Species of Greatest Conservation Need (SGCN) and are listed in Table 3.3-6 (Mitchell *et al.* 2005).

Table 3.3-6 Hawaiian Coastal Bird Species of Conservation Need

Common Name	Scientific Name	MHI	NWHI	State of Hawai`i	USFWS	IUCN
SEABIRDS						
Laysan albatross	*Phoebastria immutabilis*	X	X	SGCN	BCC	NT
Black-footed albatross	*Phoebastria nigripes*	X	X	SGCN	BCC	E
Short-tailed albatross	*Phoebastria albatrus*		X	E	E	VU
Hawaiian petrel	*Pterodroma sandwichensis*	X		E	E	VU
Bonin petrel	*Pterodroma hypoleuca*		X	SGCN		LC
Bulwer's petrel	*Bulweria bulwerii*	X	X	SGCN		LC
Wedge-tailed shearwater	*Puffinus pacificus*	X	X	SGCN		LC
Christmas shearwater	*Puffinus nativitatis*	X	X	SGCN	BCC	LC
Newell's shearwater	*Puffinus auricularis newelli*	X		T	T	E
Band-rumped storm petrel	*Oceanodroma castro*	X		SGCN	C/BCC	LC
Tristram's storm petrel	*Oceanodroma tristrami*		X	SGCN	BCC	NT
White-tailed tropicbird	*Phaethon lepturus*	X	X	SGCN		LC
Red-tailed tropicbird	*Phaethon rubricauda*	X	X	SGCN		LC
Masked (blue-faced) booby	*Sula dactylatra*	X	X	SGCN		LC
Brown booby	*Sula leucogaster*	X	X	SGCN		LC
Red-footed booby	*Sula sula*	X	X	SGCN		LC
Great frigatebird	*Fregata minor*	X	X	SGCN		LC
Gray-backed tern	*Sterna lunata*	X	X	SGCN		LC
Sooty tern	*Sterna fuscata*	X	X	SGCN		LC
Brown noddy	*Anous stolidus*	X	X	SGCN		LC
Black noddy	*Anous minutus*	X	X			LC
Blue-gray noddy	*Procelsterna cerulea*		X	SGCN		LC
White (Fairy) tern	*Gygis alba*	X	X			LC
SHOREBIRDS						
Hawaiian Stilt	*Himantopus mexicanus knudseni*	X		E	E	LC
Pacific golden plover	*Pluvialis fulva*	X	X	SGCN		LC
Wandering tattler	*Heteroscelus incanus*	X	X	SGCN		LC
Bristle-thighed curlew	*Numenius tahitiensis*	X	X	SGCN	BCC	VU
Ruddy turnstone	*Arenaria interpres*	X	X	SGCN		LC
Sanderling	*Calidris alba*	X	X	SGCN		LC
ADDITIONAL NWHI ESA LISTED SPECIES						
Laysan Duck	*Anas laysanensis*		X	E	E	CR
Nihoa millerbird	*Acrocephalus familiaris kingi*		X	E	E	CR
Laysan finch	*Telespiza cantans*		X	E	E	VU
Nihoa finch	*Telespiza ultima*		X	E	E	CR

Sources: Mitchell *et al*. 2005, USFWS 2010a, USFWS 2008, International Union for the Conservation of Nature and Natural Resources (IUCN) 2010
Legend: E = endangered, T = threatened, C = Candidate, BCC = Bird of Conservation Concern, NT = Near Threatened, VU = Vulnerable, CR = Critically Endangered, LC = Least Concern

Seabird species typically nest in colonies either directly on the ground or underground in burrows and crevices or on vegetation (USFWS 2005). Nesting and/or brood-rearing seabirds that occur on or adjacent to beaches will primarily be the seabird species found within the Project area. These species include: Laysan albatross (*Phoebastria immutabilis*), black-footed albatross (*Phoebastria nigripes*), wedge-tailed shearwater (*Puffinus pacificus*), masked (blue-faced) booby (*Sula dactylatra*), brown booby (*Sula leucogaster*), gray-backed tern (*Sterna lunata*), sooty tern (*Sterna fuscata*), black noddy (*Anous minutes*), brown noddy (*Anous stolidus*), and white (Fairy) tern (*Gygis alba*) (USFWS 2005). The distribution of seabird species that depend on beach habitats where monk seal research and enhancement activities may occur are identified in Table 3.3-7.

Seabird colonies in the NWHI constitute one of the largest and most important assemblages of tropical seabirds in the world, with over 14 million birds and 5.5 million birds of 24 species breeding annually (USFWS 2005). Many species of seabirds that breed on or near beaches depend on the NWHI. Sooty terns are the most numerous breeding species in the NWHI with annual breeding populations estimated at more than 2.5 million birds. The largest populations of Laysan albatross and black-footed albatross in the world nest at Midway Atoll and Laysan Islands. Populations of gray-backed tern in the NWHI are of global significance (NWHI USFWS 2005). Although nesting seabird species are often found throughout the NWHI, the most important islands for breeding seabirds are Laysan, Lisianski, Nihoa, and Necker Islands (Mitchell *et al.* 2005).

The larger islands within the MHI that have higher elevations historically supported large and diverse populations of nesting seabirds. However, human habitation has greatly altered these islands. Today, many of the seabirds nest on the smaller rocks and islets off the MHI where they are free from predators and human disturbance (USFWS 2005). The MHI are still the primary nesting habitat for cliff-nesting species such as petrels and shearwaters that do not nest on islands of low elevation. Many of these species, (*i.e.,* Hawaiian Petrel [*Pterodroma sandwichensis*] and Newell's shearwater [*Puffinus auricularis newelli*]), are threatened by predators and habitat degradation and are listed under the ESA. Some of the most important seabird habitats in the MHI occur on Lehua and Kaula islets off of Ni`iahu, as well as on Mokumanu and Manana islets off of O`ahu (OIRC 2011). The seabird species that depend on beach habitats within the MHI are listed in Table 3.3-7.

Table 3.3-7 Distribution of Breeding or Brood-Rearing Seabird Species That Occur on or Near Beaches in the Hawaiian Archipelago

Common Name	Scientific Name	Nesting Habitat	Kaua`i	O`ahu	Moloka`i	Lāna`i	Maui	Kaho`olawe	Hawai`i	NWHI (throughout)
Laysan albatross	*Phoebastria immutabilis*	Surface, with vegetation	X	X						X
Black-footed albatross	*Phoebastria nigripes*	Surface, with and without vegetation		X						X
Wedge-tailed shearwater	*Puffinus pacificus*	Below surface, burrows	X	X	X	X	X	X	X	X
Masked (blue-faced) booby	*Sula dactylatra*	On surface, no vegetation		X			X			X
Brown booby	*Sula leucogaster*	On surface, with vegetation	X	X						X
Gray-backed tern	*Sterna lunata*	On surface, no vegetation		X						X
Sooty tern	*Sterna fuscata*	On surface, with vegetation		X						X
Black noddy	*Anous minutus*	Above ground, on vegetation; on surface, no vegetation	X	X	X	X	X	X	X	X
Brown noddy	*Anous stolidus*	Above ground, on vegetation; on surface, with and without vegetation		X			X			X
White (Fairy) tern	*Gygis alba*	Above ground, on vegetation; on surface, no vegetation		X						X

Source: USFWS 2010a, USFWS 2005, Mitchell *et al*. 2005

3.3.6.2 *Shorebirds*

Forty-seven species of shorebirds have been recorded in the Hawaiian Islands (National Audubon Society 2008). Most shorebirds are migratory birds that winter throughout the Hawaiian Archipelago, arriving in July and August then returning to the Arctic to breed in May. Younger birds may skip breeding their first summer and remain in the Pacific Islands (National Audubon Society 2008). The only breeding shorebird species in the MHI is the endangered endemic Hawaiian Stilt; no breeding shorebirds occur in the NWHI.

Most shorebird species overwintering in Hawai`i are infrequent visitors or vagrants, but the Hawaiian Islands are of primary importance for four species: Hawaiian stilt (*Himantopus mexicanus knudseni*), Pacific golden-plover (*Pluvialis fulva*), bristle-thighed curlew (*Numenius tahitiensis*), and wandering tattler

(*Heteroscelus incanus*) (Engilis and Naughton 2004). Other common winter visitors include ruddy turnstone (*Arenaria interpres*) and sanderling (*Calidris alba*) (Engilis and Naughton 2004). All of these shorebird species have been identified as Hawaii's SGCN and are listed in Table 3.3-6 (Mitchell *et al.* 2005).

Shorebirds utilize a variety of habitats throughout the Hawaiian Islands, many of which differ from those habitats used by continental wintering populations. Tidal flats, estuaries, exposed reefs, freshwater and salt marshes, ephemeral wetlands, ephemeral playas, and aquaculture wetlands (taro, shrimp, and rice) support the highest diversity of shorebirds (Engilis and Naughton 2004). Beaches, including coral and volcanic sands, and associated dune systems, provide important habitat for curlews, turnstones, sanderlings, and to a lesser degree, Pacific golden-plovers (Engilis and Naughton 2004).

Protected Bird Species

The Hawaiian Islands display a rich biodiversity arising from a variety of factors, including the remoteness of the islands, millions of years of isolation, varying climates, diverse topography, and the pattern of volcanic activity. This biodiversity includes a high percentage of endemic plants and animals.

Unfortunately, roughly ten percent of the endemic bird species to Hawai`i are identified as birds of conservation concern (BCC) (Mitchell *et al.* 2005). The Hawaiian Islands also have a disproportionately large number of bird species listed as either endangered or threatened under the ESA; combining BCC with endangered or threatened species, about 25 percent of the native Hawaiian avifauna is at risk (USFWS 2008a).

There are varying levels of protection for bird species found within the project area, including at the state, federal and international level. Therefore, several lists exist that provide information on the conservation status of these bird species, many of which include the same species. The conservation status of seabird and shorebird species that occur within the Project area are summarized below relative to their applicable state, federal and international protection.

State Listed Species

Hawai`i's Comprehensive Wildlife Conservation Strategy (CWCS) identifies Hawai`i's Bird SGCN (Mitchell *et al.* 2005). The Hawaiian Islands are biologically diverse, with fauna characterized by high levels of endemism. In addition, many migratory species spend key parts of their life cycles (for example, breeding or wintering) in Hawai`i. To recognize the global rarity of these species or the importance of Hawai`i to these species, 77 species of birds were identified as SGCN. Migratory species with irregular or insignificant presence in Hawai`i were not included on the list.

Hawai`i's CWCS identified 77 species of birds as SGCN, including 23 species of breeding seabirds and 6 species of shorebirds (Mitchell *et al.* 2005). All seabird and shorebird species listed as SGCN that occur in either the NWHI or MHI, as well as any ESA listed bird species in the NWHI, are listed in Table 3.3-5.

Birds of Conservation Concern

The primary statutory authority for BCC is the Fish and Wildlife Conservation Act of 1980 (FWCA), as amended; the 1988 amendment to FWCA mandates the USFWS to "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA of 1973." The objective of the BCC is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions. These lists should be consulted in accordance with EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds.

Seabird and shorebird species in the Project area listed as BCC include Laysan albatross and black-footed albatross (USFWS 2008a). Laysan albatross breed throughout the NWHI and on the MHI of Kauai and O`ahu and Lehua Islet off of Ni`ihau. Outside of Hawai`i, Laysan albatross breed on islands off of Japan and Mexico. In the Hawaiian Archipelago, the population is estimated at greater than 590,000 pairs, with the largest colonies occurring on Midway Atoll (441,000 pairs) and Laysan (145,000 pairs) (Mitchell 2005). Total population of all MHI colonies is less than 100 pairs. Worldwide population is estimated at 630,000 breeding pairs. Threats include introduced predators, invasive species, contaminants, marine pollution, collisions, and fisheries (Mitchell et al 2005).

The breeding distribution of black-footed albatross is almost entirely restricted to the Hawaiian Islands except of small breeding populations off Japan (USFWS 2005). In Hawai`i, breeding colonies occur on the NWHI and Kaula and Lehau islets off Ni`iahu. The largest colonies occur at Laysan and Midway Atoll. Black-footed albatross nest close to the shoreline on open sandy beaches or dunes. Longline fisheries, ingestion of plastics, and sea level rise are major threats to this species.

ESA Listed Species

This section addresses ESA-listed seabird and shorebird species in the Hawaiian Archipelago. ESA-listed species identified include: Laysan duck, Nihoa millerbird, Laysan finch, short-tailed albatross, Nihoa finch, Hawaiian petrel, Newell's shearwater, band-rumped storm petrel (candidate species) and Hawaiian stilt (USFWS 2010a). No critical habitat has been designated for any of these species (USFWS 2010a).

Several of the ESA-listed birds identified do not occur within the Project area. These include Hawaiian stilt, Hawaiian petrel, Newell's shearwater, band-rumped petrel and the Nihoa finch. Hawaiian stilt are shorebirds that depend on large coastal wetlands and ephemeral playas in the MHI. Hawaiian petrel, Newell's shearwater, and band-rumped storm petrels are seabirds that nest in upper elevation sea cliffs outside the Project area. The Nihoa finch is an endemic bird species that lives only on the island of Nihoa. It prefers open but vegetated habitat throughout the island and build their nests in small holes in rock outcrops 100 to 800 feet above sea level (USFWS 2010d).

Short-tailed Albatross

The world population of short-tailed albatross is estimated at 2,200 birds (USFWS 2011b). Unfortunately, about 85% of the global short-tailed albatross currently breed on an active volcano at Torishima Island, Japan (USFWS 2009d). The first confirmed successful nesting of short-tailed albatross outside of Japan in modern history occurred on Eastern Island, Midway Atoll in June, 2011 (USFWS pers. comm. 2012a).

Previously, short-tailed albatross have been observed rarely in the NWHI at Midway Atoll (Sand and Eastern Islets), Laysan Island, French Frigate Shoals (Tern Islet), Pearl and Hermes Reef (Southeast Islet), and Kure Atoll (Green Islet) Short-tailed albatross are primarily seen in the NWHI between November and April but can remain onshore until mid-June if nesting is successful. Short-tailed albatross typically nest on sloping grassy terraces further inland than the Project area.

In recent years, short-tailed albatross have been seen at Midway Atoll, Kure Atoll, and Laysan Island (USFWS pers. comm. 2011 a, b; DLNR pers. comm. 2011). The first confirmed successful nesting of short-tailed albatross outside of Japan in modern history occurred on Eastern Island, Midway Atoll in June, 2011 (USFWS pers. comm. 2012a). The same pair nested again within meters of their previous nest and raised a chick estimated to fledge in June 2012 (USFWS pers. comm. 2012a). Short-tailed albatross have also been sighted on Kure Atoll from October to April in 1994, 2008, 2010, and 2011 (DLNR pers. comm. 2011). A female-female pair was observed nesting on Kure Atoll in 2010, but the egg was not fertilized. Short-tailed albatross land on Kure Atoll in camp, at the border of the west landfill and runway, and at the nesting site at the southern edge of the west end of the runway (DLNR pers. comm. 2011). On Laysan Island, a short-tailed albatross arrived in December of 2009 and 2010 (USFWS pers. comm. 2011b). It was most often observed in the interior of the island in the northern East Desert (USFWS pers. comm. 2011b).

Laysan Duck

The Laysan duck has the most restricted range of any duck in the world. A single naturally occurring population estimated at 611 (95% CI 538-714) adult birds exists on Laysan Island (Reynolds *et al.* 2006a cited in USFWS 2009e), and a newly established population estimated in 2007 at nearly 200 birds exists at Midway Atoll (Reynolds *et al.* 2007a cited in USFWS 2009e). Although this species primarily occurs in vegetated upland and lake/wetland habitats during the breeding season, a few ducks on Laysan Island selectively use the camp area to obtain freshwater, insects, and shade (Reynolds 2004 cited in USFWS 2009e). Coastal habitats appear to be used more frequently during the post-breeding season (September through February) when flocks of up to 70 Laysan ducks have been recorded (Reynolds 2004 cited in USFWS 2009e).

Nihoa Millerbird

The Nihoa millerbird is an endangered song bird that has only existed on remote Nihoa Island during the past century. Although previously found at Laysan Island, Nihoa millerbirds were extirpated from Laysan as a result of overbrowsing of the island's vegetation by rabbits and other introduced grazing mammals (NOAA 2012). This species is considered to be at a high risk of extinction from biological and catastrophic factors (BirdLife International 2010). In September of 2011, 24 Nihoa millerbirds were successfully translocated to Laysan Island to help reduce their risk of extinction (USFWS 2012). Millerbirds currently have an estimated global population of 775 birds that are distributed patchily in the vegetated area of Nihoa and Laysan islands (BirdLife International 2010).

Laysan Finch

Laysan finches are endemic to Laysan Island and were introduced to Southeast Island and Grass Island (respectively) at Pearl and Hermes Reef in 1967. This species is restricted to the vegetated area of Laysan Island (NMFS 2003). Laysan finches are a single species and population numbers fluctuate widely, with current estimates to be 17,780 ± 2819 individuals at Laysan Island and approximately 329 at Pearl and Hermes Reef (USFWS 2008d). The Laysan finch is threatened by degradation of habitat from invasive species and both Laysan and Pearl and Hermes Reef are highly susceptible to rising sea levels (Baker et al. 2006).

IUCN Listed Species

The IUCN Red List is the world's most comprehensive inventory of the global conservation status of plant and animal species (IUCN 2010). It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. The IUCN Red List is recognized as the most authoritative guide to the status of biological diversity (IUCN 2010).

According to the IUCN Red list, the Laysan duck, Nihoa millerbird and Nihoa finch are listed as critically endangered; the black-footed albatross is listed as endangered; Laysan finches are listed as vulnerable; and the Laysan albatross is listed as near-threatened.

The Laysan duck, Nihoa millerbird, Nihoa finch, and Laysan finch are listed under the ESA and discussed under the ESA section above. Laysan albatross and black-footed albatross are considered birds of conservation concern (BCC) and are discussed under the BCC section above.

3.3.7 Coral

The Hawaiian Islands contain 6,764.5 square miles of coral reefs, representing 84% of the coral reefs in the United States (NOAA 2008a). Hawai`i, because of its isolated location in the central pacific, contains relatively few coral species (about 50 species in 17 genera) (WPRFMC 2005). These reefs consist of both shallow water, waters less than 98 feet (30 m) and deep water, waters greater than 98 feet

(30 m). In the NWHI, 57 species of coral have been identified, with 30 percent of them being endemic (NOAA 2008a).

Precious corals of the genus *Corallium* (pink), *Gerardia* (gold), *Narella* (gold), *Lepidisis* (bamboo), and *Antipathes* (black) are regulated by the State of Hawai`i and the U.S. Federal government (NOAA 2008a). Precious corals that are commonly harvested include pink coral, gold coral, bamboo coral, and black coral (WPRFMC 2009).The State of Hawai`i regulates all coral out to 3 nm and also claims jurisdictional authority over the Makapuu Coral Beds, 6 miles off Makapuu (NOAA 2008a). The U.S. Federal government, represented by WPRFMC, regulates all precious coral within the U.S. Exclusive Economic Zone (EEZ) which extends from 3 to 200 nm off the coast of Hawai`i (NOAA 2008a).

3.3.7.1 Shallow Water Corals

Shallow water ecosystems are the best understood of the reef ecosystems as most assessment and monitoring of reefs are done at waters shallower than 98 feet (30 m) (NOAA 2008b). Corals are defined by the Coral Reef Conservation Act of 2000 (16 USC 6401 *et. seq.*) as any of the 6000 species of the phylum Cnidaria including:

A. All species of the orders black corals (*Antipatharia*), stony corals (*Scleractinia*), horny corals (*Gorgonacea)*, organpipe corals and others (*Stolonifera)*, soft corals (*Alcyanacea)*, and blue coral (*Coenothecalia)*, of the class *Anthozoa*; and
B. All species of the order fire corals and hydrocorals (*Hydrocorallina)* of the class Hydrozoa.

Coral reef ecosystems are rock like structures that consist of both reef-building and non-reef-building corals, sand and unconsolidated sediments, colonized hardbottom, and microalgae (NOAA 2008b; WPRFMC 2005; NOAA 2005). With the exception of a few outliers and deep water reefs, most coral are confined to warm tropical and subtropical waters located between 30o North and 30o South (WPRFMC 2005; NOAA 2005).

In the NWHI shallow water reef ecosystem, cover ranges from 4.4% to 64.1% and less than 1% to nearly 100% within various island habitats (NOAA 2008b).

Currently, NOAA has proposed listing three species of shallow water reef building corals in Hawaii as threatened under the Endangered Species Act: *Montipora patula/verrilli*, *Montipora dilitata/flabellata/turgescens*, and *Acroproa paniculata*. All three of these species occur in the Northwestern Hawaiian Islands, and *Montipora patula/verrilli* and *Montipora dilitata/flabellata/turgescens* occur in the Main Hawaiian Islands. These species are proposed as threatened due to a number of threats, with the most significant identified as ocean warming, coral disease, and ocean acidification as a result of climate change.

3.3.7.2 Deep Water Corals

Deep water corals are found at depths of greater than 98 ft (30 m) (NOAA 2008b) in temperatures as low as 39 °F (NOAA 2008a). Few data are available on the deepwater banks, seamounts and the abyssal plain in the NWHI. In some areas where depths approach 1,000 fathoms (6,000 ft), dense communities of corals (*ahermatypic* [non reef building]) and sponges obscured the underlying substratum (NOAA 2008a). At this depth, light penetration is not sufficient enough for photosynthesis to occur. Deep water ecosystems provide essential habitat, feeding grounds, recruitment and nursery grounds for a variety of deep water epibenthic invertebrates, fishes, and marine mammals (for example monk seals) (NOAA 2008a). Deep water ecosystems are prevalent throughout the Hawaiian Archipelago (NOAA 2008a) extending from the big island of Hawai`i in the south (NOAA, 2008a) to the NWHI (NOAA 2008b).

3.3.8 ESA-Listed Plant Species

There are approximately 343 endangered and 11 threatened plant species in the Hawaiian Islands (USFWS 2010). While consultation with USFWS for NMFS permit 10137 concluded that any proposed activities would not affect any ESA-listed plant species (NOAA 2009c), those species found in or near the coastal zone in the Hawaiian Archipelago will be evaluated in Chapter 4 for potential impacts associated with the proposed alternatives.

3.3.9 Invasive Species

The introduction of alien species to the Hawaiian Islands is considered to be the main culprit for the decline of the native Hawaiian species (USFWS 2009a). Invasive or alien species are defined as an organism (plant, animal, or microbe) that is introduced into a non-native ecosystem and which cause, or are likely to cause, harm to the economy, environment, or human health (USFWS 2009a; HISC 2008a).

The Hawai`i Invasive Species Council (HISC) was formed in 2002 for the "purpose of providing policy level direction, coordination, and planning among state departments, federal agencies, and local and international initiatives for the control and eradication of harmful invasive species infestations through the State of Hawai`i (HISC 2008a). The body of the HISC is collaboration between the Department of Land and Natural Resources (DLNR), Department of Agriculture, University of Hawai`i, Hawai`i Department of Business, Economics, Development, and Tourism, Hawai`i DOH, and the Hawai`i Department of Transportation (HISC 2008b).

The HISC recognizes 46 high-profile invasive species/categories of concern within the Hawaiian Islands (http://www.hawaiiinvasivespecies.org/pests/index.html). Additionally, in the NWHI, there is special concern over the introduction and proliferation of non-native seeds, insects or other alien species such as snakes, amphibians, rodents, dogs, cats and others.

The islands and atolls of the NWHI provide habitat for a number of rare endemic plants and animals. While some islands are considered to be "relatively pristine" (NOAA 2009e), several others have already been impacted to lesser or greater extent by several introduced alien species. Historically, three notable examples of alien species introduction to Laysan Island included rabbits, rats, and the common sandbur (*Cenchrus echinatus*) a mat-forming weed that inhibits regeneration of the primary nest substrate (*Eragrostis variabilis*) for Laysan finches (Morin and Conant 1998).

Throughout the Archipelago there are concerns that a variety of insect and arachnids species (*e.g.*, beetles, weevils, grasshoppers, bees, wasps, spiders and ants), reptiles (*e.g.*, snakes, lizards) and mammals (*e.g.*, mice, rats, dogs, cats), could be translocated from the MHI to the NWHI and between islands and atolls within the NWHI. Any of these animals may be accidently introduced to a new location.

Invasive plant species include golden crown beard (*Verbesina encelioides*) on Pearl and Hermes Reef, Laysan Island, Kure Atoll, and Midway Atoll and sandbur (*Cenchrus echinatus*) on Laysan Island.

The Monument permit General Terms and Conditions sets out protocols and procedures to reduce the risk of the spread of non-native (invasive) species including the assurance that "…all vessels are inspected for potential introduced species prior to departing the last port before entering the Monument". In addition, NOAA Administrative Order (NAO) 216-6, Section 7.03 addresses the integration of EO 13112, Invasive Species, in the NOAA Decision making process, requiring the agency to "…use authorities to prevent introduction of invasive species, respond to and control invasions in a cost effective and environmentally sound manner".

3.3.10 Other Permitted Activities on Protected Species within the Project Area

Information about other scientific research and other activities within the project area was gathered from two sources: 1) NMFS Authorizations and Permits for Protected Species (APPS) for activities involving marine mammals and other marine endangered and threatened species, and 2) the Papahānaumokuākea Marine National Monument Permitted Activities 2011 Report.

Under the ESA and MMPA, NMFS issues the following types of permits and authorizations:

- Scientific research permits;
- Enhancement permits;
- 4(d) research authorizations;
- Incidental take authorizations;
- Photography permits (excludes ESA species);
- General Authorizations (excludes ESA species);
- Permits to import/export parts for scientific research;
- Authorization to import/export pre-Act parts;

- Authorization to receive U.S. stranded marine mammal parts for scientific research or education; and
- Permits related to public display (excludes ESA species).

Table 3.3-8 presents a list of activities (scientific research and photography permits and incidental take authorizations) currently permitted by NMFS within the project area.

Table 3.3-8 Current NMFS Permits and Authorizations for Federally Protected Species under the ESA and MMPA

Permit/File Number	Project Title	Organization	Date issued	Date Expires	Location	Species
727-1915	PR1 Permit #727-1915 scientific research	Scripps Institution Of Oceanography	2/6/2008	2/1/2014	Hawaiʻi / Palmyra Atoll	Bottlenose Dolphin, Hawaiian Stock (Adult/ Juvenile; All); Bryde's Whale, Hawaiian Stock (Adult/ Juvenile; All); Fin Whale, Hawaiian Stock (Adult/ Juvenile; All); Fraser's Dolphin, Hawaiʻi Stock (Adult/ Juvenile; All); Melon-headed Whale, Hawaiian Stock (Adult/ Juvenile; All); Minke Whale, Hawaiian stock (Adult/ Juvenile; All); Risso's Dolphin, Hawaiian Stock (Adult/ Juvenile; All); Rough-toothed Dolphin, Hawaiian Stock (Adult/ Juvenile; All); Sei Whale, Hawaiian stock (Adult/ Juvenile; All); Sperm Whale, Hawaiian stock (Adult/ Juvenile; All); Spinner Dolphin, Hawaiian Stock (Adult/ Juvenile; All); Striped Dolphin, Hawaiian Stock (Adult/ Juvenile; All); Beaked Blainville's beaked Whale, Hawaiian Stock (Adult/ Juvenile; All); Beaked Cuvier's beaked Whale, Hawaiian Stock (Adult/ Juvenile; All); Beaked Longman's beaked Whale, Hawaiian Stock (Adult/ Juvenile; All); Beaked Unidentified beaked Whale (Adult/ Juvenile; All); Killer False killer Whale, Hawaiian Stock (Adult/ Juvenile; All); Killer Pygmy killer Whale, Hawaiian Stock (Adult/ Juvenile; All); Short-finned Pilot Whale, Hawaiian stock (Adult/ Juvenile; All); Sperm Dwarf sperm Whale, Hawaiian Stock (Adult/ Juvenile; All); Sperm Pygmy sperm Whale, Hawaiian stock (Adult/ Juvenile; All); Spotted Pantropical spotted Dolphin, Hawaiian Stock (Adult/ Juvenile; All)
932-1905	PR1 Permit #932-1905 research/enhancement	NMFS Office of Protected Resources, Marine Mammal Health and Stranding Response Program	6/30/2009	6/30/2014	Beaches, coastal waters of the US, waters within the US EEZ, and international waters; world-wide import/export; U.S. rehabilitation and captive facilities	Pinniped (unidentified; All); Cetacean (unidentified; All)
10018	Level B Harassment of Humpback Whales in the Near Shore Waters Around Maui, Hawaiʻi	Keiki Kohola Project	6/18/2008	6/30/2014	Waters of the Au-Au Channel and in the near shore waters off the Four Island region of Maui, Hawaiʻi. All research activities would be conducted within the 200 fathom contour encompassing the islands of Maui, Molokaiʻi, Lānaʻi, and Kahoʻolawe.	Bottlenose Dolphin, Hawaiian Stock (All); Humpback Whale (Adult/ Juvenile; Calf); Spinner Dolphin, Hawaiian Stock (All); Killer False killer Whale, Hawaiian Stock (All); Short-finned Pilot Whale, Hawaiian stock (All); Spotted Pantropical spotted Dolphin, Hawaiian Stock (All)

Permit/File Number	Project Title	Organization	Date issued	Date Expires	Location	Species
10137	PIFSC Hawaiian monk seal field research and enhancement activities.	NMFS Pacific Islands Fisheries Science Center, Marine Mammal Research Program	6/30/2009	6/30/2014	Activities may occur in the Hawaiian Archipelago, which includes the NWHI and MHI, and at Johnston Atoll.	Hawaiian Monk Seal, Hawaiian Islands (Adult; All; pup; Pup/ Juvenile)
13427	Vessel surveys and photo-id of non-listed cetaceans in Hawaiian waters	Pacific Whale Foundation	6/4/2008	6/15/2014	Pacific Ocean / Deeper waters (>100 fathoms) outside of the inshore Maui County area, primary South and West of the islands of Lanai and Kahoolawe. Also, research may be conducted within the waters of Maui County, including the Auau, Kealaikahiki and Alalakeiki Channels.	Blainville's beaked Whale, Hawaiian Stock (All);Bottlenose Dolphin, Hawaiian Islands Stock Complex (All);Cuvier's beaked Whale, Hawaiian Stock (All);Killer False killer Whale, Hawaiian Stock (All);Killer Pygmy killer Whale, Hawaiian Stock (All);Killer Whale (All);Melon-headed Whale (All);Risso's Dolphin, Hawaiian Stock (All);Rough-toothed Dolphin, Hawaiian Stock (All);Short-finned Pilot Whale, Hawaiian stock (All);Sperm Dwarf sperm Whale, Hawaiian Stock (All);Sperm Pygmy sperm Whale, Hawaiian stock (All);Spinner Dolphin, Hawaiian Islands Stock Complex (All);Spotted Pantropical spotted Dolphin (All);Striped Dolphin, Hawaiian Stock (All)
13545	Global ecology and toxicology of cetaceans	Ocean Alliance	2/16/2010	2/15/2015	Atlantic Ocean, Indian Ocean, Pacific Ocean, High seas / U.S. EEZs and high seas	Blue Whale (Adult/ Juvenile);Bryde's Whale (Adult/ Juvenile);Fin Whale (Adult/ Juvenile);Gray Whale, Eastern North Pacific (Adult/ Juvenile);Humpback Whale (Adult/ Juvenile);Killer False killer Whale (Adult/ Juvenile);Killer Whale (Adult/ Juvenile);Long-beaked Common Dolphin (Adult/ Juvenile);Long-finned Pilot Whale (Adult/ Juvenile);Minke Whale (Adult/ Juvenile);North Atlantic Right Whale, Western Atlantic Stock (Adult/ Juvenile);Sei Whale (Adult/ Juvenile);Short-finned Pilot Whale (Adult/ Juvenile);Sperm Dwarf sperm Whale (Adult/ Juvenile);Sperm Pygmy sperm Whale (Adult/ Juvenile);Sperm Whale (Adult/ Juvenile);Sperm Whale, North Atlantic Stock (Adult/ Juvenile);Sperm Whale, North Pacific (Adult/ Juvenile);Unidentified Mesoplodon Whale (Adult/ Juvenile)
13846	Behavior, social organization and communication in humpback and gray whales in Hawaiʻi, Alaska and Washington	Whale Trust	7/14/2010	7/31/2015	Coastal waters of S.E. Alaska and Hawaiʻi / Coastal waters of the main Hawaiian Islands (N21 W157); coastal waters throughout S.E. Alaska (N58 W134). Primary study area in AK within the Frederick Sound, Chatham Strait, Stephens Passage, Lynn Canal and Icy Strait areas.	Humpback Whale, Central North Pacific Stock (Adult; Adult/ Juvenile; All); Killer Whale (All)
14097	NMFS Southwest Fisheries Science Center (SWFSC) pinniped, cetacean and sea turtle studies	NMFS SWFSC	7/7/2010	6/30/2015	North Pacific Ocean	Sea Green sea Turtle (Adult/ Subadult/ Juvenile); Sea Hawksbill sea Turtle (Adult/ Subadult/ Juvenile); Sea Leatherback sea Turtle (Adult/ Subadult/ Juvenile); Sea Loggerhead sea Turtle (Adult/ Subadult/ Juvenile); Sea Olive ridley sea Turtle (Adult/ Subadult/ Juvenile)

Permit/File Number	Project Title	Organization	Date issued	Date Expires	Location	Species
14118	Medium to long-term satellite, acoustic, and multi-sensor tagging studies on large and small cetaceans via a novel, noninvasive peduncle belt attachment mechanism	Woods Hole Oceanographic Institution	5/1/2012	4/30/2017	North Pacific Ocean / Tagging will occur in N. Pacific waters out to the US EEZ along the coasts of CA,OR,WA,AK, HI, including NMS protected areas: Channel Isl., Monterey Bay, Gulf of Farallones, Cordell Bank, Olympic Coast, Hawaiian Isl. Humpback Whale, Papahanaumokuakea	Fin Whale (Adult/ Juvenile);Gray Whale, Eastern North Pacific (Adult/ Juvenile);Humpback Whale, Central North Pacific Stock (Adult/ Juvenile);Long-finned Pilot Whale (Adult/ Juvenile);Minke Whale (Adult/ Juvenile);Sei Whale (Adult/ Juvenile);Short-finned Pilot Whale (Adult/ Juvenile)
14245	Cetacean Research at the National Marine Mammal Laboratory	NMFS National Marine Mammal Laboratory (NMML)	4/25/2011	5/1/2016	Alaska and US West Coast (CA, HI, OR, WA)	Baird's beaked Whale (Adult/ Juvenile;All;Non-neonate);Bearded Seal (All);Beluga Whale, Beaufort Sea Stock (All;Non-neonate);Beluga Whale, Bristol Bay Stock (All;Non-neonate);Beluga Whale, Cook Inlet Stock (Adult/ Juvenile;All);Beluga Whale, Eastern Bering Sea Stock (All;Non-neonate);Beluga Whale, Eastern Chukchi Sea Stock (All;Non-neonate);Blue Whale (Adult/ Juvenile;All;Calf);Blue Whale, Eastern North Pacific Stock (Adult/ Juvenile;All;Calf);Bottlenose Dolphin (Adult/ Juvenile;All;Non-neonate);Bowhead Whale (Adult/ Juvenile;All;Calf);California Sea lion (All);Cuvier's beaked Whale (Adult/ Juvenile;All;Non-neonate);Dall's Porpoise (All;Non-neonate);Fin Whale (Adult/ Juvenile;All;Calf);Fin Whale, California/Oregon/Washington Stock (Adult/ Juvenile;All;Calf);Gray Whale, Eastern North Pacific (Adult/ Juvenile;All;Non-neonate);Harbor Porpoise (All;Non-neonate);Harbor Seal (All);Harbor Seal, Bering Sea Stock (All);Harbor Seal, California Stock (All);Harbor Seal, Gulf of Alaska Stock (All);Harbor Seal, Oregon & Washington Coastal Waters Stocks (All);Harbor Seal, Southeast Alaska Stock (All);Harbor Seal, Washington Inland Waters Stock (All);Humpback Whale, Central North Pacific Stock (Adult/ Juvenile;All;Calf);Humpback Whale, Eastern North Pacific Stock (Adult/ Juvenile;All;Calf);Humpback Whale, Western North Pacific Stock (Adult/ Juvenile;All;Calf);Killer False killer Whale (Adult/ Juvenile;All;Non-neonate);Killer False killer Whale, Hawaiian Stock (Adult/ Juvenile;All;Non-neonate);Killer Whale (Adult/ Juvenile;All;Non-neonate);Killer Whale, Eastern North Pacific Southern Resident Stock (Adult/ Juvenile;All);Long-beaked Common Dolphin (Adult/ Juvenile;All;Non-neonate);Melon-headed Whale (Adult/ Juvenile;All;Non-neonate);Mesoplodon beaked Whale, California/ Oregon/ Washington Stocks (Adult/ Juvenile;All;Non-neonate);Minke Whale (Adult/ Juvenile;All;Non-neonate);Narwhal (All);North Pacific Right Whale (Adult/ Juvenile;All;Calf);Northern fur Seal, Eastern Pacific Stock (All)

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14353	Humpback whale research around Maui, Hawaiʻi	Cetos Research Organization	7/14/2010	7/31/2015	Humpback research: Au-au Channel; minke research: main HI islands / For humpbacks: the Au'au Channel, < 108' deep. The Channel is surrounded by four-islands: Molokaʻi, Maui, Kaho'olawe, and Lānaʻi to the west, resulting in calm, protected waters. For minkes: primarily around Kauaʻi and the other main HI islands.	Bottlenose Dolphin, Hawaiian Stock (All); Humpback Whale, Western North Pacific Stock (Adult; All; Calf); Melon-headed Whale, Hawaiian Stock (All); Minke Whale, Hawaiian stock (All); Risso's Dolphin, Hawaiian Stock (All); Rough-toothed Dolphin, Hawaiian Stock (All); Spinner Dolphin, Hawaiian Stock (All); Beaked Cuvier's beaked Whale, Hawaiian Stock (All); Killer False killer Whale, Hawaiian Stock (All); Killer Pygmy killer Whale, Hawaiian Stock (All); Short-finned Pilot Whale, Hawaiian stock (All); Sperm Dwarf sperm Whale, Hawaiian Stock (All); Sperm Pygmy sperm Whale, Hawaiian stock (All); Spotted Pantropical spotted Dolphin, Hawaiian Stock (All)
14381	Sampling sea turtle bycatch in Hawaiian Longline Fisheries	NMFS PIRO	2/12/2010	3/1/2015	Hawaiʻi Shallow-Set Longline Fishery	Sea Green sea Turtle (Subadult/ Adult); Sea Leatherback sea Turtle (Subadult/ Adult); Sea Loggerhead sea Turtle (Subadult/ Adult); Sea Olive ridley sea Turtle, Mexican Breeding Population (Subadult/ Adult)
14451	Assessing distribution and abundance of marine mammals on Navy operational area, instrumented ranges and adjacent waters using surface vessel surveys, photo identification, videography, and acoustic recording	University of Hawaiʻi at Manoa	7/14/2010	7/31/2015	North Pacific Ocean Offshore Hawaiian Islands/ Federal and state waters around the main Hawaiian Islands and Northwest Hawaiian Islands, including the Hawaiian Islands Humpback Whale National Marine Sanctuary and Papahānaumokuākea Marine National Monument, and waters of and adjacent to US Navy PMRF	Blue Whale, Western North Pacific Stock (All); Bottlenose Dolphin, Hawaiian Stock (All); Bryde's Whale (All); Fin Whale (All); Fraser's Dolphin (All); Humpback Whale (All); Killer Whale (All); Melon-headed Whale (All); Minke Whale (All); Risso's Dolphin (All); Rough-toothed Dolphin (All); Sei Whale (All); Sperm Whale (All); Spinner Dolphin, Hawaiian Stock (All); Striped Dolphin (All); Unidentified baleen Whale (All); Unidentified Dolphin (All); Unidentified Mesoplodon Whale (All); Unidentified toothed Whale (All); Beaked Baird's beaked Whale (All); Beaked Blainville's beaked Whale (All); Beaked Cuvier's beaked Whale (All); Beaked Longman's beaked Whale, Hawaiian Stock (All); Beaked Unidentified beaked Whale (All); Killer False killer Whale (All); Killer Pygmy killer Whale (All); Short-beaked Common Dolphin (All); Short-finned Pilot Whale (All); Sperm Dwarf sperm Whale (All); Sperm Pygmy sperm Whale (All); Spotted Pantropical spotted Dolphin (All)
14585	Behavior and biology of humpback whales in the Pacific Ocean, primarily off Hawaiʻi and Alaska	University of Hawaiʻi at Hilo	7/14/2010	7/31/2015	Eastern, Central, and Western North Pacific Ocean / Includes waters off Hawaiʻi (main study area) and along the North Pacific rim from California northward to Southeast Alaska and then westward through the Gulf of Alaska, Aleutian Islands, and regions of the upper western Pacific.	Humpback Whale (Adult/ Juvenile; All; Non-neonate); Sperm Whale (All); North Pacific Right Whale, Eastern North Pacific Stock (All)

Permit/File Number	Project Title	Organization	Date issued	Date Expires	Location	Species
					Hawaiian Islands Exclusive Economic Zone / Waters of the Hawaiian EEZ only	Blue Whale, Western North Pacific Stock (All); Bottlenose Dolphin, Hawaiian Stock (All); Bryde's Whale, Hawaiian Stock (All); Fin Whale, Hawaiian Stock (All); Fraser's Dolphin, Hawaiʻi Stock (All); Killer Whale (All); Melon-headed Whale, Hawaiian Stock (All); Minke Whale, Hawaiian stock (All); Rough-toothed Dolphin, Hawaiian Stock (All); Sei Whale, Hawaiian stock (All); Spinner Dolphin, Hawaiian Stock (All); Striped Dolphin, Hawaiian Stock (All); Beaked Blainville's beaked Whale, Hawaiian Stock (All); Beaked Cuvier's beaked Whale, Hawaiian Stock (All); Killer False killer Whale, Hawaiian Stock (All); Killer Pygmy killer Whale, Hawaiian Stock (All); Kogia (dwarf/pygmy sperm) Unidentified Kogia (dwarf/pygmy sperm) Whale (All); Short-finned Pilot Whale, Hawaiian stock (All); Spotted Pantropical spotted Dolphin, Hawaiian Stock (All)
14682	Application for a Permit for Scientific Research or to enhance the survival or recovery of a stock under the Marine Mammal Protection Act and the ESA	University of Hawaiʻi	8/6/2010	11/15/2015	Off the western end of Oʻahu, and in the Au Au Channel, in the Four-Island Region of the Hawaiian Main Islands	Bottlenose Dolphin, Hawaiian Stock (Adult; All); Humpback Whale (Adult; All); Killer Whale (Adult; Adult/ Juvenile; All); Melon-headed Whale, Hawaiian Stock (Adult; All); Risso's Dolphin, Hawaiian Stock (Adult; All); Rough-toothed Dolphin, Hawaiian Stock (Adult; All); Spinner Dolphin, Eastern Tropical Pacific Stock (Adult; All); Spinner Dolphin, Hawaiian Stock (Adult; All); Striped Dolphin, Hawaiian Stock (Adult; All); Beaked Blainville's beaked Whale, Hawaiian Stock (Adult; Adult/ Juvenile; All); Beaked Cuvier's beaked Whale, Hawaiian Stock (Adult; Adult/ Juvenile; All); Killer False killer Whale, Hawaiian Stock (Adult; Adult/ Juvenile; All); Killer Pygmy killer Whale, Hawaiian Stock (Adult; All); Short-beaked Common Dolphin (Adult; All); Short-finned Pilot Whale, Hawaiian stock (Adult; Adult/ Juvenile; All); Sperm Dwarf sperm Whale, Hawaiian Stock (Adult; All); Sperm Pygmy sperm Whale, Hawaiian stock (Adult; All); Spotted Pantropical spotted Dolphin, Hawaiian Stock (Adult; All); White-sided Pacific white-sided Dolphin (Adult; All)

Permit/File Number	Project Title	Organization	Date issued	Date Expires	Location	Species
15240	Scientific Research and to enhance the survival and recovery of Central and Western Pacific cetacean species	Pacific Islands Fisheries Science Center	5/15/2012	5/31/2017	U.S. EEZ waters. International waters, and foreign waters, subject to permission of the sovereign host State	Blainville's beaked Whale (Adult/ Juvenile;All;Calf);Blue Whale (Adult/ Juvenile;All;Calf);Bottlenose Dolphin (Adult/ Juvenile;All;Calf);Bryde's Whale (Adult/ Juvenile;All;Calf);Cuvier's beaked Whale (Adult/ Juvenile;All;Calf);Fin Whale (Adult/ Juvenile;All;Calf);Fraser's Dolphin (Adult/ Juvenile;All;Calf);Hawaiian monk Seal, Hawaiian Islands (All);Humpback Whale (Adult/ Juvenile;All;Calf);Killer False killer Whale (Adult/ Juvenile;All;Calf);Killer False killer Whale, Hawaiian Stock (Adult/ Juvenile;All;Calf);Killer Pygmy killer Whale (Adult/ Juvenile;All;Calf);Killer Whale (Adult/ Juvenile;All;Calf);Kogia (dwarf/pygmy sperm) Unidentified Kogia (dwarf/pygmy sperm) Whale (Adult/ Juvenile;All;Calf);Longman's beaked Whale (Adult/ Juvenile;All;Calf);Melon-headed Whale (Adult/ Juvenile;All;Calf);Minke Whale (Adult/ Juvenile;All;Calf);North Pacific Right Whale (Adult/ Juvenile;All;Calf);Risso's Dolphin (Adult/ Juvenile;All;Calf);Rough-toothed Dolphin (Adult/ Juvenile;All;Calf);Sei Whale (Adult/ Juvenile;All;Calf);Short-beaked Common Dolphin (Adult/ Juvenile;All;Calf);Short-finned Pilot Whale (Adult/ Juvenile;All;Calf);Sperm Dwarf sperm Whale (Adult/ Juvenile;All;Calf);Sperm Pygmy sperm Whale (Adult/ Juvenile;All;Calf);Sperm Whale (Adult/ Juvenile;All;Calf);Spinner Dolphin (Adult/ Juvenile;All;Calf);Spotted Pantropical spotted Dolphin (Adult/ Juvenile;All;Calf);Striped Dolphin (Adult/ Juvenile;All;Calf);Unidentified beaked Whale (Adult/ Juvenile;All;Calf);Unidentified Dolphin (Adult/ Juvenile;All;Calf);Unidentified Mesoplodon Whale (Adult/ Juvenile;All;Calf);Unidentified rorqual Whale (Adult/ Juvenile;All;Calf)

Permit/File Number	Project Title	Organization	Date issued	Date Expires	Location	Species
15330	Studies of population size, population structure, habitat use, movements, behavior and ecology of cetaceans in the Pacific Ocean	Cascadia Research Collective	7/28/2011	8/1/2016	Pacific Ocean including U.S. states (AK, WA, OR, CA, HI), territories (e.g., Palmyra, American Samoa, Guam, Wake), and International waters	Baird's beaked Whale (Adult/ Juvenile;All);Beluga Whale (All);Blainville's beaked Whale (Adult/ Juvenile;All);Blue Whale (Adult/ Juvenile;All);Bottlenose Dolphin (Adult/ Juvenile;All);Bryde's Whale (Adult/ Juvenile;All);California Sea lion (All);Cuvier's beaked Whale (Adult/ Juvenile;All);Dall's Porpoise (Adult/ Juvenile;All);Fin Whale (Adult/ Juvenile;All);Fraser's Dolphin (Adult/ Juvenile;All);Ginkgo-toothed beaked Whale (Adult/ Juvenile;All);Gray Whale, Eastern North Pacific (Adult/ Juvenile;All);Guadalupe fur Seal (All);Harbor Porpoise (All);Harbor Seal (All);Hawaiian monk Seal, Hawaiian Islands (All);Hubbs' beaked Whale (Adult/ Juvenile;All);Humpback Whale (Adult/ Juvenile;All);Indian Ocean bottlenose Dolphin (Adult/ Juvenile;All);Killer False killer Whale (Adult/ Juvenile;All);Killer False killer Whale, Hawaii Insular (Adult/ Juvenile;All);Killer False killer Whale, Hawaiian Stock (Adult/ Juvenile;All);Killer Pygmy killer Whale (Adult/ Juvenile;All);Killer Whale (Adult/ Juvenile;All);Killer Whale, Eastern North Pacific Southern Resident Stock (Adult/ Juvenile;All);Long-beaked Common Dolphin (Adult/ Juvenile;All);Longman's beaked Whale (Adult/ Juvenile;All);Melon-headed Whale (Adult/ Juvenile;All);Minke Whale (Adult/ Juvenile;All);North Pacific Right Whale (All);Northern elephant Seal (All);Northern fur Seal (All);Northern right whale Dolphin (Adult/ Juvenile;All);Pacific white-sided Dolphin (Adult/ Juvenile;All);Perrin's beaked Whale (Adult/ Juvenile;All);Pygmy beaked Whale (Adult/ Juvenile;All);Risso's Dolphin (Adult/ Juvenile;All);Rough-toothed Dolphin (Adult/ Juvenile;All);Sei Whale (Adult/ Juvenile;All);Short-beaked Common Dolphin (Adult/ Juvenile;All);Short-finned Pilot Whale (Adult/ Juvenile;All);Sperm Dwarf sperm Whale (Adult/ Juvenile;All);Sperm Pygmy sperm Whale (Adult/ Juvenile;All);Sperm Whale (Adult/ Juvenile;All);Spinner Dolphin (Adult/ Juvenile;All);Spotted Pantropical spotted Dolphin (Adult/ Juvenile;All);Stejneger's beaked Whale (Adult/ Juvenile)

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15409	Population and photo-id studies of small cetaceans in the Pacific Islands	Duke University	6/8/2010	6/15/2015	Nearshore waters of HI islands EEZ and American Samoa	Blainville's beaked Whale, Hawaiian Stock (All);Bottlenose Dolphin (All);Bottlenose Dolphin, Hawaiian Islands Stock Complex (All);Cuvier's beaked Whale, Hawaiian Stock (All);Fraser's Dolphin, Hawaii Stock (All);Killer Pygmy killer Whale, Hawaiian Stock (All);Killer Whale, Hawaiian Stock (All);Longman's beaked Whale, Hawaiian Stock (All);Melon-headed Whale, Hawaiian Stock (All);Risso's Dolphin, Hawaiian Stock (All);Rough-toothed Dolphin, Hawaiian Stock (All);Short-finned Pilot Whale, Hawaiian stock (All);Sperm Dwarf sperm Whale, Hawaiian Stock (All);Sperm Pygmy sperm Whale, Hawaiian stock (All);Spinner Dolphin, Hawaiian Islands Stock Complex (All);Spotted Pantropical spotted Dolphin, Hawaiian Stock (All);Striped Dolphin, Hawaiian Stock (All)
15453	Scientific Research Relating to Enhancing the Survival of the Hawaiian monk seal (*Monachus schauinslandi*) under the Marine Mammal Protection Act and the Endangered Species Act.	Waikiki Aquarium	4/30/12	4/30/2017	Waikiki Aquarium, University of Hawaii, 2777 Kalakaua Avenue, Honolulu, HI 96815.	Hawaiian monk seal
15685	Ocean capture research of green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) sea turtles in the Hawaiian Islands to determine growth rates, health status, stock and population structure, foraging ecology, habitat use, and movements.	NMFS Pacific Islands Fisheries Science Center (PIFSC)	1/26/2012	1/31/2017	Hawaiian coastal waters (bays, reefs, canals, etc.) / Most of the study sites are accessed by land, the exception being Kaneohe Bay which is accessed by boat. Public beach accesses, private residences, hotel and resort beaches, and State and National Parks are used.	Green sea Turtle (Adult/ Subadult/ Juvenile);Hawksbill sea Turtle (Adult/ Subadult/ Juvenile)
16053	Measuring the hearing of stranded cetaceans in U.S. waters, beaches and rehabilitation centers using the evoked auditory potential procedure	Marine Mammal Research Program, Hawaii Institute of Marine Biology	2/22/2012	2/28/2017	Stranded on beaches/waters in U.S., in temporary pools on beaches, or in U.S. rehabilitation facilities while under care by authorized NMFS Stranding Network participants	Unidentified Cetacean (All)

Permit/File Number	Project Title	Organization	Date issued	Date Expires	Location	Species
16163	Studies of movements, habitat use, ecology, behavior, and risk factors of cetaceans in the Pacific Ocean	NMFS Northwest Fisheries Science Center	6/5/2012	6/6/2017	Pacific Ocean / WA, OR, CA, HI, AK, High Seas North Pacific Ocean	Baird's beaked Whale (Adult/ Juvenile; All); Blainville's beaked Whale (Adult/ Juvenile; All);Blue Whale, Eastern North Pacific Stock (Adult/ Juvenile; All);Bottlenose Dolphin (Adult/ Juvenile; All); Bryde's Whale (All);California Sea lion, US Stock (All);Cuvier's beaked Whale (Adult/ Juvenile; All); Dall's Porpoise (Adult/ Juvenile; All);Fin Whale (Adult/ Juvenile; All); Fraser's Dolphin (All);Gray Whale, Eastern North Pacific (Adult/ Juvenile; All);Guadalupe fur Seal (All);Harbor Porpoise (Adult/ Juvenile; All);Harbor Seal (All);Hawaiian monk Seal, Hawaiian Islands (All); Hubbs' beaked Whale (All);Humpback Whale (Adult/ Juvenile; All);Killer False killer Whale (Adult/ Juvenile; All);Killer False killer Whale, Hawaiian Stock (Adult/ Juvenile; All);Killer Pygmy killer Whale (Adult/ Juvenile; All);Killer Whale (Adult/ Juvenile; All);Killer Whale, Eastern North Pacific Alaska Resident Stock (Adult/ Juvenile; All);Killer Whale, Eastern North Pacific Northern Resident Stock (Adult/ Juvenile; All);Killer Whale, Eastern North Pacific Offshore Stock (Adult/ Juvenile; All);Killer Whale, Eastern North Pacific Southern Resident Stock (Adult/ Juvenile; All);Killer Whale, Hawaiian Stock (Adult/ Juvenile; All);Killer Whale, West Coast Transient Stock (Adult/ Juvenile; All);Long-beaked Common Dolphin, California Stock (Adult/ Juvenile; All);Longman's beaked Whale (Adult/ Juvenile; All);Melon-headed Whale (Adult/ Juvenile; All);Mesoplodon beaked Whale, California/ Oregon/ Washington Stocks (Adult/ Juvenile; All);Minke Whale (Adult/ Juvenile; All);North Pacific Right Whale, Eastern North Pacific Stock (All);Northern elephant Seal (All);Northern fur Seal, Eastern Pacific Stock (All);Northern right whale Dolphin (Adult/ Juvenile; All);Pacific white-sided Dolphin (Adult/ Juvenile; All);Perrin's beaked Whale (All);Pygmy beaked Whale (All);Risso's Dolphin (Adult/ Juvenile; All);Rough-toothed Dolphin (Adult/ Juvenile; All);Sei Whale (All);Short-beaked Common Dolphin, California/Oregon/Washington Stock (Adult/ Juvenile; All
16479	Whale surprise encounters and near misses: proxies of vessel strikes in Maui County waters	Pacific Whale Foundation	9/18/2012	6/1/2017	Maui County Waters / The study will take place in the four island region of Maui County, Hawaii Latitude: 20.901025 Longitude: -156.615839	Humpback Whale, Central North Pacific Stock (All);Killer False killer Whale, Hawaiian Stock (All)
16599	Evoked Potential Auditory Tests for Stranded Marine Mammals	National Marine Mammal Foundation	3/30/2012	4/1/2017	Nationwide: All US Waters / Stranding locations including beaches and rehabilitation centers	Unidentified Cetacean (All)
16992	Paul Nachtigall -- auditory research on captive cetaceans in Hawaii (HIMB)	Marine Mammal Research Program, Hawaii Institute of Marine Biology	5/29/2013	5/31/2018	University of Hawaii Institute of Marine Biology (Kaneohe, HI)	Bottlenose Dolphin (Adult; Juvenile);Killer False killer Whale (Adult)

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17159	Spinner dolphin filming at Midway Atoll	Parthenon Entertainment Ltd	5/24/2012	5/31/2017	Midway Atoll NWR, part of the Papahanaumokuakea Marine National Monument The anticipated areas will be opportunistic, but are most likely to include the lagoon, the channel between islands and nearshore shallow waters, including Wells Harbor	Spinner Dolphin, Hawaiian Islands Stock Complex (All)
17268	Honolulu Seawater AC	Honolulu Seawater Air Conditioning, LLC	9/25/2012	9/30/2013	Area offshore of Kakaako, island of Oahu, Hawaii	Blainville's beaked Whale, Hawaiian Stock (All);Blue Whale, Western North Pacific Stock (All);Bottlenose Dolphin, Hawaiian Islands Stock Complex (All);Bryde's Whale, Hawaiian Stock (All);Cuvier's beaked Whale, Hawaiian Stock (All);Fraser's Dolphin, Hawaii Stock (All);Hawaiian monk Seal, Hawaiian Islands (All);Humpback Whale, Western North Pacific Stock (All);Killer False killer Whale, Hawaii Insular (All);Killer Pygmy killer Whale, Hawaiian Stock (All);Killer Whale, Hawaiian Stock (All);Longman's beaked Whale, Hawaiian Stock (All);Melon-headed Whale, Hawaiian Stock (All);Minke Whale, Hawaiian stock (All);Risso's Dolphin, Hawaiian Stock (All);Rough-toothed Dolphin, Hawaiian Stock (All);Sei Whale, Hawaiian stock (All);Short-finned Pilot Whale, Hawaiian stock (All);Sperm Dwarf sperm Whale, Hawaiian Stock (All);Sperm Pygmy sperm Whale, Hawaiian stock (All);Sperm Whale, Hawaiian stock (All);Spinner Dolphin, Hawaiian Islands Stock Complex (All);Spotted Pantropical spotted Dolphin, Hawaiian Stock (All);Striped Dolphin, Hawaiian Stock (All)
17860	Acoustic Technology Experiments	U.S. Navy	7/8/2013	6/30/2014	Western Pacific	Baird's beaked Whale (All);Blainville's beaked Whale (All);Blue Whale, Western North Pacific Stock (All);Bottlenose Dolphin (All);Bryde's Whale (All);Cuvier's beaked Whale (All);Dall's Porpoise (All);Fin Whale (All);Fraser's Dolphin (All);Ginkgo-toothed beaked Whale (All);Gray Whale, Western North Pacific (Korean) (All);Hawaiian monk Seal, Hawaiian Islands (All);Hubbs' beaked Whale (All);Humpback Whale, Western North Pacific Stock (All);Killer False killer Whale (All);Killer Pygmy killer Whale (All);Killer Whale (All);Kogia (dwarf/pygmy sperm) Unidentified Kogia (dwarf/pygmy sperm) Whale (All);Longman's beaked Whale (All);Melon-headed Whale (All);Mesoplodon beaked Whale, California/ Oregon/ Washington Stocks (All);Minke Whale (All);North Pacific Right Whale (All);Pacific white-sided Dolphin (All);Risso's Dolphin (All);Rough-toothed Dolphin (All);Sei Whale (All);Short-beaked Common Dolphin (All);Short-finned Pilot Whale (All);Sperm Dwarf sperm Whale (All);Sperm Pygmy sperm Whale (All);Sperm Whale (All);Spinner Dolphin (All);Spotted Pantropical spotted Dolphin (All);Stejneger's beaked Whale (All);Striped Dolphin (All)

Permit/File Number	Project Title	Organization	Date issued	Date Expires	Location	Species
18072	2013 Letter of Authorization - SURTASS LFA (USNS ABLE)	U.S. Navy	8/13/2013	8/14/2014	Northwest and North Central Pacific Ocean	Blue whale; Bryde's whale; Fin whale; Humpback whale; Common minke whale; North Pacific right whale; Sei whale; Western north Pacific gray whale; Baird's beaked whale; Blainville's beaked whale; Common bottlenose dolphin; Cuvier's beaked whale; Dall's porpoise; Dwarf sperm whale; False killer whale; Fraser's dolphin; Ginkgo-toothed beaked whale; Hubbs' beaked whale; Killer whale; Kogia spp.; Longman's beaked whale; Melon-headed whale; Mesoplodon spp.; Pacific white-sided dolphin; Pantropical spotted dolphin; Pygmy killer whale; Pygmy sperm whale; Risso's dolphin; Rough-toothed dolphin; Short-beaked common dolphin; Short-finned pilot whale; Sperm whale; Spinner dolphin; Stejneger's beaked whale; Striped dolphin; Hawaiian monk seal.
18073	2013 Letter of Authorization - SURTASS LFA (USNS IMPECCABLE)	U.S. Navy	8/13/2013	8/14/2014	Northwest and North Central Pacific Ocean	Blue whale; Bryde's whale; Fin whale; Humpback whale; Common minke whale; North Pacific right whale; Sei whale; Western north Pacific gray whale; Baird's beaked whale; Blainville's beaked whale; Common bottlenose dolphin; Cuvier's beaked whale; Dall's porpoise; Dwarf sperm whale; False killer whale; Fraser's dolphin; Ginkgo-toothed beaked whale; Hubbs' beaked whale; Killer whale; Kogia spp.; Longman's beaked whale; Melon-headed whale; Mesoplodon spp.; Pacific white-sided dolphin; Pantropical spotted dolphin; Pygmy killer whale; Pygmy sperm whale; Risso's dolphin; Rough-toothed dolphin; Short-beaked common dolphin; Short-finned pilot whale; Sperm whale; Spinner dolphin; Stejneger's beaked whale; Striped dolphin; Hawaiian monk seal
18074	2013 Letter of Authorization - SURTASS LFA (USNS VICTORIOUS)	U.S. Navy	8/13/2013	8/14/2014	Northwest and North Central Pacific Ocean	Blue whale; Bryde's whale; Fin whale; Humpback whale; Common minke whale; North Pacific right whale; Sei whale; Western north Pacific gray whale; Baird's beaked whale; Blainville's beaked whale; Common bottlenose dolphin; Cuvier's beaked whale; Dall's porpoise; Dwarf sperm whale; False killer whale; Fraser's dolphin; Ginkgo-toothed beaked whale; Hubbs' beaked whale; Killer whale; Kogia spp.; Longman's beaked whale; Melon-headed whale; Mesoplodon spp.; Pacific white-sided dolphin; Pantropical spotted dolphin; Pygmy killer whale; Pygmy sperm whale; Risso's dolphin; Rough-toothed dolphin; Short-beaked common dolphin; Short-finned pilot whale; Sperm whale; Spinner dolphin; Stejneger's beaked whale; Striped dolphin; Hawaiian monk seal

Permit/File Number	Project Title	Organization	Date issued	Date Expires	Location	Species
18075	2013 Letter of Authorization - SURTASS LFA (USNS EFFECTIVE)	U.S. Navy	8/13/2013	8/14/2014	Northwest and North Central Pacific Ocean	Blue whale; Bryde's whale; Fin whale; Humpback whale; Common minke whale; North Pacific right whale; Sei whale; Western north Pacific gray whale; Baird's beaked whale; Blainville's beaked whale; Common bottlenose dolphin; Cuvier's beaked whale; Dall's porpoise; Dwarf sperm whale; False killer whale; Fraser's dolphin; Ginkgo-toothed beaked whale; Hubbs' beaked whale; Killer whale; Kogia spp.; Longman's beaked whale; Melon-headed whale; Mesoplodon spp.; Pacific white-sided dolphin; Pantropical spotted dolphin; Pygmy killer whale; Pygmy sperm whale; Risso's dolphin; Rough-toothed dolphin; Short-beaked common dolphin; Short-finned pilot whale; Sperm whale; Spinner dolphin; Stejneger's beaked whale; Striped dolphin; Hawaiian monk seal
N/A	Take of marine mammals incidental to Navy training activities in the Hawaii Range Complex	U.S. Pacific Fleet	1/23/2013	1/5/2014	Hawaii Range Complex	Humpback whale; Minke whale; Sei whale; Fin whale; Bryde's whale; Sperm whale; Pygmy sperm whale; Dwarf sperm whale; Cuvier's beaked whale; Blainville's beaked whale; Longman's beaked whale; Rough-toothed dolphin; Bottlenose dolphin; Pan-tropical dolphin; Spinner dolphin; Striped dolphins; Risso's dolphin; Melon-headed whale; Fraser's dolphin; Pygmy killer whale; False killer whale; Killer whale; Short-finned pilot whale; Hawaiian monk seal

Source:

NMFS Authorizations and Permits for Protected Species Website: https://apps.nmfs.noaa.gov and http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications; data as of August 16, 2013. Additional data obtained from NMFS Office of Protected Resources on August 27, 2013.

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3.3.10.1 *Papahānaumokuākea Marine National Monument Permitted Activities*

The Papahānaumokuākea Marine National Monument (Monument) is administered jointly by three Co-Trustees: Department of Commerce (DOC) through NOAA, the Department of the Interior through USFWS, and the State of Hawai`i through DLNR ("Co-Trustees"). In addition, the Co-Trustee agencies work in close collaboration and consultation with the Office of Hawaiian Affairs to ensure that both cultural and natural resources are protected. More information about the Monument can be found in Section 3.4.11.2.

Permit applications are approved in one of six permit categories:

1) **Research** – projects that are designed to further understanding of Monument resources and qualities;
2) **Education** – projects that will further the educational value of the Monument;
3) **Conservation and Management** – projects that will assist in the conservation and management of the Monument;
4) **Native Hawaiian** – practices and activities that will allow Native Hawaiian cultural practices (non-commercial);
5) **Special ocean use** – projects that will allow a special ocean use (ecotourism, documentary filmmaking); or
6) **Recreational** – projects that will allow recreational activities such as snorkeling, wildlife viewing and kayaking.

For details of the permitted activities, please refer to the Papahānaumokuākea Marine National Monument 2011 Permitted Activities Annual Report (NOAA 2013). BMPs for activities permitted within the Monument are presented in Appendix G. Table 3.3-9 lists the number of 2011 active permits by category. Table 3.3-10 provides basic information about each activity - permit type, permittee affiliation and project title/description.

Table 3.3-9 Number of PMNM Permits issued in 2011 by Permit Type

Permit Type	2011 Permits
Research	19
Conservation and Management	6
Education	4
Native Hawaiian Practices	3
Recreation	0
Special Ocean Use	5
TOTAL	37

Adapted from: Permitted Activities 2011 Report (NOAA 2013)

Table 3.3-10 Papahānaumokuākea Marine National Monument Permitted Activities 2011.

Permit Category	Permittee Affiliation	Number of Permits Issued	Permitted Project Titles
Research	Center for Coastal and Ocean Mapping/Joint Hydrographic Center, University of New Hampshire	1	Bathymetric Mapping of the Intersection of Necker Ridge with the Hawaiian Ridge
	Department of Geosciences, Pennsylvania State University	1	Collection of Bryozoan Specimens
	Department of Earth, Ocean, and Atmospheric Sciences, Florida State University	1	Identification of Deep-Sea Coral and Sponge Beds
	University of Hawaiʽi Departments of Oceanography, Plant and Environmental Protection Sciences, Botany, and Anthropology	4	Algal Baseline Characterization Activities; Collection of Adult and Larval *Hyposmocoma* Moths to Conduct Species Descriptions and DNA Analysis of Their Evolutionary Relationships; Characterization of Large Deep-sea Scavenging Fauna, General Habitat Associations and Their Relationship to Water Depth Within the Monument; Documentation and Assessment of Cultural Sites on Mokumanamana and Nihoa Islands

Permit Category	Permittee Affiliation	Number of Permits Issued	Permitted Project Titles
	Hawai'i Institute of Marine Biology, University of Hawai'i at Mänoa	7	Documenting the Biodiversity and Ecology of Nearshore Basaltic Reefs Monitoring Incidence, Growth Rates, and Genetic Relatedness of Coral and Fish Diseases within NWHI Nearshore Reefs Retrieval of Ecological Acoustic Recorders (EARs) in Deep Marine Areas Genetic Surveys to Address the Level of Isolation Between Shallow and Deep Reef Ecosystems Relative Role of Terrestrial Sources of Nutrients for Algae and Bivalve Productivity Quantify the Movements and Feeding Habits of Top Predators Coral Reef Bioerosion Rates as Indicators of Community Response to Ocean Acidification
	Department of Anthropology, University of Hawai'i at Mänoa	1	Documentation and Assessment of Native Hawaiian Cultural Sites on Mokumanamana (Necker) Island
	Oceanic Institute, Hawai'i Pacific University	2	Plastic Ingestion of Black Footed and Laysan Albatross Analysis of Carbonate Chemical Make-up of Waters Surrounding Atoll Systems
	Institute of Marine Sciences, University of California at Santa Cruz	2	Laysan and Black-footed Albatross Monitoring Red-footed, Masked, and Brown Booby Monitoring
	NOAA, National Marine Fisheries Service, Pacific Islands Fisheries Science Center	2	Activities to Enhance Understanding of Hawaiian Monk Seal Foraging Ecology at Nihoa Island Efforts to Increase Juvenile Monk Seal Survival
	NOAA, National Ocean Service, Office of National Marine Sanctuaries	2	Pacific Reef Assessment and Monitoring Program Documenting the Biodiversity of Deep Reefs Using Conventional and Technical SCUBA Diving Technology

Permit Category	Permittee Affiliation	Number of Permits Issued	Permitted Project Titles
Conservation and Management	Monument Co-Trustees	1	Co-Trustee conservation and management activities (See below for details)
	NOAA Office of Marine and Aviation Operations	2	Support for permitted activities aboard NOAA Ship *Hiʻialakai*; Support for permitted activities aboard NOAA Ship *Oscar Elton Sette*
	NOAA National Ocean Service ONMS	1	Maritime Heritage Conservation and Management Activities
	NOAA National Marine Fisheries Service Office of Protected 1 Resources	1	Monitoring Shark Activity at Select Hawaiian Monk Seal Pupping Sites of French Frigate Shoals and the Removal of Predatory Sharks from these Areas
	University of Hawai`i, Marine Center	1	Support for Permitted Research Activities Using University of Hawaii Research Vessel Kilo Moana
Education	KGMB/KHNL/KFVE - TV Stations	1	Photographs and Video Film for 'Hawaiʻi News Now' Broadcasting Stations
	Sea Education Association	1	Sea Education Association Marine Conservation Field Studies Expedition
	University of Hawaiʻi, Hawaiʻi Institute of Marine Biology	1	Development of Multimedia Resources for Distance Learning Courses and Marine Exchange Programs
	Waikīkī Aquarium	1	Waikīkī Aquarium Live Reef Fish and Coral Collection Activities
Special Ocean Use	DUMA-Naturreisen	1	Guided Eco-tourism Activities on Midway Atoll
	Film und Medien Stiftung NRW and West German Television Cologne	1	Production of a Script for a German Cinema Documentary
	Private Citizen	1	Literary Publication on Resource Restoration Efforts
	Private Citizen	1	Literary Publication on Midway Tour Activities

Permit Category	Permittee Affiliation	Number of Permits Issued	Permitted Project Titles
	Red Sea Ocean Adventures	1	Filming for *Hawaii Skin Diver* Television Program
Native Hawaiian Practices	University of Hawaiʻi at Hilo	1	Using Traditional Ecological Knowledge to Examine Nearshore Ecosystems
	University of Hawaiʻi at Hilo - Ola Nä Iwi Hawaiian Language Program	1	Hawaiian Language Immersion Program (Ola Nä Iwi) on Midway Atoll
	University of Hawaiʻi at Hilo, Kïpuka Native Hawaiian Student Center, Edith Kanakaʻole Foundation, Hawaiʻi Community College	1	Autumnal Equinox Cultural Research and Native Hawaiian Practices on Mokumanamana (Necker Island)

Source: Adapted from: 2011 Monument Permitted Activities Report (NOAA 2013)

A single conservation and management permit is issued annually, pending a stringent review process, to the Monument Co-Trustee agencies for conservation and management activities conducted within the Monument. These activities are:

- Management and Operation of Midway Atoll Field Station;
- Benthic Habitat Mapping;
- Management and Operation of French Frigate Shoals, Tern Island Field Station;
- Marine Maritime Surveys at Midway Atoll;
- Maintenance and Operation of Hawaiian Monk Seal Monitoring Field Stations;
- Marine Debris Removal; and
- Management and Operation of Kure Atoll Field Station.

3.4 SOCIAL AND ECONOMIC ENVIRONMENT

This section describes the existing social and economic conditions in the area that may be affected by the proposed action and alternatives. The Project Area, as described in Section 1.3, is the State of Hawai`i, including both the NWHI and the MHI. Where available from reliable sources, information is also presented at the county- or island-level. The key social and economic resources addressed in this section include population trends; area economy (employment, income, and unemployment); commercial fishing; subsistence fishing; recreational fishing; cultural resources and historic properties; recreation and tourism; environmental justice; sanctuaries, monuments and refuges; and military activities within the project area.

3.4.1 Human Population Trends

The human population in the State of Hawai`i has grown by over 22% between 1990 and 2010, with an estimated population of close to 1.4 million (U.S. Census Bureau 1990, 2000, and 2010) (see Table 3.4-1). The City and County of Honolulu has the highest population and population density in the state, with almost 0.95 million people and 1,589 people per square mile.

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Table 3.4-1 Human Population and Population Change

Area	Population			Population Change (%)			2010 Population Density (people/mi^2)
	1990	2000	2010	1990-2000	2000-2010	1990-2010	
City and County of Honolulu	836,231	876,156	953,207	4.8%	8.8%	14.0%	1,589
Hawai`i County	120,317	148,677	185,079	23.6%	24.5%	53.8%	46
Kaua`i County	51,177	58,463	67,091	14.2%	14.8%	31.1%	108
Maui County *	100,504	128,241	154,924	27.6%	20.8%	54.1%	132
State of Hawai`i	1,108,229	1,211,537	1,360,301	9.3%	12.3%	22.7%	212
U.S.A.	248,709,873	281,421,906	308,745,538	13.2%	9.7%	24.1%	87

Note: * Information for Maui County includes Kalawao County, which has a population of 90 people according to the 2010 Census.
Sources:
U.S. Census Bureau (2010). *2010 Census National Summary File of Redistricting Data, Tables P1 and H1*. Website (http://factfinder2.census.gov/), accessed April 19, 2011.
U.S. Census Bureau (2000). *Census 2000 Summary File 1*. Website (http://factfinder.census.gov/), accessed April 19, 2011.
U.S. Census Bureau (1990). *DP-1, General Population and Housing Characteristics: 1990, 1990 Summary Tape File 1 (STF 1) - 100-Percent Data, United States*. Website (http://factfinder.census.gov/), accessed April 19, 2011.

3.4.2 *Area Economy*

The economy of Hawai`i and its counties is contingent upon employment, income, the unemployment rate, and industry employment characteristics. To understand the economic and social and economic makeup of the Project Area, key economic indicators such as employment and unemployment and income are further explored here.

Data in this section are presented at the county level, the level for which consistent data for economic indicators are available from reliable and published sources. However, it is acknowledged that the economies of some islands within the same county can be quite different from one another. To the extent that such differences are important for evaluating the effects of the proposed alternatives and that sufficient island-level information/data are available, the effects on these islands may be discussed individually in Chapter 4 of this PEIS.

3.4.2.1 *Employment*

Industry-specific employment information provides important insight into the characteristics of a regional economy. Total non-farm employment in Hawai`i consisted of 835,523 jobs in November 2009 (BEA 2011) (see Table 3.4-2). About 78% of non-farm employment in the state is private, while the rest is government. The counties more or less reflect this trend, with major employment in the private sector. The industry with the highest level of employment in Hawai`i is accommodation and food services (11%), followed by state and local government (military) and retail trade, respectively. The high employment in the accommodation and food services industry reflects Hawai`i's dependence on tourism. Table 3.4-2 presents employment by industry in 2009 for the state and its counties.

Table 3.4-2 Employment by Industry in 2009

	Hawai`i County		City and County of Honolulu		Kaua`i County		Maui & Kalawao Counties		State of Hawai`i	
	Employees	% of Total Employment	Employees	% of Total Employment	Employees	% of Total Employment	Employees	% of Total Employment	Employees	% of Total Employment
Total employment	94,859	100%	604,392	100%	41,023	100%	95,249	100%	835,523	100%
Farm employment	5,936	6%	2,224	0%	1,129	3%	2,587	3%	11,876	1%
Nonfarm employment	88,923	94%	602,168	100%	39,894	97%	92,662	97%	823,647	99%
Private employment	74,854	79%	451,264	75%	34,818	85%	81,750	86%	642,686	77%
Forestry, fishing, and related activities	(D)		1,177	0%	(D)		(D)		3,538	0%
Mining	(D)		731	0%	(D)		(D)		1,181	0%
Utilities	587	1%	2,277	0%	254	1%	495	1%	3,613	0%
Construction	(D)		28,566	5%	(D)		5,505	6%	43,034	5%
Manufacturing	(D)		12,839	2%	(D)		1,574	2%	16,917	2%
Wholesale trade	(D)		16,921	3%	(D)		1,900	2%	21,607	3%
Retail trade	10,892	11%	56,931	9%	4,773	12%	10,772	11%	83,368	10%
Transportation and warehousing	(D)		20,876	3%	(D)		3,053	3%	27,678	3%
Information	861	1%	8,769	1%	376	1%	1,073	1%	11,079	1%
Finance and insurance	(D)		23,915	4%	(D)		2,076	2%	29,389	4%
Real estate and rental and leasing	(D)		24,130	4%	(D)		5,846	6%	38,035	5%
Professional, scientific, and technical services	(D)		35,319	6%	(D)		4,056	4%	45,166	5%
Management of companies and enterprises	(D)		6,379	1%	(D)		405	0%	7,203	1%
Administrative and waste services	5,102	5%	38,646	6%	3,031	7%	6,902	7%	53,681	6%
Educational services	(D)		15,295	3%	(D)		1,458	2%	18,953	2%
Health care and social assistance	8,156	9%	54,786	9%	(D)		(D)		72,381	9%
Arts, entertainment, and recreation	(D)		12,310	2%	(D)		4,419	5%	21,857	3%
Accommodation and food services	(D)		57,443	10%	(D)		18,632	20%	94,869	11%

	Hawai`i County		City and County of Honolulu		Kaua`i County		Maui & Kalawao Counties		State of Hawai`i	
	Employees	% of Total Employment	Employees	% of Total Employment	Employees	% of Total Employment	Employees	% of Total Employment	Employees	% of Total Employment
Other services, except public administration	5,936	6%	33,954	6%	2,870	7%	6,377	7%	49,137	6%
Government and government enterprises	14,069	15%	150,904	25%	5,076	12%	10,912	11%	180,961	22%
Federal, civilian	1,361	1%	30,601	5%	536	1%	881	1%	33,379	4%
Military	1,400	1%	52,528	9%	573	1%	1,162	1%	55,663	7%
State and local	11,308	12%	67,775	11%	3,967	10%	8,869	9%	91,919	11%
State government	8,532	9%	55,495	9%	2,711	7%	6,167	6%	72,905	9%
Local government	2,776	3%	12,280	2%	1,256	3%	2,702	3%	19,014	2%

Note:
(D) - Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.
Source:
Regional Economic Information System, Bureau of Economic Analysis (BEA), US DOC. (April 2011). CA25N Footnotes. Retrieved from http://www.bea.gov/regional/docs/footnotes.cfm?tablename=CA25N

Between 2001 and 2009, employment in Hawai`i increased by 9% (see Table 3.4-3). The highest gain is in the mining industry at almost 114%, followed by utilities. Jobs in the tourism-related sectors of accommodation and food services and arts, entertainment, and recreation increased by over 4% and over 11%, respectively. Three sectors that experienced job losses during this period include forestry, fishing, and related activities; information; manufacturing; transportation and warehousing; and retail trade.

Table 3.4-3 Industry Employment Growth, 2001 to 2009 (% Change)

	Hawai`i County	City and County of Honolulu	Kaua`i County	Maui & Kalawao Counties	State of Hawai`i
Total employment	16.2%	7.9%	8.9%	9.7%	9.0%
Farm employment	11.9%	-22.0%	-15.1%	-7.6%	-3.4%
Nonfarm employment	16.5%	8.1%	9.8%	10.2%	9.2%
Private employment	17.2%	8.3%	10.6%	9.6%	9.6%
Forestry, fishing, and related activities		-35.2%			-11.6%
Mining		116.9%			114.3%
Utilities		34.4%		25.3%	33.3%
Construction		31.5%		13.9%	27.5%
Manufacturing		-13.1%		-27.1%	-14.0%

	Hawai`i County	City and County of Honolulu	Kaua`i County	Maui & Kalawao Counties	State of Hawai`i
Wholesale trade		3.6%		17.6%	5.5%
Retail trade	8.0%	-3.6%	-2.5%	0.7%	-1.6%
Transportation and warehousing		-7.8%		3.8%	-4.4%
Information	5.3%	-22.5%	-18.4%	-8.5%	-19.5%
Finance and insurance		17.1%		44.2%	21.8%
Real estate and rental and leasing		19.9%		16.8%	21.1%
Professional, scientific, and technical services		16.2%		20.2%	17.0%
Management of companies and enterprises		16.7%		1.0%	15.7%
Administrative and waste services	23.4%	10.8%	16.5%	33.3%	14.7%
Educational services		21.2%		56.9%	27.9%
Health care and social assistance	21.8%	20.0%			20.4%
Arts, entertainment, and recreation		1.2%		13.2%	10.5%
Accommodation and food services		7.5%		-2.9%	3.6%
Other services, except public administration	23.1%	7.3%	22.6%	13.8%	10.6%
Government and government enterprises	13.0%	7.2%	4.9%	15.7%	8.1%
Federal, civilian	40.3%	11.6%	43.3%	66.2%	14.0%
Military	-3.2%	4.4%	-11.7%	-6.4%	3.7%
State and local	12.7%	7.6%	3.9%	15.8%	8.8%
State government	10.3%	8.6%	-0.2%	11.5%	8.7%
Local government	20.6%	3.1%	14.1%	27.0%	9.1%

Source: Regional Economic Information System, Bureau of Economic Analysis (BEA), US DOC. (April 2011). CA25N Footnotes. Retrieved from http://www.bea.gov/regional/docs/footnotes.cfm?tablename=CA25N

3.4.2.2 *Income*

Hawai`i's per capita personal income ($42,152) is slightly higher than that of the nation as a whole, with the annualized growth rate of 5.4% between 2001 and 2009 (DBEDT 2009a) (see Table 3.4-4). Among the counties, the City and County of Honolulu has the highest per capita personal income in 2009 of $45,496, while Hawai`i County has the lowest at $32,023. A high per capita income in a community indicates the presence of high paying employment opportunities. See Table 3.4-4 for a summary of personal income the U.S., and the State of Hawai`i and its counties.

Table 3.4-4 Personal Income in 2001-2009

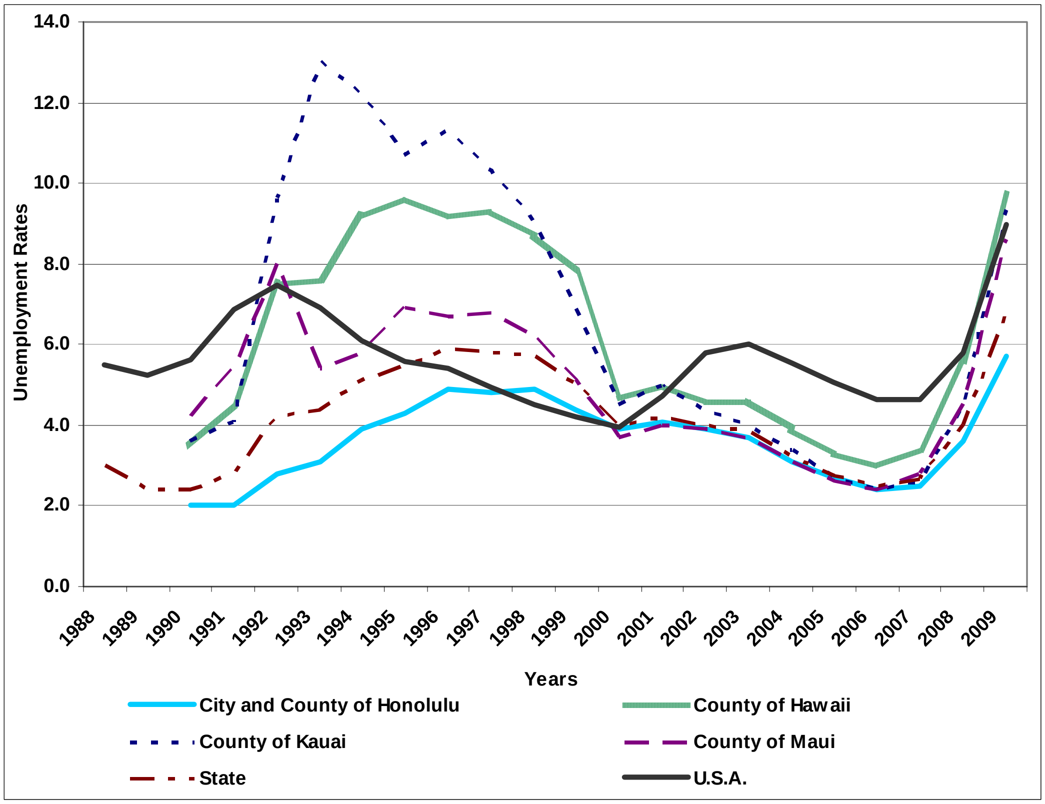
Area	Per Capita Personal Income ($)		
	2001	2009	Annualized Rate of Change (%)
City and County of Honolulu	31,304	45,496	5.7%
Hawai`i County	23,056	32,023	4.9%
Kaua`i County	25,393	35,560	5.0%
Maui County	26,669	36,585	4.6%
State of Hawai`i	29,497	42,152	5.4%
U.S.A.	31,145	39,635	3.4%

Source: DBEDT (2010). *County Social, Business and Economic Trends in* Hawai`i*: 1990 – 2010.*

3.4.2.3 Unemployment

The unemployment rate is a key economic indicator providing important insight into the economic health of a region. High unemployment is a sign of an unhealthy economy, which can lead to reduced spending, a decreased tax base, and more unemployment. In the recent recession, Hawai`i and its counties have faced high unemployment. Among the counties, in 2009 the highest unemployment rate was in the County of Hawai`i at 9.8%, followed by county of Kaua`i at 8.7% and County of Maui at 8.3% (see Figure 3.4-1). Despite these high rates, the national unemployment rate (9.6%) was higher than the State of Hawai`i. By the end of 2012, according to the Bureau of Labor Statistics, the unemployment rate in Hawaii was 5.1%.

Figure 3.4-1 Historic Unemployment Rates in the Counties in Hawai`i, the State of Hawai`i, and the United States



3.4.3 *Commercial Fishing*

Commercial fisheries in Hawai`i are extensive, and include fish caught for sale, as well as charter fishing services. An annually renewable commercial marine license (CML) is required for commercial fishing in the state. Based on CML data, there were 4,263 licensed commercial fishers in 2008 (Hawai`i Division of Aquatic Resources (DAR) and WPacFin 2010).

In 2010, about 28 million pounds of fish were caught for commercial purposes in the state, worth over $83.5 million (WPacFIN 2009) (see Table 3.4-5). The average value of commercial landings between 1990 and 2010 exceeds $64 million (WPacFIN 2009). The overall price per pound (based on amount paid to commercial fishers by dealers) for all commercial fish in 2010 was approximately $2.99. Key fishery categories include pelagic, coral reef, bottomfish, precious corals, and crustaceans.

Table 3.4-5 Quantity, Value, and Price per Pound of Commercial Landings in Hawai'i, 1990- to 2010

Year	Quantity (Millions of Pounds)	Value (Millions of Dollars)	Price per Pound (Dollars)
1990	17.9	$48.1	$2.68
1991	26.7	$64.4	$2.41
1992	26.8	$68.0	$2.53
1993	29.4	$73.4	$2.50
1994	23.2	$62.7	$2.70
1995	26.0	$59.2	$2.28
1996	24.1	$57.7	$2.39
1997	27.5	$61.6	$2.24
1998	28.5	$61.0	$2.14
1999	29.0	$62.9	$2.17
2000	28.6	$68.3	$2.38
2001	23.5	$48.1	$2.05
2002	24.0	$52.4	$2.19
2003	23.7	$52.8	$2.22
2004	24.5	$57.7	$2.36
2005	28.1	$71.0	$2.52
2006	25.7	$66.1	$2.58
2007	29.0	$75.8	$2.62
2008	30.7	$85.1	$2.77
2009	26.9	$71.2	$2.65
2010	27.9	$83.5	$2.99

Source: WPacFIN. (2011). 1982-2009 *Commercial Landings* (various data tables and charts). Retrieved from http://www.pifsc.noaa.gov/wpacfin/central/Pages/central_data.php

3.4.3.1 *Pelagic Fisheries*

Among the various categories of fisheries, the pelagic fishing industry is the largest and most valuable one, accounting for approximately 95% of commercial landings with 26.6 million pounds of pelagic fish caught commercially in 2010 (see Table 3.4-6). Pelagic fisheries primarily use longline gear, but also include the MHI troll and handline, offshore handline, and the aku boat (pole and line) fisheries (NMFS 2005). Tunas (especially bigeye tuna) and billfish (particularly blue marlin, striped marlin, swordfish) are the main target species for pelagic fishing, but other species, such as mahimahi, ono (wahoo), and moonfish are also important (NMFS 2005).

3.4.3.2 *Coral Reef Fisheries*

Coral reef fish made up about 1% of commercial landings in 2010 (see Table 3.4-6). With presently no active commercial coral reef fisheries in the NWHI, the commercial catch primarily comes from nearshore reef areas around the MHI (NMFS 2005). However, there has been a notable decline in nearshore coral reef fishery resources in recent decades because of overfishing (NMFS 2005). Coral reef fish species popular for commercial purposes include akule (which dominates nearshore commercial landings), soldierfishes, surgeonfishes, goatfishes, squirrelfishes, unicornfishes, and parrotfishes (WPRFMC 2010b). Numerous fishing gears are used to target these species, including nets, traps, hook and line, spear, hand, and other methods.

3.4.3.3 *Bottomfish Fisheries*

Catches of bottomfish accounted for about 1% of commercial landings in 2010 (see Table 3.4-6). Target species include snappers, jacks, and a single species of grouper that is concentrated at depths of 30 to 150 fathoms (fm) (NMFS 2005). The most desirable species are seven deepwater species known as the Deep 7 (opkapaka, onaga, hapuupuu, ehu, kalekale, gindai, and lehi), which made up 54% of the commercial bottomfish catch in 2008 (WPRFMC 2010a).

After the establishment of the NWHI Marine National Monument in 2006 (later renamed Papahānaumokuākea Marine National Monument [Monument]), bottomfishing was scheduled to end in the Monument in 2011 (WPRFMC 2010b). However, this fishery was closed in 2009 when permit holders surrendered their permits and received compensation from the federal government. Bottomfishing continues to take place in the MHI, where roughly about 50% of bottomfish habitat is located in state waters (WPRFMC 2010b). While bottomfishing around the MHI is conducted both commercially and by recreational fishermen, fishing in the NWHI was solely for commercial purposes (NMFS 2005). Methods and gear used in these fisheries are highly selective for desired species and sizes. In 2008, the Deep 7 fishery in the MHI was managed through the implementation of a federally-mandated total allowable catch (TAC) limit of 241,000 lbs, as a means to end overfishing of these species (DAR and WPacFin 2010).

3.4.3.4 *Precious Coral Fisheries*

The discovery of two species of commercially valuable black coral in 1958, including Au‘au, led to the establishment of a small black coral cottage industry for manufacturing black coral jewelry. Recently, this industry is threatened by changes in harvesting pressure and the introduction of an alien pest species (WPRFMC 2010b). Over the past 30 years, almost all of the black coral has been harvested from state waters and from a bed located in the Au‘au Channel (WPRFMC 2010b). The domestic fishery for pink, gold, and bamboo precious coral resumed in 1999 (NMFS 2005). Harvest of precious corals is only allowed by selective gear with submersibles or by hand (NMFS 2005).

3.4.3.5 *Crustaceans Fisheries*

The main target species under this category are a species of spiny lobster and the common slipper lobster and kona crab; other lobster in the family Scyllaridae are also desirable (WPRFMC 2010b). In the MHI, commercial catch of spiny lobsters dropped by 75 to 85% by the early 1950s (NMFS 2005). The NWHI had the largest crustacean fishery in Hawai`i, until it was closed by NMFS in 2000 due to uncertainties regarding accurate lobster stock assessments. This fishery remains closed due to the establishment of the Monument (NMFS 2005).

Table 3.4-6 Hawai'i Annual Reported Commercial Landings (Millions of Pounds) for Pelagic, Bottom, Reef, and Other Fisheries Categories, 2000 to 2010

Year	Pelagic Fishes	Bottom Fishes	Reef Fishes	Other Fishes
2000	26.74	0.72	0.2	0.95
2001	22	0.65	0.24	0.59
2002	22.34	0.62	0.35	0.67
2003	22.06	0.62	0.33	0.73
2004	23.03	0.62	0.24	0.56
2005	26.91	0.53	0.22	0.48
2006	24.51	0.44	0.2	0.51
2007	27.73	0.44	0.23	0.54
2008	29.57	0.43	0.27	0.41
2009	25.71	0.45	0.27	0.50
2010	26.62	0.39	0.36	0.57

Source: NMFS, PIFSC. (2010). *Annual Reported Commercial Landings of Pelagic Fishes, Bottomfishes, Reef Fishes, Other Fishes*. Retrieved from http://www.pifsc.noaa.gov/wpacfin/hi/Data/Landings_Charts/hr3a.htm

3.4.4 *Subsistence Fishing*

Hawai`i Revised Statutes (HRS) Section 188-22.6 defines subsistence fishing as the customary and traditional Native-Hawaiian uses of renewable ocean resources for direct personal or family consumption or sharing. Native Hawaiian in the HRS is defined as any descendant of the races inhabiting the Hawaiian Islands prior to 1778.

Annual fish consumption in Hawai`i is about 90 lbs per capita, over twice the national average (U.S. Department of the Navy 2008a). There is no license required for subsistence and recreational fishing in Hawai`i. Without a requirement for subsistence licenses, it is difficult to assess the overall level of subsistence fishing activity due to a lack of detailed catch data. No formal attempt to assess the subsistence fishing contribution to island economies has been made in the past, but the value of fishing for subsistence by contemporary

Native Hawaiians is known to be an important component of some communities, particularly rural communities (U.S. Department of the Navy 2008a).

3.4.5 *Recreational Fishing*

Fishing is a popular pastime for people in Hawai`i, with a quarter of the population participating in some form of fishing at least once a year (U.S. Department of the Navy 2008a). In addition, fishing is also popular with tourists visiting Hawai`i. However, as with subsistence fishing, data on recreational fishing in Hawai`i are very limited because no license was required for non-commercial saltwater fishing. While occasional surveys have been fielded over the years, there has been no systematic collection of such data.

The Marine Recreational Fisheries Statistical Survey collected data in Hawai`i for a period ending about 20 years ago. The program was recently restarted in Hawai`i as the Hawai`i Marine Recreational Fishing Survey (HMRFS). HMRFS is collecting data through a dual approach including random telephone surveys, as well as fisherman intercept surveys conducted at boat launch ramps, small boat harbors, and shoreline fishing sites. Given the HMRFS is a relatively recent undertaking, some scattered information is made available through the newsletters released by NMFS, but not enough intercepts of fishermen have occurred to date to allow catch and effort determinations for Hawai`i fisheries.

Based on the 2010 HMRFS data, it is estimated that 475,000 recreational fishermen took 2.4 million recreational fishing trips, of which approximately 1.9 million were shorefishing trips. The recreational fishery landed 2.1 million fish in 2010 weighing a total of 14.6 million pounds (NOAA 2012).[1]

A new initiative by NMFS, the Marine Recreational Information Program, is anticipated to collect better data and produce improved estimates of marine recreational catch and effort. The Marine Recreational Information Program is anticipated to replace the HMRFS (Marine Recreational Information Program 2011). An important component of Marine Recreational Information Program is the National Saltwater Angler Registry. All Hawaii recreational fishermen (including indigenous fishermen) who fish more than 3 miles from shore (Federal waters) are required to register. The registration is valid for one year from the date of registration, and must be renewed.

Absent systematic data, it is believed that offshore recreational and subsistence catch is likely equal to or greater than the offshore commercial fisheries catch,

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1 NMFS, Fishery Statistics Division, April 13, 2012, Website (http://www.st.nmfs.noaa.gov/st1/recreational/queries/index.html).

with more species taken using a wider range of fishing gear (Friedlander *et al.* 2004).

The issue is further complicated by the overlapping behaviors of subsistence, commercial, and recreational fishermen. A recent study that surveyed the small boat pelagic fishermen reveals that within that specific fishery, while 42% of the survey respondents classified themselves as commercial fishermen, 60% actually sold fish in the 12 months preceding the study (PIFSC 2011). Also, over 30% of fishermen classifying themselves as recreational sold fish in the past one year. Most fishermen within this fishery participate in fish sharing networks, with 97% of those surveyed indicating that they give away a portion of the catch to friends or relatives (not immediate family). About 62% consider the fish they catch to be an important source of food for their family (PIFSC 2011).

3.4.6 Cultural Environment

The National Environmental Policy Act (NEPA; 42 U.S.C. §§ 4321 et seq., § 4331(a)(4)) requires this PEIS to take into consideration the possible effects of proposed Hawaiian monk seal recovery actions on cultural resources as part of the analysis of impacts to human environment. The cultural resources include not only places of historic and cultural significance but also traditional ways of life as manifested in cultural and customary practices.

Native Hawaiians have a rich traditional history of cultural and customary practices. Traditional Hawaiian customary practices are based on the relationship between Native Hawaiians and the land or *ʻāina*. Native Hawaiians see themselves as both children and stewards of their native lands. Traditional Hawaiian stewardship involves a resource management strategy based on the *ahupuaʻa* system, a system of land division that allows for equitable and sustainable use of natural resources. Most *ahupuaʻa* extend from the highest mountain ridge (*i.e.*, the top of the watershed) through the upland forests and the cultivated lowlands out to the submerged reef. While not part of local *ahupuaʻa*, the open ocean was nonetheless essential to cultural and customary practices, as deep-sea fishing was regularly practiced by Native Hawaiians.

To better understand the impacts that proposed Hawaiian monk seal recovery actions may have on Native Hawaiian cultural resources and practices, a Cultural Impact Assessment (CIA) was prepared. The CIA has been included as Appendix M of the present PEIS.

3.4.7 Cultural Resources and Historic Properties

3.4.7.1 Hawaiian Monk Seals in Traditional Hawaiian Culture

As part of the CIA, in-depth research was undertaken into the role that Hawaiian monk seals may have played in traditional Hawaiian society. This research included a thorough examination of the evidence for seal remains from archaeological excavations, of the various Hawaiian language terms for seal, and of references to seals in traditional *oli* (chants), *mo'olelo* (stories, historical narratives, and mythologies), the accounts of early Western visitors, articles in Hawaiian language newspapers, and other historic documents.

The research revealed that, although monk seals appear to have been present within the Hawaiian archipelago as early as 3.5 million years ago, there is surprisingly little direct evidence of human and monk seal interactions, either in the archaeological record or the traditional literature. Seal bones have only been recovered from a small number of archaeological excavations, suggesting that for much of the period before Western contact, seal meat was not a major part of the Hawaiian diet. Seal bones may have been used in the manufacture of fishhooks and other bone tools, but this does not seem to have been a common practice.

Unlike the mammals that arrived in Hawai'i with the early Polynesian voyages, the dog (*'īlio*), pig (*pua'a*), and rat (*iole*), all of which were identified by a single Hawaiian name, seals were found to be referred to in *'ōlelo* Hawai'i (the Hawaiian language) by several different terms. Among these were *he 'īlio o ke kai* (the dog of the sea, also *'īlio o ke kai*), *'īlio-holo-kai* (the dog that runs in the sea), *'īlio-holo-i-kauaua* (dog running in the toughness), *uwa'lo* (to cry out), *hulu* (fur; possibly a historic usage to refer to arctic fur seals), and *kila* or *sila* (an adaptation of the English word seal). With their furred bodies and bark-like calls, it is easy to see how seals were identified as the dogs of the sea. The range of different names used to refer to these animals, however, some of which were derived from the English term seal, might suggest that seals were not frequently encountered by the Hawaiians of the late pre-Contact period.

References to seals in the traditional literature are relatively rare. Not until the historic period, when Hawaiian sailors began to take part in voyages to the arctic to capture fur seals for the China trade and local vessels began actively hunting the newly-discovered monk seal populations in the Northwestern Hawaiian Islands (NWHI), do accounts of seals begin to appear with any regularity in Hawaiian language sources. Although the early accounts of Western visitors to the islands are replete with detailed descriptions of the various plants and animals they encountered, there appear to be no references to the presence of Hawaiian monk seals within the main Hawaiian Islands (MHI). Descriptions of monk seals begin to appear when Western ships began visiting the NWHI. All of these archival sources appear to suggest that during the late pre-Contact and early historic periods monk seals were not common visitors to the MHI.

Although it has been suggested that the original range of the Hawaiian monk seal did not extend from the NWHI into the MHI, this does not seem reasonable given the similarity in the marine and coastal environments of the two areas. Both would have offered an equivalent range of suitable habitats for pupping and resting, an abundance of available food resources, and a relative scarcity of predators, at least until the advent of humans.

A more likely scenario is that, prior to the arrival of the first Polynesian voyagers, a population of monk seals existed within the MHI. Soon after human settlement, however, this indigenous seal population suffered much the same fate as many species of indigenous Hawaiian land birds, which appear to have been driven into extinction through a combination of human predation and the impacts of the rats, pigs, and dogs that accompanied the voyagers from central Polynesia. Monk seals hauled out on the beaches of the islands would have presented an easily obtainable food source for the first settlers. It is also well documented that monk seals do not adapt well to disturbance from dogs or humans. The monk seal population that occupied the MHI could have died out or have been forced out within a few generations.

While stray individual seals undoubtedly occasionally found their way down from the NWHI, it seems unlikely that monk seals were numerous enough within the MHI for there to have been regular and significant interactions with humans until the historic period. This lack of regular contact might explain why the Hawaiian monk seal seldom appears in the *oli* (chants), *mele* (songs), and *mo'olelo* (stories, legends and traditional history) of pre-Contact Hawai'i and why the seal seems strangely absent from the Hawaiian traditional world view.

This apparent absence of monk seal populations from the MHI dating back to the early period of human occupation may account for the feeling expressed by some present day Native Hawaiians that monk seals are not indigenous to the Islands and were never a significant part of traditional Hawaiian culture. Community meetings and individual interviews conducted by NOAA, both as part of the present CIA and previous public outreach programs, indicate that individuals within the Native Hawaiian community hold a range of perspectives and opinions concerning the Hawaiian monk seal.

As part of a research project commissioned by NMFS PIRO in 2010, ethnographic interviews were conducted with individuals from across the state (Kittinger et al. 2011). More than 30 Native Hawaiian community members, cultural practitioners, and *kūpuna* (elders) were interviewed or consulted. The results of the study showed that the individuals interviewed possessed varied perspectives on the cultural significance of the Hawaiian monk seal. Some Native Hawaiians interviewed did not believe the monk seal to be a native species, whereas other interviewees identified the monk seal as being associated with the Hawaiian god Lono or as being *'aumākua* (ancestral guardians). A somewhat similar range of opinions was expressed during public meetings held on O'ahu, Maui, Lāna'i, Moloka'i, Kaua'i, and Hawai'i Island as part of the present Cultural Impact Assessment process. The issues raised during these meetings are discussed in detail in Appendix M.

3.4.7.2 Cultural Resources and Cultural Practices

A wide range of cultural resources other than historic properties are known to be present within the area in which the proposed Hawaiian monk seal recovery actions would be conducted, both along the shoreline and in the inshore waters. Present within the shore zone are dune and strand dwelling plants (such as *kaunaʻoa*, *paʻu o Hiʻiaka*, and *hinahina*) that are used in *lāʻau lapaʻau* (traditional Hawaiian medicine). Within the inshore zone are a range of fish, shellfish and other marine organisms that form an important component of the traditional Hawaiian diet.

Traditional cultural practices that regularly take place within the area include fishing and gathering. Other ocean related activities such as swimming and surfing can also be considered as traditional practices.

3.4.7.3 Historic Properties

This section provides a summary of historic properties, as defined in the National Historic Preservation Act of 1966, which are located within the project area. Appendix L of this PEIS presents a more detailed discussion of these properties.

The National Historic Preservation Act of 1966 (Section 101) authorized the Secretary of Interior to maintain and expand a National Register of Historic Places (National Register) that contains a listing of districts, sites, buildings, structures and objects significant in American history, architecture, archaeology, engineering and culture. The National Register is defined as an authoritative guide to be used by Federal, State, and local governments, private groups, and citizens to identify the nation's cultural resources and to indicate what properties should be considered for protection from destruction or impairment.

The term "historic property" is defined in the National Historic Preservation Act (Section 301 Title III, 16 U.S.C. 470w – Definitions (5)) as: "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the National Register." Historic properties eligible for inclusion in the National Register include both properties formally listed on the National Register and all other historic and cultural sites that meet the National Register criteria (36 C.F.R. § 800.16(1)). These include properties of traditional religious and cultural importance.

A property may be listed on the National Register if it meets the criteria for evaluation as defined in Title 36 C.F.R. § 60.4:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> (a) That are associated with events that have made a significant contribution to the broad patterns of history; or
>
> (b) That are associated with the lives of persons significant in the past; or

(c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) That have yielded, or may be likely to yield, information important in prehistory or history.

The Secretary of Interior has also recognized the significance of Traditional Cultural Properties (TCP). The National Register Bulletin 38 "Guidelines for Evaluating and Documenting Traditional Cultural Properties" (Parker and King 1990) defines “[a] traditional cultural property … as one that is eligible for inclusion on the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community’s history, and (b) are important in maintaining the continuing cultural identity of the community” (Parker and King 1990:1).

A TCP can be considered a historic property even if it does not possess any recognizable archaeological remains. The lack of any physical evidence of an area’s past use and significance would in no way reduce its importance as a TCP. “Although many traditional cultural properties have visual physical indications, others do not. Importantly, the historical significance of most traditional cultural properties can only be evaluated in terms of the oral histories of the community” (Sebastian 1993:22). The Advisory Council on Historic Preservation (ACHP) 1985 guidelines also note that “[a] property need not have been in consistent use since antiquity by a cultural system in order to have traditional cultural value...” (ACHP 1985:7).

A historic property need not be formally listed on the National Register to receive NHPA protection. The property need only meet the National Register criteria (i.e., be eligible for listing in the National Register).

A wide range of historic properties are known to be present within the Area of Potential Effect (APE) of the proposed monk seal recovery actions. NMFS has determined that the APE for this project encompasses the range where Hawaiian monk seals are found throughout the Hawaiian Archipelago, including the NWHI, MHI and Johnston Atoll. The APE includes the shore zone, encompassing those terrestrial areas up to twenty-five meters inland from the line where the shore meets the sea, and the inshore waters up to 300 meters off from the shoreline, as well as camp sites further inland on the NWHI, as described in Section 3.4.6. of this PEIS. Historic properties that may be present in these areas include both traditional Hawaiian and post-Contact sites.

Given the vast geographic extent of the APE for the proposed monk seal recovery actions, as well as the programmatic nature of the actions themselves, it is not practical to list all of the historic properties that have the potential to be affected by the undertaking. This list would easily extend into the thousands. There also remain many coastal areas within the MHI where the archaeological sites have not yet been identified or adequately documented. In order to propose measures that may serve to mitigate these effects, however, it is necessary to examine the types of sites that may be affected.

Historic Properties in the Northwestern Hawaiian Islands

The total number of historic properties present within the NWHI is much fewer than in the MHI. This is due primarily to the relative lack of habitable land area on many of the islands, reefs, and atolls that make up the NWHI. Although recent studies suggest that several of the Leeward Islands were known to early Hawaiian voyagers (Kikiloi 2010), the only islands which contain evidence of traditional Hawaiian occupation are Nihoa and Mokumanamana (Necker), the closest islands to the main Hawaiian chain. The Nihoa Island Archaeological District (Site # 92-01-89) and the Necker Island Archaeological District (Site # 91-01-53) were both placed on the National Register in 1988. The two islands together contain over 140 documented archaeological sites. On Nihoa, these historic properties are located on the gentler upland slopes above the coastal cliffs, while monk seal activity is restricted to the basalt ledges washed by the tide. On Mokumanamana, the island's archaeological sites are all located along the upper slopes of its central ridge well away from the shoreline and outside the APE of the monk seal recovery project. Given the topography of these islands there is little likelihood that monk seal recovery actions will geographically overlap the areas occupied by their historic properties and therefore will not impact them.

No direct archaeological evidence of Polynesian presence has been found on the remaining islands of the NWHI or on Johnston Island. However, historic era shipwrecks are present in the offshore waters of several islands. Archival research indicates that there may be as many as sixty shipwreck sites, the earliest dating back to 1818 (Papahānaumokuākea Marine National Monument 2011:20-21), and at least sixty-one aircraft sites in the waters of the Papahānaumokuākea Marine National Monument. To date, seventeen shipwreck sites have been discovered and documented by NOAA archaeologists. These vessels range from nineteenth century whaling ships and cargo vessels to Liberty ships (Papahānaumokuākea Marine National Monument 2011:34-43). At least sixty-seven naval aircraft are recorded as being lost in the vicinity of the NWHI. During the Second World War an intense air battle was waged directly over and around Midway atoll. Numerous Japanese and American planes were lost and their wrecks are considered war graves (Papahānaumokuākea Marine National Monument 2011:22). Shipwrecks and underwater plane crash sites located within 300 meters of the shoreline have the potential to be affected by the anchoring of vessels associated with monk seal recovery actions.

During the historic period, Midway Atoll was the most heavily utilized of the NWHI, and the relics of that use remain today in a variety of forms. By 1903 a cable station was in operation on the island, and in the 1930s, Midway became a stopover for the famous Pan American Airways flying clipper seaplanes on their five-day transpacific passage. The construction of a naval air facility at Midway began in 1940. The island played a major role in one of the most important battles of the war. The Battle of Midway, which took place from 4 to 7 June 1942 is considered the turning point of the war in the Pacific. Because of its association with the battle, Midway Atoll has been designated a National Memorial (Papahānaumokuākea Marine National Monument 2011:21-22). Historic properties present on the island include several ammunition magazines, a concrete pillbox, and gun and battery emplacements. For the most part, these historic properties are located outside the APE of the monk seal recovery program. Although Johnston Island was at one time the site of a U.S. Navy air station, today only the airfield remains.

Historic Properties in the Main Hawaiian Islands

Although relatively few of the archaeological and cultural resources located within the NWHI have the potential to be affected by undertakings associated with the Hawaiian monk seal recovery actions proposed in this PEIS, this is not the case in the MHI. The shoreline and immediate offshore areas within the MHI contain large numbers of both pre-Contact and historic archaeological sites. The individual sites are far too numerous to be listed here and, as noted above, many have not yet been identified or formally documented. The Hawaiʻi State Historic Preservation Division (SHPD) is presently updating its Geographic Information System (GIS) database of historic properties, which have been assigned State Inventory of Historic Places (SIHP) site numbers. The database will show the exact location of all SIHP sites for which accurate location coordinates are available. Once the database is fully operational, it will be possible to quickly identify those documented sites that fall within the APE of the presently proposed actions. The SHPD GIS database can serve as a useful tool in planning monk seal recovery actions so as to avoid adversely impacting known historic properties.

Several types of archaeological and cultural resources dating to the traditional period are likely to be encountered within the APE for monk seal recovery actions. These can be grouped into onshore sites, sites located within the intertidal zone, and offshore sites.

Due to the fact that many onshore features occur within or atop sand dunes, coastal sites are often relatively fragile. The types of historic properties found up to twenty-five meters inland from the line where the shore meets the sea would include the following:

> Coastal house sites and other habitation structures: These might consist of stone faced platforms or terraces that served as the foundations of pole and thatch dwellings or walled house enclosures. They can be built on or immediately behind sand dunes, on coastal flats, or atop shoreline

promontories. The walls and facings of these structures, being of stacked stone, are relatively fragile and can be easily tumbled if climbed upon.

Buried cultural deposits: These subsurface deposits of cultural features (stone lined fire hearths, post holes, pits, etc.) and materials (artifacts, food remains, etc.) usually represent the remnants of former habitation areas. They are often present in sand flats and dunes situated just back of the high tide line and are visible as dark, charcoal stained layers exposed in the face of wave cuts. These deposits are highly susceptible to erosion by wave action or pedestrian traffic.

Canoe landings and canoe sheds: While canoe landings are often natural features such as small sand beaches or areas of gently sloping shingle where a canoe could easily be brought ashore, canoe sheds were long and narrow, stone walled enclosures that were originally roofed with thatch. Like other stacked stone structures, canoe sheds are susceptible to collapse.

Fishing shrines and other religious sites: Small fishing shrines (*ko'a*) were often build near the shoreline, usually on low promontories overlooking the sea. It was at these *ko'a* that the first fish of the catch was left as an offering to Kū'ulakai or one of the other patron gods of fishing. Larger religious structures (*heiau*) were usually set further back from the shore, but at times they can be found just above the high tide line. Both of these types of ceremonial sites, being stacked stone structures (platforms, terraces or enclosures), are susceptible to human impacts.

Human burials: It is relatively easy to excavate a shallow pit into soft sand. For this reason, sand dunes and sandy shorelines were among the preferred burial areas (*ilina*) utilized during both the pre-Contact and early historic periods. Dune burial was particularly frequent in the early years of the post-Contact era when epidemics of introduced diseases decimated the Hawaiian population, leaving little time for more elaborate burial measures. Some coastal burial areas consist of formal cemeteries with individual graves marked by stone mounds or headstones. Other *ilina* are unmarked and may not be immediately recognizable on the surface. It is always safest to assume that a sizeable sand dune is likely to contain burials. Dune burials, like the dunes themselves, are extremely fragile and can be easily disturbed and damaged if exposed by wave action or human activity.

Very little archaeological evidence of past human activities has survived in the turbid environment of the surf zone. Some traditional features, however, have been documented within more gentle intertidal areas. Most of the historic properties present within the inter-tidal zone are relatively impervious to minor disturbances such as those that might result from monk seal recovery actions. These inter-tidal sites may include:

Fishing related features: Along the shoreline where low promontories and fingers of lava extend out into the sea, it is not unusual to encounter depressions of various sizes and shapes that have been battered or ground into the surface of *pāhoehoe*. These depressions were created and used for a range of purposes. They include bait cups, mortar like depressions used in grinding *palu* (bait), and fish poison basins, shallow depressions where plants like *'auhuhu* and *'akia* were pounded to extract their juices, which were then used to stun fish in tidal pools. These features were created by the Hawaiians who fished the tidal pools and the shallow offshore waters.

Salt pans: Some of the shallow depressions pecked and ground into the *pāhoehoe* lava at or just above the high tide line were used for the manufacture of salt. These basins were filled with sea water, which was then allowed to evaporate and the resulting salt crystals were collected and used to season food and for ceremonial purposes.

Rock Art: Some traditional Hawaiian petroglyphs are known to have been carved into the surface of level lava or sandstone benches which extend out into the intertidal zone. The primary example of an occasionally submerged petroglyph field is in the *ahupua'a* of Kahalu'u on the island of Hawai'i.

While there are a substantial number of pre-Contact archaeological and cultural sites located within the shoreline zone of the monk seal APE, there are relatively few located in the offshore waters up to 300 meter of the shore. The sites that do exist are for the most part stacked stone structures that could potentially be disturbed by activities such as the capture and translocation of a monk seal.

Fishponds and fish traps: Stone walled fishponds (and, to a lesser extent, fish traps) were traditionally constructed in the shallow off-shore waters that fringe the leeward coasts (and sheltered portions of the windward coasts) of several of the MHI. The largest concentrations of traditional *loko i'a* (fishponds) are located along the southern coastlines of O'ahu and Moloka'i, and the west coast of Hawai'i island, though *loko i'a* can be found on almost all of the main islands. The State of Hawai'i Office of Planning maintains a Geographic Information System (GIS) database that shows the locations of several fishponds presently listed on the NRHP (Figures 3.4-10 through 3.4-13). Traditional fishponds are most commonly of two types, either *loko kuapā* (walled shoreline ponds) or *pu'uone* (inland ponds connected to the sea). While many ancient ponds are long abandoned (the walls of some having been damaged or destroyed, others silted in), some ponds have been restored and are actively used for aquaculture.

Ceremonial sites: There is archaeological evidence that some traditional ceremonial structures were located within the off-shore zone. Such sites are relatively rare. The most well known of these is the *heiau* of Hale o Kapuni located in Pelekane bay on the Kohala coast of the island of Hawai'i. This shrine is submerged just offshore below the larger *heiau* of Mailekini and Pu'u Koholā and near the former royal compound within Pu'u Koholā

National Historic Site. A site like Hale o Kapuni could be damaged by vessels unaware of its existence.

Post-Contact shoreline structures include piers, jetties, lighthouses and other historic properties associated with maritime activities. Stone walled livestock enclosures were sometimes constructed just back of the beach, particularly when cattle and other livestock were to be taken or swum out to vessels waiting offshore to transport them to other islands. The remains of historic residential sites are less common, but are sometimes present close to the shoreline. Also found are the remnants of the cement pillboxes erected during World War II as part of a coastal defense system aimed at defending against a potential Japanese invasion. These military defensive positions are located at strategic points along the coastlines of most of the main islands. In general, because of the materials used in their construction, post-Contact shoreline sites tend to be more robust than pre-Contact sites and are less likely to be impacted by monk seal recovery activities.

The most common offshore historic properties that date from the post-Contact period are historic shipwrecks. Shipwrecks in shallow water close to shore have been reported off most of the MHI. There are several shipwrecks off the coast of O‘ahu which are listed on the NRHP. Many of these are located within Pearl Harbor, including the U.S.S. Arizona, U.S.S. Bowfin, and U.S.S. Utah. Shipwrecks are generally much more fragile than most historic era shoreline sites, and have the potential to be impacted by vessels anchoring on or near them to conduct monk seal recovery actions.

Traditional Cultural Properties (TCPs) are far more difficult to recognize than most archaeological sites since their significance often depends less on a physical structure than on some mythical or historic event that may have taken place there or some ritual associated with the place. At present, there are no TCP listed on the National Register for Hawai‘i. There are, however, numerous known *wahi pana* (storied places) which may be eligible for nomination. Sites eligible for listing as a coastal TCP may include physical features such as *leina a ke akua*, the leaping off points from which a departing spirit enters the next world. There are several of these within the main Hawaiian chain. Bays and beaches, stretches of shoreline and other natural landmarks may be associated with mythic or historic figures, traditional activities or historic events. An example is the westernmost tip of the island of Kaho‘olawe, which is known as Lae o Kealaikahiki, the point of the pathway to Kahiki (foreign lands). This point and the adjacent channel are traditionally associated with the epic sea voyages between Hawai‘i and the islands of Central Polynesia.

3.4.8 Recreation and Tourism

The economy of Hawai`i has been dependent on tourism and tourism-related activities since statehood in 1959. In 2009, 14% of jobs in the state were in industries directly involved with tourism, with many other indirectly associated with the industry (see Table 3.4-2). Hawai`i is a popular destination for both national and international tourists, with Japanese and Canadian tourists being the top two international tourist groups. Due to the recent downturn in the national and international economies, tourism in the state has suffered over the past couple of years. However, the industry is recently showing signs of recovery, with total visitor spending increasing by double digits for all islands between 2009 and 2010.

Total spending by visitors to Hawai`i in 2010 was $11.2 billion, an increase of 12% compared to the same period in 2009 (HTA 2010) (see Table 3.4-7). Among the islands, the highest percent increase was in Maui with 17%, while O`ahu topped the list in terms of total spending at $5.7 billion. Per person per day spending increased by 2.8% and reached $168.9. Approximately 7.1 million people visited Hawai`i in 2010, an increase of 8.7% from 2009. About 4.4 million of these visited O`ahu, while almost 2.2 million visited Maui. Overall, the total visitor days increased 8.9% to 65.6 million in Hawai`i (HTA 2010) (see Table 3.4-7).

Recreation activities in Hawai`i are primarily centered around the ocean, while other non-ocean recreation is also popular. Ocean-based recreation includes surfing, pleasure boating (for various activities), fishing, swimming, snorkeling, SCUBA-diving, whale-watching, water-skiing, kite-boarding, kayaking, relaxing at beaches, and cruises, among others. The list of non-water recreation is also extensive, and includes, but is not limited to, hiking, golf, sightseeing, and hunting.

Various federal, state, and local agencies have specific roles and responsibilities for managing ocean-based recreation use in Hawai`i. Some of these include the USCG, NOAA, HLNR, Hawai`i State Department of Transportation, Hawai`i State Department of Health, and city and county governments (DOBOR 2009). Some of the regulatory tools for managing ocean-based recreation in the state include, among others, Designated Ocean Recreation Management Areas (ORMA), Non-Designated Ocean Recreation Management Areas, Fishery Management Areas, Local and Special Rules – Ocean Waters, Marine Life Conservation Districts, and Commercial Ocean Recreational Activity (CORA) permits (DOBOR 2009).

Select recreation resources in Hawai`i are presented in Table 3.4-8. The State of Hawai`i has many beaches and over 185 miles of sandy shoreline. Over 24 miles of this shoreline is safe, clean, accessible, and generally considered suitable for swimming. There are also 1,600 surfing sites throughout the state. There are a total of 55 wildlife sanctuaries and refuges. The 630 county parks extend over 8,764 acres, most of which are in O`ahu.

Table 3.4-7 Key Tourism Statistics for the State of Hawai`i and its Counties –2010 Versus 2009 and Percent Change

2010	Hawai`i	% Change	Maui	% Change	Lāna`i	% Change	Moloka`i	% Change	O'ahu	% Change	Kaua`i	% Change	State Total	% Change
Total Arrivals	1,378,921	6.1%	2,186,279	10.6%	72,152	7.6%	52,258	-1.2%	4,427,372	7.5%	1,042,633	4.4%	7,083,663	8.7%
Domestic Arrivals (by air)	986,086	3.7%	1,802,254	9.1%	57,710	9.8%	41,599	1.3%	2,587,557	5.8%	880,358	2.8%	5,022,883	7.5%
Int'l Arrivals (by air)	304,773	15.8%	289,815	20.5%	11,174	31.3%	8,653	19.2%	1,741,292	10.3%	84,366	18.0%	1,959,542	12.1%
Visitor Arrivals (by ship)	88,062	4.3%	94,210	11.5%	3,268	-45.8%	2,005	-56.1%	98,523	4.1%	77,909	10.0%	101,238	4.8%
Total Visitor Days	9,102,156	7.5%	16,886,015	11.2%	249,660	12.4%	245,258	3.9%	31,918,530	8.9%	7,196,459	5.5%	65,598,078	8.9%
Total Expenditures ($mil.)	1,345.73	7.6%	2,953.30	16.7%	72.4	14.4%	24.4	-2.8%	5,683.43	11.3%	1,086.95	6.9%	11,166.27	11.7%
PPPD[1] Spending ($)	145.1	0.2%	173.3	4.9%	290.0	1.9%	99.5	-6.4%	177.1	2.3%	148.8	1.3%	168.9	2.8%

Notes: 1/ PPPD - Per Person Per Day.

Source: Hawai`i Tourism Authority, Annual Visitor Research: 2010 Annual Research Tables, Website (http://www.hawaiitourismauthority.org/research/reports/annual-visitor-research/) accessed April 6, 2012.

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Ocean recreation in Hawai`i supports an $800 million industry (DOBOR 2011). As a result of population growth and demand for new products and destinations, ocean recreation in the state is increasing (DOBOR 2009). Economic and other data on most of these activities are older, sparse, and hard to obtain from public sources. A few older studies focusing on specific activities provide some information collected through surveys. Based on these, in 1999, the direct revenues from the ocean tour boat industry in the state were approximately $132 million (in 1999 dollars) (Utech 2000).

The tour boat industry includes whale watching, snorkeling, dinner cruises, and sunset cruises, and is a growing segment of Hawai`i's economy. The largest share of the revenue was from snorkeling tours (approximately $67 million) and dinner cruises (approximately $47 million). In geographical terms, tours in Maui brought in the highest revenue, followed by those in O`ahu. The total economic impact, including direct, indirect, and induced revenues was estimated to be $225 million (in 1999 dollars). The industry supported 3,232 jobs in 1999 (Utech 2000). Between 1990 and 1999, revenues from this industry in Big Island, Maui, and Kaua`i increased by 25% in real terms (Utech 2000).

Another large segment of ocean-based recreation industry in Hawai`i is the cruise industry. According to the U.S. Maritime Administration, Hawai`i was the seventh most popular cruise destination in North America in 2003 (DBEDT 2003). In 2003, over 83% of cruise visitors to Hawai`i were from within the United States, followed by Canada at 6.5% and Europe at 2.8%. The total direct economic impact of the cruise industry in Hawai`i in the same year (2003) was estimated at $268.7 million, with each cruise visitor brining about $157 into the state's economy per day. The largest impact was from out-of-state visitors, including cruise visitors and crew members, followed by that from cruise lines (DBEDT 2003). The direct, indirect, and induced effects from the cruise industry amounted to $390.5 million of Gross State Product in 2003, and the industry generated 4,582 jobs (DBEDT 2003).

Table 3.4-8 Select Recreation Resources in the Hawaiian Islands

Recreation Resources	Hawai`i	Maui	Lāna`i	Moloka`i	O`ahu	Kaua`i	Total
Swimming and Surfing Sites, by Island							
Miles of Sandy Shorelines[1]	19.4	32.6	18.2	23.2	50.3	41.2	184.9
Primary[2]	1.2	7.9	-	-	12.5	2.8	24.4
Other	18.2	24.7	18.2	23.2	37.8	38.4	160.5
Number of Surfing Sites[3]	185	212	99	180	594	330	1,600
State Parks and Historic Sites, 2009							
Number of State Parks and Historic Sites	20	9		2	28	10	69

Recreation Resources	Hawai`i	Maui	Lāna`i	Moloka`i	O`ahu	Kaua`i	Total
Acreage of State Parks and Historic Sites	7,253.6	317.5		244.2	11,956.4	13,750.5	33,4522.2
Developed Acreage of State Parks and Historic Sites	258.3	37.9		10.0	275.8	130.6	712.6
Recreation Visits per Year to State Parks and Historic Sites 4/	1,312,000	1,182,000		8,000	2,950,000	2,370,000	7,823,000
Wildlife Sanctuaries and Refuges, by Island, 2009							
Number of Wildlife Sanctuaries and Refuges (excluding hunting areas)	8	11	4	6	19	7	55
Acreage of Wildlife Sanctuaries and Refuges (1,000 acres) (excluding hunting areas)	83.3	0.3	Less than 50 acres	Less than 50 acres	0.6	10.5	94.8
County Parks, by Island, 2009							
Number of County Parks	126	122	6	14	288	74	630
Acreage of County Parks	1,734	1,307	15	73	5,148	487	8,764

Notes:
1 Surveyed in 1962.
2 Safe, clean, accessible, and generally suitable for swimming.
3 Surveyed in 1971. A surfing site is defined as "a specific wave-breaking zone caused by a shoal and having sufficient consistency to be identified as a surfable riding area, either seasonally or in a combination of seasons, for example, Queen's Surf, Waikiki."
4 State park visitation was not tracked in 2010. The total number of visitors by park was derived using the 2009 figure as provided by DBEDT and adjusting it with an year-to-date percentage change in visitor arrivals by island. (2010 number calculated using 2010 HTA survey data, Table 1: Summary of Visitor Statistics 2010 vs. 2009)..
Source: Department of Business, Economic Development & Tourism (DBEDT) (2009b). The State of Hawai`i Data Book 2009. Retrieved from http://hawaii.gov/dbedt/.

As presented in Table 3.4-9, there are seven major National Parks in Hawai`i, with a combined acreage of 369,113. In 2010, there were over 4.5 million visitors to these parks. The Hawai`i Volcanoes National Parks is the largest in terms of acreage and was visited by 1.3 million people. The most popular national park remains the U.S.S. Arizona Memorial, which received almost 1.4 million visitors in 2010.

Table 3.4-9 Acreage of and Visitation to National Parks in Hawai`i During 2009

National Park	Acreage			Visits
	Total	Federal	Non-Federal	
Hawai`i Volcanoes National Park 1/	323,431	323,431	-	1,304,667
Haleakala National Park	33,223	33,222	0.15	1,105,606
Pu'uhonua o Honaunau National Historical Park	420	419	1	419,590
Kaloko-Honokohau National Historical Park	1,163	616	547	132,731
Pu'ukohola Heiau National Historic Site	86	61	25	129,886
U.S.S. Arizona Memorial	11	11	-	1,372,724
Kalaupapa National Historical Park	10,779	23	10,756	27,919
Total	**369,113**	**357,783**	**11,329**	**4,493,123**

Notes:
1/ Federal land includes 9,654.67 acres under the custody and administration of the National Parks Service with their inclusion in the park pending.
Source: DBEDT (2010b). The State of Hawai`i Data Book 2009. Retrieved from http://hawaii.gov/dbedt/.

Hawai`i also has many state parks, of which the seven major ones are listed in Table 3.4-10. The Wailua River State Park received the most recreation visits in 2010, followed by Waimea Canyon State Park. The largest state park in terms of acreage is the Na Pali Coast State Park, spread over 6,175 acres. The Kokee State Park has the most developed acres (55).

Table 3.4-10 Acreage of and Visitation to Major[3] State Parks in Hawai`i During 2009

State Park	Acreage		Recreation Visits (in 1,000) 1/
	Total	Developed	
Na Pali Coast State Park	6,175.0	4.0	317,780
Ahupua'a'O Kahana State Park	5,256.5	26.0	81,074
Kokee State Park	4,345.0	55.0	228,251
Waimea Canyon State Park	1,866.4	10.0	323,488
Kekaha Kai State Park	1,642.5	5.0	188,953
Sacred Falls (Kaluanui) State Park 2/	1,375.9	10.0	NA
Wailua River State Park	1,093.0	37.4	667,030

Notes:
1/ State park visitation was not tracked in 2010. The total number of visitors by park was derived using the 2009 figure as provided by DBEDT and adjusting it with an year-to-date percentage change in visitor arrivals by island . (2010 number calculated using 2010 HTA survey data, Table 1: Summary of Visitor Statistics 2010 vs. 2009).

State Park	Acreage		Recreation Visits (in 1,000) 1/
	Total	Developed	

2/ Park closed since May 1999.
3/ Parks having at least 500,000 recreation visits or 1,000 acres.
DBEDT (2010b). The State of Hawai`i Data Book 2010. Retrieved from http://hawaii.gov/dbedt/.

3.4.9 *Public Safety*

Since 1991, NMFS has documented numerous cases of human-seal interactions involving monk seals in the MHI (NMFS 2009, unpublished data). The cases tend to fall into the following categories:

- Seals, which are habituated to people, biting swimmers or divers;
- Habituated seals conditioned by people through feeding and interactive play; and
- Interactions with a mother protecting a dependent pup (NMFS 2011).

As the MHI seal population increases, human-seal interaction events are likely to continue and will require more attention and, in some cases, intervention from NMFS to protect both people and seals. Events in recent years where interactions have necessitated NMFS intervention, have often resulted from seals becoming socialized to humans. Prevention, mitigation and documented human-seal interactions are summarized in Table 3.4-11 below.

Table 3.4-11 Prevention, Mitigation and Documented Human-Seal Interactions in the MHI (1991- April 2013)

Date	SEAL ID	Location	Type of Interaction	NMFS Response	Status
The following seals remained in the MHI with no reported deleterious human-seal interactions post NMFS intervention to prevent socialization					
August 2000	RH44	Poipu, Kaua'i	Human socialization concerns	Female weaned seal was translocated to Larson's beach after weaning to avoid socialization with people in high human density area.	Seal pupped on Moloka'i in 2007, 2008, 2010 and on Maui in 2009.
September 2000	RH58	Maha'ulepu, Kaua'i	Human socialization concerns	Female translocated to Larson's Beach after weaning to avoid human socialization.	Seal pupped on Kaua'i in 2006, 2007, 2009 and 2010; observed on O'ahu 2011. No reports of interaction with humans since translocation.
July 2012	RL10	Aliomanu, Kauai	Human socialization concerns and proximity to road.	Female weaned seal was translocated to North Larson's beach after weaning to avoid socialization with people in high human density area.	No reports of interaction with humans since translocation.
December 2012 – January 2013	R6FQ	Salt Ponds, Kauai	R6FQ observed resting in the camp area, on the edge of the beach road in very close proximity to cars, tents and two leashed dogs. The seal approached people within three feet. Seal put his head in a tent, was sleeping under cars, approached leashed barking dogs, and rested in the beach roadway.	Seal was displaced into the water from the camp area by response staff. Volunteers and staff increased surveillance of R6FQ's normal haul out locations and developed plan to displace the seal if it hauled out in pre-determined undesirable areas or showed further signs of interaction with humans. Seal was subsequently displaced from Baby Beach I and II in Lawai.	Seal has engaged in no further observed human interaction.
The following seal remained in the NWHI with no reported deleterious human-seal interactions post NMFS intervention to prevent socialization					
June 1991	RZ20	Waialee Beach Park, O'ahu	Female born near the mouth of a river with large outflow and potentially fatal conditions during a rainstorm.	Pup was initially translocated down the beach away from the river mouth. Due to proximity to a human-dense area and to prevent socialization with humans, the seal was translocated post weaning to Kure in June 1991.	Observed at Kure Atoll in 2008.

Date	SEAL ID	Location	Type of Interaction	NMFS Response	Status
The following seals have since died or disappeared, but had no reported deleterious human-seal interactions post NMFS intervention					
September 2000	RM68	Poipu, Kaua`i	Weaned in area with high human density.	Male translocated to Larsen's beach after weaning to avoid human socialization.	Last observed in 2001.
September 2004	RI19	Maha'ulepu, Kaua`i	Human socialization concerns	Male translocated to Na Aina Kai after weaning to avoid human socialization.	Died from a gunshot wound April 2009.
September 2004	RI21	Poipu, Kaua`i	Human socialization concerns	Female translocated to Na Aina Kai after weaning to avoid human socialization.	Not resighted after 2004.
August 2005	R6AY	Hakalau, Big Island	Male born in close proximity to river mouth.	Due to disease concerns, the seal was captured and held in captivity for observation.	Died in captivity prior to release.
July 2006	RO32	Turtle Bay, O`ahu	Fishing line entanglement and human socialization concerns	Female translocated to Rabbit Island after weaning.	Died from entanglement drowning in October 2006.
July 2008	RW18	Mokuleia, O`ahu	Human socialization concerns	Male translocated to Rabbit Island after weaning to avoid human socialization.	Found dead at Waimanalo in October 2008.
The following seals remained in the MHI with no further reported human-seal interactions post NMFS intervention					
March 2003	R2AU	Poipu, Kaua`i	Three juvenile seals (2 male, 1 female) socializing among swimmers at Poipu Beach, Kauai.	Seals were tagged, instrumented with VHF transmitters and epidemiologically sampled. Seals were translocated to the north shore Kaua`i.	Seen in 2009. No reports of interaction with humans since translocation.
March 2003	RH40	Poipu, Kaua`i	Three juvenile seals (2 male, 1 female) socializing among swimmers at Poipu Beach, Kauai.	Seals were tagged, instrumented with VHF transmitters and epidemiologically sampled. Seals were translocated to the north shore Kāua`i.	Seen on Kaua`i2009. No reports of interaction with humans since translocation.
March 2003	R1AQ	Poipu, Kaua`i	Three juvenile seals (2 male, 1 female) socializing among swimmers at Poipu Beach, Kauai.	Seals were tagged, instrumented with VHF transmitters and epidemiologically sampled. Seals were translocated to the north shore Kāua`i.	Last seen in 2008. No reports of interaction with humans since translocation.
September 1991	RZ22	Haena Pt., Kaua`i	Female seal began socializing with swimmers post weaning.	Seal was translocated to Ni`ihau in and re-sighted in 1994.	RZ22 was reported killed by a boat propeller prior to 1999.
The following seals remained in the MHI but with continued human-seal interaction post NMFS intervention					

Date	SEAL ID	Location	Type of Interaction	NMFS Response	Status
October 2005	RV18	Kiahuna, Kaua`i	Hooking	Male translocated to Kulikoa Pt. after weaning in October 2005 to avoid human socialization. Three separate dehooking events initiated by PIRO/PIFSC 2006–2008.	Observed on Kaua`i in 2011.
November 2007	RB24	Maha'ulepu, Kaua`i	Dog attack	Female seal was attempted to be translocated after weaning in November 2007 to avoid human socialization however the potential release site was deemed unacceptable and the seal was released at birth site. Seal was attacked by a dog in 2007 Maha'ulepu.	Observed on Kaua`i in 2011.
The following seals exhibited deleterious human-seal interactions and subsequently died or disappeared. NMFS did not intervene in these cases.					
April 1996 (seal birth date)	RP18	Kaneohe Bay Marine Corp Air Station, O`ahu	Male seal was reported socializing with humans. The seal began to move around the island post weaning.	Disappeared prior to NMFS planned translocation efforts.	Disappeared several moths post weaning in 1996.
September 1997	TEMP 700 ("Humpy")	Molokini	Seal, unknown sex, was reported interacting with snorkelers including biting, grabbing and mounting. Additional sightings of "Humpy" were reported although it was not clear if it is the same seal.	None	Permanent identification of the seal was not made therefore current status is unavailable.
August 1999	RD34	Pacific Missile Range Facility, Kaua`i	Female born in close proximity to a drainage canal.	Pup was tagged but not translocated August 1999.	Pup reported dead September 1999.

Date	SEAL ID	Location	Type of Interaction	NMFS Response	Status
December 2011 - February 2013	RK68	Mahukona area, Big Island	Male weaned in December 2011 in Waimanu Valley, Hawaii and there were reports of human interaction. Seal travelled to Mahukona area in March 2012. There was at least one report in July 2012 of seal being provisioned.	In February 2013, RK68 was brought to Oahu for captive care due observations of labored breathing.	Seal died in captive care due to large mass of tissue occluding trachea, which resulted from an ingested circle hook, which punctured the esophagus and trachea. Additionally, there were six healing rib fractures on the right side of his body, suggestive of blunt force trauma, which had likely been healing over a matter of months.
The following seals do not remain in the MHI post NMFS intervention due to translocation out of the MHI, death, or placement into captivity.					
October-December 2003	RM34	South Point, Hawaiʻi	Male born on the Big Island and became habituated to humans within first two years. Two separate fishing gear entanglements and dehooking events initiated by PIRO/PIFSC. First reported interaction on 15 October 2003 at Kealakekua Bay, Hawaiʻi.	Translocated back to birth location at South Point on 19 October 2003. Returned to Kealakekua Bay within seven days and re-initiated human interactions. Translocated to Kahoolawe Island on 28 October 2003. Observed at Big Beach, Maui on 18 November 2003, again interacting with humans. Recaptured on 21 November 2003 and moved to Kewalo Basin NMFS facility for holding. Translocated to Johnston Atoll on 1 December 2003.	Not relocated or detected via satellite tag following release in December 2003.

Date	SEAL ID	Location	Type of Interaction	NMFS Response	Status
October 2003 – January 2004	RK07	Nawiliwili Harbor, Kauaʻi	Adult male approaching people at Nawiliwili Harbor to be fed. The first record of feeding was on 15 October 2003. Anecdotal stories reported seal was fed beginning in 2001 although no reports were received at that time. Socialization with people also occurred at Waikaea canal in Kapaa at the boat ramp where feeding interactions most likely took place.	Observations of the seal were conducted and educational outreach for the community was provided in an effort to stop people from feeding the seal.	Last reported human interaction on 15 January 2004. Found dead January 22, 2004. Cause of death systemic Toxoplasma gondii infection.
September 2006-February 2009	RO42	Black Point, Hawaiʻi	Female born on the Big Island near a stream mouth and translocated after weaning due to disease and habituation concerns.	The seal moved to Kapanai Beach where there was risk of human socialization as well as disease concerns due to proximity of freshwater stream. Animal then translocated a second time on 19 September 2006 three miles south of Lapakahi State Park but began interaction with the public. Captured on 24 August 2007 and translocated Keahaou however began interaction with people again. Translocated a fourth time on 26 August 2008 to Molokaʻi. Observed interacting with people on Lānaʻi. Translocated a fifth time to captivity on Oahu 23 February 2009, translocated and released at Nihoa Island (NWHI) in February 2009.	Not re-sighted on Nihoa Islands following release.

Date	SEAL ID	Location	Type of Interaction	NMFS Response	Status
February – November 2009	RW46 (KP2)	Kaunakakai Wharf, Molokaʻi	Male born to a mother who had abandoned first pup therefore second pup (KP2) was immediately taken into captivity and raised to wean. While in captivity he developed an eye problem, cause was never definitive. Seal was released at age 8 mo. at Kalaupapa, Molokaʻi in December 2008. Two months post release reports of socialization with people at Kaunakakai Wharf.	Seal monitored and displaced when hauled out at the Kaunakakai Pier or other locations where interactions with humans occurred. Translocated June 2009 back to Kalaupapa, Molokaʻi. Community outreach to stop people from interacting with the seal. Veterinary exam during subsequent translocation in October 2009 resulted in seal being held for permanent captivity due to near blindness and human socialization concerns.	Placed in permanent captivity at the Waikiki Aquarium
Seal interactions with humans that involved biting and other aggressive behavior 2003-2013					
October 2003	Temp700	Kealakakua Bay, Hawaiʻi	Male seal had been fed and interacted with by humans and was conditioned to human interaction. The seal was known for mounting, grabbing and nipping; one diver sustained bite wounds to the neck.	Seal was relocated to Johnston Atoll.	N/A
September 2005	N/A	Poi'pu Beach, Kauaʻi	Man was bit in buttocks after snorkeling in close proximity to female with dependent pup	Female is being monitored and when pupping occurs outreach is provided to public	N/A
May 2007	RS00	Rabbit Island, Oʻahu	Female with dependent pup bit a male swimmer on the arm when he got in close proximity to the seal pair	OLE investigation and response program investigation. Female is being monitored and when pupping occurs outreach is provided to public	Seen through 2012.
January 2009	R042	Kaumalapau, Lānaʻi	Spearfisher diver sustained bite to the left calf through his wetsuit from a female seal that had been fed and interacted with by humans	NMFS relocated seal to NWHI (Nihoa Islands)	N/A
December 2009	RK12	Mahalepu'u, Kauaʻi	Female with dependent pup attacked woman in the water; injury to woman's face and arm/hand	OLE investigation and response program investigation, NMFS and DAR staff also followed up with woman.	Seal was resighted in MHI through 2011.
The following seals were currently being monitored for possible management action as of Spring 2013.					

Date	SEAL ID	Location	Type of Interaction	NMFS Response	Status
March 2012- April 2013	R017	Lahaina Harbor, Oahu	Seal being fed and interacting with people.	OLE and response program investigation. Volunteers conducted daily monitoring of seal and performed outreach in the harbor. Seal is seen infrequently in the harbor but does haul out on crowded beaches on Maui with no observations of human interaction with humans on land.	Continued monitoring and outreach.
May 2012 – April 2013	RT02	Olowalu, Maui	Multiple reports of seal interacting with spear fishers, snorkelers, divers, kayaker, etc. Reported to closely approach and follow spear fishers, and to take or attempt to take catch from gear bag/dive float.	Extensive outreach and monitoring conducted at Olowalu and nearby harbors. Plan to capture and apply a satellite tag to seal, but the haulout location of the seal in unknown.	Continued monitoring and outreach.
February 2013 – April 2013	RK72	Waikiki, Oahu	Multiple reports of seal approaching spear fishermen, nudging their hands, and stealing fish from their spears. Seal was also reportedly "herding the fish" in a specific area for the men to spear.	NMFS would like to capture this animal to apply a satellite tag for further monitoring.	RK72 has not hauled out in a suitable area for capture
March 2013 – April 2013	RL06	Olowalu, Maui	Multiple reports of seal interacting with spear fishers, snorkelers, divers, kayaker, etc. Reports of approaching spear fishers and attempting to take catch. Making contact with humans and their gear in water. Reports of seal being fed. Reports that seal attempts to climb up on kayaks, boards and swim steps of boats. Reportedly has grabbed legs of snorkeler/diver with foreflippers more than once.	Extensive outreach and monitoring conducted at Olowalu and nearby harbors. Plan to capture and apply a satellite tag to seal, but the haulout location of the seal in unknown.	Continued monitoring and outreach. RL06 has not hauled out in a suitable area for capture.

Note:
N/A = Data Not Available

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Mitigation for human-seal interactions must consider the unique circumstances of each event and accordingly, use various techniques to minimize harm to humans and seals. NMFS prepared a "Technical Review of Aversive Conditioning and Monk Seal-Human Interactions in the Main Hawaiian Islands" (NMFS 2009) resulting from a workshop on the subject. The purpose of aversive conditioning is to change an animal's behavior by pairing a negative 'experience' with the undesired behavior to condition against the behavior (Shivik and Martin 2000). Methods used on monk seals must involve a detailed understanding of animal behavior and training techniques as well as the availability of aversive stimuli. The 2009 technical review provides an overview of mitigation techniques NMFS has historically used with monk seals to address interactions including, but not limited to:

- Roping off small sections of beach around resting monk seals (this area is typically approximately 80 ft in diameter or 5,072 square ft). Barriers (ropes) are removed once the seal(s) has left the area.
- Translocation to remote areas; and
- Use of aversive stimuli to encourage seals to move away (for example, loud noises, motioning with palm fronds, etc).

As part of this PEIS, NMFS is considering other methods that will be effective to reduce human-seal interactions as described in Sections 2.6-2.10. An evaluation of potential impacts of human-seal interactions is provided in Sections 4.8.1 and 4.9.5.

3.4.10 *Environmental Justice*

Under EO 12898, Environmental Justice (59 CFR 7629), NMFS is required to identify if minority, low-income, or Native American populations are present in the action area. Using demographic data, if such populations are in the project area, a determination must be made whether or not carrying out the proposed action may cause disproportionately high and adverse human health or environmental impacts on those populations. The analysis of impacts is found in Section 4.9.6.

The Council on Environmental Quality (CEQ) defines the term "minority" as persons from any of the following U.S. Census categories for race: Black/Africa American; Asian, Native Hawaiian or Other Pacific Islander; and American Indian or Alaska Native. Additionally, for the purposes of this analysis, "minority" also includes all other nonwhite racial categories that were added to census definitions in the most recent (2000) censure, such as "two or more races."

The CEQ also mandates that persons identified through the U.S. Census as ethnically Hispanic, regardless of race, should be included in minority counts. Hispanic origin is considered an ethnicity, not a race; therefore Hispanics may be of any race. For the purposes of environmental justice analysis all persons except for “white, non-Hispanic” are considered “minority.” The Interagency Federal Working Group on Environmental Justice guidance states that a “minority population” may be present in an area if the minority percentage in the area of interest is “meaningfully greater” than the minority population of the general population (CEQ 1997).

For the purposes of this demographic analysis the 2010 Census of the population estimates for the racial categories mentioned above were used. Selected economic characteristics, such as poverty data, are not available from the 2010 Census and are only available through the Census Bureau's American Community Survey Program.

Demographic analysis for Hawai`i covers each county separately, but is also aggregated into statewide totals. There are five counties; Kaua`i County, Honolulu County (City and County of Honolulu), Maui County, Kalawao County, and Hawai`i County.

Kaua`i County includes the privately owned Island of Ni`ihau that contains a small population of Native Hawaiians. Census data for Ni`ihau are not available separately, but are included in Kaua`i County totals. Kalawao County is located on the Kalaupapa Peninsula which encompasses a portion of the Island of Moloka`i. Kalawao County is a separate county from the rest of Moloka`i and Maui County. Maui County includes the islands of Maui, Moloka`i, and Lāna`i. While 2010 population estimates are used for Maui County totals, these data are not available for each island within Maui County. Therefore, data from the Census-Designated Places (CDPs) of Kaunakakai (Moloka`i) and Lāna`i City (Lāna`i) were used to provide poverty estimates. CDPs are delineated for each decennial census as the statistical counterparts of incorporated places. CDPs are delineated to provide census data for concentrations of population, housing, and commercial structures that are identifiable by name but are not within an incorporated place. CDP boundaries usually are defined in cooperation with state, local, and tribal officials.

Table 3.4-12 illustrates the racial and ethnic composition of the potentially affected communities by county and Hawai`i as a whole. The proportion of minority on the islands of Moloka`i and Lāna`i are 83.9% and 86.0% respectively. These proportions are significantly higher than Hawai`i in total, which has a minority population of 75.3%.

Table 3.4-13 illustrates the proportion of people with income considered below poverty in the potentially affected counties, as well as Hawai`i as a whole. The proportion of people with income below poverty level in Hawai`i County and the Island of Moloka`i, in Maui County, is 14.4% and 13.4% are notably higher than other islands or counties which range from 2.9 percent to 8.9%. The State of Hawai`i proportion of people below the poverty level is 9.6%.

Table 3.4-12 Study Area Race and Ethnicity, 2010

	Kaua`i County**	City and County of Honolulu	Maui County: Island of Maui*	Maui County: Moloka`i *	Maui County: Lāna`i* Lāna`i City	Kalawao County	Hawai`i County	State of Hawai`i
Total population	67,091	953,207	144,477	7,255	3,102	90	185,079	1,360,301
White	22,159	198,732	51,733	1,168	435	24	62,348	336,599
	33.0%	20.8%	35.8%	16.1%	14.0%	26.7%	33.7%	24.7%
Black or African American	278	19,256	837	28	5	-	1,020	21,424
	0.4%	2.0%	0.6%	0.4%	0.2%	0.0%	0.6%	1.6%
American Indian and Alaska Native	254	2,438	581	20	2	-	869	4,164
	0.4%	0.3%	0.4%	0.3%	0.1%	0.0%	0.5%	0.3%
Asian	21,016	418,410	41,727	1,131	1,737	7	41,050	525,078
	31.3%	43.9%	28.9%	15.6%	56.0%	7.8%	22.2%	38.6%
Native Hawaiian and Other Pacific Islander	6,060	90,878	13,967	1,879	205	44	22,389	135,422
	9.0%	9.5%	9.7%	25.9%	6.6%	48.9%	12.1%	10.0%
Some Other Race	608	10,457	3,023	23	5	1	2,868	16,985
	0.9%	1.1%	2.1%	0.3%	0.2%	1.1%	1.5%	1.2%
Two or More Races	16,716	213,036	32,609	3,006	713	14	54,535	320,629
	24.9%	22.3%	22.6%	41.4%	23.0%	15.6%	29.5%	23.6%
Total Minority	44,932	754,475	92,744	6,087	2,667	66	122,731	1,023,702
	67.0%	79.2%	64.2%	83.9%	86.0%	73.3%	66.3%	75.3%
Hispanic or Latino (of any race)	6,315	77,433	14,960	496	254	1	21,383	120,842
	9.4%	8.1%	10.4%	6.8%	8.2%	1.1%	11.6%	8.9%

Notes:
*Maui County Total includes the islands of Maui, Moloka`i, and Lāna`i. Moloka`i and Lāna`i census data presented here includes West Moloka`i, East, Moloka`i, and Lāna`i City Census-Designated Places.
**Kaua`i County includes the Island of Ni`ihau
***Hispanic origin is considered an ethnicity, not a race. Hispanics may be of any race.
Source: U.S. Census Bureau, American FactFinder, Census 2010.

Table 3.4-13 Study Area Income Below Poverty Level, 2010

	Kaua`i County**	Honolulu County	Maui County: Maui County Total*	Maui County: Moloka`i * Kaunakakai	Maui County: Lāna`i* Lāna`i City	Kalawao County	Hawai`i County	State of Hawai`i
Total Population	67,091	953,207	154,834	3,425	3,102	90	185,079	1,360,301

	Kaua`i County**	Honolulu County	Maui County			Kalawao County	Hawai`i County	State of Hawai`i
			Maui County Total*	Moloka`i * Kaunakakai	Lāna`i* Lāna`i City			
Persons Below Poverty Line	8.8%	8.8%	8.9%	13.4%	2.9%	4.1%	14.4%	9.6%

Notes:
*Maui County Total includes the islands of Maui, Moloka`i, and Lāna`i. Moloka`i and Lāna`i census data presented here includes Kaunakakai and Lāna`i City Census-Designated Places. Poverty estimates for Kaunakakai and Lāna`i City Census-Designated Places is representative of 2006-2010, 5-year data.
**Kaua`i County includes the Island of Ni`ihau
Sources:
U.S. Bureau of Census: 2008 Estimate. U.S. Bureau of Census: 2006-2010 American Community Survey
U.S. Bureau of Census: 2010 Census

3.4.11 Sanctuaries, Monuments, and Refuges

The State of Hawai`i has a system of conservation areas that include wildlife and marine sanctuaries, monuments, parks, refuges, natural area reserves, and marine life conservation districts (see Figure 3.4-13). These public lands have a variety of management structures, jurisdictional authorities, and permit requirements. The following section highlights the public lands and their managing agencies that NMFS interacts with more frequently and where notable overlap of boundaries and/or jurisdictions exist regarding monk seals and their management.

3.4.11.1 Hawaiian Islands Humpback Whale National Marine Sanctuary

The HIHWNMS was established in 1992 by the Hawaiian Islands National Marine Sanctuary Act and is managed by the NOAA National Ocean Service (NOS), ONMS in co-management partnership with the State of Hawaii, Department of Land and Natural Resources. The primary purpose of the HIHWNMS is to protect humpback whales and their habitat.

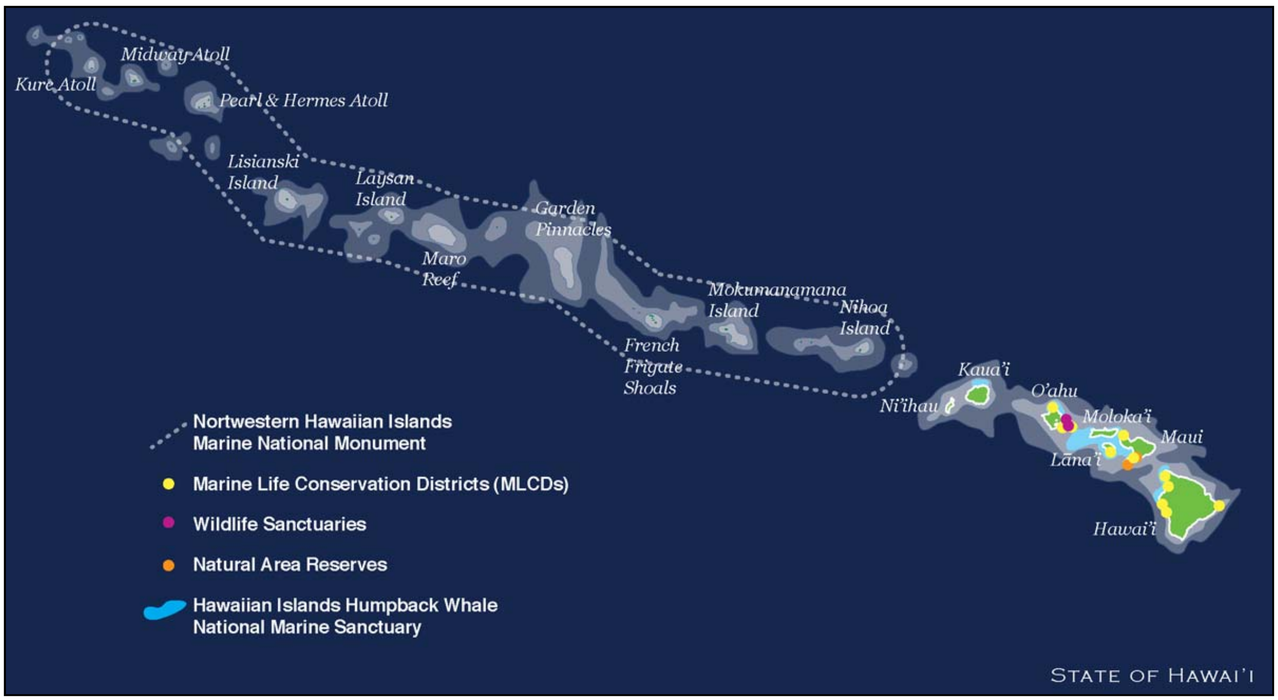
The Revised Management Plan (2002) identified a strategy to "develop and implement a process that identifies and evaluates resources for possible inclusion in the sanctuary." This strategy is derived from the Hawaiian Islands National Marine Sanctuary Act Section 2304(b)(4), which required this be done. The Revised Management Plan (2002) committed to addressing this requirement, and the plan notes public support at Sanctuary Advisory Council meetings to include other marine species such as the monk seals.

With the current management plan revision (see Section 1.9.2), the addition of Hawaiian monk seals (and other species as part of an ecosystem-based management approach) is being evaluated and as such, NOAA NOS must coordinate efforts with NMFS to develop and/or adjust the focus of appropriate

Sanctuary programs, "including expansion of the scope and type of research, monitoring, education, and outreach programs; enforcement efforts, and the use of management tools such as zoning" (NOAA NOS 2002).

NOAA NOS must also consult with NMFS to comply with Section 7 of the ESA with regard to monk seals any time the management plan is revised, which is currently underway. The consultation must occur to review the possible effects to monk seals that could result from preparation and implementation of the revised management plan and any new rules. Resulting mitigation from the consultation would direct NOAA NOS' management activities with regard to monk seals.

Figure 3.4-14 Sanctuary and Conservation Areas Map



Source: Hawai`i DLNR 2010

3.4.11.2 *Papahānaumokuākea Marine National Monument*

Established on June 15, 2006 by Presidential Proclamation of President George W. Bush, the Monument is co-managed by U.S. DOC NOAA NOS, the USFWS, and the Hawai`i DLNR. The Monument boundaries surround the NWHI as one of the world's largest marine protected areas, and is home to several endangered and threatened species. The NWHI are considered a sacred place for many Native Hawaiian people and Nihoa and Mokumanamana Islands have many *wahi kūpuna* (ancestral sites) (PMNM 2008). Because of the Monument's outstanding and unique natural and cultural qualities significant to the international community, the United Nations Educational, Scientific, and

Cultural Organization (UNESCO) designated it a World Heritage Site in July 2010 (UNESCO 2011).

Research scientists wishing to conduct research and/or enhancement activities within the Monument are required to obtain a Research Monument Permit. The permit allows the permit holder to conduct their permitted activities within the Monument. The permit also covers activities that are proposed in the Hawaiian Islands National Wildlife Refuge, the Midway Atoll National Wildlife Refuge, Battle of Midway National Memorial, Northwestern Hawaiian Islands State Marine Refuge, Kure Atoll Hawai`i State Seabird Sanctuary, and the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve as these conservation units are within the Monument boundaries. The permit applications must go through a public process and any regulatory and agency reviews (PMNM 2008). Notably, the Office of Hawaiian Affairs review all permit applications from a cultural perspective (Johnson personal communication 2011).

3.4.11.3 *Hawaiian Islands National Wildlife Refuge*

USFWS manages the Hawaiian Islands National Wildlife Refuge, which was established in 1909 by an executive order from President Theodore Roosevelt. The Refuge includes the NWHI excluding Midway and Kure Atolls; thus its boundaries coincide with the Monument. The eight islands, reefs, and atolls within the Refuge provide habitat for monk seals and other threatened and endangered species like the Hawaiian green turtle and endemic songbirds and waterfowl. Much like the Monument, the Refuge includes unique cultural resources (USFWS 2011).

The Refuge is not open to public visitation nor are there any permanent human inhabitants. As with the Monument, research scientists must obtain a Research Monument Permit to conduct their activities within the Refuge. The permit process is conducted through the Monument (USFWS 2011). A description of research camps in the Monument is provided in Section 3.3.1.9.

3.4.11.4 *Kalaupapa National Historic Park*

Hawaiian monk seals have established a year-round resident and breeding population on the Kalaupapa Peninsula, "has emerged as a premier birthing location for the seals in the MHIs" (NPS 2010). The Kalaupapa National Historic Park (NHP) was established in 1980 on the north shore of Moloka`i on the remote Kalaupapa Peninsula below 2,000-foot sea cliffs. The Kalaupapa NHP is about 10,700 acres of non-federal land. NPS co-manages the NHP with the Hawai`i DOH. As part of the NPS management structure, several cooperative agreements exist with the land owners, which include the Hawai`i Departments of Health, Transportation, Land and Natural Resources, and Hawai`i Homelands. Specifically, NPS operates, preserves, and protects the park and the Hawai`i DOH provides health services to the residents. The Moloka`i Lightstation is owned and operated by the USCG (NPS 2011 and NPS 2010).

Although NPS does not have management authority concerning monk seals, NPS must consult with NMFS to comply with Section 7 of the ESA within the context of implementing its various management duties (for example, with the recent proposal to repair the existing dock structures). NPS management activities are bound by mitigation required as a result of consultation. NPS also cooperates and assists NMFS with protecting hauled out seals.

3.4.11.5 Hawai`i State Marine Life Conservation Districts

The Hawai`i DLNR, DAR manages 11 Hawai`i State Marine Life Conservation Districts (MLCD) on O`ahu, Hawai`i, Lāna`i, Maui, and Molokini. The first MLCD was established in 1967 at Hana`uma Bay on O`ahu. These districts have restricted uses but allow some fishing and consumptive uses (DLNR DAR 2011). DAR consults and coordinates with NMFS when necessary and appropriate with regard to their management actions that could affect monk seals.

3.4.12 Military Activities within the Project Area

This section provides information on military installations within Hawai`i. Detail on individual installations is organized based on the five branches of the military including; U.S Air Force, U.S. Army, USCG, U.S. Marine Corp and the U.S. Navy. Only those installations located along the shoreline or have training exercises within the Pacific Ocean have been highlighted and discussed.

The military is the second most important sector to the Hawaiian economy, behind only tourism. The military contributes more than $4.6 billion annually to the Hawaiian economy and employs 27,000 civilians. There are an estimated 55,000 active duty military, 65,000 family members and 10,000 National Guardsmen in Hawai`i. Furthermore, in Hawai`i there are 13,000 retirees and 101,000 veterans receiving more than $55 billion in benefits from the U.S. government (U.S. Department of the Navy 2008).

3.4.12.1 Air Force

The Air Force has one base located in Hawai`i, the Hickam Air Force base, which is currently under reorganization with Naval Base Pearl Harbor. Details regarding Hickam Air Force Base are discussed below.

Hickam Air Force Base (O'ahu)

Hickam AFB is a 2,850 acre base located next to the Honolulu International Airport along the eastern shore of Pearl Harbor. The base is home to the 15th Airlift Wing and 67 partner units (U.S. Department of the Navy 2008a).

As part of a realignment strategy of the Base Closure and Realignment Commission, Hickam AFB and Naval Station Pearl Harbor are realigning to establish Joint Base Pearl Harbor-Hickam (U.S. Department of the Navy 2010). The individual mission areas of each branch will remain the same, while the installations management functions will be combined. In total, the combined land area of the establish Joint Base Pearl Harbor-Hickam will be approximately 27,700 acres. Hickam AFB has approximately one mile of shoreline.

3.4.12.2 *Army*

The U.S. Army Garrison-Hawai`i consists of Fort Shafter and Schofield Barracks communities, which include many other installations and sites (U.S Department of the Army 2010). Including active military, civilian, contractors and retirees, the Army population in Hawai`i is over 93,000 people with nearly 190,000 acres of land within Hawai`i (U.S Department of the Army 2010).

The two Army installations that directly border the shoreline include Makua Military Reservation and Dillingham Military Reservation. The Sikes Act requires that each military facility complete and implement an Integrated Natural Resource Management Plan ("Resource Plan") unless there is a significant lack of natural resources at those installations (US Army 2001). The Army has completed Resource Plans for both the Makua Military Reservation and Dillingham Military Reservation. Personal communication with a NMFS Marine Mammal Response representative reveals that the Army has not had any Hawaiian monk seal response events on their installations in Hawai`i (NMFS, personal communication 2011).

Makua Military Reservation (O'ahu)

Makua Military Reservation is an Army facility located on 4,190 acres in the Makua Valley on the northwestern side of O`ahu and has approximately two miles of shoreline (U.S Department of the Navy 2008a).

Since 2004, the use of Makua Military Reservation has been limited to non live-fire training including unmanned aerial vehicle training, blank ammunition training, and engineer training. The area has also been used as a staging base for ground or air movement, and to control elements for activities elsewhere in Hawai`i. A Record of Decision (ROD) for an increase in training activities at the Makua Military Reservation was approved in July of 2009. This ROD approves for up to 32 combined arms live-fire exercises (CALFEX) and 150 convoy live-fire exercises (LFX) per training year at the site (U.S. Army Environmental Command *et al.* 2009a).

The U.S. District court has recently found that the Army violated agreements required for its EIS to conduct a subsurface archaeological survey of areas within the Makua Military Reservation. Furthermore, the court ruled that the Army did not adequately study the effects of training activities on the *limu* along the shoreline of the area. Addition litigation surrounding increased military training on subsistence activities is scheduled for February 23, 2011 (Kobayashi 2010).

The Makua Military Reservation Resource Plan does not identify Hawaiian monk seals as being found on the Makua Military Reservation (US Army 2001).

However, the recently completed EIS stipulates that the shore adjacent to the military reservation provides suitable habitat for Hawaiian monk seals (U.S. Army Environmental Command *et al.* 2009a). The EIS also claims that there has been at least one anecdotal sighting of a monk seal at the beach.

Mitigation measures for the Preferred Alternative identified in the Makua Military Reservation final EIS include:

- The Army will inspect Makua Beach immediately prior to training exercises and will not begin a training exercise if there are Hawaiian monk seals present; and
- Additional mitigation measures beyond those proposed for ground training may be incorporated after informal consultation with NOAA.

The Makua Military Reservation Resource Plan provides that the current management for endangered species includes surveying, monitoring, protection and the management of the natural communities from military training. The Army proposes to survey for new rare vertebrate species in unsurveyed areas and establish and update GIS information for rare invertebrates at the Makua Military Reservation. Furthermore, the Army proposes to monitor and determine military impacts on threatened, endangered and rare vertebrates at the Makua Military Reservation.

Dillingham Military Reservation (O'ahu)

The Dillingham Military Reservation is located on a 664 acres parcel of land with a beach and airfield near the northwestern corner of O'ahu and is approximately one mile north of the Makua Military Reservation. Mokuleia Beach borders the Dillingham Military Reservation for approximately one mile, but due to the heavy surf and coral beds amphibious training does not occur. (Global Security 2011h) There are no resident rare animal species documented at the Dillingham Military Reservation (U.S. Army 2001). Despite this, Hawaiian monk seals may potentially use the reservation or adjacent areas (U.S. Army 2001). Current management for threatened, endangered and rare vertebrates on the Dillingham Military Reservation includes surveying, but monitoring and management of rare species is not possible because no such populations have been identified.

3.4.12.3 Coast Guard

USCG District 14 is headquartered in Honolulu, Hawai`i. The USCG is the only military branch organized under the Department of Homeland Security. Under the USCG natural resource policy, the USCG must obtain all the necessary permits and conduct consultations with NMFS when preparing for work that may impact marine mammals, such as the construction or maintenance of structures along beaches. The USCG is also required to notify the chain of command when prohibited encounters with marine mammals occur (USGC 1997).

Under the Marine Mammal Health and Stranding Response Program (MMHSRP), NMFS and USCG have a Memorandum of Understanding (MOU), where the USCG assists NMFS with marine mammal response. The USCG provides transport via vessel or aircraft for NMFS to translocate monk seals; between three to five seals are transported by the USCG annually (NMFS Response Coordinator pers. comm. 2011). These translocation activities are conducted under the MMHSRP permit 932-1905 and are separate from the translocation activities considered in this PEIS.

Air Station Barbers Point (O'ahu)

The USCG is stationed at Air Station Barbers Point on Kalaeloa Airport in Honolulu on a former Navy base and is located along approximately three miles of shoreline. However, the Air Station is self-contained and separated from the shoreline by a highway. NMFS is responsible for HMS response along this section of shoreline. The USCG Air Station Barbers Point is the only Coast Guard Air Unit in Hawai`i and is responsible for search and rescue missions over a vast area of the Pacific including the Hawaiian Islands, Marianas, Caroline and the Marshalls. Air Station Barbers Point has four Aerospatiale HH-65A helicopters and four Lockheed HC-130H aircraft (U.S. Department of the Navy 2008a; Global Security 2005d).

3.4.12.4 Marine Corps

The Marine Corps has one base in Hawai`i along with an installation at Bellows Airfield. These facilities, which are located along the shoreline, are discussed below. The INRMP guides implementation of Marine Corps Base Hawaii (MCBH) integrated natural resource management program on their properties. Objectives of the MCBH INRMP outline the MCBH Environmental Departments management actions, which describe the incorporation of the marine mammal policy into base plans, projects and protocols as appropriate.

In total, MCBH properties have 12.5 miles of shoreline and coastal and MCBH resource responsibilities extend seaward from Mokapu Peninsula shoreline for 500 yards. Therefore, it is assumed that the MCBH manages approximately four square miles of nearshore area. Amphibious training maneuvers are conducted along the coastal areas of the MCBH in order to prepare USMC personnel for forced entry by sea (U.S. Marine Corps 2006). HMSs regularly come ashore on the MCBH-Kaneohe Bay beaches to rest. Furthermore, in 1996 there was a documented birth of a HMS pup at this location.

NMFS and the MCBH have a standing agreement where U.S. Marine Corps personnel notify NMFS in the event a HMS is located along MCBH shoreline. MCBH personnel cordon off the area where the HMS is located and notifies NMFS. A photo is then taken by either NMFS or MCBH personnel for documentation. (NMFS Response Coordinator personal communication 2011)

Marine Corps Base Hawai`i (O'ahu)

The MCBH is a 2,951 acre site on the Mokapu Peninsula, which is located along the southeastern shoreline of O`ahu. A large portion of the base is designated as urban and is located approximately 12 miles northeast of Honolulu (Global Security 2005e). As of 2005, there are approximately 10,000 marines and navy personnel stationed at the base (Global Security 2005f).

Marine Corps Training Area/Bellows (O'ahu)

The Marine Corps Training Area/Bellows is located on 1,078 acre site on the southeastern portion of O`ahu. The onsite airfield is inactive; however, it is occasionally used for Marine Corp helicopter training (U.S. Department of the Navy 2008a).

3.4.12.5 Navy

The Navy has the largest military presence in Hawai`i and contributes more than $2 billion to the local economy annually. The Navy accounts for more than 15,000 military personnel and over 10,000 civilian employees in Hawai`i (U.S. Department of the Navy 2011a). As of 2008, the United States Department of the Navy conducted more than 9,300 training and Research, Development, Test and Evaluation activities around Hawai`i each year (U.S. Department of the Navy 2008a).

The Navy's application to NMFS for authorization to incidentally harass marine mammals outlines the Navy's mitigation measures for acoustic effects and training exercises (U.S. Department of the Navy 2007). During anti-submarine warfare events, Navy ships have two or more personnel on watch. The bridge team has at least three officers whose responsibilities include observing the water. When marine mammals are close, operating procedures are implemented to avoid adverse effects, including the shutting down of active sonar operation. The Navy requires marine species awareness as part of its training for its bridge lookout personnel on ships and submarines as required training for Navy lookouts.

NMFS has a Protocol and Communication Plan with the Navy pertaining to training exercises and they are currently in the process of drafting an MOU (NMFS personal communication 2011). The Navy notifies NMFS 72 hours prior to major training exercises (NMFS personal communication 2011). NMFS and the Navy have a standing agreement where Navy personnel notify NMFS in the event a HMS is found along Navy installation shorelines. Navy personnel cordon off the area where the seal is located and notify NMFS. A photo is then taken by either NMFS or Navy personnel for documentation (NMFS personal communication 2011).

If major exercises must occur in an area where conditions may contribute to marine mammal stranding, the conditions must be fully analyzed in environmental planning documentation (U.S. Department of the Navy 2007). The Navy will also use aircraft to survey the area and detect marine mammals prior to the use of the area by exercise participants. Advance survey should occur within about two hours prior to mid-frequency active sonar use, and periodic surveillance should continue throughout the exercise. Unusual conditions, such as presence of sensitive species, should be reported to the Office in Tactical Command (OTC), who should give consideration to delaying, suspending or altering the exercise.

The Letter of Authorization for the taking of marine mammal's incidental to U.S. Navy training in Hawai`i Range Complex was issued on January 23, 2013 and expires on January 5, 2014 (see Table 3.3-8). This permit allows for the take of 121 monk seals through level B harassment (NMFS 2013).

Kaula

Kaula is an uninhabited island located approximately 50 miles southwest of Kaua`i Island. The federally owned island is approximately 108 acres in size. The Navy uses approximately 10 acres along the south side of the island for aircraft gunnery and target practice (U.S. Department of the Navy 2008a).

Pacific Missile Range Facility (Kaua'i)

The Pacific Missile Range Facility is the world's largest instrumented range capable of supporting surface, subsurface, air and space operations simultaneously (U.S. Department of the Navy 2011c). There are over 1,100 square miles of instrumented underwater range and 42,000 square miles of controlled airspace.

The Pacific Missile Range Facility is located on the west side of Kaua`i, where the majority of Pacific Missile Range Facility's facilities and equipment are located upon the 1,925 acre main base (U.S. Department of the Navy 2008a). The facilities that support Pacific Missile Range Facility range operations include Kaua`i Test Facility, Makaha Ridge, Kokee, Hawai`i Air Nation Guard Kokee, Kamokala Magazines, Port Allen, Kiliaola Small Boat Harbor and Mt. Kahili.

A recently issued Record of Decision for the Hawai`i Range Complex EIS/Overseas EIS states that the number of Pacific Missile Range Facility training events and Research, Development, Test and Evaluation programs will be increasing effective June 26, 2008 (U.S. Department of the Navy 2008a).

Puuloa Underwater Range (O'ahu)

The Puuloa Underwater Range is a 2 square nm underwater demolition area. Puuloa Underwater Range is located near Ewa Beach, west of the entrance to Pearl Harbor. The range is located in water depths ranging from 9 feet to 228 feet, while the majority of the range is in water less than 39 feet deep (U.S. Department of the Navy 2008a).

Naval Defensive Sea Area (O'ahu)

The Naval Defense Sea Area is the restricted area extending outward from the mouth of Pearl Harbor and encompasses an area of approximately ten square miles. No vessels are allowed into Naval Station Pearl Harbor without permission of Commander Naval Region Hawai`i. The Naval Defense Sea Area is used for underwater training and Research, Development, Test and Evaluation activities (U.S. Department of the Navy 2008a).

Ewa Training Minefield (O'ahu)

The Ewa Training Minefield is a surface ship mine avoidance training area located offshore of Ewa Beach on O`ahu and is approximately ten square miles in size (U.S. Department of the Navy 2008a).

Barbers Point Underwater Range (O'ahu)

The Barbers Point Underwater Range is located offshore from the USCG Air Station and the Kalaeloa Airport on O`ahu and encompasses an area of approximately one square mile (U.S. Department of the Navy 2008a).

Naval Underwater Warfare Center (O'ahu)

The Naval Underwater Warfare Center, Shipboard Electronic Systems Evaluation Facility range is located off of Barbers Point on O`ahu and is approximately 35 square miles in size. The range is used to test combat systems which emit electromagnetic radiation. Furthermore, the NUWC conducts tests within the Fleet Operations Readiness Accuracy Check Site, which is an area approximately 30 square miles in size. The Naval Underwater Warfare Center Range control officer conducts visual lookout and radar searches of the Fleet Operations Readiness Accuracy Check Site range to determine if non-participating vessels are located within the area (U.S. Department of the Navy 2008a).

Naval Station Pearl Harbor (O'ahu)

Naval Station Pearl Harbor is a 25,170 acre site located on the southern shore of O`ahu (U.S. Department of the Navy 2008a). Furthermore, Naval Station Pearl Harbor hosts a population of approximately 35,000.

The Harbor is divided into three lochs; the West Lock, Middle Lock and East Loch. A major portion of the area adjacent to ship berthing and repair areas is used for maintenance, supply and storage (U.S. Department of the Navy 2008a). The base is currently undergoing realignment with the neighboring Hickam AFB as previously described. Pearl Harbor has nearly ten square miles of water and approximately 40 miles of shoreline.

Lima Landing Range (O'ahu)

Lima Landing Range is located within Joint Base Pearl Harbor-Hickam and is used a small underwater demolition training area. This range is less than one square mile in size. At this time, approximately five training events occur each year at the site (U.S. Department of the Navy 2008a).

Shallow-water Minefield Sonar Training Area (Maui)

The Shallow-water Minefield Sonar Training Area is used by Pearl Harbor based submarines to conduct mine sonar training and is approximately two square miles in size. Submarines utilize high-frequency active sonar and training can occur when marine mammals are present (U.S. Department of the Navy 2008a).

Kawaihae Pier (Hawai'i)

Kawaihae Pier is one of two deep water ports located on the island of Hawai`i. Expeditionary assault events are conducted by the Navy at the pier and primary activities include the loading and unloading of vehicles and equipment from vessels (U.S. Department of the Navy 2008a).

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes the predicted consequences, or potential effects, on the physical, biological, and human environment from implementing the alternatives described in Chapter 2. The chapter begins by describing the Project Area (Section 4.1), defining frequently used terms (Section 4.2), and explains how incomplete or unavailable information is dealt with in this document (Section 4.3). Section 4.4 describes the steps used for determining the level of impact including the resource-specific criteria used in the evaluation. Section 4.5 provides an overview of the approach to cumulative effects assessment. Section 4.6 presents resources not carried forward for further analysis, while Section 4.7 characterizes elements common to all alternatives. Sections 4.8 and 4.9 provide analyses of impacts to the biological environment and to the social and economic environment, respectively, from each of the alternatives.

4.1 PROJECT AREA AND SCOPE FOR ANALYSIS

The project area for this Programmatic Environmental Impact Statement (PEIS) encompasses the range where Hawaiian monk seals are found throughout the Hawaiian Archipelago (including the Northwestern Hawaiian Islands [NWHI] and Main Hawaiian Islands [MHI]) and Johnston Atoll (Figure 1.3-1).

More specifically, the Project Area includes portions of the open ocean and nearshore environment where monk seals may be found; and, the shorezone of the islands, islets and atolls that make up the Hawaiian Archipelago and Johnston Atoll. For the purposes of this project, the shore zone generally includes those terrestrial areas 5 meters (m) inland from the line where the shore meets the sea. In addition, secondary use areas, such as research field camps in the NWHI, are also considered for inclusion in the analysis.

In the NWHI, monk seals have six main reproductive sites including Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island, and French Frigate Shoals. Necker and Nihoa Islands have smaller breeding sub-populations and monk seals have been observed at Gardner Pinnacles and Maro Reef. Monk seals are also found throughout the MHI where the population appears to be increasing (National Marine Fisheries Service [NMFS] 2007).

The time frame for this analysis is defined as 1958 through approximately 2024. As described in more detail in Section 3.3.1, 1958 marks the point in time when the first beach counts of Hawaiian monk seals were conducted in all the primary NWHI. That year is considered a benchmark for the species' known historic high point of abundance. By the year 2024, NMFS will have potentially completed two more permit cycles for authorizing Hawaiian monk seal research and enhancement activities; in addition, 10 years is considered a reasonable amount of time for the life of an EIS document. Within this 10-year timeframe, NMFS will continue to monitor the Hawaiian monk seal research and enhancement program to evaluate its potential impacts and to comply with NEPA as described in more detail in Chapter 5.

4.2 DEFINITION OF TERMS

The following terms are used throughout this document to discuss potential effects. In this analysis, the terms "effects" and "impacts" are used interchangeably.

- Direct Effects – caused by the action and occurring at the same time and place (40 Code of Federal Regulations [CFR] § 1508.8).
- Indirect Effects – effects "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect impacts may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR 1508.8).
- Cumulative Effects – additive or interactive effects that would result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). Direct impacts pertain to the proposed action and alternatives only, while cumulative impacts pertain to the additive or interactive effects that would result from the incremental impact of the proposed action and alternatives when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
- Reasonably Foreseeable Future Actions –reasonably foreseeable future actions (RFFAs) are those that are likely to occur and are not purely speculative. Typically, they are based on documents such as existing plans, permit applications, or announcements. The process for determining what is considered reasonably foreseeable is further described in Section 4.5.2.

4.3 INCOMPLETE AND UNAVAILABLE INFORMATION

The CEQ guidelines require that:

"When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking (40 CFR 1502.22)."

In the event that there is relevant information, but "the overall costs of obtaining it are exorbitant or the means to obtain it are not known" (40 CFR 1502.22), the regulations instruct that the following should be included:

- A statement that such information is unavailable;
- A statement of the relevance of such information to evaluate reasonably foreseeable significant adverse impacts;
- A summary of existing information that is relevant to evaluating the adverse impacts; and
- The agency's evaluation of adverse impacts based on generally accepted scientific methods.

This PEIS identifies those areas where information is unavailable to support a thorough evaluation of the environmental consequences of the alternatives. In particular, as described in more detail in Section 4.9, there are challenges to analyzing potential impacts on fisheries resources (commercial, subsistence and recreational) due to constraints associated with data confidentiality, and also cases where little or no relevant data exist. Evaluations of direct and indirect effects on fisheries were largely based on a recent NMFS analysis of fish biomass, fishery landings and monk seal prey consumption (Sprague 2013). In that publication, whenever there was uncertainty, assessments erred on the side of overestimating impacts.

Similarly, the analysis of potential effects on cultural and historic properties is based on known properties listed in the National Register of Historic Places (NRHP) and other data publicly available from the State of Hawai`i Division of Land and Natural Resources (DLNR). While additional cultural and historic properties exist, the assessment presented in this PEIS is based on publicly available information on documented sites and any information available on sites eligible for listing in the National Register. Efforts have been made to obtain all relevant information regarding cultural and historic properties as defined under NEPA, and a separate NHPA Section 106 compliance process was undertaken (see Appendix L) to gather unpublished information on historic properties as defined under NHPA. This compliance process included gathering additional information via NHPA Section 106 consultations. However, where data gaps still exist, the implication is that these areas qualify for the CEQ guidelines above.

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects of their undertakings on any historic properties located within the Area of Potential Effect (APE) of a proposed project. These effects may be either direct or indirect. Impacts to historic and cultural resources, including historic structures, archaeological sites, and traditional cultural properties, would be considered significant if they result in adverse effects to the integrity of historic properties that are listed or are eligible for listing on the National Register of Historic Places (National Register). Integrity can be considered to mean not simply the physical integrity of a structure, but "the integrity of [its] location, design, setting, materials, workmanship, feeling, and association" (Title 36 C.F.R. § 60.4). Adverse effects are those that detract from the qualities that give a property its significance and contribute to its NRHP eligibility. Direct effects are those that physically alter the historic property in some way. Indirect effects diminish some significant aspect of the historic property, but do not physically alter it.

4.4 STEPS FOR DETERMINING LEVEL OF IMPACT

The CEQ regulations implementing NEPA state that an EIS should discuss the significance, or level of impact, of the direct, indirect, and cumulative effects of the proposed alternatives (40 CFR 1502.16).

- Significance is determined by considering both the context in which the action will occur and the intensity of the action (40 CFR 1508.27).
- Context can be referred to as the extent of the effect (geographic extent or extent within a species, ecosystem, or region) and any special conditions, such as endangered species status or other legal status.
- Intensity of an impact is the result of its magnitude and duration.

Actions may have both adverse and beneficial effects on a particular resource. A component of both the context and the intensity of an effect is the likelihood of its occurrence.

Geographic extent of potential impacts to wildlife may be described using the following terms:

- Species level – change in species or population throughout its range that would likely affect its long-term survival.
- Subpopulation or local level – change in a species age- or size-classes in a limited area of its range. Subpopulations are described in Section 3.3.1.3 Hawaiian Monk Seal Population Status and Trends.
- Individual level – change to a specific animal or small number of animals.

Duration or frequency provides the context of time and may use the following terms:

- Short-term – temporary effect that lasts from a few minutes to a few days, after which the affected animals or resource revert to a "normal" condition.
- Long-term – more permanent effects that may last for years or from which the affected animals or resource never revert to a "normal" condition.
- Intermittent or infrequent effects – effects that only occur a couple times a year or fewer.
- Frequent – effects that occur on a regular or repeated basis each year.

Other species-specific characteristics, such as whether the effects occur during a sensitive or critical part of the year (for example, breeding), are described in the analyses for each species or resource.

The combination of context and intensity is used to determine the level of impact on each type of resource. Analysts follow these steps to accomplish this analysis:

1) Examine the mechanisms by which the proposed action could affect the particular resource.
2) For each type of effect, develop a set of criteria to distinguish between major, moderate, minor, or negligible impacts (defined in Tables 4.4-1 through 4.4-8).
3) Use these impact criteria to rank the expected magnitude, extent, duration, and likelihood of each type of effect under each alternative.

Determining the likelihood of an effect serves to assess whether it is plausible or just speculative. For the purposes of this analysis, "likely" effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50 percent (%). This does not imply that the analysts will perform a formal probability calculation but, in their professional judgment, the probability of the effect occurring is more likely than not.

Tables 4.4-1 through 4.4-8 provide guidelines for the analysts to assess the context of a potential effect and serve as tools for comparing the alternatives based on the conclusions drawn from the analysis. The impact criteria tables use terms and thresholds that are both quantitative and qualitative.

Qualitative thresholds are used where resource-specific baseline data may be lacking or potential effects are difficult to predict quantitatively (*e.g.*, quality of life is difficult to measure in quantitative terms). For a qualitative assessment, analysts must use professional judgment about where a particular effect falls in the continuum from "negligible" to "major."

The criteria and definitions of levels of impact provided in Tables 4.4-1 through 4.4-8 are used only in reference to effects projected to occur within 10 years (see Section 4.1 Project Area and Scope for Analysis). Predictions beyond 10 years are challenging due to uncertainty and the number of independent factors that may alter the environment. Thus potential long-term effects are described using more qualitative terms.

4.4.1 Impact Criteria for Hawaiian Monk Seals

Table 4.4-1 presents criteria for analyzing potential effects on Hawaiian monk seals. The effects of various actions on population status through direct and indirect mortality or through improvements in survival can be evaluated by various metrics. The choice of the appropriate metric to be used depends on a suite of factors including the nature of the actions, the mechanism of potential demographic effects, and our confidence in predicting the expected effects.

As described in Chapter 3, in the NWHI, protracted low juvenile survival has led to an ageing breeding population and dwindling numbers of pups being born. If juvenile survival improves naturally, or as a result of enhancement actions, the number of monk seals at the six most-studied NWHI is projected to continue to decline at least for several years before the inertia in current age structures can be overcome. As such, population modeling suggests the NWHI subpopulations will decline for some time under *all* PEIS alternatives. However, some alternatives will slow the decline, improve population status, and ultimately reverse the decline more rapidly than others.

The quantitative metrics used to compare and contrast the expected outcome associated with the different actions included in the alternatives are:

- Population growth rate;
- Age-specific survival rates and survivorship; and
- Population reproductive value (V_{pop}).

Additionally, the expected benefits associated with certain new interventions for which applicable data are not yet available, are evaluated qualitatively. For each intervention, the approach or metric believed to be most revealing for describing the expected outcome of the action is presented.

The intrinsic growth rate, or lambda (λ) for a subpopulation or group of subpopulations is determined from the demographic rates (age-specific survival and reproductive rates) for that population. When all of the demographic rates are assembled into a single table or matrix, they form the lifetable for that population.

Mathematical analysis of that lifetable allows the calculation of certain lifetable descriptors, including λ, that reveal much information about the expected behavior of the population in the future. The value of λ provides an estimate for the long-term likelihood that a population will grow or decline, with values above 1.0 representing growth and values below 1.0 representing decline. A value of exactly 1.0 would correspond to a stable population that will remain at approximately the same abundance over time.

The actual growth rate of a population will vary from the intrinsic growth rate depending on the age structure of the population. For example, more females that can reproduce in a population than normally expected within the population's lifetable may allow the population to exceed the growth rate predicted by λ. Conversely, fewer reproductive females than normally expected might mean the population would fail to meet λ. In recent years, subpopulations in the NWHI have typically had $\lambda < 1.0$ (declining), whereas, in contrast, the MHI have had λ well above 1.0 (growing). Also, as described in Chapter 3, most subpopulations in the NWHI now have poor age structures that are likely to limit their capacity to achieve the growth rate predicted by λ.

Survival rates are often the most direct measure for describing the expected outcomes for an action, or for comparing effects across the alternatives. Age-specific survival (often abbreviated as p_x) indicates the probability that a seal will survive from age x to the next age, or age $x+1$. Similarly, survivorship (abbreviated l_x) gives the probability that a newborn pup will survive to age x. Of particular interest for recovery of the monk seal is survivorship to the subadult stage (approximately age 4yr); shorthand for this measure is l_4. A number of the

One can think of V_{pop} as analogous to the quantity of potential energy stored in the population, which is likely to translate into future pup production.

research and enhancement activities included in Alternatives 1, 3 and 4 are specifically targeted at improving the value of l_4 in the NWHI.

The metric population reproductive value (V_{pop}) is used to evaluate the effects of certain actions included in some alternatives. This metric is an extension of a related demographic measure known as *age-specific reproductive value*, or v_x. This measure essentially informs us about the relative value of female seals of different ages in terms of their probable contribution to future population growth.

Females of prime reproductive age have a higher v_x than very young females that might not survive to reproductive maturity, or very old females that are past their prime reproductive years and may not produce many more pups. V_{pop} extends the concept of age-specific reproductive value by incorporating information on the current population size and age/sex composition. This parameter is the sum of the age-specific reproductive values for all of the females currently in the population.

One can think of V_{pop} as analogous to the quantity of potential energy stored in the population, which is likely to translate into future pup production. Thus:

- An action that increases the number of reproductively aged females will result in a higher V_{pop} as compared to a "baseline" scenario without the action.
- An action that results in the loss of reproductively aged females will lower V_{pop} at that site.

V_{pop} is ideally suited for assessing potential effects of the proposed translocations because that activity is focused on augmenting the number of reproductively-aged females within the high v_x age classes, thereby increasing V_{pop} for the treated subpopulation.

The effects of some actions may also be expressed as simply the change in number of reproductively-aged females in a subpopulation. Reproductively-aged females are defined as those of age 5-20.

For clarity, and because V_{pop} may be an unfamiliar concept to some readers, the effects of some actions may also be expressed as simply the change in number of reproductively-aged females in a subpopulation. This value expresses much the same thing as V_{pop}, but is slightly less informative as it does not account for the differences in v_x among females of different ages. For this measure, "reproductively aged females" are defined as those of age 5-20, corresponding to the youngest age of first reproduction through the approximate age at which fecundity tapers off in the monk seal.

In addition to evaluating the number of potential mortalities, it is important to understand how sublethal effects may result in changes to the species' status. For the purposes of this analysis, we evaluate sublethal effects in terms of how they could result in changes to reproductive success.

Finally, in order to understand how the proposed research and enhancement activities contribute to conservation of the species more broadly, the proposed actions are compared against specific actions listed in the 2007 Hawaiian Monk Seal Recovery Plan (NMFS 2007). This element of the effects analysis qualitatively discusses how well the scope of research and enhancement represented under each alternative would be able to address information needs for taking management actions that would promote recovery of the species.

The goal of the Recovery Plan is to promote the recovery of Hawaiian monk seals to the point that they could be down-listed from "endangered" to "threatened" and ultimately to the point that it could be removed from the list of threatened and endangered species under the ESA. Additional information on the 2007 Recovery Plan and its relevance to this PEIS is provided in Section 3.3.1.7.

Table 4.4-1 Impact Criteria for Hawaiian Monk Seals

Type of Effect	Impact Component	Impact Level			
		Major	**Moderate**	**Minor**	**Negligible**
Mortality or survival enhancement	Magnitude and Intensity	Sufficient to cause measurable change in population status (*i.e.*, population growth rate, survival rates, V_{pop})	Equivocal change in population status (*i.e.*, population growth rate, survival rates, V_{pop})	Mechanism for effects on population status (*i.e.*, population growth rate, survival rates, V_{pop}), but status indistinguishable from baseline	NA
	Geographic extent/Biological level	Affects entire species throughout range	Effects limited to a single or a few subpopulations	Effects limited to a small number of individuals	NA
	Duration and Frequency	Long-term duration and high frequency	Moderate duration with high frequency or long-term duration with medium frequency	Short-term duration with moderate frequency or moderate duration with low frequency	NA
	Likelihood[1]	Likely	Likely	Not Likely	Not Likely
Reproductive effects	Magnitude and Intensity	Sufficient to cause measurable change in reproductive success	Equivocal change in reproductive success	Mechanisms for effects but reproductive success similar to baseline	No mechanisms for reproductive effects
	Geographic extent/Biological level	Effects entire species throughout range	Effects limited to a single or a few subpopulations	Effects limited to a small number of individuals	No measurable effects
	Duration and Frequency	Long-term duration and high frequency	Moderate duration with high frequency or long-term duration with moderate frequency	Short-term duration with moderate frequency or moderate duration with low frequency	No measurable effects
	Likelihood[1]	Likely	Likely	Not Likely	Not Likely
Contribution toward conservation objectives	Magnitude and Intensity	Addresses all conservation objectives in Recovery Plan	Addresses multiple conservation objectives in Recovery Plan	Addresses a few conservation objectives in Recovery Plan	Addresses no conservation objectives in Recovery Plan

Type of Effect	Impact Component	Impact Level			
		Major	Moderate	Minor	Negligible
	Geographic extent/Biological level	Research and enhancement benefits conservation of species throughout range	Research and enhancement benefits conservation of a single or a few subpopulations	Research and enhancement benefits a small number of individuals	Provides no enhancement benefits or useful information for management
	Duration and Frequency	Provides immediate and long-term enhancement benefits and/or information needs	Provides periodic and long-term enhancement benefits and/or information needs	Provides periodic and short-term enhancement benefits and/or information needs	Provides no enhancement benefits or information for management
	Likelihood[1]	Likely	Likely	Not Likely	Not Likely

[1] - "Likely" effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50%.

4.4.2 *Impact Criteria for Other Biological Resources*

Tables 4.4-2 through 4.4-5 indicate the types of effects Hawaiian monk seal research and enhancement activities may have on other biological resources (species other than monk seals) that are assessed in this NEPA analysis. These tables summarize the criteria for determining the level of impact based on the magnitude, extent, duration and likelihood of occurrence. Where additional resource-specific information may provide further insight into the rationale behind impact criteria, these details are presented following each table. Sections 4.8.2 through 4.8.6 summarize the anticipated direct, indirect and cumulative effects under each alternative for other biological resources.

Table 4.4-2 Impact Criteria for Sea Turtles

Type of Effect	Impact Component	Impact Level			
		Major	Moderate	Minor	Negligible
Reproductive effects	Magnitude or Intensity	Population level changes in reproduction over several breeding seasons.	Population changes in reproduction over one breeding season.	Changes in reproduction at the individual rather than population level.	No measurable effects
	Geographic Extent	Regional impacts observed throughout the islands	Effects realized in multiple locations over several islands	Effects realized at one location (bay or beach)	No measurable effects
	Duration or Frequency	Chronic and long-term changes not likely to be reversed over several years or seasons	Periodic, temporary, or short-term changes that could be reversed in an annual or several season cycle	Periodic, temporary, or short-term changes that are reversed over one or two seasons	No measurable effects
	Likelihood[1]	Likely	Likely	Not likely	Not likely
Mortality	Magnitude or Intensity	Population-level effects observed	Sub-population or community level effects observed	Individual mortality observed but not sufficient to affect population survival.	No measurable effects
	Geographic Extent	Regional impacts observed throughout the islands	Effects realized in multiple locations over several islands	Effects realized at one location	No measurable effect
	Duration or Frequency	Chronic and long-term changes not likely to be reversed over several years or seasons	Periodic, temporary, or short-term changes that could be reversed in an annual or several season cycle	Periodic, temporary, or short-term changes that are reversed over one or two seasons	No measurable effect
	Likelihood[1]	Likely	Likely	Not likely	Not likely

[1] - "Likely" effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50%.

Table 4.4-3 Impact Criteria for Cetaceans

Type of Effect	Impact Component	Impact Level			
		Major	Moderate	Minor	Negligible
Mortality	Magnitude or Intensity	Population-level effects observed	Sub-population or community level effects observed	Individual mortality observed but not sufficient to affect population survival.	No measurable effects
	Geographic Extent	Regional impacts observed throughout the islands	Effects realized in multiple locations over several islands	Effects realized at one location	No measurable effects
	Duration or Frequency	Chronic and long-term changes not likely to be reversed over several years or seasons	Periodic, temporary, or short-term changes that could be reversed in an annual or several season cycle	Periodic, temporary, or short-term changes that are reversed over one or two seasons	No measurable effects
	Likelihood[1]	Likely	Likely	Not likely	Not likely
Reproductive effects	Magnitude or Intensity	Population level changes reproduction in several species over several seasons.	Population changes in reproduction over one season.	Changes in reproduction effect a small number of individuals	No measurable effects
	Geographic Extent	Regional impacts observed throughout the islands	Effects realized in multiple locations over several islands	Effects realized at one location	No measurable effect
	Duration or Frequency	Chronic and long-term changes that are likely to be permanent	Periodic, temporary, or short-term changes in an annual or several season cycle	Periodic, temporary, or short-term changes over one or two seasons	No measurable effect
	Likelihood[1]	Likely	Likely	Not likely	Not likely

[1] - "Likely" effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50%.

Table 4.4-4 Impact Criteria for Fish

Type of Effect	Impact Component	Impact Level			
		Major	Moderate	Minor	Negligible
Mortality	Magnitude or Intensity	Mortality to large numbers of fish.	Mortality to individual fish; no population level effects.	Mortality to very small numbers of fish.	No measurable effects
	Geographic Extent	Effects realized in multiple locations	Effects realized in multiple locations	Effects realized at few locations	No measurable effects
	Duration or Frequency	Chronic and long-term changes that are likely to be permanent	Periodic, temporary, or short-term changes in an annual or several season cycle	Periodic, temporary, or short-term changes over one or two seasons	No measurable effect
	Likelihood	Likely	Likely	Not likely	Not likely

[1] - "Likely" effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50%.

Table 4.4-5 provides criteria for analyzing the potential direct, indirect and cumulative impacts to birds based on their nesting, brood-rearing, and seasonal use patterns within the terrestrial portion of the Project Area. This area includes beach habitat up to 5 m inland from the upper reaches of the wash of the waves, as described in Section 1.3 Project Area Description, and areas where seasonal field camps at French Frigate Shoals, Pearl and Hermes Reef, Midway and Kure Atolls, and Laysan and Lisianski Islands are located (see Section 3.3.1.9).

Impact levels for the endangered Laysan finch were based on the Incidental Take Statement in the USFWS 2009 Biological Opinion for the Issuance of a Permit to Conduct Field Research on Hawaiian monk seals (USFWS 2009c).

Table 4.4-5 Impact Criteria for Birds

Type of Effect	Impact Component	Impact Level			
		Major	Moderate	Minor	Negligible
Altered survival or reproduction (other than Laysan finch)	Magnitude or Intensity	Changes in survival or productivity in one or more avian species over several years.	Changes in survival or productivity in one avian species over several years.	Changes in survival or productivity in one avian species during one year.	No measurable effects
	Geographic Extent	Regional effects observed throughout the islands	Effects realized in multiple locations over several islands	Effects realized at one location	No measurable effects
	Duration or Frequency	Chronic and long-term changes not likely to be reversed over several years or seasons	Periodic, temporary, or short-term changes that could be reversed in an annual or several season cycle	Periodic, temporary, or short-term changes that are reversed over one or two seasons	No measurable effects

Type of Effect	Impact Component	Impact Level			
		Major	Moderate	Minor	Negligible
	Likelihood[1]	Likely	Likely	Not likely	Not likely
Habitat loss or alteration	Magnitude or Intensity	Population level changes in one or more avian species over several years.	Sub-population or level changes in one avian species over one or two years.	Impacts to individuals observed during one year.	No measurable effect
	Geographic Extent	Regional impacts observed throughout the islands	Effects realized in multiple locations over several islands	Effects realized at one location	No measurable effect
	Duration or Frequency	Chronic and long-term changes not likely to be reversed over several years or seasons	Periodic, temporary, or short-term changes that could be reversed in an annual or several season cycle	Periodic, temporary, or short-term changes that are reversed over one or two seasons	No measurable effect
	Likelihood[1]	Likely	Likely	Not likely	Not likely
Altered survival or reproduction of Laysan Finch	Magnitude or Intensity	Disturbance of more than 200 Laysan finch and/or more than 10 Laysan finch are incidentally injured over 5 years.	Disturbance of 200 Laysan finch and/or incidental injury or mortality of 10 Laysan finch over 5 years.	Disturbance of less than 200 Laysan finch and/or incidental injury or mortality of less than 10 Laysan finch over 5 years.	No measurable effect
	Geographic Extent	Effects realized at Laysan Island and Pearl & Hermes Reef	Effects realized at Laysan Island and Pearl & Hermes Reef	Effects realized in one location	No measurable effect
	Duration or Frequency	Chronic and long-term changes not likely to be reversed over several years or seasons	Periodic, temporary, or short-term changes that could be reversed in an annual or several season cycle	Periodic, temporary, or short-term changes that are reversed over one or two seasons	No measurable effect
	Likelihood[1]	Likely	Likely	Not likely	Not likely

[1] - "Likely" effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50%.

4.4.3 *Impact Criteria for Socioeconomic Resources*

Table 4.4-6 presents a summary of mechanisms used to measure the effects that Hawaiian monk seal research and enhancement actions would have on the social and economic environment, and the criteria for determining the level of impact based on the magnitude, extent, duration, and likelihood of occurrence. These effects are primarily related to commercial fishing, subsistence fishing, recreational fishing, and recreation and tourism activities. Section 4.9 summarizes the anticipated direct and indirect effects under each alternative for these resources.

This analysis takes into account the economic and distributional effects of the various alternatives and their associated elements. The criteria in Table 4.4-6 specify the impact level in the context of existing socioeconomic activity. The impacts identified are translated into measures of overall expected changes in jobs, income, and quality of life in MHI.

The analysis of socioeconomic effects also discusses the distribution of effects of the proposed action – *e.g.*, what human populations are likely to be affected and how, where the effects will occur, and what businesses or industries will be advantaged or disadvantaged.

Specifically, the analysis considers how certain elements of the alternatives would affect fishing and recreation/tourism in the MHI in terms of income and employment. It further looks into the specific populations that could be affected, such as commercial fishermen, residents involved in subsistence fishing, and residents and tourists recreating in the MHI. Social and economic effects are related to effects of an action or alternatives on human populations. Given that the NWHI is designated as the Papahānaumokuākea Marine National Monument (Monument), the only human presence relates to research or other permitted activities. There are no recognized communities on these islands. Further, there is no commercial fishing allowed in the Monument. Therefore, social and economic effects of the alternatives are unlikely in the NWHI, and this analysis focuses on the MHI.

For commercial fishing, the key indicator for measuring effects is the value of commercial landings, whereas effects on recreation/tourism and recreational fishing are largely based on the number of tourists or residents recreating in the MHI. Finally, effects on subsistence fishing are evaluated by looking at potential changes in the quantity of fish consumed for subsistence purposes and how that might vary across alternatives.

Table 4.4-6 Impact Criteria for Socioeconomics

Type of Effect	Impact Component	Impact Level			
		Major	Moderate	Minor	Negligible
Changes in commercial fishing	Magnitude or Intensity	More than 10% increase or decrease in quantity and/or value of commercial landings	3% - 10% increase or decrease in quantity and/or value of commercial landings	Less than 3% increase or decrease in quantity and/or value of commercial landings	No measurable effects
	Geographic Extent	Effects realized in most of the MHI (over 50% of the MHI)	Effects realized in numerous locations in the MHI (10% - 50% of MHI)	Effects realized at few locations in the MHI (2% - 10% of MHI)	Effects realized at less than 2% of locations in MHI
	Duration or Frequency	Long-term (over 10 years) and/or frequent	Moderate (1 - 10 years) and/or intermittent	Short-term (1 month - 1 year) and/or periodic	Less than 1 month
	Likelihood[1]	Likely	Likely	Somewhat unlikely	Unlikely
Changes in subsistence fishing	Magnitude or Intensity	More than 10% change in quantity of fish consumed for subsistence	3% - 10% change in quantity of fish consumed for subsistence	Less than 3% change in quantity of fish consumed for subsistence	No measurable effects

Type of Effect	Impact Component	Impact Level			
		Major	Moderate	Minor	Negligible
	Geographic Extent	Effects realized in most of the MHI (over 50% of the MHI)	Effects realized in numerous locations in the MHI (10% - 50% of MHI)	Effects realized at few locations in the MHI (2% - 10% of MHI)	Effects realized at less than 2% of locations in MHI
	Duration or Frequency	Long-term (over 10 years) and/or frequent	Moderate (1 - 10 years) and/or intermittent	Short-term (1 month - 1 year) and/or periodic	Less than 1 month
	Likelihood	Likely	Likely	Somewhat unlikely	Unlikely
Changes in recreational fishing	Magnitude or Intensity	More than 10% change in number of recreational fishing trips	3% - 10% change in number of recreational fishing trips	Less than 3% change in number of recreational fishing trips	No measurable effects
	Geographic Extent	Effects realized in most of the MHI (over 50% of the MHI)	Effects realized in numerous locations in the MHI (10% - 50% of MHI)	Effects realized at few locations in the MHI (2% - 10% of MHI)	Effects realized at less than 2% of locations in MHI
	Duration or Frequency	Long-term (over 10 years) and/or frequent	Moderate (1 - 10 years) and/or intermittent	Short-term (1 month - 1 year) and/or periodic	Less than 1 month
	Likelihood[1]	Likely	Likely	Somewhat unlikely	Unlikely
Changes in recreation or tourism	Magnitude or Intensity	More than 10% change in recreation/tourist visits or expenditures	3% - 10% change in recreation/tourist visits or expenditures	Less than 3% change in recreation/tourist visits or expenditures	No measurable effects
	Geographic Extent	Effects realized in most of the MHI (over 50% of the MHI)	Effects realized in numerous locations in the MHI (10% - 50% of MHI)	Effects realized at few locations in the MHI (2% - 10% of MHI)	Effects realized at less than 2% of locations in MHI
	Duration or Frequency	Long-term (over 10 years) and/or frequent	Moderate (1 - 10 years) and/or intermittent	Short-term (1 month - 1 year) and/or periodic	Less than 1 month
	Likelihood	Likely	Likely	Somewhat unlikely	Unlikely

1 - "Likely" effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50%.

NEPA requires the consideration of possible effects of proposed Hawaiian monk seal recovery actions on cultural resources as part of the human environment. The impact criteria for cultural resources (other than historic properties, which are dealt with separately) and traditional cultural practices are presented below. Cultural impacts are considered to be significant if they result in adverse effects to cultural resources or in any way impeded traditional cultural practices.

Table 4.4-7 Impact Criteria for Cultural Resources and Traditional Cultural Practices

Type of Effect	Impact Component	Impact Level			
		Major	Moderate	Minor	Negligible
Changes to cultural resources or traditional cultural	Magnitude or Intensity	Adversely affects cultural resources and impedes traditional	Cultural resources are affected, but not adversely; traditional	Possible contact with cultural resources, but no effect; no	No contact with cultural resources; no effect on

practices		cultural practices	cultural practices not significantly impeded	effect on traditional cultural practices	traditional cultural practices
	Geographic Extent	Effects realized throughout the project area	Effects realized in numerous locations	Effects realized at few locations	No measurable effects
	Duration or Frequency	Chronic and long-term	Moderate and frequent or long-term and intermittent	Periodic, temporary, or short-term	No measurable effects
	Likelihood[1]	Likely	Likely	Not likely	Not likely

1 - "Likely" effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50%.

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects of their undertakings on any historic properties located within the Area of Potential Effect (APE) of a proposed project. These effects may be either direct or indirect. Impacts to historic and cultural resources, including historic structures, archaeological sites, and traditional cultural properties, would be considered significant if they result in adverse effects to the integrity of historic properties that are listed or are eligible for listing on the National Register of Historic Places (National Register). Integrity can be considered to mean not simply the physical integrity of a structure, but "the integrity of [its] location, design, setting, materials, workmanship, feeling, and association" (Title 36 C.F.R. § 60.4). Adverse effects are those that detract from the qualities that give a property its significance and contribute to its NRHP eligibility. Direct effects are those that physically alter the historic property in some way. Indirect effects diminish some significant aspect of the historic property, but do not physically alter it.

Table 4.4-8 Impact Criteria for Historic Properties

Type of Effect	Impact Component	Impact Level			
		Major	**Moderate**	**Minor**	**Negligible**
Changes to Archaeological Sites	Magnitude or Intensity	Adversely affects the qualities that contribute to NRHP eligibility	Site is affected, but not adversely	Possible contact with site, but no effect	No measurable effects
	Geographic Extent	Effects realized throughout the project area	Effects realized in numerous locations	Effects realized few locations	No measurable effects
	Duration or Frequency	Chronic and long-term	Moderate and frequent or long-term and intermittent	Periodic, temporary, or short-term	No measurable effects
	Likelihood[1]	Likely	Likely	Not likely	Not likely
Changes to Historic Structures	Magnitude or Intensity	Adversely affects the qualities that contribute to NRHP eligibility	Site is affected, but not adversely	Possible contact with site, but no effect	No contact with site

	Geographic Extent	Effects realized throughout the project area	Effects realized in numerous locations	Effects realized at few locations	No measurable effects
	Duration or Frequency	Chronic and long-term	Moderate and frequent or long-term and intermittent	Periodic, temporary, or short-term	No measurable effects
	Likelihood[1]	Likely	Likely	Not likely	Not likely
Changes to traditional cultural properties	Magnitude or Intensity	Adversely affects the qualities that contribute to NRHP eligibility or that significantly impede traditional cultural practices	Property is affected, but not adversely; traditional cultural practices not significantly impeded	Possible contact with property, but no effect; no effect on traditional cultural practices	No contact with property
	Geographic Extent	Effects realized throughout the project area	Effects realized in numerous locations	Effects realized at few locations	No measurable effects
	Duration or Frequency	Chronic and long-term	Moderate and frequent or long-term and intermittent	Periodic, temporary, or short-term	No measurable effects
	Likelihood[1]	Likely	Likely	Not likely	Not likely

[1] - "Likely" effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50%.

Impact Criteria for Environmental Justice

According to 1997 CEQ guidelines, federal agencies must evaluate whether a proposed action would have a disproportionately high adverse impact on low income populations, minority populations or Indian tribes due to a proposed action (CEQ 1997a). Analysis of potential impacts may rely on available demographic data from credible sources such as the U.S. Census. The analysis of potential Environmental Justice impacts is based on the results of the other socioeconomic impact assessments such as fisheries, cultural and historic resources and tourism. Therefore, no specific impact criteria are presented here.

Impact Criteria for Military Activities

The criteria presented in Table 4.4-8 provide a scale on which to measure potential impacts of the proposed alternatives on military activities. Specific details and results of the analysis are presented in Section 4.9.7.

Table 4.4-8 Impact Criteria for Military Activities

Type of Effect	Impact Component	Impact Level			
		Major	Moderate	Minor	Negligible
Changes to military training or operational activities	Magnitude or Intensity	Year-round change in military use or operations	Seasonal change in military use or operations	Slight change of military use or operations	No measurable effects
	Geographic Extent	Effects realized throughout the project area	Effects realized in numerous locations	Effects realized at few locations	No measurable effects
	Duration or Frequency	Long-term or permanent	Moderate and frequent or long-term and intermittent	Periodic, temporary, or short-term	No measurable effects
	Likelihood[1]	Likely	Likely	Not likely	Not likely

[1] - "Likely" effects are those that could arise from reasonable or demonstrated mechanisms and the probability of those mechanisms arising from the alternatives is greater than 50%.

4.5 *STEPS FOR IDENTIFYING CUMULATIVE EFFECTS*

The CEQ guidelines for evaluating cumulative effects state that the greatest environmental effects may result not from the direct effects of a particular action but from the combination of individually minor effects of multiple actions over time (CEQ, 1997). The CEQ regulations for implementing NEPA define cumulative effects as follows:

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).*

For this PEIS, assessment of cumulative effects requires an analysis of the direct and indirect effects of the proposed research and enhancement alternatives, in combination with other past, present, and RFFAs potentially affecting monk seals and other biological, physical, and socioeconomic resources. The intent of this analysis is to capture the total effects of many actions over time that would be missed by evaluating each action individually. It is important to note that if the results of the analysis of direct or indirect effects of the proposed action are negligible, the contribution of the proposed action to a cumulative effect would not occur and thus an analysis of cumulative effects would not be presented. For example, physical oceanography will not be directly or indirectly affected by the proposed action and is therefore not carried forward for a cumulative analysis (see Section 4.6). Therefore, for resources where there would be negligible direct or indirect effects of alternatives (i.e., marine water quality and environmental justice) do not have a detailed analysis of potential cumulative effects per CEQ guidance. Exceptions to this are certain topics of particular concern raised during the public comment period. For example, although negligible effects of proposed monk seal research and enhancement alternatives are expected for recreation and tourism, a more detailed assessment of potential cumulative impacts is presented due to specific stakeholder concerns.

Another purpose of this analysis is to assess the relative contribution the proposed action and its alternatives have on cumulative effects. The cumulative effects assessment then describes the additive or synergistic result of the research and enhancement alternatives as they are reasonably likely to interact with actions external to the proposed actions. The ultimate goal of identifying cumulative effects is to provide for informed decisions that consider the total effects (direct, indirect, and cumulative) of the alternatives.

The methodology used for cumulative effects analysis includes the steps outlined below. The advantages of this approach are that it closely follows 1997 CEQ guidance, employs an orderly and explicit procedure, and provides the reader with the information necessary to make an informed and independent judgment concerning the validity of the conclusions.

Figure 4.4-1 Steps in the Impact Assessment

Identify relevant issues and trends in the environmental baseline including effects from past activities (see Chapter 3)

Describe the direct and indirect effects of the research and enhancement alternatives (see Chapter 4)

Define the spatial (geographic) and temporal (time) frame for the analysis. The reasonably foreseeable future has been established as the next 10 years for the purposes of this assessment.

Identify past, present, and reasonably foreseeable actions (i.e., human activities and natural phenomena) that could have additive or synergistic effects when combined with the direct and indirect effects of project alternatives.

Screen direct and indirect effects, when combined with the effects of other actions and events, to identify incremental effects (both beneficial and adverse) that are potentially cumulative.

Evaluate the impact of cumulative effects using the significance criteria (Tables 4.4-1 through 4.4-8) and assess the relative contribution of the project alternatives to cumulative effects.

Provide rationale for conclusions, citing evidence from peer reviewed literature and quantitative information where available. The term "unknown" can be used where there is not enough information to determine an impact level.

4.5.1 *Relevant Past and Present Actions within the Project Area*

Relevant past and present actions (federal and non-federal) and events are those that have influenced the current condition of a resource. For the purposes of this PEIS, past and present actions/events include both human controlled events (such as shipping or commercial fisheries), and natural events, such as predation. Table 4.5-1 provides a list of past actions and events considered in the cumulative effects analysis in this PEIS.

Table 4.5-1 Relevant Past and Present Actions within the Project Area

Action / Event	Region	Status	Resource(s) Potentially Affected	Source
Natural Events				
Natural Events (Tsunami, Volcano, Earthquake, Hurricane)	Hawaiian Archipelago	Ongoing	All	Pacific Disaster Center 2012
Climate Change	Hawaiian Archipelago	Ongoing	All	Hare & Mantua 2000; Friedlander et al. 2009; etc.
Introduction of Invasive species	Hawaiian Archipelago	Ongoing	1, 3, 4, 5, 6, 7, 8, 10	HISC
Shark predation	Hawaiian Archipelago	Ongoing	1	NOAA
Male monk seal aggression	Hawaiian Archipelago	Ongoing	1	NOAA
Scientific Research				
Research and enhancement permits issued since 2000 (HMS only)	Hawai`i	Ongoing	1	NOAA
Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS LFA) (6 missions)	Hawai`i	August 16, 2008 - August 15, 2009	1, 3, 4, 5, 6, 7, 8	SURTASS 2012
Activities to Enhance Understanding of Hawaiian Monk Seal Foraging Ecology at Nihoa Island	Nihoa Island	Complete	1, 3, 6	PMNM
Bathymetric Mapping of the Intersection of Necker Ridge with the Hawaiian Ridge	Necker Ridge to Hawaiian Ridge	Complete	3, 4, 5, 6	PMNM
Comparison Study of the Biological Community Structure and Diversity of Maritime Heritage Resource Sites	PMNM	New permit	11	PMNM
Coral Reef Bioerosion Rates as Indicators of Community Response to Ocean Acidification	PMNM Shallow water reefs	New permit	8	PMNM
Determine prevalence of disease on coral reefs in shallow waters	PMNM shallow waters	New permit	8	PMNM
Genetic Surveys to Address the Level of Isolation Between Shallow and Deep Reef Ecosystems	PMNM	New permit	1, 2, 3, 4, 5, 6, 7, 8	PMNM
Humpback whale research	Maui, Molokai, Lanai, and Kahoolawe	Complete	4	NOAA
Incidence and Effects of Coral and Fish Disease within Shallow Water Reefs	PMNM shallow water reefs	New permit	6, 8	PMNM

Long term monitoring Laysan & black footed albatross	Midway, FFS, Laysan	New permit	7	NOAA
Monitoring shark activity on monk seal pupping sites	FFS	New permit	1, 5	PMNM
Pacific Reef Assessment and Monitoring Program	PMNM	New permit	8	PMNM
Permit to conduct level B harassment and biopsy sampling of cetaceans in Hawaiian waters	Leeward coast of the island of Hawai`i	Complete	4	NOAA
PR 1 Permit #1071-1770 Long-term population studies of cetacean species in North Pacific Ocean	Main study area is Hawai`i	Complete	4	NOAA
PR 1 Permit #731-1774 cetacean scientific research	Hawai`i	Complete	4	NOAA
PR 1 Permit #978-1791 auditory research on stranded and rehabilitated cetaceans	Hawai`i (waters and rehabilitation facilities)	Complete	4	NOAA
PR1 Permit #587-1767 scientific research on long-term social affiliations among humpback whales	Alaska/Hawai`i	Complete	4	NOAA
Numerous PR1 Permits for cetacean research throughout Hawai`i and Pacific Ocean	Hawai`i	Complete	4	NOAA
Military Activities				
Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS); NOAA Incidental Harassment Permits 18702 - 18705	Hawai`i	Ongoing	1-7, 10, 14	NOAA
Permit 15806 Letter of Authorization for marine mammal take: U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST])	Hawai`i	Ongoing	1-7, 10, 14	NOAA
Permit 17860 US Navy Acoustic Technology Experiments	Hawai`i	Ongoing	1-7, 10, 14	NOAA
Other Activities				
Whaling	Hawai`i	19th Century	4	DLNR 2005
Guano mining	PMNM	19th and 20th Century	1, 3, 7	Rauzon 2001
Feather poaching	PMNM	20th Century	1, 3, 7	Rauzon 2001
Whale watching (tour boats)	MHI	Ongoing	4, 12	USN
Removal of marine debris from high entanglement zones	Hawai`i	Ongoing	1, 3, 4, 5, 6, 7, 8, 10, 12	NMFS
Entanglement of Hawaiian monk seals in marine debris or fishing gear	Hawai`i	Ongoing	1	NMFS

MMHSRP and other NMFS Permits to disentangle, dehook and relocate seals away from harmful situations; Permit also includes activities for other marine mammals and sea turtles including: stranding networks ; responses/investigations of mortality events Biomonitoring; tissue/serum banking; and analytical quality assurance.	Hawai`i	Ongoing	1, 3, 4, 10	NMFS
Intentional shooting, maiming, injury or other harm of Hawaiian monk seals	MHI	Ongoing	1	NMFS
Habitat protection, loss mitigation and restoration	Hawai`i	Ongoing	1, 3, 4, 5, 6, 7, 8, 10, 12	NMFS
Natural resource and species education and outreach	MHI	Ongoing	1, 3, 4, 5, 6, 7, 8, 10, 12	NMFS
SEIS Measures to End Bottomfish Overfishing in the Hawaiian Archipelago	Hawai`i	Complete	6, 8, 10	WPRFMC 2006
Final EIS Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region (2005)	Hawai`i	Complete	6, 8, 10	WPRFMC
Closure of Bottomfish Fishery in the Hawaiian Archipelago (2006)	NWHI	Complete	6, 8, 10	WPRFMC
Fishery Ecosystem Plan for the Hawai`i Archipelago	Hawai`i	Complete	1-10, 12, 14	WPRFMC
Pilot Aquaculture Project (Tuna cultivation)	2.6 mi. off Malae Point, Hawai`i	Complete	10	USACE 2010
UNESCO World Heritage Site Monument	NWHI	Designated 2010	11	UNESCO
Building islands using dredge and fill	PMNM	Mid-20th Century	1-8	Rauzon 2001
LORAN station	PMNM	Mid-20th Century	1-8	DLNR 2005
Wailupe Stream Flood Control	East Honolulu	Underway as of 2008	1, 2, 3, 5, 6, 7, 8	HRC FEIS/OEIS 2008
Beach Park Improvements	MHI (various sites)	Ongoing	12	DLNR 2013
Wai`anae Wastewater Treatment Plan (deep ocean outfall)	Wai`anae Coast (Oahu)	NPDES Permit 2011-2016	1, 2, 3, 4, 5, 6, 7, 8, 10	HRC FEIS/OEIS 2008
Lā`ie Wastewater Collection System Expansion Phase II	Lā`ie (Oahu)	2004	1 - 10	HRC FEIS/OEIS 2008
Permit 17268 Honolulu Seawater AC (Incidental Take)	Offshore Kakaako (Oahu)	September 2012 – 2013	4	NOAA
Seabird consumption, egg harvest, nest loss to guano harvest, introduced species, chick mortality due to removal of adults	Lay, Lis, Mid	1842-1915	7	Schultz et al. 2011.
Monk seal harvest for meat, skins and shark bait	NWHI	19th century	1	Schultz et al. 2011.
Turtle harvest for meat, eggs and shark bait	NWHI	18th-19th centuries	3	Schultz et al. 2011.
Shark harvest for fins and oil.	NWHI	1859-1900; 2000	5	Schultz et al. 2011.

Unregulated fishing	NWHI	1913-2002	6, 10	Schultz et al. 2011.
Commercial, recreational and subsistence fisheries	Hawai`i	Ongoing	1, 3, 5, 6, 10	WPFMC 2013
Sea cucumber harvest	Lay, Lis, PHR, FFS	1882	6, 10	Schultz et al. 2011.
Black-lipped oyster harvest	PHR	1928-1930	6, 10	Schultz et al. 2011.
Coral harvest and illegal poaching	NWHI, Gardner, Lay	1965-1980's	8, 10	Schultz et al. 2011.
Lobster harvest	NWHI	1970-1999	6, 10	Schultz et al. 2011.
Legislation				
Hawai`i Act 165 (Class C felony to harass or kill monk seals	Hawai`i	June 2010	1	State of Hawai`i
Hawai`i Cultural Impact Assessment Bill: House Bill 2895	Hawai`i	January 1, 2012	11	State of Hawai`i
Hawai`i Environmental Justice Bill: Senate Bill 2145	Hawai`i	2006	10, 11, 13	State of Hawai`i
Hawai`i Environmental Policy Act (HRS 343)	Hawai`i	1974	All	State of Hawai`i
National Historic Preservation Act	United States	1966	11	U.S. Government
EO 12898: Environmental Justice	United States	1994	10, 11, 13	U.S. Government

Resource Key:

1 – Hawaiian monk seals	2 – Water Quality	3 – Sea Turtles	4 – Cetaceans	5 – Sharks
6 – Other Fish Species	7 – Birds	8 – Coral	9 – Invasive Species	10 – Fishing (Commercial, Recreational & Subsistence
11 – Cultural & Historical	12 – Recreation & Tourism	13 – Environmental Justice	14 – Military Activities	NA - Not available

4.5.2 *Reasonably Foreseeable Future Actions*

RFFAs (federal and non-federal human-controlled actions and natural events) are those that:

- Have already been or are in the process of being funded, permitted, or described in coastal zone management plans;
- Are included as priorities in government planning documents; or
- Are likely to occur or continue based on environmental data, or historical patterns.

Judgments concerning the probability of future impacts must be informed rather than based on speculation. RFFAs to be considered must also fall into the temporal and geographic scope described in Section 1.2 (Project Area Description).

Reasonably foreseeable future human controlled actions and natural events were screened for their relevance to the alternatives proposed in this PEIS. Because the regulations in 40 CFR 1508.8 state that the actions and events must be considered probable, not just possible, only those actions with an occurrence probability of high or medium have been included for analysis and shown in Table 4.5-2. Due to the large geographic scope of the Project Area, the identification of RFFAs was conducted on a broad scale, although some specific RFFAs were considered where applicable. Table 4.5-2 provides a list of RFFAs considered in the cumulative effects analysis in this PEIS. Also included in the following table is a list of resources that may potentially be affected (beneficially or adversely) by the activity. The resources listed are limited to only those that have been carried forward for analysis in this PEIS.

Table 4.5-2 Reasonably Foreseeable Future Actions Within the Project Area

RFFA	Region	Status	Time Frame	Probability	Resource(s) Potentially Affected	Source
Natural Events						
Climate Change	Hawaiian Archipelago	Ongoing	Ongoing	High	All	NOAA
Tsunami, Volcanic eruption, Earthquake, Hurricane	Hawaiian Archipelago	Ongoing	NA	Medium	All	NOAA
Japanese Tohoku earthquake and tsunami debris	Hawaiian Archipelago	Ongoing	Ongoing	High	All	IPRC 2012a, b
Introduction of invasive species	Hawaiian Archipelago	Ongoing	Ongoing	Medium	1-10	HISC
Disease	Hawaiian Archipelago	Ongoing	Ongoing	High	All	NOAA
Commercial Activities						
Inter-Island Transmission Cable	Maui, Oahu	Draft EIS	2014	High	1, 2, 3, 4, 5, 6, 8, 9, 10	DBED Hawai`i State Energy Office
Kampachi Farms, LLC permit to Culture and Harvest Coral Reef Fish Species (*Seriola rivolialla*); Permit WP-CRSP-01	Island of Hawai`i (west coast)	Permitted	Ongoing	High	10	NMFS
Residential & Commercial construction (beach, near shore)	Various	Ongoing	Ongoing	High	1, 2, 3, 9, 10, 11, 12	DBED (Hawai`i) CIP List
Honolulu Harbor Pier 12 & 15 Improvements	Honolulu, Hawai`i	Permitting	2013/2014	High	8	DOT Harbors Division
Kalaeloa Barbers Point Harbor Fuel Pier	Ewa, O'ahu	EIS	September 9, 2013	High	2	DOT Harbors Division
Whale & dolphin watching tours	MHI	Permitted	Ongoing	High	1, 3, 4, 12	NOAA
Other Activities						
Hawaiian Monk Seal Rehabilitation Facility at Natural Energy Laboratory of Hawai`i Authority	Keahole Point, Hawai`i	Permitted	Operational 2013	High	1	National Energy Laboratory
Kalaupapa NHP General Management Plan and EIS	Moloka`i	Draft EIS	2013-2014	High	11, 12	NPS
Fishery Ecosystem Plan for the Hawai`i Archipelago	Hawaiian Archipelago	Ecosystem Plan	Ongoing	High	1-12, 14	WPRFMC

RFFA	Region	Status	Time Frame	Probability	Resource(s) Potentially Affected	Source
Commercial, recreational and subsistence fisheries	MHI	Ongoing	Ongoing	High	1, 3, 5, 6, 10	Sprague et al 2013
Hawaiian Islands Humpback Whale National Marine Sanctuary Management Plan Revisions	Hawaiian Archipelago	DEIS Fall 2013	Ongoing	High	1-9	NOAA
Hawaiian Spinner Dolphin Human Interaction Protection Measures	MHI	DEIS/Proposed Rule	Ongoing	High	1, 3, 4, 10, 12	NOAA
Hawaiian Monk Seal Critical Habitat Revisions	Hawaiian Archipelago	Proposed Rule Under Revision	Ongoing	High	1	NOAA
State of Hawai`i DLNR. Clearing of rivers, streams, beach areas	MHI	2011 Declaratory Ruling	Ongoing	High	1-12	USACE
Shark Removal Activities. Permit Number: PMNM-2013-017	PMNM	Permitted	May 31, 2014	High	1, 5	NOAA
ESA Proposed Listing of 82 Coral Species	Hawaiian Archipelago	Status Review	Unknown	High	8	NOAA
Kukuiula Bay Beach Nourishment	Koloa, Kaua`i	Draft EA	2013/2014	High	12	DLNR
CDUA: MA-3633 Stable Road Beach Groins project (beach restoration)	Wailuku, Mau`i	Permit Application	DLNR Recommendation for approval March 2013	High	12	DLNR
Waikoloa Beach Tsunami Restoration Project	South Kohala, Hawai`i	Permit Application	September - December 2013	High	11, 12	DLNR
Military Activities						
Permit 15806 Letter of Authorization for marine mammal take: U.S. Navy Training - Hawai`i Range Complex (Hawai`i Southern California Training and Testing Activities [HSST])	Hawai`i (235,000 nm^2 around the MHI	Permitted	Permitted	High	1, 4, 14	US Navy
Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS LFA); Permits 18702 - 18705	Pacific Ocean	FEIS	Permitted	High	4, 5, 14	SURTASS
Permit 17860 US Navy Acoustic Technology Experiments	Hawai`i	Permitted	Permitted	High	1, 4, 5	NOAA

RFFA	Region	Status	Time Frame	Probability	Resource(s) Potentially Affected	Source
Joint High Speed Vessel	Hawai`i	Ongoing	2012 Vessel Trials	Medium	3, 4, 5	NOAA
Scientific Research						
Permit 15453 Enhancing Survival of Hawaiian monk seal (*Monachus schauinslandi*) (Captive animals [research enhancement])	Waikiki Aquarium, University of Hawai`i 2777 Kalakaua Avenue Honolulu, HI 96815	Permitted	April 2012 – April 2017	High	1	NOAA
Permit 10018 Level B Harassment of Humpback Whales in the Near Shore Waters Around Maui, Hawai`i (Harass)	Waters of the Au-Au Channel and in the near shore waters of Maui, Molokai`i, Lāna`i, and Kaho`olawe.	Permitted	June 2010 – June 2014	High	4	NOAA
Permit 13427 Vessel surveys and photo-id of non-listed cetaceans (Harass)	Pacific Ocean deeper waters (>100 fathoms) South and West of Lanai and Kahoolawe	Permitted	June 2008 – June 2014	High	4	NOAA
Permit 13545 Global ecology and toxicology of cetaceans (Harass / Sampling)	Pacific Ocean, High seas	Permitted	June 2010 – June 2015	High	4	NOAA
Permit 13846 Behavior, social organization and communication in humpback and gray whales in Hawai`i, Alaska and Washington (Harass; Sampling)	MHI	Permitted	July 2010 – July 2015	High	4	NOAA
Permit 14097 NMFS Southwest Fisheries Science Center (SWFSC) pinniped, cetacean and sea turtle studies (Harass)	North Pacific Ocean	Permitted	July 2010 – June 2015	High	3, 4	NOAA
Permit 14118 Medium to long-term satellite, acoustic, and multi-sensor tagging studies on large and small cetaceans (Harass)	HI, including PMNM	Permitted	May 2012 – April 2017	High	4	NOAA

RFFA	Region	Status	Time Frame	Probability	Resource(s) Potentially Affected	Source
Permit 14245 Cetacean Research at the National Marine Mammal Laboratory (Harass)	Alaska and US West Coast (CA, HI, OR, WA)	Permitted	April 2011 – May 2016	High	4	NOAA
Permit 14353 Humpback whale research around Maui, Hawai`i (Harass; Harass / Sampling)	Au-au Channel; Moloka`i; Maui; Kaho'olawe, and Lāna`i	Permitted	July 2010 – July 2015	High	4	NOAA
Permit 14381 Sampling sea turtle bycatch in Hawaiian Longline Fisheries (Handle / Release)	Hawai`i Shallow-Set Longline Fishery	Permitted	February 2010 – March 2015	High	3	NOAA
Permit 14451 Assessing distribution and abundance of marine mammals on Navy operational area; surface vessel surveys, photo identification, videography, and acoustic recording (Harass)	MHI; HIHWNMS; PMNM; US Navy PMRF	Permitted	July 2010 – July 2015	High	4	NOAA
Permit 14585 Behavior and biology of humpback whales (Harass; Harass / Sampling)	Hawaiian Islands EEZ	Permitted	July 2010 – July 2015	High	4	NOAA
Permit 14682 Scientific Research or to enhance the survival or recovery of a stock (Harass; Harass / Sampling)	Western O`ahu; Au Au Channel	Permitted	August 2010 – November 2015	High	4	NOAA
Permit 15240 Scientific Research and to enhance survival and recovery of Central and Western Pacific cetacean species (Harass; Harass/Sampling; Import/export/receive only; Incidental take)	U.S. EEZ waters. International waters, and foreign waters, subject to permission of the sovereign host State	Permitted	May 2012 – May 2017	High	4	NOAA

RFFA	Region	Status	Time Frame	Probability	Resource(s) Potentially Affected	Source
Permit 15330 Studies of population size, population structure, habitat use, movements, behavior and ecology of cetaceans (Harass / Sampling)	Hawai`i, territories (*e.g.*, Palmyra, American Samoa, Guam, Wake), and International waters)	Permitted	July 2011 – August 2016	High	4	NOAA
Permit 15409 Population and photo-id studies of small (Harass)	Pacific Islands (EEZ and American Samoa)	Permitted	June 2010 - June 2015	High	4	NOAA
Permit 15685 Ocean capture research of green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) sea turtles in the Hawaiian Islands (Capture/Handle/Release)	Coastal waters (bays, reefs, canals, etc.); Kaneohe Bay	Permitted	January 2012 – January 2017	High	3	NOAA
Permit 16053 Measuring the hearing of stranded cetaceans in U.S. waters, beaches and rehabilitation centers using auditory evoked potential procedures (Captive)	U.S. coasts and rehabilitation centers	Permitted	February 2012 – February 2017	High	4	NOAA
Permit 16163 Studies of movements, habitat use, ecology, behavior, and risk factors of cetaceans in the Pacific Ocean. (Harass; Harass/Sampling)	Pacific Ocean: WA, OR, CA, HI, AK, High Seas North Pacific Ocean	Permitted	June 2012 – June 2017	High	4	NOAA
Permit 16479 Whale surprise encounters and near misses: proxies of vessel strikes in Maui County waters (Harass)	Maui County Waters (Latitude: 20.901025 Longitude: -156.615839)	Permitted	September 2012 – June 2017	High	4	NOAA
Permit 16599 Evoked Potential Auditory Tests for Stranded Marine Mammals (Handle / Release)	All US Waters - Stranding locations; beaches and rehabilitation centers	Permitted	March 2012 – April 2017	High	4	NOAA
16992 Paul Nachtigall – auditory research on captive cetaceans (HIMB) (Captive)	Hawaii Institute of Marine Biology	Permitted	May 2013 – May 2018	High	4	NOAA

RFFA	Region	Status	Time Frame	Probability	Resource(s) Potentially Affected	Source
Permit 17159 Spinner dolphin filming at Midway Atoll (Harass)	Midway Atoll; PMNM	Permitted	May 2012 – May 2017	High	4	NOAA
Permit 727-1915 scientific research (Harass; Harass / Sample)	Hawai`i / Palmyra Atoll	Permitted	February 2008 – February 2014	High	4	NOAA
File No. 14809 Permit to take cetaceans for ecological and bioacoustic research using tagging and behavioral research methodologies (Harass / Sampling)	Coastal and offshore waters surrounding MHI and NWHI	Application for 5-year permit	In-process	High	4	NOAA
File No. 16239 Aerial and vessel surveys, behavioral focal follows, and PAM monitoring techniques to further our understanding of marine mammals sharing waters with US Naval training, offshore energy development, and construction (Harass)	Pacific Ocean - Focal areas include Navy Hawaii Range Complex	Application for 5-year permit	In-process	High	4	NOAA
File No. 17312 Study of Marine Mammal Use of Sound and Response to Anthropogenic Impacts (Harass; Harass / Sample)	Hawai`i	Application for 5-year permit	In-process; will replace Permit 727-1915	High	4	NOAA
File No. 17845 Habitat use and behavioral dynamics of maternal-female, calf and juvenile humpback whales in feeding and breeding regions (Harass)	Coastal waters around Main Hawaiian Islands / All coastal waters and inter-island channels around MHI; Kauai and Ni'ihau, Oahu, Big Island and Penguin Banks, west of Lanai.	Application for 5-year permit	In-process; will replace Permit 10018	High	4	NOAA
Monitoring of Red-footed, Brown, and Masked Boobies from Midway Atoll and French Frigate Shoals	Tern Island, FFS, Eastern Island, Midway Atoll NWR	Permit Application	Dec 2010 - Dec 2015	High	7	PMNM

RFFA	Region	Status	Time Frame	Probability	Resource(s) Potentially Affected	Source
Retrieval of Ecological Acoustic Recorders (EARs) in Deep Marine Areas	Kure, Lisianski, FFS, Nihoa	Permitted	NA	High	1, 3, 4, 5	PMNM
Tuna Tagging	Near NOAA weather buoys in MHI	Permitted	Ongoing	High	6	PFRP (SOEST)

Resource Key:

1 – Hawaiian monk seals	2 – Water Quality	3 – Sea Turtles	4 – Cetaceans	5 – Sharks
6 – Other Fish Species	7 – Birds	8 – Coral	9 – Invasive Species	10 – Fishing (Commercial, Recreational & Subsistence
11 – Cultural & Historical	12 – Recreation & Tourism	13 – Environmental Justice	14 – Military Activities	

NA - Not available

4.6 *RESOURCES AND CHARACTERISTICS NOT CARRIED FORWARD FOR ANALYSIS UNDER ENVIRONMENTAL CONSEQUENCES*

CEQ regulations require NMFS to focus attention on important issues and avoid extraneous material in this impact statement (40 CFR 1502.15). Under CEQ regulations for implementing NEPA:

- "Direct effects" are effects that are caused by the action and occur at the same time and place (40 CFR 1508.8[a]).
- "Indirect effects" are effects that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR 1508.8[b]).

Agencies must only consider indirect effects that are "reasonably foreseeable." Several of the resources and characteristics described in Chapter 3 may contribute to cumulative effects but would not be affected measurably by any of the alternatives for Hawaiian monk seal research and enhancement measures. Thus, additional analysis of these resources would not be useful to the decision makers or public.

As described in Section 2.6 Alternatives Carried Forward for Analysis, the range of Hawaiian monk seal research and enhancement activities proposed could include:

- Conducting land-based, vessel, and aerial surveys and observations;
- Mitigating infectious disease, and fishery and human/domestic animal interactions;
- Translocating seals to improve survival;
- Translocating seals to alleviate male aggression, and mitigating adult male aggression using chemical intervention;
- De-worming seals and providing supplemental feeding; and
- Capturing, restraining and handling seals for marking and attaching scientific instruments, measuring, and sampling (*e.g.,* for health and genetics).

None of these activities would have a measurable effect on the resources described below. The following subsections present each resource or factor not carried forward for detailed analysis.

4.6.1 *Physical Environment - Circulation Patterns, Water Temperatures and Nutrient Regimes, Air Quality, Climate Change*

None of the research and enhancement alternatives would be expected to have any effects on the circulation patterns in the Pacific Ocean, water temperatures and nutrient regimes, or air quality. Therefore, detailed analysis for these parameters under the alternatives is not warranted. In addition none of the proposed project alternatives would be expected to induce measurable effects on climate change. However, climate change is being considered from the perspective of cumulative effects. The potential effects of climate change generated by other sources are evaluated as part of the cumulative effects analyses for each resource evaluated in Chapter 4.

4.6.2 *Sharks*

As described in Section 3.3.4, approximately 40 species of sharks are found in Hawaiian waters. None of the proposed Hawaiian monk seal research and enhancement alternatives covered by this PEIS and that would occur in the coastal waters surrounding the Hawaiian Islands is likely to have direct or indirect effects on sharks. Researchers accessing beaches and inshore areas by small boat to observe, capture, handle or transport Hawaiian monk seal would not be likely to disturb pelagic sharks. Research vessels might encounter sharks while traveling in small or large vessels between islands to areas where Hawaiian monk seal are located, but any encounters are not expected to impact sharks. In addition it is not expected that the small increase in numbers of monk seal pups that could be realized in the MHI under Alternative 4 would attract additional large numbers of sharks.

As described in Table 1.6-1, NMFS currently has a permit for “Selective removal of predatory sharks at Hawaiian monk seal pupping sites of French Frigate Shoals” (NMFS Permit PMNM-2012-013). This activity is not part of the proposed research and enhancement actions covered by this PEIS, and it has been documented under a separate NEPA process (Section 1.6).

4.6.3 *ESA-Listed Plants*

Proposed Hawaiian monk seal research and enhancement activities would have no effect on any of the endangered plants that occur in the NWHI or (NMFS 2003; NMFS 2009). The proposed activities would be located in coastal waters on the beach or within 5 m inland of the splash zone. Field research camps in the NWHI are located further inland than this immediate shoreline area.

Some listed plants may occur near field camps or trail paths leading to beaches where monk seals haul out. These species are threatened by human disturbance and are known to exist in areas where humans access beaches. Monument Permit PMNM 2013-001-L (Appendix G) allows NMFS researchers to enter the Monument to conduct research and enhancement activities, and covers field camp support and supply activities. Although the permit does not specifically identify procedures for protecting ESA-listed plants, NMFS would take all precautions necessary to avoid contact with these plants. This includes training biologists on the identification and locations of such plants and working with the USFWS to develop a training protocol to implement for work in the MHI (similar to that implemented for work in the NWHI). When accessing beaches by foot, researchers would stay on the path where no vegetation occurs. When accessing beaches by boat, they would only land on sandy beaches below the vegetation line. It would be highly unlikely that research biologists would encounter coastal ESA-listed plant species, or they would be easily avoidable.

4.6.4 *Sanctuaries, Monuments, and Refuges*

As described in Section 3.4.11 Sanctuaries Monument and Refuges, the State of Hawai`i has a system of conservation areas that include wildlife and marine sanctuaries, monuments, parks, refuges, natural area reserves, and marine life conservation districts (MLCDs). The jurisdictional authorities for these public lands are described in Section 3.4.11. The majority of these areas are federally managed; however the MLCDs are managed by the state. Some of the proposed research and enhancement activities could occur on or near Hawaiian shorelines and waters that fall under one or several of these special designations.

Whether under state or federal jurisdiction, these areas are protected; therefore, research and enhancement activities that would access coastal or refuge lands would require permits and/or approvals for access to these areas. For example, research scientists wishing to work within the Monument are required to obtain a Monument research permit. The permit allows the permit holder to conduct their permitted activities within the Monument. For work within the state protect areas, a Special Activity Permit for Scientific, Educational or Propagation Purposes is required under HRS 187A-6. The permit allows any person with a bona fide scientific, educational or propagation purpose to legally take certain aquatic life, use certain gear, and gain entrance into certain areas otherwise prohibited.

The permit applications required in sanctuaries, monuments and refuges must go through a public process as well as regulatory and agency reviews. Thus, impacts to protected lands and waters from research and enhancement activities are not expected because of imposed requirements such as mitigation to avoid adverse effects to these areas. Also, none of the proposed alternatives would be expected to affect or change the designations of these protected areas in any way. Therefore, sanctuaries, monuments and refuges are not carried forward for detailed analysis.

4.7 *BIOLOGICAL ENVIRONMENT*

4.7.1 *Hawaiian Monk Seals*

This section presents the analyses of the effects of the four different research and enhancement alternatives on Hawaiian monk seals. The general methodology for performing this assessment is introduced in Section 4.4. However, a description of the Hawaiian monk seal-specific analysis is presented here in more detail. The alternatives represent discrete sets of research and enhancement activities varying in scope, each with a range of research and enhancement techniques and intensities that could be authorized by NMFS F/PR1.

Research and enhancement activities on endangered species are intended to determine factors limiting recovery, design intervention measures and execute those measures, evaluate their efficacy and repeat the process as warranted.

However, any research and enhancement activity that has the potential to disturb animals has some risk of adverse effect for animals exposed. Animals disturbed by research and enhancement may exhibit a variety of behavioral and physiological responses that could result in injury, reduced reproductive success, or mortality. Similarly, animals' behavioral and physiological responses to capture, chemical or physical restraint, tissue sampling, attachment of tags or instruments, and exposure to various other marking or sampling procedures can result in injury, infection, reduced fitness, and mortality.

For each type of research and enhancement activity there are one or more possible responses from the animals. For some research and enhancement activities (*e.g.,* aerial surveys) most monk seals exhibit no observable response, although it is possible they may have elevated adrenaline levels or other internal stress responses. For research and enhancement activities that require the presence of researchers on land near monk seals, most animals will remain sleeping undisturbed, others will simply watch researchers, and others may move their bodies, vocalize or enter the water.

Seals that are captured and handled will be subject to additional types of stress and risks compared to those that are simply observed. The intensity and probability of potential responses is a function of a variety of factors including the sex/age class of the animal, the tendency of the individual animal to respond in certain ways, the approach and handling technique of the researchers, timing and location of the research or enhancement activity, and environmental factors such as sea conditions and weather. Each research and enhancement activity therefore has inherent potential risks, which are influenced by all the above factors.

Potential population- or species-level impacts could result depending on the nature of all individual responses and the number of animals involved. The effect of exposure to a variety of research and enhancement procedures may be additive or synergistic (*i.e.,* the effect of two or more procedures combined could be greater than simply adding them together). For all of the procedures analyzed, it is assumed that all researchers are experienced and qualified to fill their assigned roles and that all procedures are carried out under "best practices" conditions, including all mitigation measures specified in program protocols and the relevant permits.

The analysis of the direct and indirect effects of research and enhancement activities is divided into three major components:

- An assessment of research- and enhancement-related injuries that lead to serious injury or mortality;
- An assessment of research and enhancement-related effects on reproductive success; and

- An assessment of how well each alternative research and enhancement strategy would address recovery and conservation objectives for the species.

Potential positive effects of research and enhancement are evaluated based on the project's likelihood of contributing to the species recovery or conservation, in consideration of the potential adverse effects. The criteria for determining the impact level of each component are summarized in Table 4.4-1.

4.7.1.1 *Assessment of Direct and Indirect Mortality of Hawaiian Monk Seals Due to Research and Enhancement*

There are many potential mechanisms for research and enhancement-related injuries to occur, some of which may lead directly or indirectly to the death of individual animals. Some injuries may affect the ability of an animal to forage or behave normally but are not directly fatal (*i.e.*, sub-lethal effects). The thresholds for sub-lethal effects (*i.e.*, when they start to affect an animal's ability to survive) are not well known. There are many other natural and anthropogenic factors that also affect survival of individual animals, so attributing the fate of an animal to a particular factor is often highly uncertain. The key question for this impact assessment is whether or not effects on individuals translate into population-level effects such as population growth rate.

The following begins with an extensive narrative describing the potential or hypothetical ways that the research and enhancement activities represented in the various PEIS alternatives (see Chapter 2) might affect survival of individual seals. Following that, available information from published studies, publications in development and unpublished data are brought to bear to guide the quantitative and qualitative analysis of potential effects of research and enhancement activities on monk seal mortality.

4.7.1.2 *Mechanisms of Injury to Hawaiian Monk Seals from Disturbance*

The extent to which human activities may have adverse effects on wildlife has recently become a source of conservation interest. Human disturbance causes a deviation in an animal's behavior from normal patterns that occur without human influence. There are numerous potential responses to different disturbances that could affect an individual's chance of survival and reproductive success. If the disturbance is severe and/or frequent enough to affect the fitness of many individuals, it may have population-level effects.

One type of response to disturbance is an animal's decision to move away from disturbed areas. This decision may be influenced, other than by the disturbance itself, by factors such as quality of the site being occupied, distance and quality to other suitable sites, relative risk of predation, density of competitors, and the investment the individual has made onsite (Gill *et al.* 2001a). The decisions made by animals in response to human disturbance, and the consequences thereof, have been compared to the decisions they make in response to predation risk (Frid and Dill 2002). Animals with suitable habitat nearby may move away from a disturbance simply because there is an alternative site. Conversely, animals with no suitable habitat nearby may remain despite disturbance and regardless of the survival or reproductive consequences (Gill *et al.* 2001b).

A review of available literature on responses of numerous species to a variety of human activities suggests that the behavioral and physiological responses of individuals and their consequences are highly variable and influenced by multiple factors. For example, Anderson *et al.* (1996) found that there were no long-term effects of military activities on moose, and Englehard *et al.* (2002) concluded there were no long-term effects on elephant seals from human disturbance. However, Kerley *et al.* (2002) found that roads and traffic affected the reproductive success and survivorship of Amur tigers, and Blackmer *et al.* (2004) found that human disturbance affected hatching success and nest-site fidelity of Leach's storm petrel.

In addition to assessing behavioral responses and population parameters, a frequently measured indicator of the vertebrate stress response is stress hormones: glucocorticoids (GCs), typically cortisol and corticosterone (Wingfield *et al.* 1997). Research on drivers influencing hypothalamic-pituitary-adrenal (HPA) activation, GC release and related physiological and behavioral processes are also numerous (Keay *et al.* 2006). A short-term stress response to an acute, ephemeral stressor represents an adaptive ability to cope with the stimulus, focusing on the immediate survival of the animal while suspending future processes such as energy storage as fat, production of gametes and growth (Reeder & Kramer 2005). A chronic stress response to a persistent stressor, however, can be detrimental to the organism and result in cell death, immunodeficiency, muscle wasting, reproductive suppression, and memory impairment (Reeder & Kramer 2005).

Studies on a wide range of vertebrates indicate that physiological stress responses can be reliably and repeatedly characterized by measuring GCs pre- and post-disturbance or among population subsets that vary in their exposure to a disturbance (Baker *et al.* 2013, Busch & Hayward 2009). Assessing adrenal activity through GC measurement in blood and fecal samples has become increasingly popular in recent decades, however, other physiological measures, such as cardiac response and immuno-competence are also common (MacArthur *et al.* 1979; Moen *et al.* 1982; Tarlow and Blumstein 2007).

In a review of 290 studies on stress responses of wildlife to ten disturbances, the effect of capture and handling was most frequently examined, followed by land use and alteration, human presence (*e.g.* tourism, number of people in an area, human-flushing, human interaction) and husbandry activities (*e.g.* confinement, herding, hot-branding, stocking, feeding) (Baker *et al.* in review). An increase in GCs was consistently associated with capture and handling (significant in 80% of tests) and land use and alteration (significant in 100% of tests) across species tested; whereas the effects of human presence and husbandry were more variable (significant in 62-65% of tests) (Baker *et al.* in review).

GCs have been measured in a number of marine mammals in association with disturbances. For example, GCs increased with toxin exposure, predators, capture, and entanglement, but not significantly influenced by isoflurane anesthesia and hot-branding; other correlates were also influential (pregnancy, lactation, other hormones, age, season, time of day, gender) (Gulland *et al.* 1999, Ortiz *et al.* 2000; Oki & Atkinson 2004, Bozza & Atkinson 2005; Petrauskas *et al.* 2005; Hunt *et al.* 2006; Mashburn and Atkinson 2007; Mellish *et al.* 2007). Most of these studies focused on captive animals.

For wild marine mammal populations, identifying, monitoring and analyzing covariates demonstrated to be relevant to stress physiology in other vertebrates (*e.g.,* age, reproductive state, social status) may aid in accurate characterization and interpretation of results (*e.g.* Goyman *et al.* 2001 and Gobush *et al.* 2008). A failure to account for a sufficient number of relevant variables may preclude an adequate context for sound evaluation. For example, significant GC patterns may be masked by noise from other biological factors and a particular disturbance may incorrectly be deemed to have no effect on stress physiology, contributing to some inconsistent trends between vertebrate stress responses and disturbances that are apparent across studies and species.

A measured temporary rise in GCs in response to capture or disturbance might have consequences on individual fitness if it became chronic. However, though baseline GC measures can predict the relative fitness of individuals and populations, the relationship is not always consistent or present for a particular population or species (Bonier *et al.* 2009). For example, increased GCs were associated with increased probability of death (of individuals) or diminished viability (of offspring) in 73% of tests across 42 vertebrate studies (Baker *et al.* in review). GC's may be evaluated in Hawaiian monk seals in the future to help indicate stress.

Behavioral indices can provide a useful complement to GC measures and can help determine the risks of their activities to populations. For example, some studies have considered post-disturbance recovery to be attained when a certain percentage of the animals present at the time of the disturbance return to shore (*i.e.*, Allen *et al.* 1984) or by applying statistical approaches that consider average densities and daily variation in numbers onshore (*i.e.*, Kucey 2005). Alternatively, long-term population assessment, which can determine relationships between disturbances such as handling events and individual condition and survival, offer considerable insight.

In the case of Hawaiian monk seal research and enhancement activities, great pains are taken to avoid disturbance. In the cases when it does occur, it typically involves only a single or at most a few animals at once. Disturbances that occur during activities that do not involve capture or handling monk seals, usually amount to the seal simply looking at the researcher, perhaps swinging its head and lying back down. The most dramatic response is that a seal may move down the beach, enter the water and swim some distance away. Even in these cases, the seals rarely exhibit what would be interpreted as a panic flight response.

Thus, observable monk seal response to disturbance is entirely distinct from research on other types of pinnipeds which congregate in dense colonies, where hundreds to thousands of animals can be disturbed in a single event, leading to stampedes to the water (Lewis 1987). One study (McMahon *et al.* 2005) tracked the survival of endangered southern elephant seal pups (*Mirounga leonina*) that had been handled repeatedly and subjected to intrusive research procedures in their first six weeks of life and found no short-term (24 day nursing period) or long-term (first year of life and beyond) effects on survival. The results from studies of stress on one species may not apply to the responses of another species. No physiological studies of Hawaiian monk seal response to disturbance alone (*i.e.*, not involving capture and handling) have been conducted.

The most common scenario for disturbance of Hawaiian monk seals is during research activities that involve the presence of researchers on NWHI beaches where seals are resting. The seals tend to be distributed around the islands in singles or small clusters usually fewer than a dozen in number. Perhaps because most Hawaiian monk seals are rarely captured following a brief tagging event soon after they wean as pups, they are typically not particularly wary of human presence.

However, it is thought that past circumstances, especially those involving prolonged, frequent and intense harassment and disturbance associated with military and USCG activities on NWHI beaches, caused Hawaiian monk seals to avoid certain important beach habitats (Ragen 1999).

In response to researcher presence, seals often simply return to sleep, or watch the researcher until they are no longer visible. Sometimes, however, the seals do get agitated and move a few body lengths down the beach before settling down.

Past circumstances, especially those involving prolonged, frequent and intense harassment and disturbance associated with military and USCG activities on NWHI beaches, caused Hawaiian monk seals to avoid certain important beach habitats (Ragen 1999).

While the above describes the most common disturbance scenario, not all seals exhibit the same response to the same disturbance, nor does an individual seal necessarily exhibit the same response on any given day. Hawaiian monk seal researchers have noted that juvenile seals tend to be more wary and likely to respond to researchers.

Thermoregulation may also play a role in seals' responses. Commonly, seals that have slept on land overnight spend the morning resting as well. As the temperature rises during the day they often slowly make their way to the water to cool off. This transit from the beach berm to the water may take several hours, with the seals sleeping for periods on the way. However, if a seal is feeling hot and is on the way to the water, seeing a researcher may hasten their entering the sea. Finally, seals that have recently been captured and handled understandably tend to be more likely to go to the water the next time they see a researcher. At the other extreme, there are individual seals that seem to have no concern about human presence. For example, when field camps are established on NWHI, it is common that one or more seals will habitually haul out and sleep in camp.

In the MHI, seals have been exposed to the large resident and transient human populations. Many seals have become extremely habituated to people and choose to rest on beaches with hundreds of humans in proximity.

However, Baker and Johanos (2004) conducted aerial surveys of all MHI shorelines in 2000 and 2001, and found that most of the seals seen had chosen to land at beaches less frequented by people.

This suggests that beach habitat selection of MHI Hawaiian monk seals may be influenced by human disturbance. A similar avoidance of the vastly smaller scale of human presence in the NWHI has not been detected.

Despite the fact that outwardly, Hawaiian monk seals do not usually exhibit strong disturbance responses, it is not possible to rule out that there may be unobserved deleterious responses. Indeed, human disturbance has long been considered a threat to monk seal conservation, due mostly to population declines and local extinctions associated with the long history of first persecution and hunting by people up to the early 20th Century, and subsequent intensive prolonged harassment by military personnel and others visiting the NWHI prior to the seals receiving protection (Ragen 1999). As noted above, the frequency and intensity of research and enhancement related disturbance is vastly less than the seals' historical treatment.

Baker and Johanos (2004) conducted aerial surveys of all MHI shorelines in 2000 and 2001, and found that most of the seals seen had chosen to land at beaches less frequented by people.

Thus, while there is reason to believe that the level of disturbance associated with human disturbance from research and enhancement activities that do not involve capture and restraint are benign, we must consider the potential that disturbance could cause injury or harm. The following is a list of conceivable potential mechanisms for such harm:

- Increased corticosteroid levels or other physiological stress responses;
- Seals sustaining scrapes or cuts while fleeing over abrasive substrates (*e.g.*, coral);
- Increased risk of shark predation to seals that enter water when they would otherwise be on the beach;

- Increased risk of pups being subjected to adult male seal aggression if they enter the water in proximity to an aggressive male seal; and
- Disruption of nursing of mother/pup pairs leading to lower energy and nutrient intake by the pup.

4.7.1.3 *Mechanisms of Injury to Hawaiian Monk Seals from Capture and Restraint*

In contrast to simple disturbance described above, seals that are captured and restrained during research and enhancement activities are subject to additional risks. As described in Chapter 2, capture and restraint can involve a range from brief procedures for tagging to longer procedures involving sedation, attachment of instruments, biomedical sampling, etc. Upon release from capture and restraint, most seals immediately flee to the water. The exception is that recently weaned pups often remain on land after being captured, tagged and measured. The following are mechanisms by which animals may be injured during capture and restraint without sedation:

- Efforts to avoid or escape capture could lead to contusions, lacerations, abrasions, hematomas, concussions, and fractures, as well as hyperthermia (excessively high body temperature which could lead to muscle rigidity, brain damage, or death) and myopathy from increased muscle activity;
- Increased energy expenditure with the potential for hyperthermia for those animals involved in strenuous or prolonged activity; and
- Capture myopathy is associated with prolonged or repeated stress responses in many mammals (though whether it occurs in pinnipeds is uncertain) and is characterized by degeneration and necrosis of striated and cardiac muscles (Fowler 1986). Capture myopathy may be fatal and may not develop until many days after capture and handling.

4.7.1.4 *Mechanisms of Injury to Hawaiian Monk Seals from Sedation or Anesthesia*

Diazepam (valium) is the drug used for field sedation of Hawaiian monk seals, and midazolam may also be used for sedation in some cases (see Appendix C). Gas anesthesia (*e.g.*, isoflurane) has also been successfully used in clinical settings, for example, surgeries to remove embedded fish hooks from seals. However, these latter cases involve stranding response and are covered under the Marine Mammal Health and Stranding Response Program's permit and PEIS (NMFS 2009a) and not by this PEIS. Thus, this discussion is limited to risks associated with diazepam and midazolam sedation. These include:

- Miscalculation of dosage could lead to overdose and consequently death;
- Administration of IV diazepam could cause pain, stress, and damage to the extradural vein or surrounding tissue;
- Administration of IM midazolam could cause pain, stress, and damage to surrounding tissue; and

- Possible side effects include bradycardia (slowed heart rate), respiratory depression, tremor, confusion, blurred vision, nausea, vomiting, depressed gag reflex, lethargy, and ataxia (inability to coordinate muscle activity during voluntary movement) (NMFS 2005a).

4.7.1.5 *Mechanisms of Injury to Hawaiian Monk Seals from Biomedical Sampling, Marking, Attachment of Telemetry Instruments, De-worming, Administering Antibiotics and Other Drugs, Disentanglement and Other Research and Enhancement Procedures*

Numerous research and enhancement procedures involve the handling of animals, including collection of various tissues as biomedical samples, weighing, measuring, attaching flipper tags, applying pelage (fur) bleach marks, attaching various telemetry (*e.g.*, satellite or GPS tracking) devices, and administering de-worming medications. In addition to the following risks associated with these procedures, all of the handled animals are exposed to the risks of researcher disturbance and capture/restraint presented above.

- Blood collection can cause pain, stress, damage to the extradural vein or surrounding tissue, and potentially infection;
- Biopsy punches for skin and blubber samples can cause pain and stress, and produce a small wound that has the potential for infection;
- Swab sampling of orifices could cause pain or irritation. Fecal sampling with a fecal loop could also cause pain and irritation; additionally, perforation of the rectum is a possibility. In female seals, accidental insertion of a fecal loop into the vagina could result in discomfort or possibly introduction of pathogens;
- Flipper tags involve creating a small hole in the flipper, through which plastic tags are threaded. This can cause temporary pain, stress, and possibility of infection. The tag might tear out over time, causing additional wounding to the flipper;
- Use of hair bleach to temporarily mark the pelage of Hawaiian monk seals can awaken the seal, causing a disturbance response. Bleach could cause irritation to areas it might come into contact with (eyes, nose or skin surfaces);
- Attachment of instruments to the fur with epoxy can cause irritation and in some cases minor skin wounds at the margins of the attachment area. The hydrodynamic drag created by the instrument might hinder swimming performance and result in increased energetic costs of swimming and diving, potentially affecting foraging efficiency;
- Administration of de-worming and other medications (*e.g.*, antibiotics and emergency response drugs) can occur by various routes, each with some potential risk (see Appendix C). Injections (intra-muscular or subcutaneous) can cause pain, stress, swelling, and the risk of infection at the injection site. Oral intubation of drugs also can cause pain and stress,

and carries the risk of introducing fluids into the trachea and lungs, which may lead to pneumonia. Topical application of medication has a potential to disturb or stress seals if they awaken during the application; additional information on potential effects of drug administration is presented in Appendix C;

- It is possible that de-worming a seal that has a sufficiently heavy parasite burden could result in a bolus of dead worms causing an intestinal blockage and death; and
- During disentanglement of seals caught in marine debris, removal of debris from severe wounds or from seals which have become very compromised by their entanglement, can pose a risk of causing excessive bleeding and other complications, potentially leading to death.

4.7.1.6 *Mechanisms of Injury to Hawaiian Monk Seals from Translocation*

A number of enhancement activities involve translocation of Hawaiian monk seals. The seals involved include nursing pups that have been abandoned or separated from their mothers, weaned pups, juveniles and adult males. The details of translocations are presented in Chapter 2 and Appendix E (Two-Stage Translocation: A Proposal for Endangered Hawaiian Monk Seals). The procedures associated with these actions vary with the logistics of each case and to some degree, the age of the animals involved. However, all translocations will entail some portion or all of the following elements:

- Capture;
- Restraint;
- Holding in a cage or other enclosure;
- Transport via small boat, automobile, ship or aircraft;
- Sedation;
- De-worming;
- Health and disease screening (*i.e.*, biomedical sampling);
- Pre-release quarantine;
- Attachment of telemetry devices; and
- Release at a destination site.

Risks of many of these procedures have been identified in the foregoing sections and are applicable to translocation to the extent that they occur as part of a translocation action. The following is a list of risks specific to procedures involved only in translocation:

- Temporary holding and transport may cause stress, leading to any number of related ailments, including immuno-suppression, and potentially death;
- Some monk seals in captivity have developed eye problems that make them non-viable for release into the wild;

- Seals could be harmed if an accident occurs during transport;
- Seals released in a new area may encounter risks that they were unaccustomed to in their previous location (*e.g.,* increased shark predation or competition for prey, increased human disturbance, and potential harm by humans);
- Seals released in a new area may forage less efficiently, either because the new site has less available prey, or because the seal is unfamiliar with the novel foraging landscape;
- Seals may be exposed to new diseases either through contact with other seals being translocated at the same time, or through contact with seals at the release location; and
- Translocated seals themselves may pose a risk to other seals if they carry communicable disease.

4.7.1.7 Mechanisms of Injury to Hawaiian Monk Seals from Behavioral Modification

Research to determine the safest and most effective methods for modifying undesirable behavior of seals that, for example, become habituated to humans in the MHI, will potentially involve a number of techniques. These would include methods such as capture, restraint, sedation, biomedical sampling, instrumentation, translocation, and temporary holding. Seals may also be hazed using visual, audible and tactile means. They may be guided or have their movements impeded by temporary barriers. Some of these actions have already been described and would entail the same risks identified above. Risks of actions unique to behavioral modification include:

- Hazing and use of barriers to movement may cause stress;
- Tactile means might involve momentary, minor pain or discomfort, though the techniques would not involve any type of intentional infliction of injury;
- Visual and audible hazing could cause stress; and
- In cases where the objective of behavioral modification is to move seals away from a specific area where they are, for example, interacting with people, achieving this objective could also displace the seal from resources (*i.e.*, foraging or resting areas) that are important for maintenance and growth.

Behavioral modification of aggressive male Hawaiian monk seals that harm other seals could involve experimental use of gonadotropin-releasing hormone (GnRH) agonist (*e.g.*, decapeptyl or deslorelin), to lower testosterone levels and, ideally, aggressive behavior. Decapeptyl has been used safely with no ill effects in HMS (Atkinson *et al.* 1993; Atkinson *et al.* 1998). The effects of deslorelin have proven safe in other mammals (Bertschinger *et al.* 2001; Trigg *et al.* 2006). The drugs would be given via injection after capture and restraint, and would therefore entail the same risks described above for these procedures. Potential harm or injury that could result from treatment with these drugs include:

- An initial relatively brief rise in testosterone levels prior to their suppression (as shown in other mammals injected with GnRH agonists). During this period there is a risk that male seals could exhibit elevated levels of aggression, posing a risk of harm to other seals;
- Treatment might cause the subjects to be attacked or harmed by other males;
- If effective in reducing testosterone, subject males would be temporarily "chemically castrated," such that they potentially have lower reproductive success; and
- GnRH agonists may have side effects.

4.7.1.8 *Mechanisms of Injury to Hawaiian Monk Seals from Vaccination*

Vaccines currently used for prevention of viral diseases in domestic animals can be divided into three types: those based on a dead inactivated virus; those using live attenuated virus; and vaccines consisting of recombinant viruses. Recombinant viruses use a vector virus that does not typically infect the target host but expresses antigen from the pathogen of interest, stimulating an immune response against it (Griffin and Oldstone 2009). Vaccines using a dead virus are considered the safest as the virus cannot replicate in the host or cause disease; however, this lack of replication often means that the immune response generated following vaccination is short lived and may not be protective. Live vaccines typically generate the most effective immune response, but present the risk (when used in species other than the one for which the vaccine was developed) of the virus replicating in the host and either causing disease in the vaccinated animal, or being shed in secretions and becoming infective to other contacted animals. Numerous carnivores, especially mustelids (weasel family) and procyonids (*e.g.*, raccoons), have died in zoological collections following vaccination with live canine distemper virus (CDV) vaccine (Deem *et al.* 2000). To overcome this risk of live vaccine use, recombinant vaccines to CDV are now used extensively in zoological collections (Brunson *et al.* 2007).

Vaccines currently being considered for Hawaiian monk seal include a recombinant canary pox (Purevax, Meriel) vaccine against morbillivius and an inactivated West Nile Virus (WNV) (Innovator, Fort Dodge). The canary pox vaccine has been safely used on a wide range of non-domestic carnivores including pinnipeds. It has not been associated with live virus shedding and is likely to stimulate higher immunity than a dead vaccine. The canary pox is also commercially available in the U.S. and is recommended by the American Association of Zoo Veterinarians for use in non-domestic carnivores. The Fort Dodge WNV vaccine has been used to date on Hawaiian monk seals in captivity in San Antonio, Texas, with no adverse reactions observed (Workshop to

Evaluate the Potential for Use of Morbillivirus Vaccination in Hawaiian Monk Seals, Final Report 2005).

Vaccines would most likely be administered to Hawaiian monk seals through injections which could involve capture and restraint. Vaccination would thus entail the risk associated with disturbance, injection and potentially capture/restraint. Other specific risks of vaccination may include an immune response, which can rarely result in a local reaction at the site of injection characterized by heat and swelling that resolves in 5-7 days, or febrile response (*i.e.*, fever).

4.7.1.9 *Number of Hawaiian Monk Seals Affected by Research and Enhancement under Each Alternative*

Sections 1.8 and 2.6 describe the different research and enhancement "take" activities that may occur under the various alternatives. Permits must specify the number of seals that could potentially be affected by research and enhancement take activities. Thus, each alternative may involve different numbers of animals.

The take numbers indicate the maximum number of animals that may be affected by each take category under each alternative and are presented in Appendix I (Take Tables).

When applying for MMPA/ESA marine mammal research and enhancement permits, applicants request the maximum number of takes that they believe might potentially occur during their permitted activities. Exceeding these take levels would amount to a permit violation. In the case of the Hawaiian monk seal, NMFS historically has not reached the total level of takes authorized for research and enhancement. Nevertheless, these maximum levels will be analyzed here. The numbers of takes for different research and enhancement activities under the following alternatives are presented in Appendix I and support the analysis of the alternatives presented herein.

- Alternative 1 (Status Quo) is based on the current Hawaiian monk seal research and enhancement permit (10137). Permit 10137 expires in June 2014 and Alternative 1 assumes that the same levels of take would be authorized in the future with no changes.
- Alternative 2 (No Action) assumes that no further research and enhancement permits would be authorized once the current permit (10137) expires in 2014;
- Alternative 3 (Limited Translocation, Preferred Alternative) includes a suite of additional research and enhancement activities with their associated number of takes, as well as some additional takes for existing (Status Quo) actions; and
- Alternative 4 (Enhanced Implementation) has identical take levels as Alternative 3, but is distinguished by the added potential to translocate

weaned pups from the NWHI to the MHI and subsequently return them to the NWHI when they are 2-3 years old.

Implementation of any alternative will depend on the availability of sufficient funding, which is not guaranteed. Alternatives 3 and 4 would likely require a substantial increase in future funding levels compared to the current funding available for implementing Status Quo (Alternative 1). However, for the purposes of this analysis, it is assumed that sufficient funding would be secured to fully implement each alternative.

4.7.1.10 *Assessment of Mortality of Hawaiian Monk Seals Due to Research and Enhancement*

Analysis of mortality effects associated with research and enhancement activities will be primarily based on up to three sources of lethal takes presented in Appendix I (Take Tables). These include:

- Euthanizing moribund seals and adult male removals. These involve humanely euthanizing seals deemed by an attending veterinarian as highly likely to die (*e.g.*, due to injury or illness) and either lethal removal or permanent captivity of adult male seals that have harmed or killed other seals. Because permanent captivity is equivalent to mortality from the perspective of the wild populations, captivity is treated as a mortality in the analysis of alternatives;
- Unintentional mortality (research). This includes any unintentional deaths of seals that may occur as a result of research; and
- Unintentional mortality (enhancement). This includes any unintentional deaths of seals that may occur as a result of enhancement activities.

These sources of mortality are considered to be entirely observable. NMFS has a long history of evaluating the potential effects of research and enhancement on Hawaiian monk seals as evidenced by numerous published reports and papers showing that Hawaiian monk seals subjected to specific research and enhancement activities do not subsequently exhibit higher mortality than seals not subjected to the activities (Baker and Johanos 2002; Littnan *et al.* 2004; Baker *et al.* 2011*b*). Moreover, these studies have often sought to detect sub-lethal effects (for example, on behavior, movement, body condition, etc.) of research and enhancement activities, but have failed to find evidence of any such deleterious effects. Based on these publications, coupled with the fact that most Hawaiian monk seals are uniquely identifiable and closely monitored, it is assumed that there are no unobserved mortalities associated with research and enhancement activities.

Thus, NMFS concludes that the unintentional or intentional (in the case of moribund seals or aggressive adult male seals) mortalities that are observed as an immediate result of research or enhancement constitute the totality of mortality associated with these activities. It is important to note that this is not a claim that research and enhancement have no associated mortality; rather it asserts that such mortality will be entirely observable and documentable.

4.7.1.11 *Research and Enhancement Activities That Involve Take of Hawaiian Monk Seals*

Below is a discussion of each type of activity involving take that is proposed under various alternatives and the evidence supporting the above conclusion.

Tagging – Since the early 1980s, nearly all Hawaiian monk seals have been captured, restrained and tagged with plastic flipper tags as soon as possible after weaning. To ensure that this practice did not have negative effects, Henderson and Johanos (1988) conducted a study at Lisianski Island to compare the early survival, behavior and movements of tagged and untagged weaned pups. They found no differences in any of these metrics. For most Hawaiian monk seals, this initial tagging at weaning is the only time in their lives they are handled by humans. However, some seals may be captured, restrained and retagged at an older age if they have lost, worn or broken flipper tags. Baker and Johanos (2002) compared the survival, migration and condition of 437 seals during the year subsequent to retagging to an equal number of matched controls with pre-existing tags. It was important to choose control seals that were already tagged so that probability of resighting would not be biased between the two groups. No differences in survival, migration or condition were found between the retagged and control groups.

Bleach Marking – Seals are marked with hair dye, providing marks that last until the seal's next molt. While no directed study of the effects of bleach marking has been conducted on Hawaiian monk seals, it is reasonable to assume that since the more intensive activity of capture, restraint and tagging has no detectable negative effect, bleach marking is even less likely to cause mortality. Most seals do not even awaken during bleaching so that there is no disturbance effect. Field staff is instructed not to place bleach in areas where the seal could sweep it with their flippers into their eyes, nose or mouth. Further, despite many thousands of bleach markings of monk seals, no negative effect of this procedure other than minor disturbance has ever been observed (NMFS PIFSC Annual Permit Reports for Permits No. 10137 and 848-1695-). Bleach marking aids in detection of a seal's identity from a greater distance than would be possible with flipper tags alone, thereby reducing the necessary approach distance and consequently the chances of disturbance.

Health Screening and Foraging Studies – Although these two activities have distinct goals and involve different procedures, in practice they quite often occur simultaneously and are therefore discussed together here. For example, almost every time a seal is captured to attach a telemetry instrument (to study foraging behavior) a health screening is conducted at the same time. Baker and Johanos (2002) evaluated the same metrics (survival, migration and condition) of seals that were instrumented and/or health screened compared to matched controls and found no difference. The number of cases of health screening was small (N =

19), however the sample for foraging instrumentation was much larger (N=93) and many in this latter group were also health screened, lending confidence to the conclusion that neither procedure had negative effects.

Further Littnan *et al.* (2004) evaluated a suite of diving and foraging-related parameters of juvenile Hawaiian monk seals fitted with the largest type of foraging instrument used in this species, a seal-mounted video camera (*i.e.,* "Crittercam"). The foraging behavior parameters of seven seals were compared while they had both the Crittercam and a much smaller dive recorder attached versus a period when they carried the dive recorder alone. No statistically significant differences were detected in the seals' behavior during the two periods.

De-worming – Although treatment for gastrointestinal parasites has long been a somewhat routine procedure for captive monk seals and other pinnipeds brought into captivity for rehabilitation, there has been relatively little experience with field treatment of free-ranging seals for parasites to reduce worm burden and improve body condition and survival. However, such a study was implemented at Laysan Island in 2009-2010 (Gobush *et al.* 2011). A pilot trial using orally administered de-wormers proved unsuccessful in that it was too difficult to administer a reliable dose orally in field conditions. Subsequently, an injectable medication trial was conducted. This involved 43 juvenile seals that were captured, weighed, measured, feces sampled and either given an intra-muscular injection of the anti-helmintic (Praziquantel), or served as controls three times on an 8-16 week interval.

The effect of treatment on survivorship, egg presence and gain in mass was evaluated. Survivorship of the subset of the three cohorts included in the study was 100% for the 2007 and 2008 cohorts, and 85.2% for the 2009 cohorts. There was no difference in survival of the treatment and control seals. Nearly all collected fecal samples had cestode eggs; there were no significant differences in egg presence between control and treated seals. Percent mass change differed with season and by age. Mass gain was greatest in the period from March to May. Percent mass gain was significantly greater for treated than control seals during March to May, but not during December to March or over the entire treatment period (December to May). The above study was designed to both evaluate potential beneficial effects of de-worming and also detect any potential negative effects. The fact that there was no difference in survival and a suggestion of higher growth rates in treated seals during a portion of the study indicates that there was no negative effect on survival or condition.

The following describes additional observations relevant to potential negative de-worming effects (Permit No. 10137, *Hawaiian Monk Seal Deworming Project: Year One Summary*). Typically, seals entered the water within minutes of being released from treatment with no indication of adverse effects of capture or treatment. However, adverse conditions for two seals treated during the course of the study were observed. One seal displayed signs of respiratory distress and another developed an abscess at the injection site. The respiratory distress case was reviewed by veterinarians and it was deemed unlikely that this symptom could be attributed to de-worming.

The seal with the abscess was captured, the abscess lanced and flushed. The wound healed and the seal survived and gained a large amount of mass by the next capture. Three other seals developed minor swellings near their injection sites within days of treatment; these swellings subsided on their own within 1-3 weeks. One seal that had a swelling was re-injected at the next treatment period and did not develop another swelling.

As a precaution against further swellings, protocols for cleaning the injection site were reviewed and standardized, improved restraining techniques were implemented, and the Praziquantel dose was split into two injections for half of the treated seals to test whether reducing the injected volume might mitigate swelling. The dose was divided between two bilateral intramuscular injections, each with a volume of 5 milliliters (ml) or less for five treated seals in August. The maximum injection volume for the split dose group was 3.7ml for an 85 kilogram (kg) seal, and for the single dose group it was 6.2ml for a 71kg seal. Subsequently, no injection site swellings occurred in any of the seals treated.

Due to apparently weak efficacy, lack of compelling benefits and the minor risk of potential negative effects (abscess at injection) of Praziquantel injection, the de-worming study was suspended (Permit No. 10137, *Hawaiian monk seal Deworming Project: Year One Summary*). Ongoing and future studies will consider other routes of drug administration or other drugs. For example, in 2011 and 2012, a topical dewormer that could be applied without waking seals was tested on monk seals and the results are currently being analyzed. In such cases as above, researchers will be closely monitoring individuals to detect both negative and positive effects, and in cases of the former (as with the abscess described above) be prepared to mitigate negative effects. Thus, it is very unlikely that any mortalities or injuries associated with future de-wormer studies will go undetected.

Treatment with Antibiotics and Other Drugs –Appendix C provides a list of the drugs currently used or proposed to be used in Hawaiian monk seals, possible adverse effects including any observed in Hawaiian monk seals, and the pharmacokinetics of each drug (*i.e.*, how the drug is absorbed, distributed, the rate of action and duration of effect, chemical changes in the body, and effects and routes of excretion of metabolites).

All of the drugs included have been used on Hawaiian monk seals with no severe adverse reactions observed that would preclude future use (Appendix C). Drugs are only used if prescribed by an attending veterinarian, and the purpose of using drugs in Hawaiian monk seals is to benefit the seals. For example, sedatives are given to reduce stress during certain handling events. Emergency drugs are administered if a seal has an adverse reaction during handling and needs supportive care. Long-acting antibiotics are given to seals with wounds (*e.g.*, abscesses from adult male injuries) to prevent or treat infection.

In addition to the drugs listed in Appendix C, supportive fluids such as electrolytes, dextrose, and sodium bicarbonate may be administered at the discretion of the attending veterinarian in response to adverse reactions to capture, handling, and drug administrations. New drugs may become available or other drugs may be prescribed for use in Hawaiian monk seals by the attending veterinarian. Information on such new drugs would be provided by PIFSC to the OPR Permits Division and may be incorporated into the protocols if indicated by the attending veterinarian. Possible adverse effects of any new drugs would be weighed against the benefits of using the drugs for each case. Also, if any severe adverse reactions are reported in Hawaiian monk seals, the drugs would be discontinued or dosages modified per recommendation by the attending veterinarian.

Translocation – Baker *et al.* (2011*b*) summarized and analyzed an extensive history of experience involving translocation of 247 Hawaiian monk seals to achieve a variety of objectives, including mitigating shark predation and male seal aggression, reducing human-seal interactions, and taking advantage of favorable foraging habitats to improve survival. A total of three mortalities (two adult male seals and one weaned pup) occurred during either capture or temporary captivity for translocation. While cause of death could not be determined in any of these cases, it is conservatively assumed that the deaths were attributable to the translocation action.

For all cases with data available to analyze, survival and dispersal behavior of translocated seals was statistically indistinguishable from comparable seals native to the release sites. This study indicates that, like other research and enhancement activities, mortalities associated with translocation are observable and quantifiable. However, as noted above, because two-stage translocation has some novel and yet untested aspects, negative and positive impacts of this activity will be assessed using simulation modeling as described in the Quantitative Approach section below and in Appendix J (Description of Monk Seal Stochastic Simulation Model).

Adult male removal – Aggressive adult male Hawaiian monk seals may be removed from their subpopulation either via translocation to another subpopulation, permanent captivity, or by lethal removal (euthanasia). As noted above, captivity will be treated the same as mortality for evaluation of impacts on populations. Baker *et al.* (2011*b*) found that aggressive males translocated from Laysan Island to the MHI in 1994 had high survival rates commensurate with those of native born adults. However, while data were very sparse, it seems that post-release survival of seals taken to Johnston Atoll was likely poor. In the future, translocations to Johnston Atoll are possible but unlikely; and, if they should occur, the fate of those translocatees would be closely monitored. Any that died or disappeared after release at Johnston Atoll would be considered mortalities in the context of the permit.

Disentanglement and De-hooking – When Hawaiian monk seals are entangled in marine debris or are observed with an embedded fishing hook, they may be captured to remove the offending items. In some cases, debris is cut away from seals while they are asleep and no disturbance occurs. Marine debris and hooking are known sources of serious injury and mortality. As such, the risks associated with disentanglement/dehooking are weighed against the risks of leaving the debris or hooks in place. Nearly 300 Hawaiian monk seals have been observed entangled in marine debris and over 60 have been observed with embedded hooks (Carretta *et al.* draft 2011 SAR). Many of these animals have been captured and disentangled or dehooked and none have subsequently died from causes attributable to this enhancement activity.

Nearly 300 Hawaiian monk seals have been observed entangled in marine debris and over 60 have been observed with embedded hooks (Carretta et al. draft 2011 SAR).

Behavioral modification – As described above, behavioral modification research will involve a variety of techniques that entail some risk of injury or mortality. Though experience to date with these techniques is limited to a few seals hazed or subjected to temporary barriers to movement, there have been no injuries or mortalities as a result. Further, any seals that are subject to behavioral modification in the MHI in the future will be monitored very closely to determine the efficacy of the treatments as well as to detect any adverse effects on the seal. It is therefore very unlikely that any mortality associated with behavioral modification would go undetected.

Chemical behavior modification of adult males through the use of GnRH agonists has been the subject of some experimentation in captivity and the wild in the past (Atkinson *et al.* 1993, Atkinson *et al.* 1998). While the efficacy of this approach to mitigate aggressive male behavior is undetermined, there were no deaths associated with the administration procedures or from effects of the drug itself. Testosterone reducing drugs would be tested on seals in captivity prior to use in wild seals. As with other behavior modification research, study subjects in the future would be closely monitored so that any resulting adverse reactions or mortalities could be detected and quantified.

Vaccination –To date, there have been no vaccination programs for wild pinnipeds, though some captive seals, including Hawaiian monk seals, have been vaccinated against morbillivirus and WNV (Vaccination Research and Response Plan). Under Alternatives 3 and 4, vaccine research would occur and potentially vaccination would be used for enhancement as needed. These research and enhancement projects would potentially involve either inactivated dead virus or recombinant virus vaccines.

No adverse reactions have been reported following use of the recombinant canary pox vaccine in marine mammals to date (Steller sea lions, sea otters, harbor seals, and one Hawaiian monk seal). The only data on vaccination of pinnipeds against WNV are from SeaWorld, San Antonio, where captive Hawaiian monk seals have been vaccinated with an inactivated WNV vaccine from Fort Dodge following an outbreak of WNV in the park and the loss of one monk seal to WNV infection. The vaccinated seals have sero-converted following vaccination with no adverse reactions (Workshop to Evaluate the Potential for Use of Morbillivirus Vaccination in Hawaiian Monk Seals, Final Report 2005).

Any future vaccination programs with monk seals would proceed cautiously, testing safety and sero-conversion on surrogate species and on captive monk seals prior to use in the wild. Careful monitoring would ensure that any resulting mortalities would be detected.

Disturbance – In this section, we consider mortality due to disturbance alone (that is, seals that are disturbed by research and enhancement but not captured or handled in any way). This may occur in two ways. First, seals may be disturbed during monitoring activities (aerial, vessel or land-based) where they are approached for identification, photographic documentation, etc. Second, seals may be incidentally disturbed when they are present near other seals that are approached for monitoring, capture, handling or any other research or enhancement activity. In either case, there is no indication that the level of disturbance proposed in any of the alternatives would be likely to cause any mortality.

As noted above, prolonged, repeated and intensive harassment and disturbance (not associated with research or enhancement) likely contributed to habitat avoidance and decline in monk seal populations in the past. However, as described above, the intensity and frequency of disturbances related to past Hawaiian monk seal research and enhancement has been very low. Records on how seals react when they alert to a researcher's presence showed that during 2012, only 1.4% of seals sighted raised their head, 0.15% of seals moved away <2 body lengths, and 0.36% of seals went into the water, demonstrating a very low level of disturbance resulting from permitted activities (2012 Annual Report for Permit No. 10137).

The proposed alternatives allow for at most 5 disturbances per seal in any given year, though the average for any seal will be far less. More importantly, because all disturbances are recorded, it is even less likely that should such a disturbance-related mortality occur it would go undetected. The primary potential mechanisms for disturbance-related mortality in Hawaiian monk seals would be avoidance of habitat critical for survival, or stress-induced mortality.

While there have been no studies specifically quantifying and evaluating the potential impacts of disturbance on Hawaiian monk seals, it stands to reason that disturbance alone would elicit far less impact than much more intensive activities such as capture, restraint, tagging, health screening, instrumentation, etc. The fact that these activities have been shown not to change survival, migration or body condition compared to seals that did not undergo such procedures (Baker and Johanos 2002), is compelling evidence that the low levels of disturbance proposed in the alternatives would be even less likely to induce harm. It is further worth noting that no harm or mortality due to simply disturbing a Hawaiian monk seal during research or enhancement has been documented in over 30 years (Permit No. 10137, *Hawaiian monk seal Deworming Project: Year One Summary*).

4.7.1.12 *Separation of Positive and Negative Effects in Subsequent Analysis*

To compare effects of various alternatives, it is important to explicitly identify both negative effects (such as mortalities) from positive effects, or benefits (such as lives saved) to Hawaiian monk seals. The overall balance of these opposing effects leads to conclusions about the relative merits of each alternative. In order to distinguish and explicitly present negative and positive effects, the following approach is applied in the subsequent alternatives analyses.

All ***negative*** effects are analyzed in sections entitled:

- "Direct and Indirect Mortality Due to Research and Enhancement", and
- "Direct and Indirect Reproductive Effects Due to Research and Enhancement"

All ***positive*** effects are analyzed in sections entitled:

- "Contributions to Conservation Objectives"

In this way the positive and negative effects are readily identifiable in their respective sections.

4.7.1.13 *Quantitative Approach to Analyze the Effects of the Lethal Take of Hawaiian Monk Seals*

The monk seal simulation model (Appendix J) was used to assess the population level effects of the lethal take levels allowed in the alternatives. In general terms, a simulation model combines all of the important data for a population and, starting with the current population size and composition, projects the population forward to predict what the probable future state will be under various scenarios. Details of the model structure are provided in Appendix J with additional details available in Harting (2002).

For these simulations, each of the seven subpopulations was initialized at its current status (age/sex composition) and projected forward for 10 years, using the recent estimates for the vital rates (survival and reproduction) at each subpopulation. To better represent how the population behaves in the real world, simulated vital rates varied year-to-year according to historically observed variability. In the projections, seals were allowed to move among subpopulations in accordance with the movement rates observed in the wild.

As stipulated in the descriptions of the alternatives, the takes due to unintentional mortality from research can apply to any age or sex class. This means that the consequences of the mortality to the welfare of the population can vary depending on exactly which individuals are lost. In general, the loss of females is of much greater consequence to the population than is the loss of males because the population forfeits not just that individual female but also any pups she was likely to produce in the future. Further, females at or near prime reproductive age are especially important to the population because they comprise the age class likely to produce the most pups and thereby promote future population growth (refer to the discussion of age-specific reproductive value, Section 4.4). For these reasons, an exceptionally high-impact simulation scenario was used to represent the allowable take in each alternative, in which all of the take mortality was applied to females with high age-specific reproductive value (age 4 years). The maximum number of seals removed and the number allowed each year conformed to the provisions specified in the take tables (Appendix I). For example, to simulate the four unintentional takes during research allowed under Alternative 1, two females were removed during the first year of the simulation and two additional females were removed in the following year.

As with the research-related takes, the allowable take for the loss of weaned pups and juveniles during enhancement activities (Alternatives 3-4) can apply to either sex. As with the research take, a hypothetical exceptionally high-impact scenario was specified by assuming that all of this mortality would apply to females.

Because the simulated takes might occur at any subpopulation, the outcome was evaluated in terms of the effects on abundance and realized growth rate (from first to last year of the simulations) for the total population (that is, all subpopulations combined).

4.7.1.14 Assessment of Reproductive Effects Due to Research and Enhancement on Hawaiian Monk Seals

Even if research and enhancement activities do not lead to mortality, it is possible that the activities could reduce the probability that seals produce viable offspring. Thus, effects on individual and population-level reproduction are possible from research and enhancement activities. This element of the direct and indirect effects analysis discusses the ways in which the scope of research and enhancement activities represented by each alternative may affect reproductive success.

The potential mechanisms for effects on reproductive success could happen to either gender; however, effects on females are naturally far more plausible and of greater concern. If research and enhancement activities were to impact the ability of some male seals to reproduce (*i.e.*, compete for or encounter mates, produce viable sperm or through any other mechanism), it is unlikely to translate into population level effects. The monk seal mating system is not well known but is probably promiscuous (Stirling 1983). Multiple male seals seek access to mate with females in estrous, such that if one or more males were unavailable due to some reproductive harm, other males would almost certainly ensure that any available female would be mated. For this reason, the remainder of this discussion focuses on reproductive effects on females. Possible mechanisms for reproductive effects on females include:

- Injury to the reproductive organs or damage to hormonal regulation that leads to temporary or permanent sterility.
- Physiological responses to stress that cause reproductive failure at any stage (ovulation, fertilization of ova, embryonic implantation, embryonic or fetal development).
- Changes in maternal behavior that reduces feeding of pups, consequently reducing their growth and survival rates.
- Delayed sexual maturation due to slow growth or poor health.

As noted in Chapter 2, NMFS has a long-standing conservative approach to disturbance or capture of adult female seals. For example, no adult female is captured that appears to be pregnant or is otherwise thought likely to be well into a pregnancy even if it is not visually apparent. The only exception is for a life-threatening situation such as a severe entanglement. Also, great efforts are made to minimize the disturbance of mother-pup pairs. Because of these precautionary policies, the risks to reproductive females are minimized, but at the same time risk-averse procedures complicate any analysis to evaluate whether any effects are occurring. For example, in the Baker and Johanos (2002) study on effects of research handling, reproductive effects could not be evaluated. Because pregnant females were actively avoided in the study, there were no control seals to compare subsequent reproduction of the adult females that were handled (i.e. the adult female treatment group was biased).

There has never been a reported or documented case where research or enhancement related disturbance has caused a female to abandon a pup.

Despite the complications with quantitative evaluation of reproductive effects based on actual research and enhancement activities in the past, it is possible to qualitatively infer the likelihood of such effects. For example, many of the hypothetical mechanisms for reproductive effects are mediated through reduced growth or body condition of female seals. Avoiding handling pregnant females reduces this risk. Also, the lack of any indication that actions such as tagging, health screening, instrumentation, and de-worming have had any negative effects on growth or body condition (Baker and Johanos 2002; Gobush *et al.* 2011), suggests that growth-related effects on reproduction are highly unlikely. Likewise, the strict avoidance of disturbance to mother-pup pairs and the prohibition on capturing either a mother or her offspring during the period between birth and weaning, means that effects on the nursing process are also very unlikely.

There has never been a reported or documented case where research or enhancement related disturbance has caused a female to abandon a pup.

It is difficult to evaluate the remaining mechanisms: stress-related reproductive failure or damage to reproductive organs. Again, by avoiding handling pregnant female seals (or those who could be pregnant) the potential for stress-related effects is minimized. Goebel *et al.* (2003) evaluated the birth rates of female Antarctic fur seals the year following capture, restraint, anesthesia, and post-canine tooth extraction (for age determination) to a control group of females that was not captured. There were no differences detected in birth rates of these two groups. The procedures these fur seals were subjected to were arguably far more intense than any procedure proposed for Hawaiian monk seals. While one cannot assume that results from another species are applicable to Hawaiian monk seals, this information is encouraging. We cannot rule out that handling could damage reproductive organs. On the other hand, if organ damage of any kind did occur, one would expect vital organs important to survival would be as likely, or more likely, to be involved than specific reproductive organs. The lack of any detectable effects on survival described in the preceding sections suggests that vital organ damage, and by inference, reproductive organ damage, is unlikely.

In summary, directly evaluating reproductive effects is far more complex than is the case for effects on survival. While we cannot rule out the potential for reproductive effects of proposed research and enhancement activities, several lines of evidence, including years of monitoring data for Hawaiian monk seals, suggest that this is a minor concern for Hawaiian monk seals.

4.7.1.15 *Assessment of Beneficial Contributions toward Conservation Objectives for Hawaiian Monk Seals*

This element of the direct and indirect effects analysis discusses how well the scope of research and enhancement represented under each alternative would promote recovery and conservation of the species. The evaluation of the alternatives will be conducted with reference to the 2007 Recovery Plan for the Hawaiian Monk Seal (NMFS 2007, hereafter referred to as the Recovery Plan) (see Section 3.3.1.8). The goal of the Recovery Plan is to promote the recovery of the Hawaiian monk seal to the point that it could be down-listed from “endangered” to “threatened” and ultimately to the point that it could be removed from the list of threatened and endangered species under the ESA. The Draft Recovery Plan focuses on factors impeding recovery of the population and the actions necessary to promote recovery. The following is an excerpt from the Executive Summary of the Recovery Plan:

RECOVERY STRATEGY: While recommendations within this report are many and detailed, there are four key actions required to alter the trajectory of the Hawaiian monk seal population and to move the species towards recovery:

1. Improve the survivorship of females, particularly juveniles, in sub-populations of the NWHI. To do this requires the following:

- *maintaining and enhancing existing protection and conservation of habitat and prey base;*
- *targeting research to better understand the factors that result in poor juvenile survival;*
- *intervening where appropriate to ensure higher survival of juvenile and adult females;*
- *continuing actions to protect females from individual and multiple male aggression and to prevent excessive shark predation;*
- *and continuing actions to remove marine debris and reduce mortality of seals due to entanglement.*

2. Maintain the extensive field presence during the breeding season in the NWHI. Field presence is critical not just to the monitoring and research efforts, but also to carry out the active management and conservation of Hawaiian monk seal subpopulations in these areas.

3. Ensure the continued natural growth of the Hawaiian monk seal in the MHI by reducing threats including interactions with recreational fisheries, disturbance of mother-pup pairs, disturbance of hauled out seals, and exposure to human and domestic animal diseases. This should be accomplished with coordination of all federal, state, local and non-government parties, volunteer networks, and increased outreach and education in order to develop a culture of co-existence between humans and seals in the MHI.

4. Reduce the probability of the introduction of infectious diseases into the Hawaiian monk seal population.

The various alternatives will be qualitatively analyzed with reference to how well they address the Recovery Plan's Recovery Strategy.

4.7.1.16 Methodology Used to Evaluate Two-Stage Translocation Effects on Hawaiian Monk Seals

The option to conduct two-stage translocation to enhance juvenile survival is included in Alternatives 3 and 4. The conservation benefits of two-stage translocation are evaluated independently from the effects of other activities. The methods used for this evaluation rely on simulation modeling and are described in detail in Appendix E (Two-Stage Translocation: A Proposal for Enhancement of the Endangered Hawaiian Monk Seal). Key aspects of the methodology are summarized below and in Appendix F. Because this is a new type of intervention, there are limited existing data with which to formulate predictions about its expected benefits or risks. In such cases, it is often beneficial to employ simulation modeling to provide quantitative analysis of the expected outcomes.

For this evaluation, the monk seal stochastic simulation model (Appendix J) was used to compare the expected outcomes from a representative set of translocation scenarios as permitted under each alternative. In practice, the specific two-stage translocation plan to be undertaken in a given year will be determined according to the most recent data available for each subpopulation in accordance with the decision framework described in Appendix E and summarized in Chapter 5. Results from preceding translocation efforts, logistics to accomplish the translocation, funding, and other considerations will be important factors in that determination. Based on that assessment, the translocation plan implemented in a given year might involve either single or multiple donor and nursery sites, provided that the site selection is consistent with the provisions of the operative alternative (no translocations of weaned pups from the NWHI to the MHI are allowed under Alternative 3). Further, the number of seals collected and translocated to each site can vary and will be determined following the provisions of the decision framework (Appendix E).

The allowance for flexibility in site selection and number of handled seals means that no single simulation scenario can fully represent all of the possible combinations and outcomes that might be undertaken pursuant to the translocation strategy. The simulation scenarios used for this evaluation are hypothetical and were selected to illustrate the salient aspects of the two-stage translocation concept as permitted under each alternative. In practice, prior to initiating an action, additional simulations and ancillary analyses will be undertaken to inform NMFS about the relative benefits that might accrue from various translocation scenarios under consideration in a given year.

For all simulation scenarios presented here, French Frigate Shoals was chosen to represent the "donor" site because this site has consistently had the poorest juvenile survival of any site (recent year's survivorship to age 3 and age 4 is 0.137 and 0.123, respectively). The simulations modeled the collection of 10 female pups annually for 5 years at French Frigate Shoals, with subsequent release at the nursery site. Simulations were run with and without a first-year survival decrement ("nursery site decrement") for translocatees as compared to survival of the native born seals at the release site. This decrement was primarily intended to represent a survival penalty that might result from smaller weaning girth as compared to native born seals at the nursery site.

The survival decrement, or penalty, represents a proportionate reduction in the survival rate for the translocated seals relative to other, non-managed seals of the same age at the nursery or return site. For example, if the survival rate for age 1 seals is normally 0.60 and the survival decrement is 0.90, the translocated seals will have a survival rate = 0.54 (0.90 * 0.60). As described in Appendix E, a decrement value of 0.90 (10% survival penalty) was used in those simulations that included the decrement. For the next two simulation years subsequent to the first year after release, translocated seals shared the same survival rate as native-born seals.

For all of the simulated translocations described here, seals were returned to their birth site at age 3 years. At this second stage of the simulated translocations, another survival decrement ("return decrement") was optionally applied to represent differential survival relative to non-translocated seals left at the original site. This decrement was primarily intended to represent the survival penalty that might result from translocated seals being unfamiliar with their new environment. As with the previous "nursery site survival decrement", the "return decrement" applied only to the first year after release. In the simulations that included this decrement, the value was set to 0.71 (29% survival penalty relative to non-treatment seals) to indicate the worst performance expected from the second stage of the translocation. The derivation of this value is described in Appendix E.

The metrics used to evaluate the outcome of the translocation simulations were:

- Mean final abundance (*N*) at the original donor site;
- Population reproductive value (V_{pop});
- Number of mature females (Nf_{mature});
- Realized growth rate ($\lambda_{realized}$) for the donor subpopulation from year 1 to year 10 of the simulation;
- Survivorship of the translocated seals (l_x to age 4); and
- Intrinsic growth rate (λ_{trans})[1] for the lifetable representing the translocated seals.

All results are compared to results of a baseline simulation scenario of the same duration in which no translocation occurred. The baseline scenario projected that in 10 years, the mean number of monk seals in the total population would be 898.##

[1] There are some subtleties associated with computing λ_{trans}, which make this a somewhat conservative value. First, it is assumed that the observed reproductive schedule for the translocated seals will match the estimated rates for the non-translocated French Frigate Shoals, which grew up at that subpopulation. However, if as expected, the translocated seals returned to French Frigate Shoals are in better condition than the non-translocated seals, their reproductive patterns may be closer to the nursery sites, (Laysan Island or the MHI) which have more favorable reproductive curves (see Figure 3 of Appendix E, Translocation Paper). Further, the lifetable from which λ_{trans} is calculated contains a pre-weaning survival value (0.77) equal to that observed at French Frigate Shoals in recent years. In fact, translocated seals would be selected *after* weaning, so that their actual pre-weaning survival value would be 1.0, which if used instead, would yield higher estimates of λ_{trans}. However, because these seals' survival to weaning was not attributable to the two-stage translocation, using a pre-weaning survival value of 1.0 might suggest the translocation would yield more favorable results than is actually the case. Using either value (1.0 or 0.77) is imperfect, but the latter was chosen as it more conservatively characterized the benefits to conservation.

4.7.1.17 *Direct and Indirect Effects on Hawaiian Monk Seals of Alternative 1 – Status Quo*

Direct and Indirect Mortality Due to Research and Enhancement on Hawaiian Monk Seals (Alternative 1, Status Quo)

Alternative 1 allows for the following lethal takes for both research and enhancement combined (see Table 4.8-3 and Appendix I Alternative 1 Take Table):

- Adult male removal: 10 males can be removed from the population over a five-year period. These seals can be taken for permanent captive care or by euthanasia, and may be removed in one or multiple years.
- Unintentional mortality: Four seals may be unintentionally killed over a five-year period, with no more than two seals taken per year. These seals can be of any size and of either sex. As noted previously, to model an exceptionally high-impact scenario, it is assumed that all these mortalities involve 4-year-old female seals. Note that in Alternative 1, these lethal takes could result either from research or enhancement activities, or both.
- Humane euthanasia: 10 moribund or seriously injured seals may be euthanized. These takes are not simulated in the model. By definition, this would involve seals that would definitely have died without euthanasia, so that there would be no additional mortality attributable to research or enhancement associated with this activity.

In the 10-year projection of Alternative 1 (Status Quo), the simulated loss of four 4-year old females reduced the total abundance from 898 seals (Baseline: scenario 1 of Table 4.8-3) to 889 seals (scenario 2). That difference (9 fewer seals) is attributable both to the lost female seals and the offspring they were likely to produce during the 10-year projection. The additional loss of 10 males over 5 years (scenario 3) reduced the mean abundance by an additional 3 seals. This reduction is less than the number of males removed because the losses were randomly allocated to individual males present in the subpopulation and many of those males were older individuals likely to die sometime within the 10-year projection. These losses reduced the realized population growth rate ($\lambda_{realized}$) from 0.985 to 0.983, when both types of loss (unintentional mortality and male removals) were incorporated into the simulations.

Conclusions for Mortality Effects on Hawaiian Monk Seals (Alternative 1, Status Quo)

Under the exceptionally high-impact scenario modeled, Alternative 1 could result in a reduction of total abundance of 9 seals, representing a 1% decline compared to baseline projections without these takes. This can also be viewed as a reduction in realized growth rate of 0.002. While possible, it is unlikely that all the lethal takes due to research or enhancement would occur, or that they would all involve female seals at peak reproductive value. Thus, the research and enhancement impacts will likely be less than those simulated above.

These very small changes in the population may not be detectable compared to baseline values, so the magnitude and intensity of mortality effects would be minor. Further, because the losses amount to a small number of individuals, the geographic extent/biological level of the impacts would also be minor. The frequency of allowable lethal takes is expected to be low given that they could at most average 0.8 unintentional deaths per year, and would occur with moderate (over a 5–year permit cycle) duration, such that the duration and frequency would be minor. Overall, Alternative 1 would likely result in minor adverse effects on mortality, especially when considered with positive benefits of enhancement actions that directly or indirectly improve survival as described below.

Direct and Indirect Reproductive Effects of Research and Enhancement on Hawaiian Monk Seals (Alternative 1, Status Quo)

As described above, it is difficult to reliably quantify the degree, if any, of negative reproductive effects from research and enhancement activities. To assess a more severe case than would occur by random chance, the simulations assumed that all lethal takes involved females with high reproductive value and also accounted for the loss of the offspring they would have produced, had they not been killed. Mortality effects were all determined to be minor, thus we would assume reproductive effects on the same number of females would be even less consequential.

If reproductive effects extended to a larger number of female seals, they could result in greater impacts but it is unlikely they would be detectable. Thus, mechanisms for possible adverse reproductive effects as a result of research or enhancement exist, but are likely indistinguishable from other natural stresses, so that their magnitude and intensity would be minor. Any such effects would not be measurable, so that their geographic extent/biological level and duration and frequency would be negligible. Overall, as described more in detail in Section 4.8.1 (Assessment of Reproductive Effects Due to Research and Enhancement), the direct and indirect effects from research and enhancement would likely result in negligible reproductive effects given the applicable precautionary measures (no adult female is captured that appears to be pregnant or is otherwise thought likely to be well into a pregnancy even if it is not visually apparent).

Contribution to Conservation Objectives for Hawaiian Monk Seals (Alternative 1, Status Quo)

Alternative 1 represents the Status Quo, representative of current research and enhancement activities under the existing permit. Close monitoring of Hawaiian monk seals over decades of research and enhancement activities included under Alternative 1, with the exception of the more recent addition of de-worming research and small-scale translocations of weaned pups within the NWHI, have demonstrated that procedures used do not result in major adverse effects on this species. In fact, potential effects on mortality and reproduction due to

Alternative 1 research and enhancement are considered either minor or negligible.

Despite the fact that Alternative 1 does address many of the Recovery Plan objectives (see Section 3.3.1.8) to varying degrees, Status Quo efforts have not reversed the decline. Field research monitoring in the NWHI would continue to fulfill Recovery Plan objectives to monitor that portion of the population. Juvenile survival of females would potentially be improved by continued de-worming (if determined effective), current levels of translocations of nursing and weaned pups, disentanglement/de-hooking, and removal of aggressive males under Alternative 1. Continued growth of the MHI population would be supported by de-hooking and disentangling seals, and by translocations of weaned pups from areas where they may be at risk. However, mitigation of disease risk and reduction of unmanageable human-seal interactions would be very limited under Alternative 1 measures.

Conclusions for Conservation Objectives for Hawaiian Monk Seals (Alternative 1, Status Quo)

Alternative 1 would, to some degree, address many of the objectives of the Recovery Plan, though not at a level that would be expected to result in maximum potential effects on recovery. For this reason, the magnitude and intensity of Alternative 1 in meeting conservation objectives would be moderate. Research and enhancement activities would occur throughout the species range such that the geographic extent/biological level would be major. The effects of implementing Alternative 1 would be somewhat periodic in that many enhancement activities are reactive and can only be conducted when opportunities arise (such as disentangling seals). Yet, such interventions that do occur may have long-term effects. Thus, the duration and frequency of conservation contributions would be moderate. Given the past track record of the Status Quo activities, and these considerations described, Alternative 1 would result in a moderate beneficial contribution to conservation objectives.

4.7.1.18 *Direct and Indirect Effects of Alternative 2 – No Action (No New Permits After 2014)*

Direct and Indirect Mortality Due to Research and Enhancement on Hawaiian Monk Seals (Alternative 2, No Action)

Under Alternative 2, existing levels of research and enhancement could continue until the current permit expires in 2014. As of Spring 2013, there have been no unintentional research or enhancement mortalities during the current 5-yr permit cycle, and one adult male has been brought into captivity (none was lethally removed). Assuming the risk of these mortalities is constant over time, mortality for the remainder of the current permit cycle through 2014 is not likely to result in the total number of allowed mortalities or adult males that could be removed (10 takes per year as authorized in the current Permit 10137). Because Alternative 1 mortality effects were all judged to be minor, and mortalities under Alternative

2 would be fewer given that after the permit expires in 2014, no additional research or enhancement would occur on wild seals. Thus, it stands to reason that there would be minor adverse effects on mortality under Alternative 2 until expiration of the permit in 2014 and negligible effects thereafter due to no research or enhancement.

Direct and Indirect Reproductive Effects of Research and Enhancement on Hawaiian Monk Seals (Alternative 2, No Action)

As described under Alternative 1, mechanisms for possible adverse reproductive effects as a result of research or enhancement exist, but are likely indistinguishable from other natural stresses. Alternative 2 reproductive effects would also be negligible once the existing permit expires in 2014.

Contribution to Conservation Objectives for Hawaiian Monk Seals (Alternative 2, No Action)

The difference between Alternative 2 and Alternative 1 in terms of conservation is that under Alternative 2 any positive contributions would cease after 2014. Some conservation actions, such as education/outreach, etc. could continue and some enhancement (*i.e.*, entanglement/de-hooking) could be accomplished but only under the separate permit for the Marine Mammal Health and Stranding Response Program (see Section 1.6) and not as part of this research and enhancement program. Given that most entangled monk seals are encountered in the NWHI during research field camps the majority of disentanglements are done under the Pacific Islands Fisheries Science Center (PIFSC) research and enhancement permit. Under Alternative 2, those field camps would cease after 2014, so there would be no opportunity to disentangle these seals. With the exception of those activities that could be accomplished without permits or under the auspices of stranding response, none of the objectives of the Recovery Plan would be obtained. There would be no field research to monitor populations and detect problems, and no interventions such as de-worming, translocation, etc. to improve juvenile survival.

Conclusions for Conservation Objectives for Hawaiian Monk Seals (Alternative 2, No Action)

Considering that almost all research and enhancement would cease after 2014, the Alternative 2 would not address many of the Recovery Plan objectives, therefore the contribution of this alternative to conservation of the species would be negligible in the long term. Because access to NWHI monk seals would practically cease after 2014, the geographic extent/biological level would be negligible because only scat and spew samples could be collected from vacant beaches, and seals could only be observed and photographed at great distances. The duration and frequency of meeting conservation objectives would be short-term, ending in 2014. Lack of future research and enhancement permits would result in major adverse contributions to conservation given the benefits of continued research and enhancement activities would cease and higher mortality could result from the lack of disentanglement or translocation of pups from harmful situations.

4.7.1.19 *Direct and Indirect Effects on Hawaiian Monk Seals of Alternative 3 – Limited Translocation (Preferred Alternative)*

There are two notable differences between Alternative 3 and Alternative 1 (Status Quo). While, Alternative 3 includes the same activities as Alternative 1, the number of takes allowed is greater for certain activities (*e.g.*, two-stage translocation). In addition, new activities such as expanded deworming efforts and vaccinations are included in Alternative 3. These differences are described more fully in the following sections in order to provide context for the effects analysis for Alternative 3. Appendix I, Alternative 3 Take Table provides the numbers of animals proposed to be taken under this alternative (see also Table 4.8-3).

Increased Takes of Hawaiian Monk Seals For Ongoing Activities Under Alternative 3

For some activities, the number of takes that may occur under Alternative 3 exceeds that allowed under Alternative 1, because of a recognition that new or expanded enhancement activities (*e.g.*, two-stage translocation, de-worming, behavioral modification) will require additional monitoring in order to evaluate the efficacy of these activities. Thus, for example, the number of monitoring takes was increased at most locations (except French Frigate Shoals where the steep decline in population has reduced the number of seals likely to be available for monitoring).

For sites in the MHI and Nihoa, the numbers of seals taken by monitoring, tagging and marking were all increased relative to status quo. This recognizes both the need for more monitoring at these historically under-sampled sites and the fact that these populations are expected to be increasing naturally (*i.e.*, independently of any NMFS action). Therefore, more takes would be required to monitor larger numbers of seals. Likewise, the increased number of weaned pups that may be translocated for risk alleviation (*i.e.*, to move them away from harm) is in anticipation of the growing MHI population and the probability that more pups will be weaned in high risk areas in the foreseeable future.

Health screening and foraging studies (instrumentation) are also higher in Alternative 3 in order to support activities such as translocation and the associated health screening and tracking after their release to monitor outcomes. De-worming takes are also higher under Alternative 3, which would allow for broader application of this potential enhancement tool, should research determine it is effective. Total allowable adult male removals (via euthanasia, placement in captivity, or translocation) were also increased from 10 over 5 years to 20 annually (although the number that could be lethally removed remained at 10 for a 5-yr period). This is in response to recent signs of increasing multiple male aggression at Laysan Island. When the current research and enhancement permit was granted (the basis for Alternative 1), adult male removals were primarily designed to deal with single male aggression. Should there be an increase in multiple male aggression, Alternative 3 allows for the flexibility to translocate sufficient numbers of aggressive males in any year to mitigate this source of mortality on juveniles or females.

Despite the fact that numbers of animals potentially involved in research activities under Alternative 3 increased relative to Alternative 1, the number of unintentional research mortalities remains the same. This is because in the past, Status Quo levels of research and enhancement have not led to the allowable number of lethal takes. It is anticipated that the addition of some research and enhancement activities will not lead to more than the allowed level of takes under Alternative 1.

Increased Takes of Hawaiian Monk Seals for New Activities Under Alternative 3

New research and enhancement activities in Alternative 3 include:

- Two-stage translocation (described in detail in Appendix E). This does not include any translocation of weaned pups born in the NWHI to the MHI.
- Translocations of juvenile seals for research to determine survival of juvenile seals post-translocation.
- Behavioral modification of seals in the MHI.
- Chemical (*i.e.*, GnHR agonist) behavioral modification of aggressive males as an alternative to translocation, permanent captivity or euthanasia.
- Vaccination research and implementation to mitigate infectious disease.
- Unintentional mortality due to enhancement. Recognizing that the increased enhancement efforts listed above entail increased risk as well as increased benefits, additional enhancement-only-related mortalities would be allowed under Alternative 3.

Direct and Indirect Mortality Due to Research and Enhancement of Hawaiian Monk Seals (Alternative 3, Preferred Alternative)

Excluding authorization for the humane euthanasia of up to 10 moribund or severely injured seals, Alternative 3 allows for three other types of lethal take of monk seals:

1. **Adult male removal**: Up to 20 males can be removed from the population over a 5-year period. These seals can be taken into permanent captive care or by euthanasia (no more than 10 by euthanasia over the 5-year period), and may be removed in one or multiple years. While this alternative caps the lethal removals at 10 over 5 years, many more could hypothetically be taken into

permanent captivity. However, in reality it has proven extremely difficult to identify a captive facility with space and resources to take any adult male monk seals. Therefore the simulated scenario allows for a rather liberal 10 to be taken into permanent captivity in addition to 10 lethal removals, for a total of 20.

2. **Unintentional mortality due to research**: A maximum of 4 seals may be taken in 5 years, with no more than 2 seals taken per year. These seals can be of any size and of either sex. This level of lethal take for research only is equal to that allowed for both research and enhancement under Alternative 1. Because there are separate allowances specifically for enhancement-related mortality under Alternative 3 (see below), the 4 research mortalities allowed could be viewed as an increase over Alternative 1. This is justified in the following way. Research-related mortalities have been rare. For example, during the past 4 complete years of permitted research, there has been 1 unintentional mortality, for an average of 0.25 per year. Under Alternative 3, there may be 4 mortalities in 5 years (an average of 0.8 per year). However, mortalities occur in whole numbers only, not fractions, and the proposed takes (4) is already a small whole number.
   Thus, while it is unlikely that this level of takes will occur, it is certainly within the realm of reason that 4 lethal accidents could occur over a 5-year period of research. Moreover, Alternative 3 involves increased research takes in various categories. Many of these takes entail capture, restraint and sometimes sedation, which are the types of activities that present higher risk of unintentional mortality. Specifically, over 5 years, Alternative 3 allows an additional 320 flipper taggings, 150 health screenings, and 30 juvenile monk seal research translocations over and above that allowed under Alternative 1. This additional risk exposure justifies maintaining the requested level of unintentional research mortality.
3. **Unintentional mortality during enhancement activities**: This lethal take is further subdivided into three groups:

   a. Weaned pup (either sex): Up to 4 pups over 5 years, with no more than 2 in one year

   b. Juveniles/subadults (either sex): Up to 8 seals over 5 years, with no more than 4 in one year

   c. Adult Males: Up to 4 males over 5 years, with no more than 2 in one year.

Alternative 3 entails a dramatic increase in enhancement efforts in comparison to Alternative 1. New or expanded enhancement activities included in Alternative 3, which might result in increased takes include:

- Weaned Pups
  - Increased deworming
  - Increased translocation for risk alleviation
  - First stage of two-stage translocation
  - Behavioral modification
  - Vaccination
- Juveniles
  - Increased deworming
  - Second stage of two-stage translocation
  - Behavioral modification
  - Vaccination
- Adult males
  - Doubling potential number of removals in response to increased multiple-male aggression.
  - Initiation of chemical behavior modification

Compounding the risk of simply increasing the number of animals involved in enhancement is that for some of the proposed activities, the inherent risks are not well known. Whereas a large number of weaned pup translocations have been conducted and the level of risk involved is quite low (Baker *et al.* 2011*b*), far fewer cases of juvenile translocations have occurred. The general sense, however, is that juvenile seals are at greater risk of stress and mortality when being held captive. In a 2006 captive care program at Midway Atoll, 6 weaned pups and 1 juvenile seal were held in shoreline pens to be fattened up. All the pups gained weight and were released in good body condition, while the single juvenile died of complications related to stress a few weeks after being brought into captivity (Baker and Littnan 2008). Because juveniles seem subject to greater risk in captivity, the number of allowed lethal juvenile takes in Alternative 3 (8 in 5 years) is higher than that for weaned pups (4 in 5 years), notwithstanding the fact that more weaned pups are likely to be involved in enhancement activities.

Compared to translocation, other enhancement activities with young seals (deworming, behavioral modification, vaccination) are thought to present lower risk. However, these are either entirely new or only rarely tested activities, so that their true risks remain uncertain and difficult to quantify pending initial trials.

A final risk magnifier that is reflected in the number of proposed unintentional mortalities is that some activities, most notably two-stage translocation, involve "grouped risk" whereby several animals will be captured, transported, held in quarantine and released together. In statistical language, by grouping seals in this way, the risk of unintentional mortality becomes "non-independent". That is, if some rare but lethal event should occur (disease outbreak, boating or vehicle accident, etc.), there is greater likelihood of losing multiple seals at one time.

Combining all of these types of take, under Alternatives 3, the total number of seals that could be removed from the population over a 5-year period consists of 24 males (20 removals and 4 unintentional mortality), and 16 additional unintentional mortalities of either sex (including 4 weaned pups, 8 juveniles, and 4 seals of any age/sex).

The simulated loss due to unintentional mortality, in which all of the mortality not specifically designated as males was assumed to apply to females (juvenile females were assumed to be age 3 yr), reduced the mean total population abundance from 898 seals to 874 seals (2.7% reduction; scenarios 1 and 4 in Table 4.8-3). The additional removal of 20 aggressive males (scenario 5) reduced the mean abundance to 864 seals (3.8% reduction). The realized growth rate decreased from 0.985 to 0.981 when all of the allowable takes were included in the simulations.

Conclusions for Mortality Effects on Hawaiian Monk Seals (Alternative 3, Preferred Alternative)

Under the exceptionally high-impact scenario modeled, Alternative 3 could result in a reduction of total abundance of 34 seals, representing a 3.8% decline compared to baseline projections without these takes. This can also be viewed as a reduction in $\lambda_{realized}$ of 0.004.

While possible, it is unlikely that all the lethal takes would occur, nor is it likely that all those not specified as males would turn out to be female seals.

The expected small changes in the population would likely amount to an equivocal change in population status, so that the magnitude and intensity of mortality effects would be *moderate*. Further, because the losses amount to a small number of individuals, the geographic extent/biological level of the impacts would be minor. The allowable lethal takes are moderate frequency (no more than a few per year would be likely) and would occur with moderate duration (according to the 5-year permit cycle), such that the duration and frequency would be moderate. The majority of the potential lethal takes of female seals under Alternative 3 are associated with enhancement activities. These activities will focus on seals that are already at elevated risk of natural mortality and enhancement activities are expected to achieve benefits in improved survival (presented below) The overall adverse direct and indirect effects of research and enhancement on mortality would be minor to moderate adverse.

Direct and Indirect Reproductive Effects of Research and Enhancement on Hawaiian Monk Seals (Alternative 3, Preferred Alternative)

Reproductive effects of Alternative 3 are based on the same assumptions as described for Alternative 1, such that Alternative 3 reproductive effects would be negligible as in Alternative 1.

Contribution to Conservation Objectives for Hawaiian Monk Seals (Alternative 3, Preferred Alternative)

All of the contributions to conservation that would occur under Alternative 1 would also be realized under Alternative 3. However, the suite of additional enhancement activities available under Alternative 3, while they may entail some additional unintended mortalities, are, in aggregate, expected to reap far more benefits. For example, the expansion of de-worming, if effective, would improve juvenile survival and condition. While additional removals of aggressive males would reduce the number of adult males in the future, this would only occur if adult females or young animals were being harmed and killed by these males. In such a case, there is no question that removing aggressive males would yield far greater population benefit by saving female seals relative to the loss of a small number of males (Johanos et al. 2010). Moreover, to the extent that chemical treatment of aggressive male behavior proves feasible, this could also result in improved female survival.

Behavior modification research is intended to develop tools that would allow seals in the MHI that have developed undesirable behaviors to remain in the wild population. This would likely prevent the need to either translocate such seals to areas where their survival may be impaired (NWHI) or to bring them into captivity. Any additional seal that remains wild in the MHI addresses the Recovery Plan objective of fostering MHI population growth. Vaccination research, should it lead to a tool for mitigating the introduction or spread of infectious disease, also directly addresses a Recovery Plan objective.

Illustrative simulations to evaluate conservation benefits of two-stage translocation under the constraints of Alternative 3 are as follows. Alternative 3 allows for two-stage translocation to occur among sites within the NWHI, or among sites within the MHI. Seals can also be translocated from the MHI to the NWHI, but no facilitated movements from the NWHI to the MHI are allowed under this alternative (that is, no two-stage translocation from the NWHI to the MHI is permitted). For this alternative, the monk seal model was used to simulate the two-stage translocation of 10 pups per year, collected at French Frigate Shoals and released at Laysan Island (chosen because the most recent data indicate this site has the most consistently favorable juvenile survival among the six main NWHI subpopulations). All surviving seals were returned to French Frigate Shoals at age 3 years. This pattern was repeated for the first 5 years of each simulation.

In the simulated translocations, the translocated seals were returned to their natal site at age 3 years, and therefore the effects of the translocations at the nursery site (Laysan Island) were ephemeral (in other words, they did not cause a direct, long-term change in the local population at the nursery site because they were moved back to French Frigate Shoals). As expected, final abundance at Laysan Island was approximately the same with or without the translocations (171 seals), but the mean population trajectory was elevated while the project was underway (years 1-8) as compared to the baseline trajectory.

At French Frigate Shoals, the mean abundance at the end of the 10-year projection increased from 93 seals (baseline scenario) to 96-101 seals as a result of the temporary translocation of seals to Laysan Island. The highest value (101 seals) resulted from imposing no survival decrements following either stage of the translocation. Similarly, V_{pop} in year 10 increased from 165 newborn equivalents to 203 newborn equivalents with the translocation and no survival decrements. The basis for the V_{pop} increase is evident in the number of mature females present at French Frigate Shoals: 26 with no translocation, versus a maximum of 33 mature females with translocation. With no survival decrements, survivorship to age 4 yr (l_4) of the translocatees increased from 0.123 (baseline) to 0.226 with translocation and no decrements, thereby increasing the intrinsic growth rate of the lifetable describing the demography of the translocated seals (λ_{trans}) from 0.916 to 0.952.

Table 4.8-1 represents results of simulated translocations from French Frigate Shoals to Laysan Island (10 female pups per year for five consecutive years). Result columns are: N = mean final abundance at French Frigate Shoals (5% and 95% tails in parentheses); V_{pop} = population reproductive value in year 10 of the ten year simulation (5% and 95% tails in parentheses); Nf_{mature} = mean final number of mature females (age 5-20 yrs); l_4 = survivorship of translocated seals to age 4 yrs; and λ_{trans} = intrinsic growth rate of modified life table applicable only to the translocated seals.

Table 4.8-1 Results of Simulated Translocations from French Frigate Shoals to Laysan Island

Scenario	Survival Decrements*	N	V_{pop}	Nf_{mature}	l_4	λ_{trans}
Baseline	NA	93 (61,131)	165 (100, 244)	26	0.123	0.916
No decrements	1.00, 1.00	101 (67,141)	203 (124, 299)	33	0.226	0.952
Nursery decrement only	0.90, 1.00	99 (67, 138)	198 (120, 291)	32	0.205	0.944
Return decrement only	1.00, 0.71	97 (66, 135)	187 (115, 275)	30	0.161	0.932
Both decrements	0.90, 0.71	96 (65, 133)	181 (112, 274)	29	0.145	0.926

* Survival decrements for first year after initial release at nursery site, and first year after return to natal site. Tabulated values give proportion of mean survival rate as compared to resident (non-treatment) seals on site.

Conclusions for Conservation Objectives for Hawaiian Monk Seals (Alternative 3, Preferred Alternative)

Alternative 3 would, to the highest degree considered feasible, address all of the objectives of the Recovery Plan. Under Alternative 3 (Preferred), weaned pups may be taken from areas of lower survival to areas of higher survival (1) within the NWHI, (2) within the MHI, or (3) from the MHI to NWHI, with the option of returning the seals to their birth location or nearest appropriate site at age 2 years and older. This alternative excludes moving weaned pups born in the NWHI to the MHI.

Maximum potential benefits might not be realized through the two-stage translocation proposed under Alternative 3 because weaned pups could not be moved from areas of current low survival in the NWHI to higher survival in the MHI. This limits the potential effectiveness of the translocation process given current demographic rates. If future conditions are such that translocations from the NWHI to MHI would be even more beneficial than they may be currently, the inflexibility to conduct such translocations would reduce potential conservation benefits of Alternative 3 further. However, implementing two-stage translocations from the NWHI to the MHI would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation.

The effects of implementing Alternative 3 would be quite immediate in that many enhancement activities could begin right away. Because this Alternative offers a variety of ways to conduct enhancement at any one time, the benefits are more likely to be long-term (because in any year it is likely that some suite of enhancement tools could be implemented), making the duration and frequency of conservation contributions *major*. Overall, there would likely be a *major* beneficial contribution of Alternative 3 towards conservation objectives.

Given that Status Quo (Alternative 1) efforts have failed to reverse the decline, more ambitious measures as represented in Alternatives 3 and 4 have been developed. Relative to Status Quo, the contribution to conservation through Alternative 3 measures would be moderate in magnitude and intensity. The activities would occur throughout the species range such that the geographic extent/biological level would be major. Alternative 3 provides a variety of ways to conduct enhancement at any one time and the benefits are more likely to be long-term (because in any year it is likely that some suite of enhancement tools could be implemented) therefore considered *major* in terms of duration and frequency. Overall, the contribution of beneficial effects towards conservation objectives under Alternative 3 would be *major*.

4.7.1.20 *Direct and Indirect Effects of Alternative 4 – Enhanced Implementation*

Direct and Indirect Mortality of Hawaiian Monk Seals Due to Research and Enhancement (Alternative 4, Enhanced Implemenation)

Alternatives 3 and 4 are quite similar except for the approach to two-stage translocation. Under Alternative 4, NMFS would be permitted to move weaned pups born in the NWHI to the MHI. Since the level of allowable lethal takes are the same for Alternatives 3 and 4, the expected small changes in the population would likely amount to an equivocal change in population status, so that the magnitude and intensity of mortality effects would be moderate. Further, because the losses amount to a small number of individuals, the geographic extent/biological level of the impacts would be minor. The allowable lethal takes are moderate frequency (no more than a few per year being likely) and would occur with moderate duration (5 year permit cycle), such that the duration and frequency would be moderate. As discussed under Alternatives 1 and 3, the levels of take specified in the alternatives present the maximum number possible and likely would not be reached under any alternative, including Alternative 4. Therefore, the overall direct and indirect effects of mortality would likely be minor to moderate adverse under Alternative 4, considering this represents the exceptionally high-impact simulation scenario and risks must be balanced with the potential gains from the contribution towards conservation objectives summarized below.

Direct and Indirect Reproductive Effects of Research and Enhancement on Hawaiian Monk Seals (Alternative 4, Enhanced Implementation)

The same logic applied in analysis of Alternatives 1 and 3 reproductive effects, would also apply to Alternative 4. Thus, Alternative 4 reproductive effects would be negligible as in the other alternatives.

Contribution to Conservation Objectives for Hawaiian Monk Seals (Alternative 4, Enhanced Implementation)

The distinction between Alternatives 3 and 4 becomes apparent when considering the potential benefits to conservation of two-stage translocation. Under Alternative 4, while many of the benefits described under Alternative 3 would be the same, there would be potential to yield greater results given the additional option of moving seals from the NWHI to the MHI as discussed here.

Given recent survival rates, the potential benefits associated with two-stage translocation of weaned pups from French Frigate Shoals to the MHI, an option which is unique to Alternative 4, are greater than those likely to result from a within-NWHI translocation (Alternative 3). The mean final abundance at French Frigate Shoals increased from 93 seals (baseline) to 104-112 seals with translocation. Similarly, the number of mature females increased from 26 at the end of the ten year baseline projection, to 36-43 with translocation, giving an increase in V_{pop} from 165 newborn equivalents (baseline) to 221-263 newborn equivalents. Survivorship to age 4 yr (l_4) for the translocatees increased from 0.123 to 0.434 with translocation and no survival decrements, giving λ_{trans} = 0.991 for the lifetable associated with the translocated seals.

Table 4.8-2. Results of simulated translocations from French Frigate Shoals to MHI (10 female pups per year for five consecutive years). Result columns are: N = mean final abundance at French Frigate Shoals (5% and 95% tails in parentheses); V_{pop} = population reproductive value in year 10 of the ten year simulation (5% and 95% tails in parentheses); Nf_{mature} = mean final number of mature females (age 5-20 yrs); l_{x-4} = survivorship of translocated seals to age 4 yrs; and $\boldsymbol{\lambda}_{trans}$ = intrinsic growth rate of modified life table applicable only to the translocated seals (see Table 4.8-2).

Table 4.8-2 Results of Simulated Translocations form French Frigate Shoals to MHI (10 Female Pups per Year for 5 Consecutive Years)

Scenario	**Survival Decrements***	**N**	**V_{pop}**	**Nf_{mature}**	**l_4**	**λ_{trans}**
Baseline	NA	93 (61,131)	165 (100, 244)	26	0.123	0.916
No decrements	1.00, 1.00	112 (78, 151)	263 (169, 375)	43	0.434	0.991
Nursery decrement only	0.90, 1.00	111 (77, 151)	252 (162, 360)	41	0.391	0.985
Return decrement only	1.00, 0.71	105 (71, 144)	228 (144, 326)	37	0.310	0.969
Both decrements	0.90, 0.71	104 (71, 143)	221 (138, 325)	36	0.279	0.964

Note: Survival decrements for first year after initial release at nursery site, and first year after return to natal site. Tabulated values give proportion of mean survival rate as compared to resident (non-treatment) seals on site.

Conclusions for Conservation Objectives for Hawaiian Monk Seals (Alternative 4, Enhanced Implementation)

Alternative 4 would, to the highest potential degree, address all of the objectives of the Recovery Plan. The option to conduct two-stage translocation using the MHI as a temporary nursery site, would allow the maximal potential benefits, given current demographics, to be achieved. Also, the flexibility to adapt to potential future conditions that might make translocations from the NWHI to MHI even more beneficial, would allow NMFS to adapt strategies to a greater range of future scenarios. These considerations make the magnitude and intensity of Alternative 4 conservation benefits *major*. The activities would occur throughout the species range such that the geographic extent/biological level would be *major*.

As discussed above, implementing two-stage translocations from the NWHI to the MHI would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation.

The effects of implementing Alternative 4 would, like Alternative 3, be quite immediate in that many enhancement activities could begin right away. Because this Alternative offers a variety of ways to conduct enhancement at any one time, the benefits are more likely to be long-term (because in any year it is likely that some suite of enhancement tools could be implemented), making the duration and frequency of conservation contributions *major*. Overall, there would likely be a *major* beneficial contribution of Alternative 4 towards conservation objectives. Again, the only difference between Alternative 4 and Alternative 3 is the provision for two-stage translocation of weaned pups from the NWHI to the MHI. Because that action has been deemed infeasible for the present and next several years, Alternative 4 would be equivalent to Alternative 3 in practical terms for at least several years.

Table 4.8-3 Simulation results for lethal takes for Alternatives 1 and Alternatives 3/4 (allowable lethal take is equivalent for Alternatives 3 and 4). Main cell entry is the mean value (over 500 simulations), with the 5% and 95% tails from the projections in parentheses. Details of number and types of take and simulation design are provided in the text.

Table 4.8-3 Simulation Results for Lethal Takes for Alternatives 1, 3, and 4

Scenario	Description	Total abundance	Realized growth rate
1	Baseline (no takes)	898 (773,1025)	0.985 (0.971, 0.998)
2	Alt. 1 Status Quo (unintentional mortality only)	889 (766,1019)	0.984 (0.970, 0.998)
3	Alt. 1 Status Quo (unintentional mortality and male removals)	887 (770,1014)	0.983 (0.970, 0.997)
4	Alt. 3-4 (unintentional mortality only)	874 (757,996)	0.982 (0.969, 0.996)
5	Alt. 3-4 (unintentional mortality and male removals)	864 (749,985)	0.981 (0.968, 0.994)

4.7.1.21 Cumulative Effects of Alternatives on Hawaiian Monk Seals

Summary of Direct and Indirect Effects of the Alternatives on Hawaiian Monk Seals

Direct and indirect mortality and reproductive effects of research and enhancement activities may result from disturbance, capture, and handling. The alternatives vary by the levels of take permissible for research and enhancement and were evaluated in terms of the amount of mortality and reproductive effects that would occur under a given scope of research (Sections 4.8.1.15 through

4.8.1.18 and Appendix I, Take Tables). Table 4.8-4 summarizes the direct and indirect effects of the alternatives on monk seals.

Table 4.8-4 Summary of Direct and Indirect Effects of the Alternatives on Hawaiian Monk Seals

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementatio n**
Mortality	Minor adverse	Negligible	Minor to moderate adverse	Minor to moderate adverse
Reproduction	Negligible	Negligible	Negligible	Negligible
Contribution to Conservation Objectives	Moderate Beneficial	Major adverse	Major beneficial	Major beneficial

Past, Present and Future Actions and Events Contributing to Cumulative Effects on Hawaiian Monk Seals

As described in detail in Section 3.3.1.3, Hawaiian monk seals are the most endangered pinniped species in U.S. waters and the second most endangered pinniped in the world. Hawaiian monk seals were listed as endangered in 1976 (41 FR 51611; November 23, 1976) due to a significant decline of over 70% since 1958 based on 2010 population estimates. The most recent published estimate of total abundance is 1,125 seals, declining at approximately 4.5% per year (Carretta *et al.* 2012). Table 4.8-5 presents past, present and future actions and events that may contribute to cumulative effects (beneficial and adverse) to the Hawaiian monk seal population.

Table 4.8-5 Hawaiian Monk Seal Cumulative Actions and Events

Hawaiian Monk Seal Cumulative Actions and Events			
Action / Event	**Potential Effects**	**Description/Example**	**Effect**
Natural Events			
Tsunami, volcano, earthquake, hurricane	• Prey availability • Changes in habitat	• 2011 Japanese Tohoku earthquake and tsunami debris • Debris increases likelihood of entanglement and affects habitat suitability for molting, resting, and pupping areas	**-**
Climate change		• Long-term dynamics are driven in large part by climate (ocean variability) (Baker et al. 2012).	**-**
Shark predation	• Mortality • Injury	• 1997 – 2006: 170 monk seal pups impacted by sharks at FFS (injured, confirmed and inferred deaths) • 2007 – 2012: 30 deaths due to shark predation at FFS	**-**
Male monk seal aggression		• 1980s and 1990s, injuries and deaths of female monk seals caused by multiple male aggression attacks inhibited population recovery at Laysan Island. Targeted translocations of adult males reduced this effect but this threat remains and is not unique to Laysan Island. Single male aggression toward pups remains a concern.	**-**
Disease	• Mortality • Reproduction	• Diseases such as morbillivirus could be devastating to monk seal survival or reproduction (see Section 3.1.1)	**-**
Scientific Research			

Research and enhancement permits issued since 2000 (HMS only)	• Education • Disturbance • Mortality • Injury	• 1982 – 1994: 23 seals died during rehabilitation. • 2003-2012: 2 mortalities due to research activities • While mortality has occurred, overall benefits of research and enhancement are beneficial for long term seal survival. • PIFSC - Permit 10137 HMS Research and Enhancement; MMHSRP - Permit 932-1905 ESA Species Emergency Response; Waikiki Aquarium – Permit 15453; Sea World – Permit 16124; Terrie Williams, Long Marine Laboratory – Permit 13602; Sea Life Park, Hawaii – Permit 17429; research on captive animals improves understanding of species for better management of wild populations and enhancement activities educate the public about the species' status	+
Cetacean research	• Disturbance	• Disturbance (i.e., Level B harassment) due to interaction with vessels could occur but would be temporary and not result in injury or mortality.	-
Commercial Activities			

Commercial Fisheries	• Mortality • Injury • Disturbance • Prey availability	• 1913 – 2002: fishing for trevally and amberjack. • 1930 – 2009: bottomfish fishery in NWHI. No current fisheries operating in NWHI • 1940s: Honolulu-based vessels fished lobsters, reef fish, inshore species, and turtles. • 1946: fishing companies used FFS as base for planes exporting scad and other species. • 1950s – 1991: longline for tuna (foreign fleet ended 1976; domestic fleet ended 1991). • 1970 – 1999: Hawaiian spiny lobster, Scaly slipper lobster. 11 million landed • 1965 – 1980: foreign vessels used tangle nets to harvest precious coral; Taiwanese vessels illegally poached 100 tons near Gardner Pinnacles and Lay • 1994, 2006, 2007 and 2010: 4 seals confirmed dead in nearshore gillnets • 1989 – 2010: 75 seals observed with embedded fish hooks in MHI • Hawaii State managed MHI nearshore fisheries a serious concern for seal injury and mortality seal-fishery interactions (NMFS 2012) • Past documentation of interactions between monk seals and Hawaii-based domestic pelagic longline fishery (NMFS 2002); although this fishery targets swordfish and tunas and does not compete with monk seals for prey (NMFS 2012).	-
Removal of marine debris from high entanglement zones	• Injury • Mortality	• 1982-2011: 323 entangled seals, 8 of which confirmed dead • 1994, 2006, 2007: Three seals found dead in gillnets (non-recreational) • 1995: seal found dead with hook lodged in its esophagus. • 1989-2009: 64 seals observed with embedded hooks in MHI • 2011: 9 seals observed hooked • 2012: 14 seals observed hooked (3 dead) • 2013: 3 deaths due to hookings or poor body condition (brought in under MMHSRP permit)	+
Entanglement of Hawaiian monk seals in marine debris or fishing gear			-
Inter-Island Transmission Cable	• Disturbance	• Disturbance (i.e., Level B harassment such as noise) may occur during cable laying activities. • Long-term effects not anticipated as construction-related disturbance due to noise or human presence would be temporary and not result in injury or mortality.	-
Boat tours (i.e., wildlife watching, snorkeling, parasailing, catamaran tours, etc.)		• Disturbance (i.e., Level B harassment such as noise) may occur during tour activities.	-

Residential & Commercial construction (beach, near shore)	• Disturbance • Habitat degradation	• Disturbance (i.e., Level B harassment due to noise) may occur during construction activities as well as once permanent coastal structures are in place (i.e., increased exposure to humans). • Habitat may be permanently altered by coastal infrastructure.	**-**
Military Activities			

Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS)	• Disturbance	• "Potential effects are expected to Level B harassment. Effects to impact rates of recruitment or survival on the associated marine mammal species and stocks not anticipated."
		• "Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) is minimal to negligible." The following permits are for different Navy vessels (US Navy 2012).
		  • File No. 18702: Level B harassment of 9 Hawaiian monk seals during training, testing, and military operations of LFA sonar in Hawaii North mission area; 4 monk seals in Hawaii South mission area.
		  • File No. 18703: Level B harassment of 9 Hawaiian monk seals during training, testing, and military operations of LFA sonar in Hawaii North mission area; 4 monk seals in Hawaii South mission area.
		  • File No. 18704: Level B harassment of 9 Hawaiian monk seals during training, testing, and military operations of LFA sonar in Hawaii North mission area; 4 monk seals in Hawaii South mission area.
		  • File No. 18705: Level B harassment of 9 Hawaiian monk seals during training, testing, and military operations of LFA sonar in Hawaii North mission area; 4 monk seals in Hawaii South mission area (Cody pers. Comm. 2013)
			-

Permit 15806 Letter of Authorization for marine mammal take: U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST])		• Permit 15806 NMFS Incidental Harassment Authorization: Level B harassment not to exceed 110 monk seals annually. Expires January 5, 2014. • Permit 17860 NMFS Incidental Harassment Authorization: Level B harassment not to exceed 1 monk seals annually.	-
Permit 17860 US Navy Acoustic Technology Experiments			
Joint High Speed Vessel		• 2013: second trial of vessel; speed over 40 knots • Planned for use to get warfighters and equipment into combat as needed • Risk of collision leading to serious injury or mortality • Disturbance due to underwater noise	-
Other Activities			

Monk seal harvest for meat, skins and shark bait	• Disturbance • Mortality • Injury	• Hunted to near extinction.	-
Introduction of invasive species or disease	• Competition for habitat or prey • Parasites • Indirect mortality	• Introduction to Laysan Island: rabbits, rats, common sandbur (*Cenchrus echinatus*) (weed) that inhibits regeneration of the primary nest substrate (Eragrostis variabilis) for Laysan finches (Morin and Conant 1998). • Insect and arachnids species (e.g., beetles, weevils, grasshoppers, bees, wasps, spiders and ants), reptiles (e.g., snakes, lizards) and mammals (e.g., mice, rats, dogs, cats) could introduce disease or parasites to seals. • Mammals in particular may increase the risk of diseases such as morbillivirus. • Invasive fish species introduced through ballast water may cause changes in prey dynamics.	-
Removal of marine debris from high entanglement zones Entanglement of Hawaiian monk seals in marine debris or fishing gear	• Injury • Mortality	• 1982-2011: 323 entangled seals, 8 of which confirmed dead • 1994, 2006, 2007: Three seals found dead in gillnets (non-recreational) • 1995: seal found dead with hook lodged in its esophagus. • 1989-2009: 64 seals observed with embedded hooks in MHI • 2011: 9 seals observed hooked • 2012: 14 seals observed hooked (3 dead) • 2013: 3 deaths due to hookings or poor body condition (brought in under MMHSRP permit)	+ -
MMHSRP and other NMFS permits to disentangle, dehook and relocate seals away from harmful situations		• 2005 – 2012: 136 monk seals rescued, rehabilitated or assisted (Personal communication, Look 2013). • 1982 to 1994: 23 seals died during rehabilitation though it is likely these seals would have died from injuries regardless of intervention. • Two seals died in captivity when captured for translocation to mitigate male aggression.	+
Intentional shooting, maiming, injury or other harm	• Disturbance • Mortality • Injury	• 2009: 3 seals (including a pregnant female) shot and killed in MHI (Baker et al. 2010). • 2010 - 2012: 1 juvenile female seal and 4 adult seals were found dead due to multiple skull fractures caused by blunt force trauma on Kauai and Molokai.	-

Habitat protection , loss mitigation and restoration	• Habitat protection	• 1986: critical habitat designated at all beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reef waters, and ocean waters out to a depth of 10 fathoms (18.3 m) around Kure Atoll, Midway Islands (except Sand Island), Pearl & Hermes Reef, Lisianski Island, Laysan Island, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island in the NWHI (51 FR 16047; April 30, 1986). • 1988: critical habitat expanded to include Maro Reef and waters previously designated areas out to 20 fathoms (36.6 m) (53 FR 18988; May 26, 1988).	**+**
Natural resource and species education and outreach	• Education	• 2009-2010: 10,000 people reached through partnerships with 30+ businesses, 50+ school presentations, 100+ schools • Promotes public understanding of monk seals and their habitat – increasing support for their survival	**+**
Hawaiian Monk Seal Rehabilitation Facility at Natural Energy Laboratory of Hawai`i Authority	• Survival • Reproduction	• 2.6-acre property at Keahole Point, Hawai`i for monk seal rehabilitation • Consists of a holding facility with two in-ground, custom-built fiberglass pools and two smaller in-ground pools designed specifically for monk seals.	**+**
Development and Maintenance			
Building islands using dredge and fill	• Contaminants • Habitat degradation • Disturbance • Injury • Stranding • Entanglement in debris	• Accumulation of persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), and polybrominated diphenyl ethers (PBDEs) in tissues through nursing or through diet. • Studies link contaminant exposure and detrimental health effects such as reproductive impairment, immune dysfunction, and cancer in several pinniped species (northern fur seals: Beckmen et al. 2003, harbor seals: De Swart et al. 1994; California sea lions: Ylitalo et al. 2005a; and DeLong et al. 1973). • Coastal projects, bridges, roads and other infrastructure likely have changed the quality and quantity of monk seal critical habitat.	**-**
LORAN station (NWHI)			**-**
Coastal Infrastructure and Development			**-**

Wai`anae Wastewater Treatment Plan Modification Wailupe Stream Flood Control Advanced Wastewater Treatment Upgrade Waimanalo Treatment and Disposal System Lā`ie Wastewater Collection System Expansion Phase II – Lā`ie	• Contaminants • Water Quality	• Improvements in water treatment would likely decrease the level of contaminants and biological waste entering coastal waters.	+
Legislation			
Hawai`i Environmental Policy Act (HRS 343)	• General species and habitat protection	• Protection of Hawaiian natural resources through public disclosure process and government reviewed impact evaluation	+
Hawai`i Act 165	• Survival	• June 2010: Legislature passed Act 165 to increase penalties for taking (includes harassing or killing) a monk seal. Class C felony (up to 5 years imprisonment). Someone convicted under this law could face a fine of up to $50,000.	+

Hawaiian Monk Seal Cumulative Effects Conclusion

Cumulative Hawaiian Monk Seal Mortality

Table 4.8-6 summarizes cumulative take, including mortality, of Hawaiian monk seals for cumulative actions and events that can currently be quantified. The primary contributors to adverse cumulative effects on Hawaiian monk seal mortality include entanglement, predation, male seal aggression, infectious diseases, starvation (food limitation), habitat loss, fishery interactions, and other human interactions such as intentional killing.

Table 4.8-6 Hawaiian Monk Seal Take (Including Mortality) Due to Cumulative Actions and Events (Table will be inserted during final editing)

In the long term, once the current permit expires in 2014, Alternative 2 (No Action) would contribute no mortalities. While direct mortality of research and enhancement would no longer be possible, indirect mortality associated with the cessation of beneficial activities such as moving seals away from harmful situations, could contribute to an adverse cumulative effect on seal survival.

Alternative 1 (Status Quo), assuming the maximum allowed mortality impact, would result in an estimated 11 fewer seals in the population at the end of 10 years. Compared to the number of mortalities caused by predation and starvation (6-11 pups per year eaten by sharks at French Frigate Shoals alone) combined with mortalities resulting from but not limited to entanglement, intentional lethal killings by humans and potential diseases in the future, the contribution of Alternative 1 to cumulative adverse effects from mortality would be minor and would therefore be unlikely to cause the population to decline. In addition, Alternative 1 would result in moderate benefits to survival through enhancement activities intended to promote survival.

Alternatives 3 (Limited Translocation, Preferred) and 4 (Enhanced Implementation), assuming the maximum allowed mortality impact, would result in an estimated 34 fewer seals in the population at the end of 10 years. This level of mortality would result in a minor adverse contribution to cumulative effects of mortality considering other causes of mortality shown in Tables 4.8-5 and 4.8-6. Importantly, other actions proposed under Alternatives 3 and 4 such as two-stage translocation to improve survival, protection against disease, removal of seals from harmful situations, and behavior modification to minimize interactions with fisheries would result in major beneficial contributions to recovery and promote better survival of the species.

Cumulative Reproductive Effects for Hawaiian Monk Seals

Disturbance from research and enhancement activities would likely result in negligible effects on reproduction as discussed in Sections 4.8.1.17 – 4.8.1.20. Other human disturbance such as recreation and coastal development may cause physical responses and physiological effects in monk seals as described in detail in Section 4.8.1. The intensity of response to a particular stress or disturbance and the ultimate effect on individual animals depends on many factors, including the nutritional and reproductive status of the animal at the time of the stress or disturbance.

Outward observable indications are that Hawaiian monk seals do not usually exhibit strong disturbance responses, and the consequences of other stressors can be difficult to attribute to reproductive effects alone. However, it is currently not possible to rule out that there may be unobserved deleterious effects on reproduction.

Many seals have become extremely habituated to people and choose to rest on beaches with hundreds of humans in proximity. Still, Baker and Johanos (2004) conducted aerial surveys of all MHI shorelines in 2000 and 2001, and found that most of the seals seen had chosen to land at beaches less frequented by people. This suggests that beach habitat selection of MHI monk seals may be influenced by human disturbance.

Actions and events likely to contribute to disturbance of seals (see Table 4.8-5) include commercial activities such as coastal development, tourism, research (other than seal-specific), military activities, and fisheries interactions. The combination of these actions with proposed research and enhancement alternatives may cause stress to the seals. While it is difficult to determine whether the cumulative effects of disturbance from these activities result in impacts to reproduction, the contribution of the alternatives would be negligible.

Cumulative Contribution to Conservation Objectives for Hawaiian Monk Seals

Section 3.3.1.3 and the 2007 Recovery Plan (NMFS 2007) describe numerous factors that influence the population dynamics of Hawaiian monk seals and many types of management actions that are likely to be necessary to promote the recovery of the population. The proposed alternatives were evaluated against the conservation objectives outlined by the Recovery Plan and, in essence, Alternatives 3 and 4 provide the most benefit to the species by providing major beneficial contributions to conservation while Alternative 2 would likely result in major adverse effects to conservation because research and enhancement actions would stop in 2014. Alternative 1 provides some conservation benefits however, the limitations described in Section 4.8.1.15 result in only moderate contribution to overall cumulative effects to conservation objectives.

Other factors contributing beneficially to conservation of the species include the MMHSRP (Permit 932-1905) responsible for disentanglement, dehooking and moving seals away from other harmful situations. The proposed Hawaiian Monk Seal Rehabilitation Facility at Natural Energy Laboratory of Hawai`i at Keahole Point would also benefit the species through rehabilitation. Information from scientific research and benefits of enhancement activities on monk seals play a crucial role in making informed decisions about these regulations and management actions with the overall purpose of recovering the species.

4.7.2 Marine Water Quality

As described in Section 3.2.7, Marine Water Quality, the overall quality of Hawai`i 's coastal waters, based on the Water Quality Index, is 78% rated Good, 18% fair and 4% poor (EPA 2008).

Marine waters surrounding Hawai`i are classified as either Class AA or Class A, based on protection of water quality (HAR Chapter 11-54). The open coastal waters around the NWHI are classified as Class AA waters (HAR Section 11-54-6[b][2][A][ix] and [x] from the shoreline to a depth of 183 meters or 600 feet). The objective of Class AA waters is that they remain as nearly as possible in their natural pristine state, while Class A waters are maintained for multiple uses, with lower water quality standards applied to them.

Research and enhancement activities that could cause impacts to marine water quality in the near shore regions include spills and leaks of fuels and contaminants during vessel and small boat operations; introduction of biohazards from the use of drugs such as antibiotics, de-wormers, and vaccination research; introduction of heavy metals and other contaminates from external instruments deployed on animals; and effluent from maintenance of seals in shore-based temporary pens.

4.7.2.1 *Direct and Indirect Effects of Alternatives on Marine Water Quality*

Status Quo (Alternative 1) activities would have none to negligible adverse impacts on nearshore marine water quality. Researchers using small boats and large vessels would be required to follow protocols for boat operations and refueling prior to receiving approval to conduct the work under a Monument permit (PMNM-2013-001 presented in Appendix G). In the NWHI, boat emissions are controlled by the Monument proclamation and management requirements; and researchers are required to follow these requirements. Researchers would also follow these protocols for operations in the MHI.

In addition to permit conditions, there are several Monument Best Management Practices (BMPs) that are designed to avoid, minimize or mitigate potential impacts to water quality (see Appendix G). Monument Permit PMNM-2013-001 specifies measures to minimize impacts on water quality due to boating:

- Tenders and small vessels mush be equipped with engines that meet EPA emissions requirements;
- Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or nearshore waters; and
- Special Conditions and Rules for Small Boat Operations are required at Tern Island (Monument BMP #013), which mandate specific notification and operator training.

Under the Status Quo, small boats (less than 20 ft) used by NMFS researchers conducting Hawaiian monk seal research and enhancement activities include: Boston whalers, ridged hull Zodiacs, Zodiac and Achilles inflatables and personal watercraft. These small boats can be launched from larger ships to access the islands and conduct research or can be used for access between research locations. All small boats and the larger research vessels used by NMFS such as the NOAA R/V Oscar Elton Sette (224 ft), the R/V Searcher (97 ft), and the M/V Kahana (160 ft), would be required to follow all permit requirements, provisions, and BMPs to protect water quality when working in the Monument and MHI. Thus, impacts to water quality from boat operations would be negligible.

For seals that are maintained in temporary pens in the NWHI, any seal effluent would not be expected to be substantially higher than that which naturally occurs in nearshore waters, as determined in previous NEPA documents (NMFS 2003; NMFS 2009x). The construction of temporary shoreline or land-based pens to hold seals temporarily (up to 2 weeks) for translocations would not be expected to impact water quality. A limited number of animals would be held at any given time, so feces and urine would not concentrate more than would from a natural aggregate of seals. Wastes would be diluted from currents and scats would be removed from the dry section of the pen before they could enter the water column (NMFS 2009x).

For the same reasons, the use of drugs in Hawaiian monk seals in the wild (*e.g.*, deworming medications, antibiotics) would likely result in diffuse, dilute and ephemeral environmental dispersal of the drugs, such that impacts on water quality and any non-target organisms in the water are expected to be extremely low (NMFS 2009x; NMFS 2010).

External instruments deployed on monk seals for foraging and monitoring studies are sealed by plastic polymer resin. Therefore, no leakage of metals or other materials from batteries would occur in the water column or on haulout areas if researchers are not able to retrieve the instruments and they fall off when an animal molts.

Alternative 2 (No Action) would result in no additional effects on marine water quality once the current permit expires in 2014 as no research and enhancement activities for Hawaiian monk seal would be permitted.

Despite the additional activities and expanded scope and methods under Alternative 3, would still result in a negligible potential to impact water quality due to the use of small boats. Considering the strict guidelines described above for Alternative 1, which would also be in place under Alternative 3, the potential adverse effects of Alternative 3 on water quality would be negligible. Alternatives 3 (and 4) include the use of long acting antibiotics to treat abscesses and the initiation of vaccination studies, potentially on free-ranging Hawaiian monk seals. It is not likely that the antibiotics or viruses that would be shed due to vaccination would be encountered in high enough concentrations to affect water quality.

Alternative 4 may result in slightly greater use of boats due to potential increases in the number of translocations however, the additional boats and research vessels to translocate weaned pups between NHWI and MHI would still not result in anything but negligible impacts to water quality particularly considering the controls and mitigation measures already in place.

4.7.2.2 *Cumulative Effects of Alternatives on Marine Water Quality*

Given that all of the Alternatives would result in negligible affects to marine water quality, no cumulative impacts are anticipated.

4.7.3 *Sea Turtles*

This section addresses potential direct, indirect and cumulative effects of the alternatives on sea turtles in the NWHI and MHI. In general, there are two potential types of effects on sea turtles that could result from the alternatives:

- Disturbance of individual sea turtles in the nearshore environment; or
- Disturbance of individual sea turtles on beaches during nesting.

Based on these types of potential effects, Table 4.4-2 in Section 4.4.2 summarizes the criteria used to evaluate impacts of the alternatives on sea turtles. As indicated in the table, the geographic extent, magnitude, frequency, and intensity are used to evaluate the level of potential effects on sea turtles. While sonic tags (which would transmit signals up to 69 kHz) may also be used during research and enhancement activities, sea turtles have a hearing range from approximately 100 to 1000 Hz (Bartol *et al.* 1999, Ridgway *et al.* 1969), and also would not be affected by the sonic tag transmissions. Therefore, effects of sonic tags are not further evaluated here.

The alternatives could result in direct effects on individual sea turtles through vessels in the nearshore environment, or through human activity on beaches during ground surveys or other research and enhancement beach activities. Activities related to field camps (Section 3.3.1.9) may also disturb turtles. Adherence to the BMPs for Monument (Appendix G) would minimize potential adverse effects on turtles. These special conditions for field camps and research activities in the Monument are in place to ensure preservation of the NWHI native ecosystem, including turtles (PMNM 2008).

Indirect effects on sea turtles could result from disturbance, and are evaluated here in terms of how potential indirect effects might ultimately impact turtle reproduction. Such effects would only occur if an alternative affects the monk seal population in the NWHI and MHI, and then the Hawaiian monk seal population, in turn, affects the sea turtle population. Even if the Hawaiian monk seal population increased substantially, it is unlikely that any seal interactions with sea turtles would result in population-level effects, as neither species is a major predator or competitor with the other. Therefore, effects discussed below focus on the potential for direct effects.

The research and enhancement could affect sea turtles if activities resulted in measurable effects including:

- Breeding and nesting success; and
- Disturbance of sea turtles.

The following discussion analyzes the potential for the alternatives to affect sea turtles through these two pathways.

4.7.3.1 *Breeding and Nesting Success of Sea Turtles*

Green sea turtles that are asleep and basking on the beach are generally unaware of unobtrusive human presence such as observing seals. However, some activities, such as small boat transits and landings, capturing a seal, and other research activities may waken basking turtles, causing them to flee into the water. To the extent that the research and enhancement activities in the NWHI or MHI could result in increased human presence near nesting beaches due to ground surveys, specimen collection, or other activities, up to 200 sea turtles nesting on beaches could be incidentally harassed annually. This disturbance could alter their breeding and nesting activities. The extent of these effects would depend on whether humans were present during nesting or breeding season, the proximity of activities to nesting areas, as well as the duration of the activity. Although green sea turtles nest throughout the Hawaiian Archipelago, over 90% nest at French Frigate Shoals in the NWHI (NMFS 1998). Thus, by minimizing human activities during green turtle nesting in specific areas such as French Frigate Shoals, potential effects could be avoided (NMFS 2003; NMFS 2009b; USFWS 2009c).

The USFWS requires BMPs are followed to minimize and avoid the unintentional disturbance of basking and/or nesting green sea turtles while conducting research or camping on various islands (USFWS 2009c). These measures include the following:

- Walking is prohibited on all beaches, from dusk to dawn, where adult turtles rest;
- All field camps will use maximum light control (shading, minimum wattage, etc.); and
- All field camps must avoid disorienting hatchling turtles.

4.7.3.2 *Mortality Effects on Sea Turtles*

Sea turtles could be killed if vessels used during research and enhancement activities collided with individual sea turtles. To date, no collisions with sea turtles during Hawaiian monk seal research and enhancement activities have been documented. Additionally, if monk seal researchers encountered basking turtles on beaches, and the turtles subsequently moved away from their basking site, this could result in turtles entering the water making them more vulnerable to predation or collisions however this effects is difficult to document or measure. The threat of boat strikes would be minimized by operating small boats at a moderate speed while watching for objects in the water, including turtles. While the consequences of vessel collisions are high (*i.e.,* resulting in serious injury or mortality), the likelihood of this occurring is low (NMFS 2003; NMFS 2009b).

Researchers may enhance habitat for sea turtles when they remove marine debris during field activities. Marine debris affects turtles via ingestion of anthropogenic materials (*e.g.,* plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). Removal of marine debris by researchers for Hawaiian monk seals would likely result in a beneficial effect on sea turtles.

4.7.3.3 *Direct and Indirect Effects on Sea Turtles of Alternative 1 – Status Quo*

Negligible effects on sea turtles would be expected to occur under the Status Quo Alternative. Disruption of breeding and nesting activities or disturbance of individual turtles would not likely result in adverse effects on individuals or the population thus these effects would be negligible. Minor, short-term disturbance during nesting and breeding activities could occur, but with the implementation of BMPs required by Monument permits, these effects would be minimized to a negligible level. Similarly, the likelihood of collisions with vessels during research and enhancement are low due to Monument BMPs and associated mitigation measures described in Appendix G. Impacts to turtles are expected to be temporary disturbances, and no harm or mortality is anticipated (NMFS 2003; NMFS 2009b). Thus, mortality effects on turtles are considered negligible under Alternative 1.

4.7.3.4 *Direct and Indirect Effects on Sea Turtles of Alternative 2 – No Action (No New Permits After 2014)*

Similar to Alternative 1, negligible effects on sea turtles would be expected to occur under Alternative 2. Though not likely, disruption of breeding and nesting or disturbance of individual turtles could occur as a result of research and enhancement activities on wild monk seals only until 2014. Once the current permit expires in 2014, no research or enhancement would occur that could result in disturbance.

4.7.3.5 *Direct and Indirect Effects on Sea Turtles of Alternative 3 (Limited Translocation; Preferred Alternative) and Alternative 4 (Enhanced Implementation)*

Alternatives 3 and 4 do not differ in their potential effects on turtles thus they are described together here. Alternatives 3 and 4 could result in minor disruption of breeding and nesting activities on beaches due to human presence due to the potential for increased activity in the Hawaiian Islands.

Alternatives 3 and 4 would increase the level of ground, boat, and aerial Hawaiian monk seal surveys and beach activities; however, restrictions and mitigation measures for all new activities would be required by the MMPA, ESA, and NMFS to minimize disturbances from research and enhancement activities. In addition, requirements of the Monument and protocols established by the USFWS would be in place to minimize adverse impacts of research activities (Appendix G, PMNM 2013-001; USFWS 2009c).

Minor short-term decreases in sea turtle survival and/or productivity could potentially result from disturbance of nesting and breeding, but with the implementation of procedures required by NMFS, these potential reproductive effects would be minimized to a negligible level.

Alternatives 3 and 4 could result in a small number of individual sea turtles being disturbed by vessels given the increase in activities such as translocation, but this effect would be expected to be very infrequent and of low magnitude, and would thus be negligible.

4.7.3.6 *Cumulative Effects of Alternatives on Sea Turtles*

Sea turtles in the NWHI and MHI, including leatherback, loggerhead, olive ridley, hawksbill, and green sea turtles, are all listed as threatened or endangered under the federal ESA. Sea turtle populations have declined due to incidental take in fishing operations, direct harvest of turtles, entanglement in marine debris, ocean pollution, and disease (*e.g.*, fibropapillomatosis). While the green sea turtle population remains under stress due to these threats, the population is increasing (Section 3.3.2).

Direct and indirect mortality and reproductive effects of research and enhancement activities may result from disturbance or collision with vessels. Table 4.8-7 summarizes the direct and indirect effects of the alternatives on sea turtles.

Table 4.8-7 Summary of Direct and Indirect Effects of the Alternatives on Sea Turtles

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementation**
Mortality	Negligible	Negligible	Negligible	Negligible
Reproduction	Negligible	Negligible	Negligible	Negligible

<u>Past, Present and Future Actions and Events Contributing to Cumulative Effects on Sea Turtles</u>

Past, present and reasonably foreseeable future actions that may affect sea turtle survival or reproduction are summarized in Table 4.8-8.

Table 4.8-8 Effects of Past, Present and Reasonably Foreseeable Future Actions on Sea Turtles

Hawaiian Sea Turtle Cumulative Actions and Events			
Action / Event	**Potential Effects**	**Description/Example**	**Effect**
Natural Events			
Tsunami, Volcano, Earthquake, Hurricane Japanese Tohoku earthquake and tsunami debris	• Changes to habitat • Injury or mortality • Changes in prey due to ecosystem shift	• 2011 Japanese Tohoku earthquake and tsunami debris • Debris increases likelihood of ingestion of debris, entanglement and affects habitat suitability for resting, and nesting areas	-
Climate Change		• Long-term dynamics are driven in large part by climate (ocean variability) (Baker et al. 2012). Variability in fish prey populations are affected by these changes and can be both beneficial and adverse.	-/+
Introduction of Invasive species or disease		• Insect and arachnids species (e.g., beetles, weevils, grasshoppers, bees, wasps, spiders and ants), reptiles (e.g., snakes, lizards) and mammals (e.g., mice, rats, dogs, cats) could introduce disease or parasites to turtles. • Mammals in particular may increase the risk of diseases such as morbillivirus. • Invasive fish species introduced through ballast water may cause changes in prey dynamics.	-
Scientific Research			

Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS LFA) (6 missions) Permit 10137 PIFSC Hawaiian Monk Seal Research and Enhancement Activities to Enhance Understanding of Hawaiian Monk Seal Foraging Ecology at Nihoa Island Genetic Surveys to Address the Level of Isolation Between Shallow and Deep Reef Ecosystems Bathymetric Mapping of the Intersection of Necker Ridge with the Hawaiian Ridge Permit 14097 NMFS Southwest Fisheries Science Center (SWFSC) pinniped, cetacean and sea turtle studies (Harass) Permit 14381 Sampling sea turtle bycatch in Hawaiian Longline Fisheries (Handle / Release) Permit 15685 Ocean capture research of green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) sea turtles in the Hawaiian Islands (Capture/Handle/Release) Retrieval of Ecological Acoustic Recorders (EARs) in Deep Marine Areas	• Education • Disturbance • Injury or mortality	• Direct effects on individual sea turtles through human activity and research; beach disturbance; collisions with vessels. • Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) to fish prey and turtles. • Up to 200 sea turtles nesting on beaches could be incidentally harassed annually. • Marine debris affects turtles via ingestion of anthropogenic materials (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). • While mortality is possible, overall benefits of research and enhancement are beneficial for long term species survival.	**-/+**
Commercial Activities			

Whale watching (Tour boats)	• Disturbance • Injury or mortality	• Potential for collisions between surface vessels and sea turtles. • Noise and movement of vessels can temporarily displace sensitive species in the offshore area, such as the sea turtles. • Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) to sea turtles.	-
Military Activities			
Permit 15806 Letter of Authorization for marine mammal take: U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST]) Permit 17860 Acoustic Technology Experiments Joint High Speed Vessel Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS); NOAA Incidental Harassment Permits 18702 - 18705	• Disturbance • Injury or mortality	• Possible TTS, injury, masking, harassment, contamination, collision, entanglement, and detonation impacts to sea turtles due to military training activities. • Airborne sound from low-flying helicopters or airplanes may be heard by sea turtles while at the surface or underwater. Responses by turtles could include hasty dives or turns, or decreased foraging (Soto et al., 2006). • Degradation or destruction of feeding habitat by underwater detonations and training activities. • Land-based training exercises may displace nesting or resting sea turtles, may damage nests. • Degradation or destruction of feeding habitat by underwater detonations and training activities. • Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) to sea turtles.	-
Other Activities			

Guano mining Feather poaching Turtle harvest	• Mortality and Reproductive effects	• Direct disturbance to breeding and resting individuals during activities. • 18th – 19th Centuries: Unregulated take of meat, eggs for consumption and shark bait. Direct disturbance to breeding and resting individuals during activities.	-
State of Hawai`i DLNR. Clearing of rivers, streams, beach areas	• Disturbance • Mortality and Reproductive effects • Reduction in marine debris	• There are NO regulations as to when activities may occur, there are no stipulations with regards to protection of nesting or resting habitat.	-/+
Removal of marine debris from high entanglement zones MMHSRP and other NMFS permits and authorizations to disentangle, dehook and relocate seals away from harmful situations; also includes activities for other marine mammals including: stranding networks; rehabilitation; responses/investigations of mortality events; biomonitoring; tissue/serum banking; and analytical quality assurance. Fishery Ecosystem Plan for the Hawai`i Archipelago	• Injury or mortality	• Researchers may enhance habitat for sea turtles when they remove marine debris during field activities. Marine debris affects turtles via ingestion of anthropogenic materials (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). Removal of marine debris by researchers for Hawaiian monk seals would likely result in a beneficial effect on sea turtles. • Federal regulations authorize Federal and state employees to aid stranded endangered (50 CFR 222.310) and threatened (50 CFR 223.206) sea turtles.	+
Hawaiian Islands Humpback Whale National Marine Sanctuary Management Plan Revisions Habitat protection , loss mitigation and restoration	• Habitat protection	• Sea Turtles may benefit from Habitat designations; feeding areas, breeding and resting areas.	+
Natural resource and species education and outreach	• Education	• 2009-2010: 10,000 people reached through partnerships with 30+ businesses, 50+ school presentations, 100+ schools	+
Hawaiian Spinner Dolphin Human Interaction Protection Measures	• Disturbance • Injury or mortality	• Sea turtles may benefit from protection measures reducing disturbance and mortality due to ship collisions.	+

Development and Maintenance			
Building islands using dredge and fill Inter-Island Transmission Cable LORAN station (NWHI) Residential & Commercial construction (beach, near shore)	• Contaminants • Habitat degradation • Disturbance • Injury • Stranding • Entanglement in debris	• Accumulation of persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), and polybrominated diphenyl ethers (PBDEs) in tissues through diet. • Contaminants left over from military use of the NWHI islands also continue to affect emergent land areas, especially at Midway and French Frigate Shoals (Keller et al. 2010). • Coastal projects, bridges, roads and other infrastructure likely have changed the quality and quantity of habitat. • Impacts of cable installation are brief and minimal. Laying cable does cause some disturbance of the ocean floor, but within days the area returns to normal. • Impacts to turtles may occur while laying the cable, including entanglement and mortality.	-
Wai`anae Wastewater Treatment Plan Modification Wailupe Stream Flood Control Lā`ie Wastewater Collection System Expansion Phase II – Lā`ie	• Contaminants • Water quality improvements	• Improvements in water treatment would likely decrease the level of contaminants and biological waste entering coastal waters.	+
Legislation			
Hawai`i Environmental Policy Act (HRS 343)	• General species and habitat protection	• Protection of Hawaiian natural resources through public disclosure process and government reviewed impact evaluation	+

Cumulative Effects Conclusion for Sea Turtles

Turtles encounter orders of magnitude more people and boats in the MHI from non-Hawaiian monk seal related activities than under any of the proposed Alternatives. While green sea turtles are the turtle species most likely to overlap with Hawaiian monk seals, the contribution of the proposed research and enhancement activities are not likely to result in anything but negligible cumulative effects given the mitigation measures implemented during research and enhancement. In addition, the removal of marine debris by monk seal researchers would likely be beneficial for sea turtles.

4.7.4 Cetaceans

This section addresses potential direct, indirect and cumulative effects of the alternatives on cetaceans in the NWHI and MHI. As discussed in Section 3.3.3, humpback whales, spinner dolphins, and bottlenose dolphins are the cetacean species most likely to be present in nearshore areas where Hawaiian monk seals and activities associated with the alternatives would occur. The impact discussion therefore focuses on potential effects of the alternatives on these species.

In general, there are two potential types of mechanisms for effects that could result from the alternatives:

- Disturbance due to vessel activities, aerial surveys or beach activities; or
- Collisions with vessels.

Table 4.4.3 in Section 4.4.2 summarizes the criteria used to evaluate effects of the alternatives on cetaceans. As indicated in the table, the geographic extent, magnitude, frequency, and intensity are used to evaluate the level of potential effects.

The alternatives could result in direct and indirect reproductive effects on spinner dolphins or bottlenose dolphins as a result of disturbance due to vessel or aircraft activity during surveys or transport Hawaiian monk seals. However, the disturbance that could occur would likely be short-term and not result in lasting effects on these species.

Spinner dolphins and bottlenose dolphins may alter their behavior in response to a small boat transiting within lagoons where research and enhancement activities may occur. The level of disturbance is temporary and dolphins typically approach researchers, versus showing avoidance behaviors. This disturbance is not likely to result in adverse effects on reproduction.

As summarized in the 2009 EA for NMFS Permit 10137 for monk seal research and enhancement, abundance of humpback whales for the entire North Pacific Ocean is estimated to be 18,302 individuals, with over 50% of the population (approximately 10,000) estimated to winter in Hawaiian waters (Calambokidis *et* *al.* 2008). In 2012, the main Hawaiian Islands insular stock of false killer whales was listed as endangered. These animals could also occur near shore where aerial and boat surveys occur. Most aerial surveys would occur during summer months when humpback whales are not present, but vessel and aerial surveys and transporting seals by air and boat could occur year-round. Takes of humpback whales and false killer whales would be avoided by implementing mitigation measures described in the analysis of alternatives below.

The potential effects of sonic tags are included in the 2009 EA for NMFS Permit 10137 for Hawaiian monk seal research and enhancement (NMFS 2009b) and are summarized here. Sonic tags used during research and enhancement would transmit signals at 69 kHz. While spinner dolphins that occur in lagoon waters of French Frigate Shoals have an estimated auditory range of 150 Hz to 160 kHz (Southall *et al.* 2007), it is not likely that the presence of these tags on pups would have a measurable impact on dolphins. Therefore, under all alternatives, the potential effects of sonic tags are considered negligible.

While it is possible that collisions with vessels used during research and enhancement could result in mortality of humpback whales or dolphins, the likelihood of this occurring is very low. Mitigation measures and BMPs implemented by NMFS such as NAO 217-103 (Management of Small Boats) and Monument Permit Conditions presented in Appendix G. To date, there have been no documented incidents of collision with monk seal research and enhancement vessels.

4.7.4.1 *Direct and Indirect Effects on Cetaceans of Alternative 1 – Status Quo*

Under Status Quo, Permit No. 10137 authorizes annual harassment of 500 spinner dolphins within the lagoon waters at four NWHI sites (Midway Atoll, Pearl and Hermes Reef, Kure Atoll, and French Frigate Shoals). Harassment would occur primarily during summer months but may occur year-round (NMFS 2009b). As described above, the presence of sonic tags on pups would have a negligible effect on dolphins under all alternatives.

Negligible effects on cetaceans would be expected to occur under Alternative 1 given that the interactions with cetaceans are not likely to cause disturbance that would result in reproductive effects and collisions are not anticipated. Mitigation would be incorporated as follows:

- Aerial surveys would be conducted above shoreline areas; in the event cetaceans were encountered near shore, researchers would fly to an altitude of 1000 feet to avoid harassment (NMFS 2009b); and
- If encountered by boat, researchers would maintain a distance of 50 yards (150 feet) for cetaceans other than humpback whales, and a distance of 300 feet if a humpback whale is encountered.

These approach distances are consistent with Federal Regulation (50 CFR 224.103) to avoid take if humpback whales are encountered and NMFS guidelines to avoid harassment of other cetaceans (NMFS 2009b).

4.7.4.2 *Direct and Indirect Effects on Cetaceans of Alternative 2 – No Action (No New Permits After 2014)*

While there is potential for short-term disturbance or low probability of collisions with vessels under Alternative 2 while the permit is still valid, negligible effects on cetaceans would be expected under the No Action Alternative given that the magnitude of potential disturbance is not likely to cause reproductive effects and collisions would be extremely rare. Research and enhancement activities on wild monk seals would discontinue after the current permit expires in 2014.

4.7.4.3 *Direct and Indirect Effects on Cetaceans of Alternative 3 Limited Translocation (Preferred Alternative) and Alternative 4 Enhanced Implementation*

Alternatives 3 and 4 could result in disturbance of up to 500 individual spinner dolphins and 20 bottlenose dolphins annually; however, these incidents are expected to be short-term and not result in long-term or population level effects on reproduction. Given the stringent BMPs (see Appendix G) and other permit conditions implemented by NMFS, there would be negligible effects on reproduction due to research and enhancement activities. As stated under Alternative 1 above, the presence of sonic tags on pups would have a negligible effect on dolphins under all alternatives (NMFS 2009b).

The same procedures and mitigation would be followed in Alternative 3 (Preferred) as that described under Alternative 1 to avoid takes of humpback whales. Aerial survey altitudes would be increased if cetaceans are encountered, and boat surveys would maintain distances to cetaceans consistent with NMFS regulations and guidelines.

While collisions with survey vessels may occur, the increased level of activity under Alternatives 3 and 4 are still not expected to result in mortalities of cetaceans. Vessel activities associated with the research and enhancement would not be frequent, and it is expected that individual dolphins or whales would move away from survey vessels in their vicinity. Although individual dolphins or whales could be injured during collisions, this would be an extremely rare occurrence, and the effect on the populations of humpback whales and spinner dolphins would be negligible.

4.7.4.4 *Cumulative Effects of Alternatives on Cetaceans*

Humpback whales are listed as endangered, under the ESA and depleted under the MMPA. Spinner dolphins in Hawai`i are not listed as threatened or endangered under the ESA, nor are any of the Hawaiian Islands stocks depleted under the MMPA. Recent Stock Assessment Reports (SARs) indicate that Central North Pacific Stock of humpback whale (which winters in Hawaii) has been increasing in the 1990s and 2000s. Estimates of the rate of increase vary, but are generally between 4 and 9% (NMFS 2009). Despite recent concerns regarding potential adverse effects on spinner dolphins due to human interaction (see Section 4.5.2), interactions with monk seal researchers are managed through the stringent Monument permit process and are relatively infrequent compared to other interactions with humans throughout the Islands.

Direct and indirect mortality and reproductive effects of research and enhancement activities may result from disturbance or collision with vessels. Table 4.8-9 summarizes the direct and indirect effects of the alternatives on cetaceans.

Table 4.8-9 Summary of Direct and Indirect Effects of the Alternatives on Cetaceans

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementation**
Mortality	Negligible	Negligible	Negligible	Negligible
Reproduction	Negligible	Negligible	Negligible	Negligible

<u>Past, Present and Future Actions and Events Contributing to Cumulative Effects on Cetaceans</u>

Past, present and reasonably foreseeable future actions that may affect cetacean survival or reproduction are summarized in Table 4.8-10.

Table 4.8-10 Effects of Past, Present and Reasonably Foreseeable Future Actions on Cetaceans

Hawaiian Cetacean Cumulative Actions and Events			
Action / Event	**Potential Effects**	**Description/Example**	**Effect**
Natural Events			
Tsunami, Volcano, Earthquake, Hurricane	• Changes to habitat • Injury or mortality • Changes in prey due to ecosystem shift	• 2011 Japanese Tohoku earthquake and tsunami debris • Debris increases likelihood of ingestion of debris, entanglement and affects habitat suitability for resting, and feeding areas	-
Japanese Tohoku earthquake and tsunami debris			
Climate Change		• Long-term dynamics are driven in large part by climate (ocean variability) (Baker et al. 2012). Variability in fish prey populations are affected by these changes and can be both beneficial and adverse.	-/+
Introduction of Invasive species		• Invasive fish species introduced through ballast water may cause changes in prey dynamics.	-
Scientific Research			

Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS LFA) (6 missions)	• Education • Disturbance • Injury or mortality	• Direct effects on individuals through vessels and aircraft in the nearshore environment; collision, disturbance. • Humpbacks could be killed if vessels used during research and enhancement activities collided with individuals • Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) to cetaceans. • Various cetacean research permits as listed in Table 4.5-2. . Permit 14451 Assessing distribution and abundance of marine mammals on Navy operational area; surface vessel surveys, photo identification, videography, and acoustic recording (Harass)	-
Bathymetric Mapping of the Intersection of Necker Ridge with the Hawaiian Ridge			-/+
Genetic Surveys to Address the Level of Isolation Between Shallow and Deep Reef Ecosystems			
Cetacean research			
Retrieval of Ecological Acoustic Recorders (EARs) in Deep Marine Areas			-
Commercial Activities			
Whaling	• Disturbance • Injury or mortality	• 19th Century subsistence activities. • Commercial whaling: nearly 600 whaling ships were based out of Hawaii in the mid-1800s (Bishop Museum 2013)	-
Whale and dolphin watching (Tour boats)		• Potential for collisions between surface vessels and cetaceans. • Noise and movement of vehicles can temporarily displace sensitive species in the offshore area, such as the cetaceans. • Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) to cetaceans.	-/+
Military Activities			

Joint High Speed Vessel (JHSV)	• Disturbance • Injury or mortality	• Possible TTS, injury, masking, harassment, contamination, collision, entanglement, and detonation impacts to cetaceans due to military training activities. • Airborne sound from low-flying helicopters or airplanes may be heard by cetaceans while at the surface or underwater. Responses by cetaceans could include hasty dives or turns, or decreased foraging (Soto et al., 2006). • Degradation or destruction of feeding habitat by underwater detonations and training activities.	-
Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS); NOAA Incidental Harassment Permits 18702 - 18705			
Permit 15806 Letter of Authorization for marine mammal take: U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST])			
Permit 17860: US Navy Acoustic Technology Experiments.			
Other Activities			

State of Hawai`i DLNR. Clearing of rivers, streams, beach areas	• Disturbance • Mortality and Reproductive effects • Reduction in marine debris	• There are NO regulations as to when activities may occur, there are no stipulations with regards to protection of habitat or species	- /+
Removal of marine debris from high entanglement zones Fishery Ecosystem Plan for the Hawai`i Archipelago MMHSRP and other NMFS permits and authorizations to disentangle, dehook and relocate seals away from harmful situations; also includes activities for other marine mammals including: stranding networks; rehabilitation; responses/investigations of mortality events; biomonitoring; tissue/serum banking; and analytical quality assurance.	• Injury or mortality	• Researchers may enhance habitat for cetaceans when they remove marine debris during field activities. Marine debris affects cetaceans via ingestion of anthropogenic materials (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). Removal of marine debris by researchers for Hawaiian monk seals would likely result in a beneficial effect on cetaceans. • Response to stranded cetaceans may increase survival through rehabilitation or identify causes of mortalities.	+
Hawaiian Islands Humpback Whale National Marine Sanctuary Management Plan Revisions Habitat protection , loss mitigation and restoration	• Habitat protection	• Cetaceans may benefit from Habitat designations; feeding areas, breeding and resting areas.	+
Natural resource and species education and outreach	• Education	• 2009-2010: 10,000 people reached through partnerships with 30+ businesses, 50+ school presentations, 100+ schools	+
Hawaiian Spinner Dolphin Human Interaction Protection Measures	• Disturbance • Injury or mortality	• Cetaceans will benefit from protection measures reducing disturbance and mortality due to ship collisions.	+
Development and Maintenance			

Building islands using dredge and fill	• Contaminants • Habitat degradation • Disturbance • Injury • Stranding • Entanglement in debris	• Accumulation of persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), and polybrominated diphenyl ethers (PBDEs) in tissues through diet. • Contaminants left over from military use of the NWHI islands also continue to affect emergent land areas, especially at Midway and French Frigate Shoals (Keller et al. 2010). • Coastal projects, bridges, roads and other infrastructure likely have changed the quality and quantity of habitat. • Impacts of cable installation are brief and minimal. Laying cable does cause some disturbance of the ocean floor, but within days the area returns to normal. • Impacts to cetaceans may occur while laying the cable, including entanglement and mortality.	-
Inter-Island Transmission Cable			
LORAN station (NWHI)			
Permit 17268 Honolulu Seawater AC (Incidental Take)	• Disturbance • Injury • Stranding	• Potential for collisions between surface vessels and cetaceans. • Noise and movement of vehicles during training can temporarily displace sensitive species in the offshore area, such as the cetaceans. • Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) to cetaceans.	-
Wai`anae Wastewater Treatment Plan Modification	• Contaminants • Water quality improvements	• Improvements in water treatment would likely decrease the level of contaminants and biological waste entering coastal waters.	+
Lā`ie Wastewater Collection System Expansion Phase II – Lā`ie			
Legislation			
Hawai`i Environmental Policy Act (HRS 343)	• General species and habitat protection	• Protection of Hawaiian natural resources through public disclosure process and government reviewed impact evaluation	+

__Cumulative Effects Conclusion for Cetaceans__

While there are several permits for research on cetaceans in the Hawaiian Islands, these authorized research activities are not expected to result in long-term negative impacts on cetacean populations and likely contribute to overall conservation of the species. There are few disturbances to spinner dolphins in the NWHI concurrent with research and enhancement activities, as a limited number of people are able to access the Monument via a permit issued by the Monument, and such permits would not authorize harassment of spinner dolphins unless a research and enhancement permit were issued. Permit No. 1007-1629-01 issued to Dr. Leszek Karczmarski, Marine Mammal Research Program, Texas A&M University, authorized research on spinner dolphins in the NWHI over a six-year period, and expired on August 31, 2007.

Future spinner dolphin management measures may result in time-area closures that would allow the species important protection from human disturbance during critical resting periods and therefore be beneficial to species survival and reproduction. Similarly, Hawaiian monk seal critical habitat designation would likely be beneficial for spinner dolphins due to overall habitat protection in bays shared by seals and dolphins.

Overall, Hawaiian monk seal research and enhancement under any of the alternatives is expected to result in a negligible contribution to cumulative effects on cetaceans. Effects are likely to be negligible due to the temporary duration of research and enhancement activities in the open ocean or nearshore environment. Also, the minimal amount of vessel and airplane activity from monk seal research and enhancement as compared to those associated with recreation, fishing, shipping and other human activities is not likely to result in anything but negligible cumulative effects on cetaceans.

4.7.5 Fish

This section addresses potential direct, indirect and cumulative effects of the alternatives on fish in the NWHI and MHI, by assessing the potential for increased predation from Hawaiian monk seals. Table 4.4.4 in Section 4.4.2 summarizes the criteria used to evaluate effects of the alternatives on fish. Potential effects on fish populations would be similar for Essential Fish Habitat, commercially harvested fish species, and nearshore fish species; thus, potential effects for these categories are discussed together.

As described in Section 3.3.1.5, Hawaiian monk seals are foraging generalists, with a wide variety of prey including several varieties of fish and multiple species of crab and lobster. There is also evidence of variation in diet among individuals, demographic groups (between juveniles and adults/sub adults) and locations (Iverson 2006); indicating that individual monk seal foraging preferences and capabilities play a role in selection of foraging habitat. In other words, diets differ considerably among individual seals.

4.7.5.1 *Direct and Indirect Effects of All Alternatives on Fish*

Given the wide variety of fish consumed by monk seals, the likelihood that seal predation on fish could cause a long-term decline in fish populations is unlikely. Therefore, none of the alternatives would result in any notable effect on fish populations as a result of monk seal predation. Nearshore activities such as vessel surveys are not likely to result in disturbance or mortality of fish and would be considered negligible under all alternatives.

Negligible effects on fish would be expected to occur under the Status Quo Alternative given that the Hawaiian monk seal population is projected to continue to decline despite research and enhancement covered under the existing permit. While this is not to say that predation on fish species by monk seals does not occur, the continuation of research and enhancement activities on seals would not result in dramatic changes in the levels of fish consumed by seals throughout the Hawaiian Islands. In fact, given the projected decline in Hawaiian monk seals under all alternatives, a potential decline in predation on fish over the next 10 years could be reasonably assumed.

The potential effects of sonic tags, which may transmit signals up to 69 kHz, are summarized in the 2010 EA for NMFS Permit 10137 for Hawaiian monk seal research and enhancement (NMFS 2010) as summarized here. Many fish species hear outside of this frequency (A. Scholik, personal communication, March 31, 2009), with the exception of some clupeids (Popper *et al.* 2004). Only a few species of clupeids are found in Hawaiian waters (*e.g.,* the clupeid Spratelloides delicatulus is found from O`ahu to Kure), and if these fish can hear within the frequency emitted by the sonic tags it is highly unlikely that there would be any significant effects on these fish.

4.7.5.2 *Direct and Indirect Effects on Fish of Alternative 3 – Limited Translocation (Preferred Alternative) and Alternative 4 – Enhanced Implementation*

Alternatives 3 and 4 could result in a slight reduction in the decline of the numbers of Hawaiian monk seals. In other words, though the decline may slow, the population would still likely decrease (see Section 4.4.1). As described in more detail in Section 3.3.1.5, foraging competition may help explain differential survival rates of juvenile Hawaiian monk seals at various subpopulations between different habitat areas, but does not provide any indication that the monk seals would be more effective predators than other predators in the vicinity (*e.g.*, birds, sharks, large predatory fish).

Translocating a small number of juvenile monk seals (potentially 20 per year) between islands in the NWHI would not have a measurable effect on any fish species, as the number translocated would typically be small relative to the seal abundance at the recipient subpopulation and would likely represent a small segment of the large marine predator population, particularly when compared to the numbers of predatory fish present in the NWHI (Sprague et al. 2013).

Additionally, the predatory effect on fish resulting from the juvenile monk seals is likely to be the same whether it occurs at the original island or at the island where the juveniles are translocated. Effects of this alternative would be negligible.

It is unlikely that Hawaiian monk seals would have a predatory effect on fish populations that is measurably different than any other predatory effect of other species. Fish consumption by Hawaiian monk seals would be distributed across a wide variety of available prey species, and the effect of translocating Hawaiian monk seals (slowing their population decline) is not likely to be detectable.

4.7.5.3 *Cumulative Effects of Alternatives on Fish*

Fish populations have been affected by commercial fishing, ocean pollution, climate change, and habitat degradation. Direct and indirect mortality from research and enhancement activities is likely to be negligible. Table 4.8-11 summarizes the direct and indirect effects of the alternatives on fish species.

Table 4.8-11 Summary of Direct and Indirect Effects of the Alternatives on Fish

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementation**
Mortality	Negligible	Negligible	Negligible	Negligible
Reproduction	Negligible	Negligible	Negligible	Negligible

<u>Past, Present and Future Actions and Events Contributing to Cumulative Effects on Fish</u>

Past, present, and reasonably foreseeable future actions that may affect fish survival or reproduction are summarized in Table 4.8-12.

Table 4.8-12 Effects of Past, Present and Reasonably Foreseeable Future Actions on Fish

Hawaiian Fish Cumulative Actions and Events			
Action / Event	**Potential Effects**	**Description/Example**	**Effect**
Natural Events			
Tsunami, Volcano, Earthquake, Hurricane Japanese Tohoku earthquake and tsunami debris	• Changes to habitat • Injury or mortality • Changes in prey due to ecosystem shift	• 2011 Japanese Tohoku earthquake and tsunami debris • Debris increases likelihood of ingestion of debris, entanglement and affects habitat suitability	-
Climate Change		• Long-term dynamics are driven in large part by climate (ocean variability) (Baker et al. 2012). Variability in fish prey populations are affected by these changes and can be both beneficial and adverse. However, future climate change projected to shift ecosystem towards smaller fish even if fishing remains constant (Polovina 2011).	- /+
Introduction of Invasive species or disease		• Parasites have been shown to be significant stressors in many species. Reif et al. (2006). • Invasive fish species introduced through ballast water may cause changes in fish population dynamics.	-
Predation by apex predatory fish nearshore (30m depth)	• Mortality	• Apex predatory fish consume a minimum of 66,000 kg/day (146,000 lb/day) approximately 50 times more than a Hawaiian monk seal (Sprague et al. 2013).	-/+
Predation by Hawaiian monk seals nearshore (30m depth)	• Mortality	• Estimated predation by 200 monk seals in MHI is approximately 1,300 kg per day (2,900 lb per day) (Sprague et al. 2013)	-/+
Scientific Research			

Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS LFA) (6 missions) Activities to Enhance Understanding of Hawaiian Monk Seal Foraging Ecology at Nihoa Island Bathymetric Mapping of the Intersection of Necker Ridge with the Hawaiian Ridge Genetic Surveys to Address the Level of Isolation Between Shallow and Deep Reef Ecosystems Incidence and Effects of Coral and Fish Disease within Shallow Water Reefs Tuna Tagging	• Education • Disturbance • Injury or mortality	• Direct effects on individual fish through human activity and research. • Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) to fish. • While mortality is possible, overall benefits of research and enhancement are beneficial for long term species survival.	-/+
Commercial Activities			

Commercial Fisheries (bottomfish and pelagic)	• Mortality • Injury	• 1882: Sea cucumber harvest • 1913 – 2002: fishing for trevally and amberjack. • 1930 – 2010: bottomfish fishery. Following WWII, Honolulu-based vessels had fishery for bottomfish, lobsters, reef fish, inshore species, and turtles. • 1946: fishing companies used FFS as base for planes exporting scad and other species. • 1950s – 1991: longline for tuna (foreign fleet ended 1976; domestic fleet ended 1991). • 1970 – 1999: Hawaiian spiny lobster, Scaly slipper lobster. 11 million landed • 1965 – 1980: foreign vessels used tangle nets to harvest precious coral; Taiwanese vessels illegally poached 100 tons near Gardner Pinnacles and Lay • 1948 – 1978: number of trips per year per fishermen increased and has remained about 8 trips per year between 1980 and 2004. Data suggest there are more fishermen catching fewer fish. • Aggregated bottomfish stock is below maximum sustainable yield (a fisheries management metric) suggesting that overfishing is resulting in declines in fish populations. Overfishing is most severe in MHI (PIFSC 2011; Moffitt et al. 2006). • 1996-2006: Increased fishing effort with number of hooks set increasing four-fold. Catch rates for apex predators such as blue shark, bigeye and albacore tunas, shortbill spearfish, and striped marlin declined from 3 to 9% per year while catch rates for mahimahi, sickle pomfret, escolar, and snake mackerel, increased by 6 to 18% per year (Polovina 2009). • 1950 – 1990s: fishing impacts on marine ecosystems (Pauly 2005). Decreased catch rates for large fishes has continued through at least 2011 (Polovina 2011). • 2010: pelagic fishery landings 26.6 million pounds (WPacFin 2011). • 2014: 6% increased quota recommended for bottomfish due to improved reporting and reduction in management uncertainty about stocks (WPFMC 2013).	-

Recreational and Subsistence Fisheries	• Mortality • Injury	• No license requirements in Hawaii making it difficult to manage overfishing (Moffitt et al. 2006). • Though data are lacking, recreational overfishing very likely contributing to decreases in fish species and therefore declines commercial fisheries landings (PIFSC 2011). • Limited data on subsistence harvest of fish species in Hawaii make estimating harvest levels difficult. • 2013: daily commercial nearshore catch was estimated to be 1676 kg, the near-shore recreational and subsistence catch was estimated to be 2178 kg (Sprague et al. 2013) • Widely believed that nearshore recreational and subsistence catch is equal to or greater than the nearshore commercial fisheries catch, with more species taken using a wider range of fishing gear (Friedlander et al. 2004).	- -
Military Activities			
Permit 15806 Letter of Authorization for marine mammal take: U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST])	• Disturbance • Injury or mortality	• Possible TTS, injury, contamination, collision, entanglement, and detonation impacts to fish due to military training activities. • Degradation or destruction of feeding habitat by underwater detonations and training activities.	-
Permit 17860 US Navy Acoustic Technology Experiments			
Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS); NOAA Incidental Harassment Permits 18702 - 18705		• Navy's impact analysis expects effects on recruitment or survival to be negligible. • Potential for injury to fish is negligible. • Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) to fish is expected to be minimal.	
Other Activities			

State of Hawai`i DLNR. Clearing of rivers, streams, beach areas	• Disturbance • Mortality and Reproductive effects • Reduction in marine debris	• There are NO regulations as to when activities may occur, there are no stipulations with regards to protection of nesting or feeding habitat.	-/+
Removal of marine debris from high entanglement zones Fishery Ecosystem Plan for the Hawai`i Archipelago	• Injury or mortality	• Researchers may enhance habitat for fish when they remove marine debris during field activities. Marine debris affects fish via ingestion of anthropogenic materials (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). Removal of marine debris by researchers for Hawaiian monk seals would likely result in a beneficial effect on fish.	+
Hawaiian Islands Humpback Whale National Marine Sanctuary Management Plan Revisions Hawaiian monk seal critical habitat designation	• Habitat protection	• Fish may benefit from Habitat designations; feeding areas, breeding and resting areas.	+
Hawaiian Spinner Dolphin Human Interaction Protection Measures	•	• Fish populations may benefit from dolphin protection measures due to potential time-area closures in bays around the MHI; potential additional protection of habitat; added recruitment could benefit fish populations.	+
Natural resource and species education and outreach	• Education	• 2009-2010: 10,000 people reached through partnerships with 30+ businesses, 50+ school presentations, 100+ schools	+
SEIS Measures to End Bottomfish Overfishing in the Hawaiian Archipelago Closure of Bottomfish Fishery in the Hawaiian Archipelago (2006) Final EIS Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region (2005)	• Mortality • Habitat protection	• Fish may benefit from habitat protection and cessation of overharvesting.	+
Development and Maintenance			

Building islands using dredge and fill Inter-Island Transmission Cable LORAN station (NWHI)	• Contaminants • Habitat degradation • Disturbance • Injury • Stranding • Entanglement in debris	• Accumulation of persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), and polybrominated diphenyl ethers (PBDEs) in tissues through diet. • Contaminants left over from military use of the NWHI islands also continue to affect emergent land areas, especially at Midway and French Frigate Shoals (Keller et al. 2010). • Coastal projects, bridges, roads and other infrastructure likely have changed the quality and quantity of habitat. • Impacts of cable installation are brief and minimal. Laying cable does cause some disturbance of the ocean floor, but within days the area returns to normal. • Impacts to fish may occur while laying the cable, including entanglement and mortality.	-
Wai`anae Wastewater Treatment Plan Modification Wailupe Stream Flood Control Lā`ie Wastewater Collection System Expansion Phase II – Lā`ie	• Contaminants • Water quality improvements	• Improvements in water treatment would likely decrease the level of contaminants and biological waste entering coastal waters.	+
Agriculture	• Nutrient pollution • Sedimentation	• Sediment runoff and pollution and nutrients from agricultural practices also widely impact coral reef habitat. • Sources of sediment on Hawaiian reefs include: improperly managed construction sites; cleared agricultural lands; heavy grazed lands; and eroding stream banks. Nutrients from fertilizers and pollutants such as bacteria from livestock, herbicides, and insecticides enter marine waters in runoff and seepage. Nutrient pollution and sediments from coastal development and farming can block sunlight, smother corals, and impede larval settlement (NOAA 2013).	-
Legislation			
Hawai`i Environmental Policy Act (HRS 343)	• General species and habitat protection	• Protection of Hawaiian natural resources through public disclosure process and government reviewed impact evaluation	+

Cumulative Effects Conclusion for Fish

The contribution of the proposed monk seal research and enhancement activities to cumulative effects on fish are expected to be negligible. A maximum current population of 200 Hawaiian monk seals in the MHI is liberally estimated to consume approximately 1,300 kg per day (2,900 lb per day); this is an average of about 15 lb per day per seal. In comparison, Sprague et al. (2013) conservatively estimate that apex predatory fish (sharks and jacks present in just the nearshore waters out to 30 m depth in the MHI) consume a minimum 66,000 kg/day (146,000 lb/day). The estimate of commercial catch of species occurring within nearshore (up to 30 m depth) habitats (that is, after excluding mostly pelagic species that account for 95% of commercial landings), is 1,676 kg (3,969 lb) per day.

Natural environmental processes such as climate also drive long-term dynamics that affect fish populations. Variability in fish prey populations are affected by these changes and can be both beneficial and adverse. Future climate change is projected to shift ecosystem towards smaller fish even if fishing remains constant (Polovina 2011).

Other actions including species habitat protection such as monk seal critical habitat designation and spinner dolphin protection measures could result in better recruitment of fish species in the nearshore environment around Hawaii due to potential restrictions on types of activities or time-area closures that may disrupt fish.

4.7.6 Birds

4.7.6.1 Direct and Indirect Effects on Birds of Alternative 1 – Status Quo

Under Alternative 1, the current NMFS Research and Enhancement Permit (10137) would continue until its expiration in 2014, and subsequent permits would be issued to continue research and enhancement activities according to the scope and methods currently permitted. For a complete description of research and enhancement activities allowed under Alternative 1, please refer to Section 2.7, Alternative 1 Status Quo, and Table 2.10-1.

Seabirds

Alternative 1 would result in minor, adverse short-term effects on productivity of seabird species identified in Table 3.6-6. Seabirds that nest in proximity to areas where monk seals haul out could be disturbed by researchers' presence on beaches. Accidental crushing of eggs, chicks, or nest burrows, blockage of access to nest sites with gear, thermal stress, increased predation of chicks, and elevated stress levels in birds are examples of impacts that are possible each time a human or humans enter a nesting seabird colony (PMNM 2008). Thermal stress could occur to eggs and/or very young chicks if adult seabirds are flushed from the nest and kept away for more than 3 minutes (PMNM 2008). In addition, if adult seabirds are flushed from nests, unattended eggs or hatchlings are more vulnerable to predation. Stress reactions (elevated heart rate, elevated levels of corticosterone, and behavioral responses) have also been documented in several species of nesting seabirds as a result of human activities in nesting colonies (PMNM 2008).

All reasonable precautions would be implemented to avoid take of seabirds incidental to research and enhancement activities and nesting seabirds on beaches would be avoided. To mitigate impacts, USFWS gives research and enhancement field researchers a briefing on appropriate mitigation to avoid take of seabirds in the NWHI (USFWS 2010a). Mitigation includes:

- Looking for nests or for adults flushing from inconspicuous nests when approaching seabird colonies;
- Not disturbing any colonies of ground-nesting sooty terns, gray-backed terns or brown noddies with chicks 2-7 days old (before scapular feathers have erupted);
- Planning activities to avoid displacing adults from eggs or chicks for longer than 3 minutes;
- Never leaving string or line anywhere in nesting colonies;
- Planning work when the fewest birds are in the area;
- Extinguishing all ship lights except for running lights or anchor lights when operating in proximity to seabird colonies;
- Traveling on marked trails to avoid subsurface nests; and
- Digging out shearwaters or petrels if nests are stepped on (PMNM 2008).

Alternative 1 would result in minor periodic, adverse short-term effects on survival of seabirds. There is limited risk that seabirds, particularly albatross that require a long straight-line ground trajectory to become airborne, could fly into fencing associated with shoreline or inland pens with resultant injury.

Temporary pens for Hawaiian monk seals were seasonally maintained by researchers at Kure Atoll, Midway Atoll, and French Frigate Shoals for ten years during summer months with no incidents of seabirds becoming entangled in the fence. However, during a three-month period in 2006, a single Laysan albatross flew into fencing associated with a temporary pen at French Frigate Shoals and was injured, but not killed (USFWS 2010a).

In order to minimize hazards from shoreline pens for birds, including short tail albatross, researchers would increase monitoring on windy days and would dismantle the pen after use, which would not exceed two weeks for holding seals (USFWS 2010a).

Airplane flight activities could also have minor adverse effects on birds due to the increased noise disturbance and potential risk for birds being hit by aircraft

(PMNM 2008). Noise disturbance results in an energetic cost to the bird although the energetic cost of response may not equate to reduced survival or productivity.

The millions of seabirds in the NWHI make aircraft flights to the islands potentially hazardous to both the birds and the aircraft personnel. At Tern Island and French Frigate Shoals, the species most commonly killed during aircraft operations is the sooty tern, but occasionally wedge-tailed shearwaters, great frigate birds, and both species of albatross are also hit (PMNM 2008). Both Laysan and black-footed albatross use the runway at Midway as a soaring area on their way to feed during the day (PMNM 2008). However, bird use of the airport runways declines dramatically at night, so night flights have a greatly reduced chance of hitting birds.

Requirements of the Monument would be in place to ensure the overall effects of air strikes on birds is minimal (PMNM 2008).

Requirements of the Monument include:

- Night flights for most of the year at Midway;
- Vegetation management along the runways to modify bird flight and nesting behavior;
- Flight path advisories given to pilots; and
- Runway clearing of birds and other wildlife by personnel prior to landing and takeoffs (PMNM 2008).

As described above and in Section 3.3.1.9, field camps in the NWHI are typically supplied and staffed using vessels, rather than aircraft. While the use of aircraft may occur under special circumstances (at Midway Islands or French Frigate Shoals), this is expected to be infrequent, thereby further minimizing the potential for these effects to occur.

Alternative 1 would result in minor localized effects on habitat for seabirds, which could be short or long-term depending on the extent or type of damage to the physical environment. The NWHI or the islets off the MHI are particularly vulnerable to the introduction of invasive species. Invasive plants and introduced mammals (*e.g.,* rats) are a primary threat to nesting seabirds, both indirectly by altering the ecosystem (plants) and directly by eating eggs and chicks (mammals).

For example, the invasive plant golden crownbeard (*Verbesina encelioides*) displaces almost all native vegetation in some nesting areas at Kure, Midway, and Pearl and Hermes Atolls. This plant causes entanglement of albatross adults and chicks and increases chick mortality due to heat stress by reducing the birds' ability to use convective cooling for thermoregulation (PMNM 2008). BMPs for Monument Special Conditions for Moving between Islands and Atolls and packing for field camps would be in place to ensure preservation of the NWHI native ecosystem, and temporary field camps are established primarily during summer months only (PMNM 2008).

Researchers may enhance habitat for birds when they remove marine debris during field activities. Marine debris affects seabirds via ingestion of anthropogenic materials (*e.g.,* plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). Removal of marine debris by researchers for Hawaiian monk seals would result in a beneficial impact for birds.

Activities to be undertaken by researchers in the MHI are not likely to have a measurable impact to the environment relative to those activities that already exist (*e.g.,* recreational boating and fishing, aerial tour operations, use of beaches by tourists), and no permanent damage to the physical environment (*e.g.,* construction) is expected. Thus, the analysis of potential effects of the research and enhancement alternatives focuses on potential effects in the NWHI.

Shorebirds

Alternative 1 is expected to have minor or negligible effects on shorebirds. The only nesting shorebird in the Hawaiian Archipelago is the endangered Hawaiian Stilt. This species breeds in the MHI and large coastal wetlands and ephemeral playas, not beaches, are important habitats for this species.

Large numbers of overwintering shorebirds occur throughout the Hawaiian Archipelago, but negligible effects on their productivity or survival are expected from research and enhancement activities associated with Alternative 1. Overwintering shorebirds may be temporarily displaced from foraging areas during research and enhancement activities on the beach (ground surveys, holding pens, etc.), but these are expected to be brief, temporary disturbances with no measurable effects on shorebirds.

Minor risk from aircraft collisions is possible, but requirements of the Monument would be in place to ensure the overall effects of air strikes on birds is minimal. Requirements of the Monument are the same as described above. As described above and in Section 3.3.1.9, , field camps in the NWHI are typically supplied and staffed using vessels, rather than aircraft, and any aircraft use is expected to be infrequent, minimizing the potential for these effects to occur.

Protected Bird Species

Most nesting seabirds and commonly occurring shorebirds that occur in the Hawaiian Archipelago (Table 3.3-5) are considered Species of Greatest Conservation Need (SGCN) by the State of Hawai'i. Thus, effects from Alternative 1 on the altered survival or productivity and habitat alteration for SGCN species are identical to the effects identified for seabirds and shorebirds in the above sections.

Components of Alternative 1 with the greatest potential to affect protected Birds of Conservation Concern (BCC) (Laysan and black-footed albatross) would be the same as those described in Section 3.3.6.1 for seabirds. Because albatross species require long runways for takeoffs, they are the protected species most likely to collide with aircraft or holding pens. However, Monument requirements for the use of aircraft and of the USFWS for holding pens would be in place to ensure the overall effects of air strikes on birds is minimal (Appendix D, PMNM 2011-001).

ESA-listed seabird and shorebirds and all bird species occurring in the NWHI include:

- Short-tailed albatross;
- Laysan duck;
- Nihoa millerbird;
- Laysan finch, Nihoa finch;
- Hawaiian petrel;
- Newell's shearwater;
- Band-rumped storm petrel (candidate species); and
- Hawaiian stilt (USFWS 2010a).

Alternative 1 is not likely to affect the Hawaiian stilt, Hawaiian petrel, Newell's shearwater, band-rumped petrel and Nihoa finch. These species occur outside of the Project Area and would rarely, if ever, come into contact with NMFS personnel, equipment or activities.

Short-tailed Albatross

Alternative 1 may have short-term, minor effects on short-tailed albatross. Short-tailed albatross are currently nesting at Midway Atoll and recently attempted to nest at Kure Atoll and Laysan Island (USFWS pers. comm. 2011d, 2011 e f; DLNR pers. comm. 2011). Although short-tailed albatross typically nest on sloping grassy terraces further inland, the active nest at Midway Atoll is approximately 20 m from the beach where Hawaiian monk seal surveys will occur. NMFS personnel will strictly adhere to island-specific USFWS protocols for short-tailed albatross to minimize effects to this species. No holding pens will be placed in the vicinity of short-tailed albatross or their nests. Monument requirements for the use of aircraft and of the USFWS for holding pens will also be in place to ensure the overall effects of air strikes on short-tailed albatross are minimal (Appendix G, PMNM 2011-001).

Laysan Duck

USFWS previously found NMFS monk seal activities were not likely to affect the Nihoa millerbird, Nihoa finch and Laysan duck because they primarily occur in the vegetated or interior areas of the NWHI (USFWS 2009c). Nihoa millerbird and Nihoa finch occur on Nihoa Island, which is infrequently visited by researchers and no regular field camps occur there.

Alternative 1 may have short-term minor effects on the Laysan duck. Laysan ducks use all available habitats, including the field camp at Laysan Island and coastal habitats at both Laysan Island and Midway Atoll (USFWS 2009e). It is possible that non-breeding Laysan ducks in coastal areas may be disturbed by

NMFS personnel, but these are expected to be brief, temporary disturbances with no measurable effects on Laysan ducks.

Some Laysan ducks, including ducklings, selectively use the camp area for foraging and resting and may be affected by NMFS personnel conducting camp activities. NMFS personnel must be cautious in their use of pesticides and monitor the effects of water use and discharge on the island's aquifer (USFWS 2009e). Hens that nest in or near camp may lead ducklings into camp; therefore, NMFS personnel should always be aware of ducks in camp and be careful not to disturb or fragment broods (USFWS 2009e).

Laysan ducks may also inadvertently fly into or run into Hawaiian monk seal holding pens. However, this is unlikely because: 1) Laysan ducks are most active at night when Hawaiian monk seal activities are minimal (USFWS 2009e); 2) Laysan ducks are more likely to walk rather than fly (USFWS 2009e); and 3) when foraging Laysan ducks tend to freeze rather than flush when startled (USFWS 2009e). In addition, NMFS personnel would strictly adhere to USFWS requirements for holding pens to ensure the overall effects on Laysan ducks due to Hawaiian monk seal activities are minimal (Appendix D, PMNM 2011-001).

Nihoa Millerbird

Alternative 1 may have short-term, minor effects on Nihoa Millerbirds at Laysan Island. Although Millerbirds are not typically found in beach habitats where monk seal activities will occur, both NMFS and USFWS maintain field camps at Laysan Island. Unintentional disturbance of Nihoa Millerbirds is possible as NMFS personnel transit from beach areas to field camps and conduct activities around field camps. Millerbirds often stay hidden in dense vegetation when not singing, so their contact with humans is anticipated to be minimal. Monk seal research personnel will adhere to strict procedures mandated by USFWS to avoid injury or death to Laysan Finch (USFWS 2009d), and these procedures protect Millerbirds as well. Campsites at Laysan Island will be inspected regularly for potential hazards to birds (USFWS 2009d).

Laysan Finch

Alternative 1 may moderately affect Laysan finches (USFWS 2010b). Both NMFS and USFWS maintain field camps at Laysan Island, and NMFS maintains field camps at Pearl and Hermes Reef (see Section 3.3). Laysan finches are tame to human presence, thereby entering these field camps in search of food and water. Unintentional mortality or serious injury of Laysan finches is possible given their high activity level and curious nature. Despite efforts to prevent mortality, finches have drowned in camp containers that filled with rainwater when researchers were away from camp, or have become trapped in camp gear. In 2010, one Laysan finch died at Laysan Island when it got into a sink bucket that was left open, and one died at Pearl and Hermes due to unknown causes. In 2011, five Laysan finches died at Pearl and Hermes during a single incident after a lid was left off a pallet tub and then accumulated rainwater. In response to these unfortunate incidences, the HMSRP has reviewed its training protocols for staff working at Laysan Island and Pearl and Hermes, and placed a renewed emphasis on the avoidance and minimization measures described below. There were no lethal takes of Laysan finches in 2012. Furthermore, the HMSRP has developed new notification procedures to ensure that the news of any lethal takes is immediately transmitted to the Director of the Pacific Islands Fisheries Science Center and USFWS.

Conclusions for Direct and Indirect Effects of Alternative 1 on Birds

Overall, Alternative 1 is expected to have minor or negligible effects on seabird and shorebird productivity, survival, and habitat. Because beaches in the Hawaiian Archipelago are not used by nesting shorebirds, they are much less likely to be affected by human disturbance. Alternative 1 would also have minor or negligible short-term adverse effects on productivity or survival of SGCN-listed seabirds and shorebirds and BCC listed albatross species. Alternative 1 may have minor, short term effects on the Laysan Duck, Nihoa Millerbird, and short-tailed albatross. Alternative 1 may have moderate adverse effects on Laysan Finch. Although possible, it is not expected that the finches would become entangled in shoreline net pens. Carcasses of any dead birds would be frozen and notification given to USFWS within five days (see below). While the deaths in 2011 represented an increase over previous mortalities in a given year, this did not exceed the estimated take over the five year period of Permit No. 10137. The HMSRP expects not to exceed 10 unintentional mortalities of Laysan finches over five years.

BMPs and protocols of the Monument would be in place to ensure preservation of the NWHI ecosystem and the resources it holds (PMNM 2008). USFWS gives monk seal field researchers a briefing on appropriate mitigation to avoid take of nesting seabirds and BMPs are in place by the Monument to reduce incidental take of birds by collisions with aircraft and holding pens, to prevent the spreading of disease or introduced species and to minimize human effects on endangered land birds. Therefore, Alternative 1 would result in minor effects on bird productivity, survival, and habitat.

4.7.6.2 Direct and Indirect Effects on Birds of Alternative 2 – No Action (No New Permits after 2014)

Alternative 2, the No Action Alternative, would only allow for status quo research and enhancement activities on Hawaiian monk seals to continue until the current permit (10137) expires in 2014. When the existing permit expires, all research and enhancement activities that require a permit (except under the separate MMHSRP permit) would cease. For a complete description of research and enhancement activities allowed under Alternative 2, please refer to Section 2.8, Alternative No Action, and Table 2.10-1.

Seabirds

Effects from potential disturbance, altered survival and/or productivity, and habitat alteration from Alternative 2 mirror the effects described for seabirds Alternative 1 (Status Quo) but would occur for a shorter timeframe. Hawaiian monk seal ground surveys and beach activities would cease after 2014, resulting in fewer disturbances to seabirds by monk seal research personnel, fewer chances of collisions by seabirds with airplanes and Hawaiian monk seal holding pens, fewer opportunities for the introduction of exotic species. Therefore, effects from Alternative 2 would be less likely to impact seabirds than those outlined for Alternative 1. It is possible that seabirds may be affected by monk seal research activities until 2014, and thus implementation of Alternative 2 may result in minor short-term decreases in survival or productivity in seabirds

Once the current permit expires in 2014, potential effects on birds are likely to be negligible as no research or enhancement activities would occur on wild Hawaiian monk seals under Alternative 2; however, the beneficial removal of marine debris by monk seal researchers would also cease.

Shorebirds

Effects from potential disturbance, altered survival, and habitat alteration from Alternative 2 mirror the effects described for Alternative 1 for shorebirds but would occur for a shorter timeframe. Overwintering shorebirds may be temporarily displaced from foraging areas during research and enhancement activities on the beach (ground surveys, holding pens, etc.), but these brief, temporary disturbances with no measurable effects on shorebirds would cease after 2014. Implementation of Alternative 2 is not likely to have any measurable effects on shorebird survival and is unlikely to cause adverse short or long-term localized effects on habitat.

Protected Bird Species

Effects from potential disturbance, altered survival or productivity, and habitat alteration from Alternative 2 mirror the effects described for the protected species in Alternative 1 but would occur for a shorter timeframe. Hawaiian monk seal ground surveys and beach activities would cease after 2014, resulting in fewer disturbances to protected species by monk seal research personnel, fewer chances of collisions of birds with airplanes and Hawaiian monk seal holding pens, and fewer opportunities for the introduction of exotic species.

It is possible that protected birds may be affected by research activities prior to 2014, and thus, Alternative 2 may result in minor, short-term decreases in survival and/or productivity in SGCN-listed seabirds and shorebirds. However, requirements of the Monument and protocols established by the USFWS would be in place to minimize effects to protected seabirds and shorebirds. Alternative 2 may also have minor, short term effects on short-tailed albatross, Laysan Duck, and Nihoa Millerbird, and moderate effects on the Laysan Finch prior to 2014. To mitigate effects to Laysan finch, MMRP personnel adhere to strict procedures mandated by USFWS to avoid injury or death to this species. Campsites at islands where Laysan finches occur would be inspected regularly for presence of hazards to the birds.

Conclusions for Direct and Indirect Effects of Alternative 2 on Birds

Effects from potential disturbance, altered survival and/or productivity, and habitat alteration from Alternative 2 mirror the effects described for seabirds under Alternative 1 (Status Quo) except research activities would cease to occur after 2014.

It is possible that birds may be affected by monk seal research activities prior to 2014, and thus implementation of Alternative 2 may result in minor short-term decreases in survival and/or productivity in birds. Alternative 2 may also have short term, minor effects on short-tailed albatross, Laysan Duck, and Nihoa Millerbird, and moderate adverse effects on Laysan finches. However, requirements of the Monument would be in place to ensure preservation of the NWHI ecosystem and the resources it holds. USFWS gives monk seal field researchers a briefing on appropriate mitigation to avoid take of nesting seabirds and BMPs are in place by the Monument to reduce incidental take of birds by collisions with aircraft and holding pens, to prevent the spreading of disease or introduced species, and to minimize human effects on endangered land birds. Once the current permit expires in 2014, potential effects on birds are likely to be negligible as no research or enhancement activities would occur on wild Hawaiian monk seals under Alternative 2; however, the beneficial removal of marine debris by researchers would also cease.

4.7.6.3 Direct and Indirect Effects on Birds of Alternative 3 – Limited Translocation (Preferred Alternative)

Under Alternative 3, all activities currently permitted would continue, and new permissions would be granted with expanded scope and methods. For a complete description of research and enhancement activities allowed under Alternative 3, please refer to Section 2.9, Alternative 3 Limited Translocation, and Table 2.10-1.

Seabirds

Potential effects from Alternative 3 on seabirds are identical to the effects described under Status Quo (Alternative 1), but their likelihood of occurrence would be slightly increased due to the additional ground, boat, and aerial Hawaiian monk seal surveys and beach activities (*i.e.,* remote camera installations, increased capturing and translocation of Hawaiian monk seals, increased use of shore pens) that may be authorized under this alternative. Increased field activities would also correlate to increased removal of marine debris for Hawaiian monk seals by researchers, which indirectly results in a beneficial impact to birds. In addition, once remote cameras are installed, fewer

Hawaiian monk seal ground surveys would be needed, thereby reducing effects on nesting seabirds overall. Restrictions and mitigation measures would be required by the MMPA, ESA and NMFS to minimize disturbances caused by all new and existing monk seal research and enhancement activities. Thus, Alternative 3 is expected to have minor short-term adverse effects on seabird productivity and/or survival.

Potential effects from Alternative 3 on seabird habitat are identical to the effects described under Status Quo (Alternative 1), but their likelihood of occurrence would be slightly increased due to the additional research and camp activities that may occur under this alternative. Alternative 3 would result in minor localized effects on habitat for seabirds if fire, disease, or introduced species are spread through research or field camp activities. Habitat effects could be short or long-term depending on the extent or type of damage to the physical environment. However, BMPs would be in place by the Monument for camp protocols and to prevent the spreading of disease or introduced species (PMNM 2008).

Shorebirds

Potential effects from Alternative 3 on shorebirds are identical to the effects described for Alternative 1 (Status Quo) but their likelihood of occurrence would slightly increase due to the additional ground, boat, and aerial Hawaiian monk seal surveys and beach activities (*i.e.,* remote camera installations, increased capturing of Hawaiian monk seals) that may be authorized under Alternative 3. However, restrictions and mitigation measures would be required by the MMPA, ESA and NMFS to minimize disturbances caused by all new research and enhancement activities. Thus, Alternative 3 is expected to have minor short-term adverse effects on shorebird survival and/or adverse short or long-term localized effects on shorebird habitats.

Protected Bird Species

Potential effects from Alternative 3 on SGCN protected seabird and shorebird species are identical to the effects described for Status Quo (Alternative 1), but their likelihood of occurrence would slightly increase due to the additional ground, boat, and aerial Hawaiian monk seal surveys and beach activities that may be authorized under this alternative. However, restrictions and mitigation measures for all new activities would be required by the MMPA, ESA and NMFS to minimize disturbances by research and enhancement activities. Alternative 3 may thus result in minor short-term decreases in survival and/or productivity and/or adverse short or long-term localized effects on habitats. Alternative 3 may also have minor, short term effects on short-tailed albatross, Laysan Duck, and Nihoa Millerbird, and moderate adverse effects on Laysan finches. To mitigate effects to Laysan finch, monk seal researchers adhere to strict procedures mandated by USFWS to avoid injury or death to this species.

Campsites at islands where Laysan finches occur will be inspected regularly for presence of hazards to the birds.

Conclusions for Direct and Indirect Effects of Alternative 3 on Birds

Potential effects from Alternative 3 on birds are identical to the effects described under Status Quo (Alternative 1), but their likelihood of occurrence would be slightly increased due to the additional ground, boat, and aerial Hawaiian monk seal surveys and beach activities that may be authorized under this alternative. Implementation of Alternative 3 may result in minor short-term decreases in survival and/or productivity in birds and/or short or long-term localized effects on bird habitats. Alternative 3 may also have minor, short term effects on short-tailed albatross, Laysan Duck, and Nihoa Millerbird, and moderate adverse effects on Laysan finches. However, requirements of the Monument would be in place to ensure preservation of the NWHI ecosystem and the resources it holds. USFWS gives monk seal field researchers a briefing on appropriate mitigation to avoid take of nesting seabirds and BMPs (PMNM 2008) are in place by the Monument to reduce incidental take of birds by collisions with aircraft and holding pens, to prevent the spreading of disease or introduced species, and to minimize human effects on endangered land birds.

4.7.6.4 Direct and Indirect Effects on Birds of Alternative 4 – Enhanced Implementation

The Enhanced Implementation Alternative would encompass all the activities permitted under Alternative 3, with the addition of the option for temporary translocation of weaned pups from the NWHI to the MHI. For a complete description of research and enhancement activities allowed under Alternative 4, please refer to Section 2.10, Alternative 4 Enhanced Implementation, and Table 2.10-1.

Seabirds

Potential effects from Alternative 4 on seabirds are identical to the effects described under Alternative 3. Requirements of the Monument and protocols established by the USFWS would be in place to minimize adverse effects of monk seal research and enhancement activities on nesting seabirds. Overall, Alternative 4 is expected to have minor short-term adverse effects on seabird productivity, survival, or habitat.

Shorebirds

Potential effects from Alternative 4 on shorebirds are identical to the effects described under Alternative 3. Requirements of the Monument and protocols established by the USFWS would be in place to minimize adverse effects of research activities (Appendix G, PMNM 2011-001). Thus, Alternative 4 is expected to have minor short-term adverse effects on shorebird survival and could result in adverse short or long-term localized effects on shorebird habitats depending on the extent or type of damage to the physical environment.

Protected Species

Potential effects from Alternative 4 on SGCN-protected seabird and shorebird species are identical to the effects described under Alternative 3. Requirements of the Monument and protocols established by the USFWS would be in place to minimize adverse effects of MMRP activities. Overall, Alternative 4 would have minor short-term decreases in survival and/or productivity and/or adverse short or long-term localized effects on habitats for SGCN-protected seabirds and shorebirds. Alternative 4 may also have minor, short term effects on short-tailed albatross, Laysan Duck, and Nihoa Millerbird, and moderate adverse effects on Laysan finches. To mitigate effects to Laysan finch, monk seal personnel adhere to strict procedures mandated by USFWS to avoid injury or death to this species. Campsites at islands where Laysan finches occur will be inspected regularly for presence of hazards to the birds.

Conclusions for Direct and Indirect Effects of Alternative 4 on Birds

Potential effects from Alternative 4 on birds are identical to the effects described in Alternative 3. Implementation of Alternative 4 may result in minor short-term decreases in survival or productivity in birds and/or short or long-term localized effects on bird habitats. Alternative 4 may also have minor, short term effects on short-tailed albatross, Laysan Duck, and Nihoa Millerbird, and moderate adverse effects on Laysan finches. However, requirements of the Monument would be in place to ensure preservation of the NWHI ecosystem and the resources it holds. USFWS gives MMRP field researchers a briefing on appropriate mitigation to avoid take of nesting seabirds and BMPs are in place by the Monument to reduce incidental take of birds by collisions with aircraft and holding pens, to prevent the spreading of disease or introduced species, and to minimize human effects on endangered land birds.

4.7.6.5 Cumulative Effects of Alternatives on Birds

Direct and indirect mortality and reproductive effects of research and enhancement activities may result from disturbance or collision with vessels. Table 4.8-13 summarizes the direct and indirect effects of the alternatives on birds.

Table 4.8-13 Summary of Direct and Indirect Effects of the Alternatives on Birds

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementation**
Mortality	Negligible to Minor adverse (Moderate adverse for Laysan finch)	Negligible	Negligible to Minor adverse (Moderate adverse for Laysan finch)	Negligible to Minor adverse (Moderate adverse for Laysan finch)
Reproduction	Negligible	Negligible	Negligible	Negligible

<u>Past, Present and Future Actions and Events Contributing to Cumulative Effects</u>

Past, present and reasonably foreseeable future actions that may affect bird survival or reproduction are summarized in Table 4.8-14.

Table 4.8-14 Effects of Past, Present and Reasonably Foreseeable Future Actions on Birds

Hawaiian Bird Cumulative Actions and Events			
Action / Event	**Potential Effects**	**Description/Example**	**Effect**
Natural Events			
Tsunami, Volcano, Earthquake, Hurricane	• Changes to habitat • Injury or mortality • Changes in prey due to ecosystem shift	• 2011 Japanese Tohoku earthquake and tsunami debris • Debris increases likelihood of ingestion of debris, entanglement and affects habitat suitability for resting, and nesting areas	-
Japanese Tohoku earthquake and tsunami debris			
Climate Change		• Long-term dynamics are driven in large part by climate (ocean variability) (Baker et al. 2012). Variability in fish prey populations are affected by these changes and can be both beneficial and adverse.	+/-
Introduction of invasive species or disease		• Introduction to Laysan Island: rabbits, rats, common sandbur (*Cenchrus echinatus*) (weed) that inhibits regeneration of the primary nest substrate (Eragrostis variabilis) for Laysan finches (Morin and Conant 1998). • Insect and arachnids species (e.g., beetles, weevils, grasshoppers, bees, wasps, spiders and ants), reptiles (e.g., snakes, lizards) and mammals (e.g., mice, rats, dogs, cats) could introduce disease or parasites to birds. • Mammals in particular may increase the risk of diseases such as morbillivirus. • Invasive fish species introduced through ballast water may cause changes in prey dynamics.	-
Scientific Research			

Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS LFA) (6 missions)	• Education • Disturbance • Injury or mortality	• Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) to birds.	-
Genetic Surveys to Address the Level of Isolation Between Shallow and Deep Reef Ecosystems		• Direct effects on individual birds through vessels in the nearshore environment, or through human activity on beaches during ground surveys or other research and enhancement beach activities. • While mortality has occurred, overall benefits of research and enhancement are beneficial for long term seal survival.	-/+
Long term monitoring Laysan & black footed albatross			
Monitoring of Red-footed, Brown, and Masked Boobies from Midway Atoll and French Frigate Shoals			
Military Activities			

US Navy Hawaii Range Complex Permit 15806 Letter of Authorization for marine mammal take: U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST])	• Disturbance • Injury or mortality • Habitat destruction	• Potential effect on night-flying birds flying into lighted towers or buildings. • Downed birds near the new towers or antennas. • Noise from launches, ricocheting projectiles, mine neutralization activities and beach activities may startle / disturb nearby wildlife and cause flushing behavior in birds. • The potential ingestion of toxins, such as the small amount of propellant or simulant remaining in the spent boosters or on pieces of missile debris, by birds is possible but unlikely. Birds flying through an exhaust plume may be exposed to concentrations of hydrogen chloride that could irritate eye and respiratory membranes (Federal Aviation Administration, 1996). • The potential for main-beam (airborne) exposure thermal effects on birds exists. • Activities related to beach training exercises may also disturb habitat and nesting or resting birds. • Possible loss of individual migratory seabirds to GUNEX training in the designated impact area. • Contaminants left over from military use of the NWHI islands also continue to affect emergent land areas, especially at Midway and French Frigate Shoals (Keller et al. 2010). • Potential strike or mortality by training activities.	-
Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS); NOAA Incidental Harassment Permits 18702 - 18705		• Birds could be killed by collisions with vessels used during research and enhancement activities during night hours, e.g. unshielded lights. • "Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) is minimal to negligible." (US Navy 2012)	
Permit 17860 US Navy Acoustic Technology Experiments			
Other Activities			

Guano mining	• Injury or mortality • Reproductive effects	• Direct disturbance to breeding and resting individuals during activities.	-
Feather poaching			
Seabird harvest activities		• 1842 – 1915: Unregulated take of seabirds by consumption, egg harvest, nest loss to guano harvest, introduced species, chick mortality due to removal of adults; direct disturbance to breeding and resting individuals during activities.	
State of Hawai`i DLNR. Clearing of rivers, streams, beach areas	• Disturbance • Mortality and Reproductive effects • Reduction in marine debris	• No regulations as to when activities may occur, there are no stipulations with regards to protection of nesting or feeding habitat.	-/+
Removal of marine debris from high entanglement zones	• Injury or mortality	• Marine debris affects seabirds via ingestion of anthropogenic materials (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). Removal of marine debris by researchers for Hawaiian monk seals would likely result in a beneficial effect on sea birds. • Mortality in longline fisheries is a global threat to most albatross and large petrel species (Gilman 2004). Hundreds of thousands of seabirds, including tens of thousands of albatrosses, are caught annually in longline fisheries worldwide (Gilman 2004).	+
Fishery Ecosystem Plan for the Hawai`i Archipelago			
Hawaiian Islands Humpback Whale National Marine Sanctuary Management Plan Revisions	• Habitat protection	• Birds may benefit from Habitat designations; feeding areas, nesting and resting areas.	+
Habitat protection , loss mitigation and restoration			
Natural resource and species education and outreach	• Education	• 2009-2010: 10,000 people reached through partnerships with 30+ businesses, 50+ school presentations, 100+ schools	+
Building islands using dredge and fill	• Contaminants • Habitat degradation • Disturbance • Injury • Stranding • Entanglement in debris	• Accumulation of persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT), and polybrominated diphenyl ethers (PBDEs) in tissues through diet. • Coastal projects, bridges, roads and other infrastructure likely have changed the quality and quantity of habitat.	-
LORAN station (NWHI)			

Wai`anae Wastewater Treatment Plan Modification Wailupe Stream Flood Control Lā`ie Wastewater Collection System Expansion Phase II – Lā`ie	• Contaminants • Water quality improvements	• Improvements in water treatment would likely decrease the level of contaminants and biological waste entering coastal waters.	+
Legislation			
Hawai`i Environmental Policy Act (HRS 343)	• General species and habitat protection	• Protection of Hawaiian natural resources through public disclosure process and government reviewed impact evaluation	+

Since the arrival of the first humans to the Hawaiian Archipelago, more than half of the islands' 140 native bird species have become extinct (Hawaiian invasive species.org). Today, 31 Hawaiian bird species are endangered. Past threats to birds within the Project Area include habitat loss (MHI), bird poaching, seabird bycatch from longline fisheries, invasive species, marine debris, habitat loss, and contaminants.

Current threats are outlined below.

- Mortality in longline fisheries is a global threat to most albatross and large petrel species (Gilman 2004). Hundreds of thousands of seabirds, including tens of thousands of albatrosses, are caught annually in longline fisheries worldwide (Gilman 2004).
- Invasive species spread disease, destroy habitat, and indirectly and directly kill Hawaiian birds. Rats, mongoose, ants, mosquitoes (carrying bird pox and bird malaria), cats, and the golden crownbeard have been some of the most damaging invasive species for nesting seabirds in the Hawaiian Archipelago.
- Marine debris affects seabirds via ingestion of anthropogenic materials (*e.g.,* plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). In addition, debris from the tsunami that occurred in Japan in March 2011 could have significant impacts on wildlife, including seabirds, throughout the Pacific (Ocean Conservancy 2012). Tsunami debris that goes north of the Hawaiian Islands is predicted to primarily collect in the Northern Pacific Gyre where it will mix with common debris. This mixture of debris will then turn up in the NWHI again as currents carry debris from the Gyre to the NWHI (Maximenko and Hafner 2012). Tsunami debris is thus expected to continue to litter NWHI coastlines for many years to come (Maximenko and Hafner 2012).
- Contaminants left over from military use of the NWHI islands also continue to affect emergent land areas, especially at Midway and French Frigate Shoals (Keller *et al.* 2010).
- Global climate change factors are already affecting the NWHI ecosystem and will have widespread effects. Global mean sea levels have risen an estimated 3.1 ± 0.7 mm yr-1 from 1993-2003, an amount higher than any other 10-year period since 1950 (Keller *et al.* 2010). Habitat loss from sea level rise may be devastating to seabird populations that depend on these low islands for survival (Baker *et al.* 2006, Reynolds *et al.* 2012).

Avian mortality or reduced survival/reproductive success from RFFAs is identified for wind farms, residential and commercial construction (beach, nearshore), commercial fishing, scientific research activities on land, natural events, introduction of invasive species, tourism and recreation, and marine pollution. Particularly in the MHI, all of the mortality factors except bird poaching identified in the previous section may continue to occur within the Project Area in the future. Some of the greatest sources of human-caused bird mortality from the past include the introduction of invasive species, habitat loss, and commercial fishing. However, effects of global climate change may become the largest threat to seabirds, especially in the NWHI, in the future.

Components of climate change most likely to affect seabirds in the NWHI include sea level rise, changing storm intensity and frequency (causing erosion), sea surface temperature rise and acidification (Keller *et al.* 2010). Habitat loss from sea level rise may be devastating to seabird populations that nest at or near sea level. Models predict that sea level will continue to rise. In addition, there is the potential for further habitat degradation with the release of contaminants contained in landfills as the islands are eroded or flooded from sea level rise (Reynolds et al 2012). As sea surface temperature increases, seabird prey species may move to deeper, cooler water, thereby decreasing food availability for foraging birds, or requiring birds to fly further north in the Pacific to obtain food resources.

Cumulative Effects Conclusion for Birds

Birds, especially nesting seabirds, of the Hawaiian Archipelago are susceptible to future human-caused mortality factors. The contribution from Hawaiian monk seal research and enhancement activities, however, is considered minor or negligible on birds. Activities to be undertaken by researchers in the MHI are not likely to have a measurable impact to the environment relative to those activities that already exist (*e.g.,* recreational boating and fishing, aerial tour operations, use of beaches by tourists), and no permanent damage to the physical environment (*e.g.,* due to construction) is expected. Thus, the contribution of any alternatives to cumulative effects on birds in the MHI is considered negligible.

Because Best Management Practices and protocols in place for the NWHI minimize human disturbance to birds, the direct and indirect effects associated with Alternative 1 are minimized, and research and enhancement activities would contribute negligible to minor cumulative effects on bird species. Alternative 2 would involve even less disturbance to birds from research and enhancement activities because activities would cease in 2014, thus contributing even less to the overall cumulative effects on birds. Compared to status quo (Alternative 1) Alternatives 3 and 4 would involve additional human disturbance associated with increased research and enhancement ground activities or aerial surveys than Alternative 1. However, the magnitude, intensity and duration of these effects are still considered minor given the low likelihood of interacting with these species and the temporary nature of the disturbance. Overall, the contribution to an adverse cumulative effect from any of the alternatives is considered negligible to minor.

4.7.7 *Corals*

As described in Section 3.3.7, Coral, the Hawaiian Islands contain about 6,700 square miles of coral reef habitats, consisting of both shallow water species inhabiting waters less than 98 ft (30 m) and deep water species found in waters greater than 98 ft (30 m) (NOAA 2008b). NOAA has proposed listing three species of shallow water reef building corals in Hawaii as threatened under the Endangered Species Act: *Montipora patula/verrilli*, *Montipora dilitata/flabellata/turgescens*, and *Acroproa paniculata*. All three of these species occur in the Northwestern Hawaiian Islands, and *Montipora patula/verrilli* and *Montipora dilitata/flabellata/turgescens* occur in the Main Hawaiian Islands. These species are proposed as threatened due to a number of threats, with the most significant identified as ocean warming, coral disease, and ocean acidification as a result of climate change. A final listing decision is expected by December 2013.

4.7.7.1 *Direct and Indirect Effects of Alternatives on Corals*

Status Quo (Alternative 1) activities would have negligible adverse impacts on shallow water corals due to the strict protocols described for entering the NWHI under a Monument permit. Vessel anchors and chains have the potential to destroy corals and live rock. To mitigate this type of damage, mooring buoys are used in areas where frequent or extended anchoring is necessary. In addition, Monument regulations, codified under 40 CFR Part 404, prohibit anchoring on corals.

In order to conduct monk seal research and enhancement activities in the Monument, NMFS must obtain a permit from the Co-Trustees. The current Monument permit (PMNM-2013-001 presented in Appendix D) dictates certain mitigation measures that are standard practice for NMFS when working in the area and also in the MHI. In addition to permit conditions and as described in Section 3.3.10.1 Monument Permitted Activities, there are several Monument BMPs that are designed to avoid, minimize or mitigate potential impacts (see Appendix G).

Monument Permit PMNM-2013-001 specifies measures to minimize impacts on corals due to boating:

- Anchoring of authorized vessels is allowed on non-coral substrate only, and anchors must be lowered slowly and carefully
- All vessels, engines, and anchor lines must be free of introduced species prior to entry into the monument
- Tenders and small vessels must be equipped with engines that meet EPA emissions requirements
- Specific measures are required for boat operations and diving activities to reduce or eliminate adverse effects on protected marine species (Monument BMP #004); and

- Special Conditions and Rules for Small Boat Operations are required at Tern Island (Monument BMP #013), which mandate specific notification and operator training.

Under the Status Quo, small boats (less than 20 ft) used by NMFS researchers conducting Hawaiian monk seal research and enhancement activities in areas with shallow corals include: Boston whalers, ridged hull Zodiacs, Zodiac and Achilles inflatables and personal watercraft. These small boats can be launched from larger ships to access the islands and conduct research or can be used for access between research locations. All small boats and the larger research vessels used by NMFS such as the NOAA R/V Oscar Elton Sette (224 ft), the R/V Searcher (97 ft), and the M/V Kahana (160 ft), would be required to follow all permit requirements, provisions, and BMPs to protect coral when working in the Monument. In the MHI, researchers do not anchor small boats. Thus, impacts to shallow or deep water corals under the status quo would be expected to result in negligible effects.

Alternative 2 (No Action) would result in no additional effects once the current permit expires in 2014 as no research and enhancement activities for Hawaiian monk seal would be permitted.

Alternative 3 (Preferred), which adds new activities with expanded scope and methods, has a slightly greater potential to impact shallow water corals as compared to Alternative 1 due to increased research activity and use of small boats. However, considering the strict guidelines described above for Alternative 1, which would also be in place under Alternative 3, the potential adverse effects of Alternative 3 on the corals would be negligible.

Alternative 4 will have a slightly greater potential impact than Alternative 3, again due (in part) to the additional use of small boats and possibly larger research vessels to translocate weaned pups between NHWI and MHI. However, any potential adverse effects on coral would likely be negligible due to the controls and mitigation measures already implemented by NMFS.

4.7.7.2 *Cumulative Effects of Alternatives on Corals*

Considering that there would only be negligible direct and indirect effects are anticipated under any of the Alternatives, there would be no contribution of monk seal research and enhancement activities to a cumulative impact on coral species.

4.7.8 ***Invasive Species***

The Hawaiian Archipelago is home to many rare and endemic species of plants and animals, many of which are formally listed as endangered (under the ESA), protected (MMPA) and/or listed as a species of concern under various federal, state or international laws or agreements. Endemic species are particularly vulnerable to harm from the introduction of non-native species, for example, through competition for resources (such as food and habitat), disease or predation.

The introduction of non-native species could have effects on plant and animal species endemic to the islands and atolls used for Hawaiian monk seal research and enhancement activities. The Hawai`i Invasive Species Council (HISC) identifies 46 high-profile invasive species/categories, of which only hull fouling species, algae and mussels, are of concern within the MHI (HISC 2010d). In the NWHI, there is special concern over the introduction and proliferation of non-native seeds, insects or other alien species such as snakes, rodents, dogs, cats and so forth, as wells as hull-fouling species (algae and mussels). Section 3.3.9 provides more detail on invasive species in the Hawaiian Archipelago relative to the proposed action and associated Project Area.

4.7.8.1 *Direct and Indirect Effects of Alternatives on Introduction of Invasive Species*

Research and enhancement on Hawaiian monk seals would likely result in minor or negligible effects pertaining to introduction of invasive species for the following reasons. Any increase in activity, especially within the NWHI, does increase the potential to introduce alien species. However, access to the Monument is limited and is contingent on the express permission of the Co-Trustees through the permitting process. Strict adherence to the special permit conditions and rules for the prevention of introduction of non-native species, as described in Appendix G of the Monument Permit, PMNM 2011-001, Attachment 13 *Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment.* The Monument permit General Terms and Conditions sets out protocols and procedures to reduce the risk of the spread of non-native (invasive) species including the assurance that "…all vessels are inspected for potential introduced species prior to departing the last port before entering the Monument". In addition, NOAA Administrative Order (NAO) 216-6, Section 7.03 addresses the integration of EO 13112, Invasive Species, in the NOAA Decision-making process, requiring the agency to "…use authorities to prevent introduction of invasive species, respond to and control invasions in a cost effective and environmentally sound manner".

NMFS closely follows these precautions when conducting any research and enhancement activities in the NWHI, thus the potential for vessels or personnel to introduce non-native species would likely be minor, particularly given that field camps in the NWHI are seasonal, typically staffed between April to August. Camps are rarely re-supplied during the field season thereby further reducing the potential introduction of invasive species. Research and enhancement activities in the MHI are not likely to result in the spread of invasive species relative to numerous other activities in the region including recreation, fishing, ecotourism and general habitation of the area.

Alternative 1 (Status Quo) activities would not likely result in the spread of invasive species due to the strict protocols described for entering the NWHI under a Monument permit however the possibility still exists. Given the high population and level of ecotourism, recreation, fishing, and other human activities that have the potential to spread non-native species, the research and enhancement activities proposed would be expected to result in negligible effects as the introduction of invasive species because while it may be possible for research activities to introduce invasive species, the likelihood of this occurring is extremely low.

Alternative 2 (No Action) would result in negligible effects once the current permit expires in 2014 as no research and enhancement on wild monk seals would be permitted.

Alternative 3, which adds new activities with expanded scope and methods, has a slightly greater potential to introduce non-native species than Alternative 1 due to increased activity. Specifically, the translocation of seals from MHI to NWHI may increase the probability that alien species already established in MHI could be transferred to the Monument. However, considering the strict guidelines described above, the potential adverse effects of Alternative 3 on the spread of invasive species would be negligible because, as with Alternative 1, while it may be possible for research activities to introduce invasive species, the likelihood of this occurring is extremely low.

Alternative 4 could have only a slightly greater potential effect than Alternative 3, due to the potential increased transport between the MHI and NWHI. Still, the likelihood of cross-region transport would also be negligible because of the strict quarantines that apply and the fact that while it may be possible to introduce invasive species, the likelihood of this occurring is extremely low.

4.7.8.2 *Cumulative Effects of Alternatives on Introduction of Invasive Species*

Since none of the Alternatives would result in measurable introduction or spread of invasive species in Hawaii, no cumulative impacts on are anticipated.

4.8 *SOCIAL AND ECONOMIC ENVIRONMENT*

4.8.1 *Commercial Fishing*

This section analyzes potential direct, indirect and cumulative effects of the alternatives on commercial fishing. The area of analysis focuses on nearshore areas surrounding the MHI. As discussed in Section 4.4.3 *Impact Criteria for Socioeconomic Resources*, given the restrictions on commercial fishing due to the Monument, effects of the alternatives on commercial fishing are unlikely in the NWHI. Therefore, this analysis focuses on the MHI.

Best available data for analyzing impacts of fisheries

The analysis of the effects of alternatives on fishing relies heavily upon a recently published report (Sprague et al. 2013). This publication evaluates nearshore fish biomass, monk seal biomass, monk seal consumption of fish, fishery landings and degree of overlap between monk seal prey selection and species targeted by fishers in the MHI. The analysis is primarily focused on shallow (up to 30 m depth) coral reef habitat. Sprague et al. (2013) used the best available data to estimate a reasonable mean or range for parameters such as biomass and consumption rates. In cases where there was considerable doubt or uncertainty, and hence a broad range of plausible values, the authors erred on the side of *over*-estimating the potential monk seal impacts (e.g., population size or consumption rate), while *under*-estimating the available resources and human impacts (e.g., available biomass or fishery landings). This approach ensures that conclusions represent a maximum estimate of potential monk seal impacts. This is particularly useful for the PEIS analysis in that it provides a worst-case scenario for impacts.

As mentioned above, analysis of potential impacts of alternatives on fishing was limited to nearshore areas. Monk seals forage almost entirely on the ocean floor in waters 200 m or shallower. However, information for estimating biomass of fishes potentially consumed by seals exists only for waters <30 m deep. As such, for this impact analysis, total estimated prey consumption of seals (foraging at all depths) is compared to fish biomass in waters < 30 m, which comprises only about 12% of the total habitat in which seals feed. As such, the estimated proportion of fish consumed by monk seals is greatly overestimated. For this and several other reasons explained in Sprague et al. (2013), conclusions about the impacts of seals on fisheries are exaggerated. It is also worth noting that some 95% of fishery landings in Hawaii are pelagic fishes and monk seals are not known to consume any of the fish species targeted by pelagic fisheries.

Details of the analysis can be found in Sprague et al. (2013), but the basic approach was to estimate and compare the following:

- Biomass of fish (at various levels of the food web- apex predatory fish, secondary consumers, herbivores, planktivore) in nearshore hard-bottom coral reef habitat to a depth of 30 m
- Biomass of monk seals in the MHI
- Rate at which monk seals of various age groups consume prey
- Rate at which apex predatory fish consume prey
- Commercial and recreational fishery landings
- Relative overlap between families of fish found in monk seal diet and caught in fisheries

A liberal estimate of the total prey biomass consumed by an assumed population of 200 monk seals in the MHI is a maximum of 1,300 kg per day (2,900 lb per day); this is an average of about 15 lb per day per seal. In comparison, Sprague et al. (2013) conservatively estimate that apex predatory fish…consume a minimum of 66,000 kg/day (146,000 lb/day). Thus, these apex predatory fish consume at least 50 times more fish than the entire population of monk seals in the MHI.

Examples of how Sprague et al. (2013) systematically overestimated absolute and relative potential impacts of seals on fisheries include, but are not limited to:

- Available fish biomass estimate did not account for several areas, in particular, Penguin Bank, a submerged former shield volcano off the west end of Molokaʻi (depth generally ranging from 40-100 m) that is frequently used by monk seals for foraging
- Monk seals are known to forage in depths beyond 30 m. The analysis considered only hard bottom coral reef out to 30 m depth, representing just 12% of the area over which monk seals may forage. The estimate of prey biomass is therefore much smaller than is actually available in the monk seal's MHI foraging range.
- The estimates of biomass density only measured fin fish density, although monk seals and other apex predatory fish are known to also consume invertebrates, and invertebrate biomass may be many times that of fin fishes.
- Values for monk seal prey consumption were inflated in several ways to account for uncertainty
- Using current methods, monk seal diet is only determined to the taxonomic level of family, rather than to species. So, while Sprague et al. (2013) report that both fishermen and monk seals may target certain *families* of fishes, it is possible that the actual *species* consumed by each within those families may not overlap. Furthermore, even when fisheries and monk seals consume the same species, there may be differences in the size of the prey, the area, and the depth over which those species are taken.

Effects of Alternatives on commercial fishing

Effects on commercial fishing could be anticipated if an action were to result in a change in profits for the commercial fishermen. A change in profits could not only affect fishermen's well-being and quality of life, but could have a larger effect on the economy of the area. Given that profit is a function of revenue and cost, profits for fishermen could decrease or increase if the cost associated with fishing increases or decreases and/or the revenue derived decreases or increases, respectively. Potential effects on costs associated with fishing are considered in terms of lost or damaged fish, lost or damaged gear, and lost fishing time and fuel costs (if vessels relocate to other fishing areas) due to the alternatives. This analysis addresses potential changes in revenues for commercial fishermen as a consequence of the alternatives. The indicator used to assess this change is the potential variation in commercial catch, both in terms of quantity and value, due to the alternatives, as presented in Table 4.4-6 in Section 4.4.3 *Impact Criteria for Socioeconomic Resources*.

The alternatives are not anticipated to result in any direct effects on commercial fishing. However, depending on the extent to which Hawaiian monk seals may prey on and reduce the population of certain fish species that are commercially viable, indirect effects on commercial fishing may be possible if an alternative results in a change in the MHI Hawaiian monk seal population, and that change in population, in turn, affects either cost to the commercial fishery or affects revenue through the level of commercial catch. On the other hand, some fish species may increase in population if Hawaiian monk seals consume predators or competitors of those species. These possible effects on commercial fishing revenues and costs are examined below.

Among commercial fisheries in Hawaii, the pelagic fishery is the largest and most valuable, accounting for about 95% of commercial landings with 26.6 million pounds of pelagic fish caught commercially in 2010 (WPacFin 2011). Monk seals are benthic (bottom) foragers and there is no evidence that they eat the species targeted by pelagic fisheries (see Section 3.3.1.5). Thus, it appears that there is no potential for monk seals to impact 95% of commercial fishery landings.

Sprague et al. (2013) report the following. Hawaiian monk seals are liberally estimated to consume 4% of body mass (adults), 6% (sub-adults), and 8% (juveniles) per day. A liberal estimate of the total biomass of prey consumed by a maximum current population of 200 monk seals in the MHI is approximately 1,300 kg per day (2,900 lb per day); this is an average of about 15 lb per day per seal. In comparison, Sprague et al. (2013) conservatively estimate that apex predatory fish (sharks and jacks present in just the nearshore waters out to 30 m depth in the MHI) consume a minimum 66,000 kg/day (146,000 lb/day). Thus, near-shore predatory fish alone consume at least 50 times more fish than does the entire assumed population of MHI monk seals.

Commercial fishery landings from 2003-2009 were reported by Sprague et al. (2013) and are reproduced here in Table 4.9-1 (adapted from DLNR commercial catch reports). A conservative estimate of commercial catch of species occurring within nearshore (up to 30 m depth) habitats (that is, after excluding mostly pelagic species that account for 95% of commercial landings), is 1,676 kg (3,969 lb) per day.

Total minimum estimated biomass of reef fish in the shallow water coral reef habitats of the MHI is 16,600,000 kg (36,600,000 lb) (Sprague et al. 2013). Thus, the daily consumption of the entire MHI monk seal population amounts to a *maximum* of 0.009% of the estimated available prey biomass. Because assumptions erred on the side of overestimating monk seal impacts, the true value is likely considerably even smaller.

Finally, Sprague et al. (2013) report that only 27% of reported commercial fishery landings (by weight, excluding pelagic species) are in the same fish families also found in monk seal diet. Or conversely, 73% of commercial nearshore landings are from families of fish not eaten by monk seals and therefore not likely to be impacted by any increase in monk seal consumption. When pelagic commercial species are included, landings in fish families also eaten by monk seals only accounted for 1.3% of the total commercial catch.

For alternatives that are anticipated to result in an increase in Hawaiian monk seal population in the MHI, either through translocation or because of the long-term success of the enhancement actions, additional fish consumption by seals may occur. However, as noted above, only about 27% of the commercial nearshore landings are from the same families of fish eaten by Hawaiian monk seals. Further, a commercially viable fish that a monk seal may eat would not necessarily be available to fishermen. For example, those fish may instead be eaten by predatory fish (which, as noted above, conservatively consume at least 50 times more fish than the entire monk seal population). Seabirds and other marine mammals also may take such commercially targeted prey. Further, Hawaiian monk seals forage over a much wider range of areas than accounted for in the Sprague et al. (2013) analysis. Given these considerations, the percentage of commercial catch that might be consumed by seals present in the MHI due to research and enhancement activities would be even smaller than indicated by the above calculations.

Table 4.9-1. Commercial fishery landings reported to the State of Hawai'i DLNR from 2003 to 2009. All are sea landings reported in pounds (lbs). Families marked as "excluded" were not included in the analysis of biomass consumption relative to monk seals.

Family	Common Name	2003	2004	2005	2006	2007	2008	2009	Annual Average (lbs)	Daily Average (lbs)	Daily Average (kg)
Acanthuridae	Surgeonfishes	102,703	88,448	90,018	71,984	76,637	81,094	41,095	78,854	216	98
Albulidae	Bonefish	3,057	2,002	3,344	5,175	9,822	11,308	8,531	6,177	17	8
Balistidae	Triggerfishes	62	113	61	8	236	812	2,015	472	1	1
Carangidae	Akule/opelu	847,465	1,002,718	887,225	867,448	1,094,462	620,770	617,268	848,194	2,324	1,054
Carangidae	Jacks/ulua	82,304	84,383	58,442	39,480	70,828	61,079	58,347	64,980	178	81
Cephalopod	Octopods & squid	25,864	23,108	20,956	20,434	18,290	31,305	34,335	24,899	68	31
Crustacean	Crabs, lobsters, prawn	40,138	26,159	150,892	36,589	52,190	57,557	155,842	74,195	203	92
Elopidae	Ladyfish tarpon	823	430	581	1,106	1,407	408	1,642	914	3	1
Holocentridae	Squirrelfishes & soldierfishes	34,548	29,629	35,367	24,041	36,049	59,171	52,508	38,759	106	48
Kuhliidae	Flagtail	2,995	1,893	2,250	1,266	1,670	4,182	4,180	2,634	7	3
Kyphosidae	Sea chub	19,503	19,349	19,639	35,616	26,773	21,597	14,479	22,422	61	28
Labridae	Wrasses	6,532	6,094	3,761	4,965	4,611	6,026	7,645	5,662	16	7
Lutjanidae	Snappers	1,789	3,387	1,851	2,381	2,645	3,460	4,223	2,819	8	4
Monacanthidae	Filefishes	906	3,590	407	741	595	454	0	956	3	1

Mugilidae	Mullet	9,239	8,171	7,785	8,369	11,329	9,740	8,560	9,028	25	11
Mullidae	Goatfishes	62,201	68,994	39,703	40,348	35,499	38,055	54,193	48,428	133	60
Muraenidae	Moray eels	59	124	85	101	250	483	1,864	424	1	1
Pomacentridae	Damselfishes	908	1,745	2,131	2,085	1,240	1,867	1,882	1,694	5	2
Priacanthidae	Bigeyes	3,209	14,117	5,541	2,987	4,842	3,843	2,752	5,327	15	7
Scaridae	Parrotfishes	35,506	32,049	32,573	30,387	40,094	44,806	50,475	37,984	104	47
Scorpaenidae	Scorpionfishes	3,348	2,972	3,279	2,713	2,303	2,053	3,641	2,901	8	4
Serranidae	Groupers, basslets, & anthias	49,052	44,292	48,214	31,443	29,203	23,226	25,742	35,882	98	45
Sphyraenidae	Barracuda	2,929	2,973	1,787	1,619	1,467	3,925	1,591	2,327	6	3
-	Misc. inshore fishes (incl. moi, mu, awa)	6,872	7,644	5,906	5,895	11,751	15,325	16,746	10,020	27	12
Subtotal		1,342,012	1,474,384	1,421,798	1,237,181	1,534,193	1,102,546	1,169,556	1,325,953	3,633	1,648
EXCLUDED											
Family	Common Name										
Istiophoridae & Xiphiidae	Billfishes & swordfishes	3,029,870	2,294,177	4,655,440	4,038,122	5,470,247	6,406,085	5,967,862	4,551,686	12,470	5,656
Scombridae	Tunas	14,055,058	13,315,002	14,596,986	12,618,034	18,660,259	18,908,288	15,229,305	15,340,419	42,029	19,064
-	Corals	0	0	0	0	3,775	0	0	539	1	1
Lutjanidae, Serranidae,	Deep bottomfishes	585,235	642,258	523,538	477,503	508,708	509,027	473,573	531,406	1,456	660

Berycidae, Carangidae											
-	Misc. pelagic fishes	4,107,385	4,633,532	4,405,774	4,269,982	4,711,822	4,847,981	5,231,456	4,601,133	12,606	5,718
-	Other animals (e.g. sea cucumber, limpet)	11,730	8,441	7,231	10,246	7,499	10,517	22,649	11,188	31	14
-	Seaweeds and limu	13,304	16,906	10,184	5,102	5,741	9,900	10,402	10,220	28	13
-	Sharks	203,253	142,289	193,450	177,205	370,349	337,043	297,078	245,810	673	305
-	Unclassified or misc	10,058	12,267	15,605	57,603	5,821	17,216	5,129	17,671	48	22
Subtotal		22,015,893	21,064,872	24,408,208	21,653,797	29,744,221	31,046,057	27,237,454	25,310,072	69,343	31,453
TOTAL		23,357,905	22,539,256	25,830,006	22,890,978	31,278,414	32,148,603	28,407,010	26,636,025	72,975	33,101

If an alternative results in a change in the Hawaiian monk seal population in the MHI, indirect effects on commercial fishing may also include changes in costs due to the nature and number of interactions between fisheries and seals. Costs from such interactions can arise from: 1) damaged catch from depredation (*i.e.*, seals eating fish off fishing lines or hooks) by Hawaiian monk seals; 2) increased loss or damage of fishing equipment such as hooks; and 3) actions taken by commercial fishing to reduce interactions and harm to Hawaiian monk seals. For example, efforts to reduce interactions can result in increased fuel costs if fishermen relocate to avoid monk seals. In addition, if a fisherman brings gear aboard and stops fishing efforts to avoid a seal interaction, fishing time could be reduced (with potential associated reductions in catch).

The data available on the above interactions types between commercial fishing and Hawaiian monk seals are limited to NOAA observer reports from the NWHI and the MHI, as well as published studies from the 1990s in the NWHI. The NOAA bottomfish observer reports from the MHI from 2003 to 2005 did not record any interactions between Hawaiian monk seals and commercial fishing vessels (NOAA Fisheries Service, Pacific Islands Regional Office, Observer Program, Hawaii Bottomfish Quarterly and Annual Status Reports, 2003, 2004, 2005; accessed online at: http://www.fpir.noaa.gov/OBS/obs_hi_bf_rprts.html). Similarly, NOAA longline observer reports from 1994 to 2011 did not record any interactions between Hawaiian monk seals and commercial fishermen (Nitta and Henderson, 1993).

However, bottomfish observer reports from the NWHI in the early 1990's indicate that bottomfish-monk seal interactions occurred, on average, at a rate of one interaction per 34.4 hours fishing, with no recordings of damaged fish from interactions (Hale and Coon 1993, Nitta and Henderson 1993). A study of commercial bottomfish fishing in the NWHI did present evidence of damaged fish by Hawaiian monk seals. This study reported that the mean incident rate for fish damaged by NWHI monk seals was 0.45 damaged fish per 1,000 landed fish, or less than 0.05% of catch (Kobayashi and Kawamoto 1995). The study also estimated that NWHI monk seals may have stolen approximately 12.15 fish per 1,000 landed fish, with estimated gear costs for each fish lost of approximately $7.50 (in 2012 dollars).

While the data from the NWHI indicate that Hawaiian monk seals did interact with commercial bottomfish fishing in the 1990's, there are no observer data in the MHI documenting such interactions. The Hawaiian monk seal population in the NWHI during the 1990's was much larger than the current MHI seal population. That difference, and the lack of data on interactions in the MHI, suggest interactions between commercial fishing vessels and monk seals in the MHI resulting in costs to the fishery are likely rare.

4.8.1.1 *Direct and Indirect Effects on Commercial Fisheries of Alternative 1 – Status Quo*

Alternative 1 (Status Quo) entails the continuation of the current NMFS Research and Enhancement Permit (10137) until it expires in 2014. Following this date, subsequent permits would be issued to continue the research and enhancement activities that are currently permitted. For a complete description of permitted research under Alternative 1, please refer to Section 2.6 *Alternatives Carried Forward for Analysis*.

Alternative 1 is not anticipated to have any direct effects on commercial catch in the MHI. Under Alternative 1 (and all other alternatives), the Hawaiian monk seal population in the MHI is anticipated to increase due to the apparent favorable conditions for continued growth as evidenced by the demographics of the Hawaiian monk seal population (Baker *et al.* 2011*a*) independent of actions taken by NMFS. While this natural growth may be enhanced by Alternative 1 activities such as de-hooking, disentanglement, and weaned pup translocation measures, the contribution of Alternative 1 activities to any increase in the monk seal population would be marginal.

As discussed above, effects on commercial fishing could stem from changes in the quantity of fish, value of commercial catch, and costs to the fishery related to commercial fishing/Hawaiian monk seal interaction.

Indirect effects of Alternative 1 on commercial fishing could be possible if there were marked changes in the availability of commercially fished species and, consequently, the quantity of commercial catch, due to an increase in the Hawaiian monk seal population. Furthermore, commercial fishing could be affected by Hawaiian monk seal interactions that could increase their costs from damages to their catch and gear due to depredation. Additionally, fishermen could bear additional costs resulting from idle time and fuel costs in an effort to avoid interaction with Hawaiian monk seals.

The Hawaiian monk seal population is anticipated to increase in the MHI regardless of the alternatives, but some activities under Alternative 1 may marginally enhance this growth. Sprague et al. (2013) estimated that

- An entire population of 200 monk seals consumes a maximum of 0.009% of the estimated available prey biomass in the nearshore MHI, and
- Only a fraction (27%) of that consumption potentially overlaps with commercially fished species, and
- Apex predatory fish likely consume over 50 times more prey than the entire monk seal population

Given those findings, any marginal increase in Hawaiian monk seal population due to Alternative 1 activities are anticipated to have negligible effects on commercial fishing.

Conclusion for Direct and Indirect Effects on Commercial Fisheries from Alternative 1 (Status Quo)

None of the research and enhancement activities permitted under Alternative 1 would directly affect commercial fishing in MHI. Therefore, direct effects are likely to be negligible. Given the small relative consumption rate of the entire Hawaiian monk seal population, the limited overlap between prey consumed by seals and species targeted by commercial fisheries, and the lack of data on interactions with the commercial fishing industry in the MHI, under Status Quo (Alternative 1) a marginal increase in the growth rate of the Hawaiian monk seal population that is already naturally increasing in the MHI is likely to result in negligible indirect adverse effects on commercial fishing.

4.8.1.2 Direct and Indirect Effects on Commercial Fisheries of Alternative 2 – No Action (No New Permits After 2014)

Alternative 2 (No Action) entails the continuation of existing research as permitted under the existing permit (10137) until 2014. Once expired, these research and enhancement activities would cease. Unlike the activities under some other alternatives, there would be no field research to monitor populations, implement de-worming, or translocation.

Alternative 2 is not anticipated to have any direct effects on commercial fishing in the MHI. As noted above, demographic data suggest that the Hawaiian monk seal population in the MHI is anticipated to continue to increase regardless of the proposed alternatives. Under Alternative 2, given that most monk seal research and enhancement activities would cease after 2014, potential effects on commercial fishing under Alternative 2 would not likely occur.

Indirect effects of Alternative 2 on commercial fishing could be possible if there were marked changes in the availability of commercially fished species and, consequently, the quantity of commercial catch, due to increased Hawaiian monk seal population. Furthermore, commercial fishing could be affected by Hawaiian monk seal interactions that could increase their costs from damages to their catch and gear due to depredation. Additionally, fishermen could bear additional costs resulting from idle time and fuel costs in an effort to avoid interaction with Hawaiian monk seals.

Because most monk seal research and enhancement activities would cease after 2014 under Alternative 2, any increases to the monk seal population due to Alternative 2 would be even smaller than under Alternative 1. Thus, for all the reasons presented in the analysis of Alternative 1 above, the effects of Alternative 2 are anticipated to be negligible.

<u>Conclusion for Direct and Indirect Effects on Commercial Fisheries from Alternative 2 (No Action)</u>

Alternative 2 is not anticipated to either directly or indirectly affect commercial fishing in MHI. The overall effects of Alternative 2 are expected to be negligible.

4.8.1.3 *Direct and Indirect Effects on Commercial Fisheries of Alternative 3 – Limited Translocation (Preferred Alternative)*

Alternative 3 entails the expansion of research and enhancement activities currently permitted, most of which are focused on improving the population status in the NWHI. The Alternative 3 expanded activities most relevant to the MHI are a vaccination program and behavioral modification activities. Vaccination could prevent Hawaiian monk seal population declines in the MHI if a disease outbreak occurs for which a safe and effective vaccine is available, and if a significant portion of the Hawaiian monk seal population can be vaccinated. Also, emergency response to a disease outbreak is already mandated under provisions of the MMPA's Marine Mammal Health and Stranding Response Program (MMHSRP) (Title IV, 16 U.S.C. 1421) and the permit held by the MMHSRP. Behavioral modification may also lead to marginal increases in the MHI monk seal population if seals with undesirable behaviors are able to remain in the wild. This would be expected to involve only very few seals. Importantly, behavioral modification is in part intended to reduce habitual seal interactions with fishing operations. If this effort succeeds, then Alternative 3 may *reduce* potential effects on fishing by minimizing interactions. Alternative 3 is not anticipated to have any direct effects on commercial fishing in the MHI.

> *Importantly, behavioral modification is in part intended to reduce habitual seal interactions with fishing operations. If this effort succeeds, then Alternative 3 may reduce potential effects on fishing by minimizing interactions.*

Indirect effects of Alternative 3 on commercial fishing could be possible if there were marked changes in the availability of commercially fished species and, consequently, the quantity of commercial catch, due to increased Hawaiian monk seal population. Furthermore, commercial fishing could be affected by Hawaiian monk seal interactions that could increase their costs from damages to their catch and gear due to depredation. Additionally, fishermen could bear additional costs resulting from idle time and fuel costs in an effort to avoid interaction with Hawaiian monk seals.

The Hawaiian monk seal population is anticipated to increase in the MHI regardless of the alternatives, but some activities under Alternative 3 may marginally enhance this growth. Sprague et al. (2013) estimated that

- An entire population of 200 monk seals consumes a maximum of 0.009% of the estimated available prey biomass in the nearshore MHI, and

- Only a fraction (27%) of that consumption potentially overlaps with commercially fished species, and
- Apex predatory fish likely consume over 50 times more prey than the entire monk seal population

While Alternative 3 activities may marginally increase the Hawaiian monk seal population, behavioral modification activities may succeed in reducing seal interactions with fisheries. Given the findings of Sprague et al. (2013) coupled with the potential reduction in seal/fishery interactions, any marginal increase in the seal population due to Alternative 3 activities are anticipated to have negligible effects on commercial fishing.

Conclusion for Direct and Indirect Effects on Commercial Fisheries from Alternative 3 (Preferred Alternative)

None of the research and enhancement activities permitted under Alternative 3 would directly affect commercial fishing in MHI. Therefore, direct effects are likely to be negligible to none. A marginal increase in the MHI Hawaiian monk seal population growth rate due to Alternative 3, especially coupled with potentially reduced seal/fishery interactions due to behavioral modification, is not likely to result in an indirect adverse effect on commercial fishing. Therefore, this effect would likely be negligible.

4.8.1.4 Direct and Indirect Effects on Commercial Fisheries of Alternative 4 – Enhanced Implementation

Alternative 4 entails expanded research and enhancement activities, most of which, as under Alternative 3, are focused on improving the population status in the NWHI. The Alternative 4 expanded activities most relevant to the MHI are potential two-stage translocation involving temporarily moving juvenile seals from the NWHI to the MHI, a vaccination program, and behavioral modification activities. It is anticipated that the benefit of Alternative 4 would primarily manifest as a reduction in the rate of decline in the NWHI as opposed to making significant contributions to the increase in MHI population growth that is naturally occurring (*i.e.,* without NMFS intervention). The proportion of seals temporarily translocated to the MHI under Alternative 4 would constitute a small proportion of the already naturally increasing seal population. Further, should the option to translocate seals from the NWHI to the MHI (allowed only under this alternative) be exercised, there would only be a temporary increase in the MHI population of monk seals due to that action because any translocated seals would be returned to the NWHI once they reached 2 or 3 years of age. Alternative 4 is not anticipated to result in any direct effects on commercial fishing in the MHI.

Indirect effects of Alternative 4 on commercial fishing could be possible if there were marked changes in the availability of commercially fished species and, consequently, the quantity of commercial catch, due to increased Hawaiian monk seal population. Furthermore, commercial fishing could be affected by Hawaiian monk seal interactions that could increase their costs from damages to their catch and gear due to depredation. Additionally, fishermen could bear additional costs resulting from idle time and fuel costs in an effort to avoid interaction with Hawaiian monk seals.

Under this alternative, a maximum of 20 weaned pups per year could be translocated to the MHI from NWHI for the five-year permit period. Each group of monk seals would be returned to the NWHI once they reached 2 or 3 years of age. The maximum number of additional seals that would be present in a single year is 60 seals if it is assumed that:

- the maximum allowed number of juvenile monk seals per year (20) are translocated for at least 3 consecutive years;
- all of these are translocated from the NWHI to the MHI and not vice versa; and
- there is no mortality of translocated seals for three years;

While it is important to consider this scenario in order to understand what might happen if all of these seals survived, that would be very unlikely. A more realistic estimate of the maximum number of translocated monk seals in the MHI is derived by applying the survival rates of native-born MHI monk seals to translocated seals. Retaining the first two assumptions in the preceding bullets, this results in a projected maximum number of 51 additional seals. Again, while this analysis acknowledges that an additional 60 seals in these years would be unlikely, it uses this number (60) in order to present the greatest potential impact scenario for the purposes of evaluating potential effects on commercial fish in the MHI under Alternative 4.

Based upon the liberal consumption rates in Sprague et al. (2013) juvenile monk seals eat approximately 5 kg (11 lb) of prey per day. Therefore, the additional 60 juvenile monk seals that could potentially occur temporarily in the MHI under Alternative 4 would consume at most 60 x 5 = 300 kg (662 lb) of prey per day. This represents at most 0.0018% of the estimated standing biomass of reef fish in the nearshore habitats of the MHI. Furthermore, apex fish predators are estimated to consume at least 220 times as much as would these 60 potential juvenile monk seals. Interactions between the translocated seals and commercial fisheries could increase under Alternative 4, although as noted above, documentation of such interactions is lacking and they are likely to be very rare. However, as under Alternative 3, behavioral modification activities under Alternative 4, if successful, could mitigate fishery interactions with both translocated and seals native to the MHI. Given the exceedingly small potential increase in prey consumption, only part of which would potentially overlap with commercially targeted species, and the potentially marginal increase in fishery interactions (though mitigated by behavioral modification), overall Alternative 4 activities are anticipated to have negligible effects on commercial fishing.

<u>Conclusion for Direct and Indirect Effects on Commercial Fisheries from Alternative 4 (Enhanced Implementation)</u>

None of the research and enhancement activities permitted under Alternative 4 would directly affect commercial fishing in the MHI. Therefore, direct effects are likely to be negligible. A temporary and only marginal Hawaiian monk seal population increase within the MHI due to Alternative 4, combined with the implementation of behavioral modification tools, is not likely to result in an indirect adverse effect on commercial fishing. Therefore, this effect would likely be negligible.

4.8.1.5 *Cumulative Effects of Alternatives on Commercial Fisheries*

This section presents the cumulative effects on commercial fishing in the context of past actions and the RFFAs listed in Tables 4.5-1 and 4.5-2 respectively.

<u>Summary of Direct and Indirect Effects on Commercial Fisheries</u>

The alternatives are not anticipated to result in any *direct* effects on commercial fishing, given that the actions proposed (such as vaccinations, de-worming, translocation) will not likely occur in locations popular for fishing. However, *indirect* effects on commercial fishing may be possible if an alternative results in a change in Hawaiian monk seal population in the MHI, and the Hawaiian monk seal population, in turn, affects the commercial catch because Hawaiian monk seals may potentially prey on and reduce the population of certain fish species that are commercially viable. On the other hand, some fish species may increase in population if Hawaiian monk seals consume predators or competitors of those species.

Indirect effects on commercial fishing may be possible if an alternative results in a change in the Hawaiian monk seal population in the MHI, which, in turn, results in an increase in the number of seal-commercial fisheries interactions. However, the analysis suggests that the indirect effects of the alternatives on commercial fishing are likely to be negligible due to the marginal increase in the monk seal population expected, and implementation of behavioral management tools.

Direct and indirect effects of monk seal research and enhancement activities on commercial fisheries are evaluated in terms of potential increases or decreases in commercial catch. Table 4.9-2 summarizes the direct and indirect effects of the alternatives on commercial fisheries.

Table 4.9-2 Summary of Direct and Indirect Effects of the Alternatives on Commercial Fisheries

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementation**
Changes in Commercial Fisheries	Negligible	Negligible	Negligible	Negligible

<u>Past, Present and Future Actions and Events Contributing to Cumulative Effects on Commercial Fisheries</u>

Past, present and reasonably foreseeable future actions that may affect commercial fisheries are summarized in Table 4.9-3.

Table 4.9-3 Effects of Past, Present and Reasonably Foreseeable Future Actions on Commercial Fisheries

Action / Event	Potential Effects	Description/Example	Effect
Natural Events			
Tsunami, Volcano, Earthquake, Hurricane Japanese Tohoku earthquake and tsunami debris	• Changes to fish habitat • Injury or mortality to fish • Changes in prey due to ecosystem shift • Changes in fish age class recruitment	• 2011 Japanese Tohoku earthquake and tsunami debris • Debris increases likelihood of ingestion of debris by fish and affects habitat suitability.	-
Climate Change		• Subtropical Pacific ecosystem changes evident although modest relative to changes from increased fishing effort. However, future climate change projected to shift ecosystem towards smaller fish even if fishing remains constant (Polovina 2011). • Long-term dynamics are driven in large part by climate (ocean variability) (Baker et al. 2012). Variability in fish populations are affected by these changes and can be both beneficial and adverse.	+/-
Introduction of Invasive species		• Parasites have been shown to be significant stressors in many species. Reif et al. (2006). • Invasive fish species introduced through ballast water may cause changes in fish population dynamics.	-
Predation by apex predatory fish nearshore (30m depth)	• Mortality of fish	• Apex predatory fish consume a minimum of 66,000 kg/day (146,000 lb/day) approximately 50 times more than a Hawaiian monk seal (Sprague et al. 2013).	-/+
Predation by Hawaiian monk seals nearshore (30m depth)	• Mortality of fish	• Estimated predation by 200 monk seals in MHI is approximately 1,300 kg per day (2,900 lb per day) (Sprague et al. 2013)	-/+
Military activities			

U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST]) Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS)	• Mortality of fish • Fish habitat destruction • Temporary or permanent area restrictions to fishing during training	• Possible yet unlikely temporary threshold shift (TTS) impact to fish sensory systems due to sonar and explosive detonations. • Potential strike or contamination by torpedo and ship training activities. • Possible entanglement of fish in parachute assemblies, remote. • Detonation and explosive ordinance impacts to fish (i.e., mortality). • Detonation impacts of buoys and RIMPAC and USWEX to fish. • Impacts to fish to include TTS injury and mortality. • Degradation or destruction of feeding habitat by underwater detonations and training activities. • Possible, however unlikely, TTS impact to fish due to sonar and explosive detonations. • Potential strike or mortality by training activities. • Potential closure or fisheries restrictions in areas where training activities occur.	-
Commercial			

<table>
<tr><td>Unregulated fishing (1913 - 2002)
Sea cucumber harvest (1882)
Black-lipped oyster harvest (1928-1930)
Lobster harvest (1970-1999)</td><td>• Mortality of fish
• Reproductive effects on fish</td><td>• Unregulated take, reducing long term sustainability of populations for future fisheries.
• Long-term catch trends suggest that there has been approximately an 80 percent decline in the nearshore stocks this century. Overfishing is partially due to an increase in population, improved fishing technology, improved gear, and failure to recognize or follow traditional conservation practices. Additionally, the number of commercial permits issued to collect reef fish increased by 39 percent between 1995 and 1998 (NOAA 2013).</td><td>-</td></tr>
<tr><td>Commercial bottomfish fisheries</td><td rowspan="2">• Changes in fisheries catch/landings
• Overharvest
• Fish mortality or injury</td><td>• 1948 – 1978: number of trips per year per fishermen increased and has remained about 8 trips per year between 1980 and 2004. Data suggest there are more fishermen catching fewer fish.
• Aggregated bottomfish stock is below maximum sustainable yield (a fisheries management metric) suggesting that overfishing is resulting in declines in fish populations. Overfishing is most severe in MHI (PIFSC 2011; Moffitt et al. 2006).</td><td>-</td></tr>
<tr><td>Commercial pelagic fisheries</td><td>• 1996-2006: Increased fishing effort with number of hooks set increasing four-fold. Catch rates for apex predators such as blue shark, bigeye and albacore tunas, shortbill spearfish, and striped marlin declined from 3 to 9% per year while catch rates for mahimahi, sickle pomfret, escolar, and snake mackerel, increased by 6 to 18% per year (Polovina 2009).
• 1950 – 1990s: fishing impacts on marine ecosystems (Pauly 2005). Decreased catch rates for large fishes has continued through at least 2011 (Polovina 2011).
• 2010: pelagic fishery landings 26.6 million pounds (WPacFin 2011).
• 2014: 6% increased quota recommended for bottomfish due to improved reporting and reduction in management uncertainty about stocks (WPFMC 2013).</td><td>-/+</td></tr>
</table>

Recreational and subsistence fisheries		• No license requirements in Hawaii making it difficult to manage overfishing (Moffitt et al. 2006). • Though data are lacking, recreational overfishing very likely contributing to decreases in fish species and therefore declines commercial fisheries landings (PIFSC 2011). • Limited data on subsistence harvest of fish species in Hawaii make estimating harvest levels difficult. • 2013: daily commercial nearshore catch was estimated to be 1676 kg, the near-shore recreational and subsistence catch was estimated to be 2178 kg (Sprague et al. 2013) • Widely believed that nearshore recreational and subsistence catch is equal to or greater than the nearshore commercial fisheries catch, with more species taken using a wider range of fishing gear (Friedlander et al. 2004).	
Inter-Island Transmission Cable	• Disturbance to fishing vessels	• Impacts of cable installation are brief and minimal. Laying cable does cause some disturbance of the ocean floor, but within days the area returns to normal. • Impacts to fish may occur while laying the cable, including entanglement and mortality.	-
Special Coral Reef Ecosystem Fishing Permit to Kampachi Farms, LLC	• Aggregation of pelagic fish	• Culture and harvest a coral reef ecosystem management unit fish species kampachi (Seriola rivoliana, marketed as Kona Kampachi[supreg]) in a floating pen moored about 5.5 nm off the west coast of the Island of Hawaii in about 6,000 ft of water. A 132m [supcaret] 3 (approximately 21 feet in diameter) brass-link mesh aquapod (CuPod) tethered to a moored, 28-ft feed vessel would be used for harvesting. • Fishermen would be able to fish around the array. The small size of the array is not expected to have a large adverse impact on catches by other fishermen in the ocean in west Hawaii.	-
Wai`anae Wastewater Treatment Plan Modification Lā`ie Wastewater Collection System Expansion Phase II – Lā`ie	• Water quality improvements	• Wastewater treatment plant improvements would generally be expected to reduce contaminants and biological waste streams entering the coastal ecosystem. Thus, minimizing exposure of fish species to contaminants and biological waste would result in improvements in habitat and would likely be beneficial for fish.	+

Agriculture	• Nutrient pollution • Sedimentation	• Sediment runoff and pollution and nutrients from agricultural practices also widely impact coral reef habitat. • Sources of sediment on Hawaiian reefs include: improperly managed construction sites; cleared agricultural lands; heavy grazed lands; and eroding stream banks. Nutrients from fertilizers and pollutants such as bacteria from livestock, herbicides, and insecticides enter marine waters in runoff and seepage. Nutrient pollution and sediments from coastal development and farming can block sunlight, smother corals, and impede larval settlement (NOAA 2013).	**-**
Other Government Activities			

Hawai`i Environmental Justice Bill: Senate Bill 2145 EO 12898: Environmental Justice	• Protection of minority interests in fisheries	• To the extent that minority populations rely on fisheries (commercial, subsistence or recreational) for income or for food, protection of minorities from projects that may cause disproportionate impacts would result in benefits to these groups.	+
Closure of Bottomfish Fishery in the Hawaiian Archipelago (2006)	• Closed fishery	• 2006: regulations prohibited commercial fishing, except for the bottomfish fishery (and associated pelagic species catch), which had potential to continue until 2011 (U.S. Department of Commerce and Department of the Interior, 2006). • 2009 remaining permit holders surrendered permits to NMFS in exchange for compensation from Federal Government and fishery was closed. Total NWHI bottomfish catch in 2009 was 29 metric tons.	-
Hawaiian Spinner Dolphin Human Interaction Protection Measures	• Habitat protection for fish • Redistribution of fishing activities to other areas	• No new fishing regulations would result from designating potential time-area closures for human activities such as wildlife viewing, swimming, boating, or fishing. Fishing activities may move to other areas where no time-area closures are in effect though overall this is not expected to reduce fish catch. • Fish populations may benefit from spinner dolphin protection measures due to potential time-area closures in bays around the MHI; potential additional protection of habitat; added recruitment could benefit fisheries.	+
State of Hawai`i DLNR. Clearing of rivers, streams, beach areas Removal of marine debris from high entanglement zones	• Reduction in marine debris • Mortality • Injury	• Reduction in marine debris could reduce mortality or entanglement of fish. • Marine debris affects fish via ingestion (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). • Potential reduction in debris entanglement in commercial fishery nets.	+

Hawaiian Monk Seal Critical Habitat Designation	• Habitat protection	• No new fishing regulations would result from designating Hawaiian monk seal critical habitat. • Fish populations may benefit from Monk Seal Habitat designation due to the additional protection of habitat; added recruitment will benefit fisheries.	+
Fishery Ecosystem Plan for the Hawai`i Archipelago	• Mortality • Prey availability	• Fishery plan may promote more stable prey resources. • Researchers may enhance habitat for fish when they remove marine debris during field activities. Marine debris affects fish via ingestion of anthropogenic materials (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). Removal of marine debris by researchers for Hawaiian monk seals would likely result in a beneficial effect on fish.	+ / -
Measures to End Bottomfish Overfishing in the Hawaiian Archipelago	• Indirect mortality • Prey availability	• Fishery plan may promote more stable prey resources.	+
Bottomfish and Seamount Groundfish Fisheries Management Plan (2005)	• Indirect mortality • Prey availability	• Fishery plan promotes more sustainable management of stocks and promotes stable prey resources.	+
Pilot Aquaculture Project (Tuna cultivation)	• Mortality • Disease • Genetic effects • Pollution	• Potential reduction in pressure on wild fish populations. • Escapement could impact native populations through disease and dilution of locally adaptive gene complexes, disrupt natural ecosystems and jeopardize recovery of depleted or endangered species. • Aquaculture facility can carry excessive nutrients, particulates, bacteria, other diseased organisms and polluting chemicals	+/-

Cumulative Effects Conclusion for Commercial Fisheries

The direct and indirect effects on commercial fisheries associated with the Hawaiian monk seal research and enhancement alternatives are negligible because proposed activities would not result in changes to landings. Thus, the contribution of monk seal research and enhancement to an overall cumulative effect from any of the alternatives is considered negligible.

Documented historical overfishing in the NWHI and MHI has adversely affected fish populations around Hawaii as shown in Table 4.8-15. The effects of ongoing subsistence and recreational fishing are not well understood due to lack of licensing requirements and reporting of catch. Though it is difficult to determine the level of catch for recreational and subsistence fisheries, Sprague et al (2013) reported that daily near-shore recreational and subsistence catch was estimated to be 2178 kg (Sprague et al. 2013) compared to daily commercial nearshore catch of 1676 kg. In addition, Friedlander et al. 2004 stated that it is widely believed that nearshore recreational and subsistence catch is equal to or greater than the nearshore commercial fisheries catch, with more species taken using a wider range of fishing gear. Based on these assumptions, there may be competition for fish between commercial and recreational/subsistence fisheries that may influence commercial landings. Notable fisheries management actions in the past have ended bottomfish overfishing in the MHI and FEPs for various fisheries would be expected to have beneficial effects on fish populations and therefore, could result in beneficial indirect effects on commercial catch.

Fisheries regulations, such as plans to end bottomfish overfishing in the Hawai`i Archipelago, could indirectly affect recreational fishing, as commercial bottomfish fishermen will seek alternatives to supplement their incomes. This could result in changes in the populations of other fish species, including those popular for recreational fishing. The management measures considered in the "Draft Supplemental Environmental Impact Statement – Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region – Measures to End Bottomfish Overfishing in the Hawai`i Archipelago" (March 2006), which supplements the May 2005 Final Environmental Impact Statement, target a 15% or greater reduction in bottomfish fishing mortality in the MHI (except for the no action alternative). Alternatives include area closures, seasonal closures, catch limits, and combinations of the three.

In addition to this, the Western Pacific Regional Fishery Management Council is implementing "ecosystem-based" approaches to fishery management in the Hawaiian Archipelago. This is a move from the "species-based' approach. Notable RFFAs in this context are "Fishery Ecosystem Plan for the Hawaiian Archipelago" (September 2009) and "Fishery Ecosystem Plan for Pacific Pelagic Fisheries of the Western Pacific Region" (December 2005). Examples of implementation measures under these plans include, among others, ecosystem boundaries, area closures, size restrictions, seasonal closures, gear restrictions, etc. In 2012, WPFMC approved a 6% increase in bottomfish quota due to improved reporting and reduction in management uncertainty about stocks (WPFMC 2012).

Effects of development, pollution, and human modifications of the coastal environment have all had adverse effects on fish populations and, thus, fisheries due to changes in overall fish habitat conditions. The local and global economic recession in recent years resulted in a reduction of fish exports by commercial fishermen, leading to reduced commercial catch. As the economy is beginning to recover, commercial catch is trending upwards and more tourists are visiting the MHI, which may increase recreational and subsistence fishing pressure.

Other ongoing federal government management actions to protect and enhance monk seal populations and other protected species such as spinner dolphins in the nearshore environment around Hawai'i could result in limited access to certain nearshore fisheries though this cannot be confirmed at this time as management measures are still being developed by NMFS. That said, designation of Hawaiian monk seal habitat is not anticipated to result in changes to fishing regulations. Protection of monk seal habitat may result in benefits to nearshore fish species through improved overall habitat protection and better recruitment. Whether this would be of benefit to commercial fisheries cannot be determined at this time.

Similar benefits could result from spinner dolphin protection measures such as time-area closures. Time-area closures however could result in limiting access to specific areas in bays around Hawaii. However, these potential spinner dolphin measures would not preclude fishermen from fishing in other areas where there were no closures thus the potential adverse effects of closures would likely be minimal.

Actions listed in Table 4.9-3 provide some overall perspective on actions and events that have had or could have effects (direct, indirect or cumulative) on commcerial fisheries. While the net effects on subsistence fishing from past and future actions are not known, Hawaiian monk seal research and enhancement actions are not likely to result in anything but negligible direct, indirect or cumulative effects on commercial fisheries.

4.8.2 Subsistence Fishing

This section addresses the potential direct, indirect and cumulative effects of the alternatives on subsistence fishing. The analysis focuses on the nearshore areas surrounding the MHI. Sprague et al. (2013, see also Section 3.4.4 *Subsistence Fishing*) noted that in Hawai'i the line between recreational and subsistence fishing is blurred, and there is little collection of data to differentiate between the two. There is no saltwater fishing license for recreational or subsistence fishing, and no requirement to report recreational catch in the State of Hawai‘i. As a result, the data on recreational fishery landings are very limited, voluntarily reported and are often considered biased or incomplete, representing a minimum estimate of extraction. Despite these data shortcomings, effects on subsistence fishing are nevertheless evaluated separately from recreational fishing (Section 4.9.3) because the types of effects may be different, owing to the intent of these non-commercial fishing activities (for subsistence versus for recreation).

Fish are an important part of the diet for the people of Hawai`i, with about 90 pounds per capita consumed annually, over twice the national average. Some fish species also have cultural significance for Native Hawaiians. Effects on subsistence fishing could be expected if an action results in changes in fish consumption by Hawaiian residents and, therefore, affects not only their well-being and quality of life, but also has a larger effect on their way of life and identity. As per Table 4.4-6 in Section 4.4.3, these effects are measured through looking at any changes in the quantity of fish consumed.

One factor that could potentially affect consumption is change in access to fishing areas, especially for onshore and nearshore fishing, as many Hawaiians tend to fish close to their homes for subsistence purposes. None of the alternatives propose any area closures or other seasonal or catch restrictions. Another factor that may result in altering fish consumption is change in the amount of fish caught due to less fish available. This is examined in more detail below.

The alternatives are not anticipated to result in any direct effects on subsistence fishing. However, indirect effects on subsistence fishing may be possible if an alternative results in a change in Hawaiian monk seal population in the MHI, and the Hawaiian monk seal population, in turn, affects the quantity of fish caught for subsistence purposes because Hawaiian monk seals may potentially prey on and reduce the population of certain fish species that are consumed by subsistence fishers. On the other hand, some fish species may increase in population if Hawaiian monk seals consume predators or competitors of those species.

It is widely believed that nearshore recreational and subsistence catch is equal to or greater than the nearshore commercial fisheries catch, with more species taken using a wider range of fishing gear (Friedlander *et al.* 2004). Consistent with this, Sprague et al. (2013) obtained recreational (and subsistence, because there is no formal distinction between these in the available data) landings summaries from the Hawaii Marine Recreational Fishing Survey from 2003 to 2011. They considered only landings from shore or from within 3 miles of shore (in order to exclude pelagic fishes) and excluded pelagic species and sharks caught within 3 mi of shore, thereby excluding 90% of the reported recreational fishery catch. While daily commercial nearshore catch was estimated to be 1676 kg, the near-shore recreational and subsistence catch was estimated to be 2178 kg (Table 4.9-

2). Sprague et al. (2013) note that commercial fishery landings data come from mandatory reports of daily fishing activity, while subsistence/recreational fishery landings data are from voluntary surveys. Both methods may underreport the actual catch, but there is likely greater accuracy in the commercial data. In particular, reported near-shore recreational landings from spear-fishing and shoreline fishing may not be as well-represented as boat-based landings. Fish families found in the monk seal diet accounted for only 39% of reported recreational/subsistence fishery landings (by weight, excluding pelagic species). Or conversely, 61% of nearshore landings are from fish families not eaten by monk seals and therefore not likely to be impacted by any increase in monk seal consumption. Sprague et al. (2013) note that with better information on the actual (versus reported) fishery catch, this estimate over monk seal dietary overlap with fisheries could be refined in the future.

The uncertainty in data on subsistence fishery landings makes it more difficult to assess the potential impacts of the alternatives. However, even the likely underestimated amount of fish (2178 kg per day) extracted by nearshore subsistence and recreational fishing is considerably higher than the relatively reliable estimate (1676 kg) of nearshore fish extracted by commercial fisheries. It is clear, then, that the amount of fish eaten by Hawaiian monks seals is relatively smaller when compared to the subsistence/recreational catch than when compared to the commercial catch. Therefore, the analyses in Section 4.9.1, which found negligible impacts of alternatives on commercial fishing as a result of potential increases in the rate of MHI monk seal population growth, are likewise applicable to subsistence fishing.

As described in Section 4.9.1 for commercial fishermen, subsistence fishermen could be affected by Hawaiian monk seal interactions resulting from increased costs from damages to their catch or gear due to depredation of fishing lines or hooks by seals. Additionally, subsistence fishermen who fish from boats could bear additional costs resulting from idle time or additional fuel costs incurred from efforts to avoid interactions with seals. Thus, alternatives that may change the frequency of monk seal interactions could affect subsistence fishing.

Table 4.9-4. Recreational fishery landings reported in the Hawaii Marine Recreational Fishing Survey from 2003 to 2011 (from Sprague et al. 2013). All are landings from shore or from <3 miles from shore reported in pounds (lb). Families marked as "excluded" were not included in the analysis of biomass consumption.

Family	Common Name	2003	2004	2005	2006	2007	2008	2009	2010	2011	Annual Average (lbs)	Daily Average (lbs)	Daily Average (kg)
Abulidae	Bonefishes	8,508	259,526	60,409	214,624	38,330	97,764	88,143	40,675	29,288	93,030	255	116
Acanthuridae	Surgeonfishes	135,661	73,859	158,062	87,556	7,676	7,906	23,473	85,519	111,922	76,848	211	96
Balistidae & Monacanthidae	Triggerfishes & filefishes	0	0	0	0	0	0	0	0	0	0	0	0
Carangidae	Jacks	605,420	863,082	873,702	1,696,371	334,223	716,651	407,169	489,651	562,817	727,676	1,994	904
Chaetodontidae	Butterflyfishes	0	0	0	0	0	0	0	0	0	0	0	0
Cirrhitidae	Hawkfishes	0	2,546	11,158	3,565	1,858	0	0	1,012	0	2,238	6	3
Clupeidae	Herrings	0	0	0	0	0	0	0	0	0	0	0	0
Elopidae	Tarpon	0	0	0	4,658	0	0	0	0	0	776	2	1
Engraulidae	Anchovies	8,433	503	0	0	0	0	0	0	0	1,117	3	1
Holocentridae	Squirrelfishes & soldierfishes	15,708	0	3,519	6,376	2,480	25,058	0	14,531	2,039	7,746	21	10
Kuhliidae	Flagtails	176,581	29,778	69,080	75,246	10,615	32,304	5,551	5,390	3,219	45,307	124	56
Kyphosidae	Sea chubs	587,756	4,751	8,684	1,274	0	0	0	0	13,543	68,445	188	85

Family	Common Name	2003	2004	2005	2006	2007	2008	2009	2010	2011	Annual Average (lbs)	Daily Average (lbs)	Daily Average (kg)
Labridae	Wrasses	137,096	226,437	186,500	86,192	22,002	529	0	41,469	18,402	79,847	219	99
Lutjanidae	Snappers	276,744	701,001	358,224	189,597	247,991	201,178	105,147	352,662	159,418	287,996	789	358
Mugilidae	Mullets	13,880	47,723	2,809	1,933	6,243	0	0	52,366	8,836	14,866	41	18
Mullidae	Goatfishes	250,189	360,749	75,621	189,917	134,687	70,610	32,950	77,173	14,630	134,058	367	167
Muraenidae, Ophichthidae, Ophidiidae, Congridae	Eels	0	0	0	0	0	0	0	0	0	0	0	0
Pleuronectidae	Flounders	0	0	0	0	0	0	0	0	0	0	0	0
Pomacentridae	Damselfishes	3,929	22,053	26,797	29,974	8,159	1,823	0	0	0	10,304	28	13
Scorpaenidae	Scorpionfishes	4,253	3,239	10,364	1,186	6,303	5,873	0	1,422	0	4,080	11	5
Serranidae	Sea basses	16,583	3,316	10,776	7,582	4,458	0	0	825	7,835	5,708	16	7
Sphyraenidae	Barracudas	15,130	45,349	26,599	1,894	0	9,319	4,850	2,996	2,518	12,073	33	15
Tetraodontidae	Puffers	0	0	0	0	0	0	0	0	0	0	0	0
-	Other fishes	1,232	197,979	1,225,586	94,192	7,485	5,313	11,713	35,428	45,219	180,461	494	224
Subtotal		**2,257,103**	**2,841,890**	**3,107,888**	**2,692,139**	**832,511**	**1,174,328**	**678,997**	**1,201,119**	**979,687**	**1,752,576**	**4,802**	**2,178**

Family	Common Name	2003	2004	2005	2006	2007	2008	2009	2010	2011	Annual Average (lbs)	Daily Average (lbs)	Daily Average (kg)
EXCLUDED													
Coryphaenidae	Mahi mahi	757,212	274,801	310,547	416,585	313,067	240,116	223,562	85,976	117,023	304,321	834	378
Scombridae	Tunas & mackerels	4,195,789	932,788	1,071,461	656,714	458,733	558,609	774,013	880,979	481,632	1,112,302	3,047	1,382
-	Sharks	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal		**4,953,001**	**1,207,589**	**1,382,008**	**1,073,299**	**771,800**	**798,725**	**997,575**	**966,955**	**598,656**	**1,416,623**	**3,881**	**1,760**
TOTAL		**7,210,104**	**4,049,479**	**4,489,896**	**3,765,438**	**1,604,311**	**1,973,053**	**1,676,572**	**2,168,074**	**1,578,343**	**3,169,199**	**8,683**	**3,938**

In contrast to commercial fisheries, for which there is little or no evidence of monk seal interactions in the MHI, seals frequently interact with non-commercial fisheries (subsistence and recreational). Unequivocal evidence of interactions includes the numerous seal hookings on non-commercial gear in recent years as well as entanglements in gillnets (laynets) (see Section 3.3.1.7). A minimum of 15 monk seals were hooked or entangled in gillnet in 2012 in a population of approximately 200 seals. From the perspective of the monk seal population, that is a relatively high rate of interaction, especially considering that many interactions that involve hooking or entanglement are likely not observed, not reported or not confirmed. The number of interactions that do not result in hooking or entanglement may be far greater.

In contrast, there are a relatively high number of subsistence fishermen compared to the MHI monk seal population of approximately 200 seals, so that the likelihood of any one fishermen experiencing interactions with seals is probably quite low. However, at meetings and through the public comment process, fishermen have reported that they believe monk seal interactions are becoming more frequent. This is not unexpected given that the MHI monk seal population is increasing naturally. Unfortunately, there are currently no data to indicate the frequency, nature, cost or outcome of monk seal interactions with subsistence fishing in the MHI. It is important to recognize that the current level of interactions or impact of monk seals is considered the baseline state, and the analysis below focuses specifically on the impact of the alternatives, rather than on the overall potential impact of monk seals on subsistence fishing. The MHI monk seal population is growing naturally, irrespective of any PEIS alternative. The crux of the analysis is whether the alternatives will be likely to increase or decrease any impacts on subsistence fishing beyond those that will occur regardless of the alternatives.

4.8.2.1 Direct and Indirect Effects on Subsistence Fishing of Alternative 1 – Status Quo

Alternative 1 (Status Quo) entails the continuation of the current NMFS Research and Enhancement Permit (10137) until it expires in 2014. Following this date, subsequent permits would be issued to continue the research and enhancement activities that are currently permitted. For a complete description of permitted research under Alternative 1, please refer to Section 2.6.

Alternative 1 is not anticipated to have any direct effects on subsistence fishing in the MHI. Indirect effects of Alternative 1 on subsistence fishing could be possible if there were marked changes in the availability of species fished for subsistence and, consequently, the quantity of subsistence catch, due to increased Hawaiian monk seal population resulting from Alternative 1. Furthermore, subsistence fishing could be affected by Hawaiian monk seal interactions that could increase costs from damages to catch and gear. Additionally, fishermen could bear additional costs resulting from idle time and fuel costs in an effort to avoid interaction with Hawaiian monk seals.

The Hawaiian monk seal population is anticipated to increase in the MHI regardless of the alternatives, but some activities under Alternative 1 may marginally enhance this growth. Sprague et al. (2013) estimated that

- An entire population of 200 monk seals consumes a maximum of 0.009% of the estimated available prey biomass in the near-shore MHI, and
- Only a portion (39%) of that consumption potentially overlaps with fish families fished for subsistence, and
- Apex predatory fish likely consume over 50 times more prey than the entire monk seal population

Also, the nearshore subsistence/recreational catch is considerably larger than the nearshore commercial catch. Therefore, any hypothetical additional fish consumption by monk seals associated with marginal increases in the monk seal population due to Alternative 1, would likely represent a smaller portion of the subsistence catch compared to the commercial catch. Given all these findings, any marginal increase in Hawaiian monk seal population due to Alternative 1 activities are anticipated to have negligible effects on subsistence fishing.

Conclusion for Direct and Indirect Effects on Subsistence Fishing from Alternative 1 (Status Quo)

None of the research and enhancement activities permitted under Alternative 1 would directly affect subsistence fishing in MHI. Therefore, direct effects are likely to be negligible. Marginal increases in the Hawaiian monk seal population growth rate in the MHI could possibly have an indirect adverse effect on subsistence fishing due to possible decreases in fish caught for subsistence purposes or increases in interactions with monk seals that damage catch or gear. However, this effect is likely to be negligible.

4.8.2.2 *Direct and Indirect Effects on Subsistence Fishing of Alternative 2 – No Action (No New Permits After 2014)*

Alternative 2 (No Action) entails the continuation of existing research as permitted under the existing permit (10137) until 2014. Once expired, these research and enhancement activities would cease. Unlike the activities under some other alternatives, there would be no field research to monitor populations, implement de-worming, or translocation.

The Hawaiian monk seal population in the MHI is anticipated to continue to increase regardless of the proposed alternatives. Under Alternative 2, given that most monk seal research and enhancement activities would cease after 2014, changes in the monk seal population due to Alternative 2 would be unlikely. Consequently, any potential indirect effects on subsistence fishing associated with Alternative 2 are also unlikely. As discussed above, indirect effects on subsistence fishing could stem from changes in the quantity of fish caught for subsistence purposes, leading to modifications in the amount of fish consumed.

Furthermore, effects on subsistence fishing could stem from a change in the number of interactions between subsistence fishing and Hawaiian monk seals.

Alternative 2 is not anticipated to have any direct effects on subsistence fishing in the MHI. Because Alternative 2 is not likely to result in more than extremely marginal changes in the MHI monk seal population, indirect effects of Alternative 2 on subsistence fishing due to either additional fish consumption by seals or additional seal interactions with the fishery, are expected to be negligible.

Conclusion for Direct and Indirect Effects on Subsistence Fishing from Alternative 2 (No Action)

Alternative 2 is not anticipated to directly or indirectly affect subsistence fishing in MHI. The overall effects of Alternative 2 are expected to be negligible.

4.8.2.3 Direct and Indirect Effects on Subsistence Fishing of Alternative 3 – Limited Translocation (Preferred Alternative)

Alternative 3 entails the expansion of research and enhancement activities currently permitted, most of which are focused on improving the population status in the NWHI. The Alternative 3 expanded activities most relevant to the MHI are a vaccination program and behavioral modification activities. Vaccination could prevent Hawaiian monk seal population declines in the MHI if a disease outbreak occurs for which a safe and effective vaccine is available, and if a significant portion of the Hawaiian monk seal population can be vaccinated. Also, emergency response to a disease outbreak is already mandated under provisions of the MMPA's Marine Mammal Health and Stranding Response Program (MMHSRP) (Title IV, 16 U.S.C. 1421) and the permit held by the MMHSRP. Behavioral modification may also lead to marginal increases in the MHI monk seal population if seals with undesirable behaviors are able to remain in the wild. This would be expected to involve only very few seals. Importantly, behavioral modification is in part intended to reduce habitual seal interactions with fishing operations. If this effort succeeds, then Alternative 3 may *reduce* potential effects on fishing by minimizing interactions. Alternative 3 is not anticipated to have any direct effects on subsistence fishing in the MHI.

Indirect effects of Alternative 3 on subsistence fishing could be possible if there were marked changes in the availability of species fished for subsistence and, consequently, the quantity of subsistence catch, due to increased Hawaiian monk seal population. Furthermore, subsistence fishing could be affected by Hawaiian monk seal interactions that could increase their costs from damages to their catch and gear due to depredation. Additionally, fishermen could bear additional costs resulting from idle time and fuel costs in an effort to avoid interaction with Hawaiian monk seals.

The Hawaiian monk seal population is anticipated to increase in the MHI regardless of the alternatives, but some activities under Alternative 3 may marginally enhance this growth. Sprague et al. (2013) estimated that

- An entire population of 200 monk seals consumes a maximum of 0.009% of the estimated available prey biomass in the nearshore MHI, and
- Only a portion (39%) of that consumption potentially overlaps with species fished for subsistence, and
- Apex predatory fish likely consume over 50 times more prey than the entire monk seal population

Also, the nearshore subsistence/recreational catch is considerably larger than the nearshore commercial catch. Therefore, any hypothetical additional fish consumption by monk seals associated with marginal increases in the monk seal population due to Alternative 3, would likely represent a smaller portion of the subsistence catch compared to the commercial catch. Finally, while Alternative 3 activities may marginally increase the Hawaiian monk seal population, behavioral modification activities may succeed in reducing seal interactions with fisheries. Given all these findings, any marginal increase in Hawaiian monk seal population due to Alternative 3 activities are anticipated to have negligible effects on subsistence fishing.

Conclusion for Direct and Indirect Effects on Subsistence Fishing from Alternative 3 (Preferred Alternative)

None of the research and enhancement activities permitted under Alternative 3 would directly affect subsistence fishing in the MHI. Therefore, direct effects are likely to be negligible. A marginal increase in the Hawaiian monk seal population growth rate in the MHI due to Alternative 3 is not likely to result in an indirect adverse effect on subsistence fishing, especially coupled with actions designed to reduce fishery interactions. Therefore, this effect would likely be negligible.

4.8.2.4 Direct and Indirect Effects on Subsistence Fishing of Alternative 4 – Enhanced Implementation

Alternative 4 entails expanded research and enhancement activities, most of which, as under Alternative 3, are focused on improving the population status in the NWHI. The Alternative 4 expanded activities most relevant to the MHI are potential two-stage translocation involving temporarily moving juvenile seals from the NWHI to the MHI, a vaccination program, and behavioral modification activities. It is anticipated that the benefit of Alternative 4 would primarily manifest as a reduction in the rate of decline in the NWHI as opposed to making significant contributions to the increase in MHI population growth that is naturally occurring (*i.e.,* without NMFS intervention). The proportion of seals temporarily translocated to the MHI under Alternative 4 would constitute a small proportion of the already naturally increasing seal population. Further, should the option to translocate seals from the NWHI to the MHI (allowed only under this alternative) be exercised, there would only be a temporary increase in the MHI population of monk seals due to that action because any translocated seals would be returned to the NWHI once they reached 2 or 3 years of age. Alternative 4 is not anticipated to result in any direct effects on subsistence fishing in the MHI.

Indirect effects of Alternative 4 on subsistence fishing could be possible if there were marked changes in the availability of species fished for subsistence and, consequently, the quantity of subsistence catch, due to increased Hawaiian monk seal population. Furthermore, subsistence fishing could be affected by Hawaiian monk seal interactions that could increase their costs from damages to their catch and gear. Additionally, fishermen could bear additional costs resulting from idle time and fuel costs in an effort to avoid interaction with Hawaiian monk seals.

Under this alternative, a maximum of 20 weaned pups per year could be translocated to the MHI from NWHI for the five-year permit period. Each group of monk seals would be returned to the NWHI once they reached 2 or 3 years of age. The maximum number of additional seals that would be present in a single year is 60 seals if it is assumed that:

- the maximum allowed number of juvenile monk seals per year (20) are translocated for at least 3 consecutive years;
- all of these are translocated from the NWHI to the MHI and not vice versa; and
- there is no mortality of translocated seals for three years;

While it is important to consider this scenario in order to understand what might happen if all of these seals survived, that would be very unlikely. A more realistic estimate of the maximum number of translocated monk seals in the MHI is derived by applying the survival rates of native-born MHI monk seals to translocated seals. Retaining the first two assumptions in the preceding bullets, this results in a projected maximum number of 51 additional seals. Again, while this analysis acknowledges that an additional 60 seals in these years would be unlikely, it uses this number (60) in order to present the worst-case scenario for the purposes of evaluating potential effects on commercial fish in the MHI under Alternative 4.

Based upon the liberal consumption rates in Sprague et al. (2013) juvenile monk seals eat approximately 5 kg (11 lb) of prey per day. Therefore, the additional 60 juvenile monk seals that could potentially occur temporarily in the MHI under Alternative 4 would consume at most 60 x 5 = 300 kg (662 lb) of prey per day. This represents at most 0.0018% of the estimated standing biomass of reef fish in the nearshore habitats of the MHI. Furthermore, apex predatory fish are estimated to consume at least 220 times as much as would these 60 potential juvenile monk seals. Interactions between the translocated seals and subsistence fishing could increase under Alternative 4, although as noted above, data are lacking to quantify the current level of interaction. Likewise, it is not possible to reliably predict how much those interactions might increase due to the potential temporary addition of 60 juvenile seals to the population. It is reasonable to expect that some of those additional seals would interact with fisheries, though the associated cost of those interactions to the fishermen is not known. However, as under Alternative 3, behavioral modification activities under Alternative 4, if successful, could mitigate fishery interactions with both translocated and seals native to the MHI. Given the exceedingly small potential increase in prey consumption, only part of which would potentially overlap with species fished for subsistence, and the potential increase in fishery interactions (though mitigated by behavioral modification), overall Alternative 4 activities are anticipated to have negligible effects on subsistence fishing.

Conclusion for Direct and Indirect Effects on Subsistence Fishing from Alternative 4 (Enhanced Implementation)

None of the research and enhancement activities permitted under Alternative 4 would directly affect subsistence fishing in the MHI. Therefore, direct effects are likely to be negligible. A temporary increase in the MHI monk seal population due to Alternative 4 is not likely to result in an indirect adverse effect on subsistence fishing. Therefore, this effect would likely be negligible.

4.8.2.5 *Cumulative Effects of Alternatives on Subsistence Fishing*

This section presents the cumulative effects on subsistence fishing in the context of past actions and the RFFAs.

Summary of Direct and Indirect Effects on Subsistence Fishing

The alternatives are not anticipated to result in any direct effects on subsistence fishing, given that the actions proposed (such as vaccinations, de-worming, translocation) will not likely occur in locations popular for fishing. Indirect effects on subsistence fishing would be negligible because measurable changes in the fish caught by subsistence fishers are not likely. Hawaiian monk seals may potentially prey on and reduce the population of certain fish species that are popular among the subsistence fishers however, some fish species may actually increase in abundance if Hawaiian monk seals consume predators of those species. Likewise, changes in the rate of costly interactions with Hawaiian monk seals are expected to be negligible given the marginal increase in the population of MHI monk seals, and implementation of behavioral modification techniques.

Direct and indirect effects of monk seal research and enhancement activities on subsistence fisheries are evaluated in terms of potential increases or decreases in subsistence catch. Table 4.8-16 summarizes the direct and indirect effects of the alternatives on subsistence fisheries.

Table 4.9-5 Summary of Direct and Indirect Effects of the Alternatives on Subsistence Fishing

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementation**
Changes in Subsistence Fisheries	Negligible	Negligible	Negligible	Negligible

Past, Present and Future Actions and Events Contributing to Cumulative Effects on Subsistence Fishing

Past, present and reasonably foreseeable future actions that may affect subsistence fisheries catch are summarized in Table 4.9-6.

Table 4.9-6 Effects of Past, Present and Reasonably Foreseeable Future Actions on Subsistence Fishing

Action / Event	Potential Effects	Description/Example	Effect
Natural Events			
Tsunami, Volcano, Earthquake, Hurricane; Japanese Tohoku earthquake and tsunami debris	• Changes to fish habitat • Injury or mortality to fish • Changes in prey due to ecosystem shift • Changes in fish age class recruitment	• 2011 Japanese Tohoku earthquake and tsunami debris • Debris increases likelihood of ingestion of debris by fish and affects habitat suitability.	-
Climate Change		• Subtropical Pacific ecosystem changes evident although modest relative to changes from increased fishing effort. However, future climate change projected to shift ecosystem towards smaller fish even if fishing remains constant (Polovina 2011). • Long-term dynamics are driven in large part by climate (ocean variability) (Baker et al. 2012). Variability in fish populations are affected by these changes and can be both beneficial and adverse.	+/-
Introduction of Invasive species		• Parasites have been shown to be significant stressors in many species. Reif et al. (2006). • Invasive fish species introduced through ballast water may cause changes in fish population dynamics.	-
Predation by apex predatory fish nearshore (30m depth)	• Mortality of fish	• Apex predatory fish consume a minimum of 66,000 kg/day (146,000 lb/day) approximately 50 times more than a Hawaiian monk seal (Sprague et al. 2013).	-/+
Predation by Hawaiian monk seals nearshore (30m depth)	• Mortality of fish	• Estimated predation by 200 monk seals in MHI is approximately 1,300 kg per day (2,900 lb per day) (Sprague et al. 2013)	-/+
Military activities			

U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST]) Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS)	• Mortality of fish • Fish habitat destruction • Temporary or permanent area restrictions to fishing during training	• Possible yet unlikely temporary threshold shift (TTS) impact to fish sensory systems due to sonar and explosive detonations. • Potential strike or contamination by torpedo and ship training activities. • Possible entanglement of fish in parachute assemblies, remote. • Detonation and explosive ordinance impacts to fish (i.e., mortality). • Detonation impacts of buoys and RIMPAC and USWEX to fish. • Impacts to fish to include TTS injury and mortality. • Degradation or destruction of feeding habitat by underwater detonations and training activities. • Possible, however unlikely, TTS impact to fish due to sonar and explosive detonations. • Potential strike or mortality by training activities. • Potential closure or fisheries restrictions in areas where training activities occur.	-
Commercial			

Unregulated fishing (1913 - 2002) Sea cucumber harvest (1882) Black-lipped oyster harvest (1928-1930) Lobster harvest (1970-1999)	• Mortality of fish • Reproductive effects on fish	• Unregulated take, reducing long term sustainability of populations for future fisheries. • Long-term catch trends suggest that there has been approximately an 80 percent decline in the nearshore stocks this century. Overfishing is partially due to an increase in population, improved fishing technology, improved gear, and failure to recognize or follow traditional conservation practices. Additionally, the number of commercial permits issued to collect reef fish increased by 39 percent between 1995 and 1998 (NOAA 2013).	-
Commercial bottomfish fisheries	• Changes in fisheries catch/landings • Overharvest • Fish mortality or injury	• 1948 – 1978: number of trips per year per fishermen increased and has remained about 8 trips per year between 1980 and 2004. Data suggest there are more fishermen catching fewer fish. • Aggregated bottomfish stock is below maximum sustainable yield (a fisheries management metric) suggesting that overfishing is resulting in declines in fish populations. Overfishing is most severe in MHI (PIFSC 2011; Moffitt et al. 2006).	-
Commercial pelagic fisheries		• 1996-2006: Increased fishing effort with number of hooks set increasing four-fold. Catch rates for apex predators such as blue shark, bigeye and albacore tunas, shortbill spearfish, and striped marlin declined from 3 to 9% per year while catch rates for mahimahi, sickle pomfret, escolar, and snake mackerel, increased by 6 to 18% per year (Polovina 2009). • 1950 – 1990s: fishing impacts on marine ecosystems (Pauly 2005). Decreased catch rates for large fishes has continued through at least 2011 (Polovina 2011). • 2010: pelagic fishery landings 26.6 million pounds (WPacFin 2011). • 2014: 6% increased quota recommended for bottomfish due to improved reporting and reduction in management uncertainty about stocks (WPFMC 2013).	-/+

Recreational and subsistence fisheries		• No license requirements in Hawaii making it difficult to manage overfishing (Moffitt et al. 2006). • Though data are lacking, recreational overfishing very likely contributing to decreases in fish species and therefore declines commercial fisheries landings (PIFSC 2011). • Limited data on subsistence harvest of fish species in Hawaii make estimating harvest levels difficult. • 2013: daily commercial nearshore catch was estimated to be 1676 kg, the near-shore recreational and subsistence catch was estimated to be 2178 kg (Sprague et al. 2013) • Widely believed that nearshore recreational and subsistence catch is equal to or greater than the nearshore commercial fisheries catch, with more species taken using a wider range of fishing gear (Friedlander et al. 2004).	
Inter-Island Transmission Cable	• Disturbance to fishing vessels	• Impacts of cable installation are brief and minimal. Laying cable does cause some disturbance of the ocean floor, but within days the area returns to normal. • Impacts to fish may occur while laying the cable, including entanglement and mortality.	**-**
Special Coral Reef Ecosystem Fishing Permit to Kampachi Farms, LLC	• Aggregation of pelagic fish	• Culture and harvest a coral reef ecosystem management unit fish species kampachi (Seriola rivoliana, marketed as Kona Kampachi[supreg]) in a floating pen moored about 5.5 nm off the west coast of the Island of Hawaii in about 6,000 ft of water. A 132m [supcaret] 3 (approximately 21 feet in diameter) brass-link mesh aquapod (CuPod) tethered to a moored, 28-ft feed vessel would be used for harvesting. • Fishermen would be able to fish around the array. The small size of the array is not expected to have a large adverse impact on catches by other fishermen in the ocean in west Hawaii.	**-**
Wai`anae Wastewater Treatment Plan Modification Lā`ie Wastewater Collection System Expansion Phase II – Lā`ie	• Water quality improvements	• Wastewater treatment plant improvements would generally be expected to reduce contaminants and biological waste streams entering the coastal ecosystem. Thus, minimizing exposure of fish species to contaminants and biological waste would result in improvements in habitat and would likely be beneficial for fish.	**+**

Agriculture	• Nutrient pollution • Sedimentation	• Sediment runoff and pollution and nutrients from agricultural practices also widely impact coral reef habitat. • Sources of sediment on Hawaiian reefs include: improperly managed construction sites; cleared agricultural lands; heavy grazed lands; and eroding stream banks. Nutrients from fertilizers and pollutants such as bacteria from livestock, herbicides, and insecticides enter marine waters in runoff and seepage. Nutrient pollution and sediments from coastal development and farming can block sunlight, smother corals, and impede larval settlement (NOAA 2013).	-
Other Government Activities			

Hawai`i Environmental Justice Bill: Senate Bill 2145 EO 12898: Environmental Justice	• Protection of minority interests in fisheries	• To the extent that minority populations rely on fisheries (commercial, subsistence or recreational) for income or for food, protection of minorities from projects that may cause disproportionate impacts would result in benefits to these groups.	+
Closure of Bottomfish Fishery in the Hawaiian Archipelago (2006)	• Closed fishery	• 2006: regulations prohibited commercial fishing, except for the bottomfish fishery (and associated pelagic species catch), which had potential to continue until 2011 (U.S. Department of Commerce and Department of the Interior, 2006). • 2009 remaining permit holders surrendered permits to NMFS in exchange for compensation from Federal Government and fishery was closed. Total NWHI bottomfish catch in 2009 was 29 metric tons.	-
Hawaiian Spinner Dolphin Human Interaction Protection Measures	• Habitat protection for fish • Redistribution of fishing activities to other areas	• No new fishing regulations would result from designating potential time-area closures for human activities such as wildlife viewing, swimming, boating, or fishing. Fishing activities may move to other areas where no time-area closures are in effect though overall this is not expected to reduce fish catch. • Fish populations may benefit from spinner dolphin protection measures due to potential time-area closures in bays around the MHI; potential additional protection of habitat; added recruitment could benefit fisheries.	+
State of Hawai`i DLNR. Clearing of rivers, streams, beach areas Removal of marine debris from high entanglement zones	• Reduction in marine debris • Mortality • Injury	• Reduction in marine debris could reduce mortality or entanglement of fish. • Marine debris affects fish via ingestion (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). • Potential reduction in debris entanglement in commercial fishery nets.	+

Hawaiian Monk Seal Critical Habitat Designation	• Habitat protection	• No new fishing regulations would result from designating Hawaiian monk seal critical habitat. • Fish populations may benefit from Monk Seal Habitat designation due to the additional protection of habitat; added recruitment will benefit fisheries.	+
Fishery Ecosystem Plan for the Hawai`i Archipelago	• Mortality • Prey availability	• Fishery plan may promote more stable prey resources. • Researchers may enhance habitat for fish when they remove marine debris during field activities. Marine debris affects fish via ingestion of anthropogenic materials (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). Removal of marine debris by researchers for Hawaiian monk seals would likely result in a beneficial effect on fish.	+ / -
Measures to End Bottomfish Overfishing in the Hawaiian Archipelago	• Indirect mortality • Prey availability	• Fishery plan may promote more stable prey resources.	+
Bottomfish and Seamount Groundfish Fisheries Management Plan (2005)	• Indirect mortality • Prey availability	• Fishery plan promotes more sustainable management of stocks and promotes stable prey resources.	+
Pilot Aquaculture Project (Tuna cultivation)	• Mortality • Disease • Genetic effects • Pollution	• Potential reduction in pressure on wild fish populations. • Escapement could impact native populations through disease and dilution of locally adaptive gene complexes, disrupt natural ecosystems and jeopardize recovery of depleted or endangered species. • Aquaculture facility can carry excessive nutrients, particulates, bacteria, other diseased organisms and polluting chemicals	+/-

Cumulative Effects Conclusion for Subsistence Fishing

The direct and indirect effects on subsistence fisheries associated with the Hawaiian monk seal research and enhancement alternatives are negligible because proposed activities would not result in changes to recreational fishing catch. Therefore, the contribution of monk seal research and enhancement to an overall cumulative effect from any of the alternatives is considered negligible.

Documented historical overfishing in the NWHI and MHI has adversely affected fish populations around Hawaii as shown in Table 4.8-17. The effects of ongoing subsistence and recreational fishing are not well understood due to lack of licensing requirements and reporting of catch. Notable fisheries management actions in the past include efforts to end bottomfish overfishing in the MHI and the FEPs for the various fisheries which would be expected to have beneficial effects on fish populations.

Subsistence fishing in Hawai`i is not regulated therefore, it is difficult to determine the level of catch for these fisheries though Sprague et al (2013) reported that near-shore recreational and subsistence catch was estimated to be 2178 kg (Sprague et al. 2013). In addition, Friedlander et al. 2004 stated that it is widely believed that nearshore recreational and subsistence catch is equal to or greater than the nearshore commercial fisheries catch, with more species taken using a wider range of fishing gear . Fisheries regulations, such as plans to end bottomfish overfishing in the Hawai`i Archipelago, could indirectly affect recreational fishing, as commercial bottomfish fishermen will seek alternatives to supplement their incomes. This could result in changes in the populations of other fish species, including those popular for recreational fishing. The management measures considered in the "Draft Supplemental Environmental Impact Statement – Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region – Measures to End Bottomfish Overfishing in the Hawai`i Archipelago" (March 2006), which supplements the May 2005 Final Environmental Impact Statement, target a 15% or greater reduction in bottomfish fishing mortality in the MHI (except for the no action alternative). Alternatives include area closures, seasonal closures, catch limits, and combinations of the three.

In addition to this, the Western Pacific Regional Fishery Management Council is implementing "ecosystem-based" approaches to fishery management in the Hawaiian Archipelago. This is a move from the "species-based' approach. Notable RFFAs in this context are "Fishery Ecosystem Plan for the Hawaiian Archipelago" (September 2009) and "Fishery Ecosystem Plan for Pacific Pelagic Fisheries of the Western Pacific Region" (December 2005). Examples of implementation measures under these plans include, among others, ecosystem boundaries, area closures, size restrictions, seasonal closures, gear restrictions, etc.

Effects of development, pollution, and human modifications of the coastal environment have all had adverse effects on fish populations and, thus, fisheries due to changes in overall fish habitat conditions. The local and global economic recession in recent years resulted in a reduction of fish exports by commercial fishermen, leading to reduced commercial catch. Consequently, there was possibly more fish available for recreational purposes. Another effect of the global recession on recreational fishing was decrease in tourism, leading to lesser non-local recreational fishermen in the MHI and possibly consequently more fish available for local subsistence fishermen, as well as for recreational and commercial fishing. However, as the economy is beginning to recover, commercial catch is trending upwards and more tourists are visiting the MHI, which may increase recreational and subsistence fishing pressure.

There are other ongoing federal government management actions to protect and enhance monk seal populations and other protected species such as spinner dolphins in the nearshore environment around Hawaiʻi. Designation of Hawaiian monk seal habitat is not anticipated to result in changes to fishing regulations. Protection of monk seal habitat may result in benefits to nearshore fish species through improved overall habitat protection. While it is difficult to determine these effects definitively at this time, improvements in habitat could result in better recruitment and increases in fish populations. Whether this would be of benefit to subsistence fisheries cannot be determined at this time. Similar benefits could result from spinner dolphin protection measures such as time-area closures. Time-area closures however could result in limiting access to specific areas in bays around Hawaii. However, these potential spinner dolphin measures would not preclude fishermen from fishing in other areas where there were no closures thus the potential adverse effects of closures would likely be minimal.

Actions listed in Table 4.9-6 provide some overall perspective on actions and events that have had or could have effects (direct, indirect or cumulative) on subsistence fisheries. While the net effects on subsistence fishing from past and future actions are not known, Hawaiian monk seal research and enhancement actions are not likely to result in anything but negligible direct, indirect or cumulative effects on fisheries.

4.8.3 Recreational Fishing

The potential direct, indirect and cumulative effects of the alternatives on recreational fishing are analyzed in this section. The analysis focuses on the nearshore areas surrounding the MHI. Sprague et al. (2013, see also Section 3.4.5 *Recreational Fishing*) noted that in Hawaiʻi the line between recreational and subsistence fishing is blurred, and there is little collection of data to differentiate between the two. There is no saltwater fishing license for recreational or subsistence fishing, and no requirement to report recreational catch in the State of Hawai'i. As a result, the data on recreational fishery landings are very limited, voluntarily reported and are often considered biased or incomplete, likely representing a minimum estimate of extraction.

Fishing is popular with both the residents and tourists visiting Hawai'i. A quarter of Hawai'i's population participates in some form of fishing at least once a year (U.S. Department of the Navy 2008a). Effects on recreational fishing could be expected if an action results in changing the recreational experience of locals and tourists through either affecting the quantity or type of fish caught for recreational purposes, or the enjoyment derived from the natural beauty of their surroundings and wildlife. As per Table 4.4-6 in Section 4.4.3, these effects are measured through looking at any changes in the number of recreational fishing trips.

One factor that could potentially affect recreational fishing trips is the experience recreational fishermen derive from enjoying their surroundings. Alternatives that can potentially enhance that experience, such as those resulting in additional Hawaiian monk seals to view in the area, would have a positive effect on recreational fishing trips. It is acknowledged that some fishers may not derive a positive experience from viewing more seals. However, given the temporary and marginal change in the Hawaiian monk seal population in the MHI attributable to any of the alternatives, this effect on recreational fishing trips is considered negligible. Another factor considered here is whether there would be any change in the number of recreational fishing trips or a change in the amount of fish caught due to less fish being available. This is examined in more detail below.

The alternatives are not anticipated to result in any direct effects on recreational fishing. Indirect effects on recreational fishing, such as changes in the number of fishing trips or the quantity of fish caught for recreational purposes, are not likely under any of the alternatives. Hawaiian monk seals are not expected to reduce the population of certain fish species that are popular with recreational fishermen.

As described in Section 4.9.1 for commercial fishermen, recreational fishermen could be affected by Hawaiian monk seal interactions resulting from increased costs from damages to their catch or gear due to depredation of fishing lines or hooks by seals. Additionally, recreational fishermen who fish from boats could bear additional costs resulting from idle time or additional fuel costs incurred from efforts to avoid interactions with seals. Thus, alternatives that may change the frequency of monk seal interactions could affect recreational fishing.

It is widely believed that nearshore recreational and subsistence catch is equal to or greater than the nearshore commercial fisheries catch, with more species taken using a wider range of fishing gear (Friedlander *et al.* 2004). Consistent with this, Sprague et al. (2013) obtained recreational (and subsistence, because there is no formal distinction between these in the available data) landings summaries from the Hawaii Marine Recreational Fishing Survey from 2003 to 2011. They considered only landings from shore or from within 3 miles of shore (in order to exclude pelagic fishes) and excluding pelagic species and sharks caught within 3 mi of shore, thereby excluding 90% of the reported catch. Whereas daily commercial nearshore catch was estimated to be 1676 kg, the recreational and subsistence catch was estimated to be 2178 kg (Table 4.9-2). Sprague et al. (2013) note that commercial fishery landings data come from mandatory reports of daily fishing activity, while subsistence/recreational fishery landings data are from voluntary surveys. Both may significantly underreport the actual catch, but there is likely greater accuracy in the commercial data. In particular, reported near-shore recreational landings from spear-fishing and shoreline fishing may not be as well-represented as boat-based landings. Only 39% of reported recreational/subsistence fishery landings (by weight, excluding pelagic species) were from fish families also found in monk seal diet. Or conversely, 61% of nearshore landings are from fish families not eaten by monk seals and therefore not likely to be impacted by any increase in monk seal consumption. Sprague et al. (2013) note that with better information on the actual (versus reported) fishery catch, this estimate over monk seal dietary overlap with fisheries could be refined in the future.

The uncertainty in data on recreational fishery landings makes it more difficult to assess the potential impacts of the alternatives. However, even the likely underestimated amount of fish (2178 kg per day) extracted by nearshore recreational/subsistence fishing is considerably higher than the relatively reliable estimate (1676 kg) extracted by commercial fisheries. It is clear, then, that the amount of fish eaten by Hawaiian monks seals is relatively smaller when compared to the recreational/subsistence catch than when compared to the commercial catch. Therefore, the analyses in Section 4.9.1, which found negligible impacts of alternatives on commercial fishing as a result of potential increases in the rate of MHI monk seal population growth, are likewise applicable to recreational fishing.

In contrast to commercial fisheries, for which there is little or no evidence of monk seal interactions in the MHI, seals frequently interact with non-commercial (including recreational) fisheries. Unequivocal evidence of interactions includes the numerous seal hookings on non-commercial gear in recent years as well as entanglements in gillnets (laynets) (see Section 3.3.1.7). A minimum of 15 monk seals were hooked or entangled in gillnet in 2012 in a population of only approximately 200 seals. From the perspective of the monk seal population, that is a relatively high rate of interaction, especially considering that many interactions that involve hooking or entanglement are likely not observed, not reported or not confirmed. The number of interactions that do not result in hooking or entanglement may be far greater.

In contrast, there are a relatively high number of recreational fishermen compared to a maximum MHI monk seal population of approximately 200 seals, so that the likelihood of any one fishermen experiencing interactions with seals is probably quite low. However, at meetings and through the public comment process, fishermen have reported that they believe monk seal interactions are becoming more frequent. This is not unexpected given that the MHI monk seal population is increasing naturally. Unfortunately, there are currently no data to indicate the frequency, nature, cost or outcome of monk seal interactions with recreational fishing in the MHI. It is important to recognize that the analysis below focuses specifically on the impact of the alternatives, rather than on the overall potential impact of monk seals on recreational fishing. The MHI monk seal population is growing naturally, irrespective of any PEIS alternative. The crux of the analysis is whether the alternatives will be likely to increase or decrease any effects on recreational fishing beyond those that will occur regardless of the alternatives.

4.8.3.1 *Direct and Indirect Effects on Recreational Fishing of Alternative 1 – Status Quo*

Alternative 1 (Status Quo) entails the continuation of the current NMFS Research and Enhancement Permit (10137) until it expires in 2014. Following this date, subsequent permits would be issued to continue the research and enhancement activities that are currently permitted. For a complete description of permitted research under Alternative 1, please refer to Section 2.6.

Alternative 1 is not anticipated to have any direct effects on recreational fishing in the MHI. Indirect effects of Alternative 1 on recreational fishing could be possible if there were marked changes in the availability of species fished for recreational and, consequently, the quantity of recreational catch, due to increased Hawaiian monk seal population resulting from Alternative 1. Furthermore, recreational fishing could be affected by Hawaiian monk seal interactions that could increase costs from damages to catch and gear. Additionally, fishermen could bear additional costs resulting from idle time and fuel costs in an effort to avoid interaction with Hawaiian monk seals.

The Hawaiian monk seal population is anticipated to increase in the MHI regardless of the alternatives, but some activities under Alternative 1 may marginally enhance this growth. Sprague et al. (2013) estimated that

- An entire population of 200 monk seals consumes a maximum of 0.009% of the estimated available prey biomass in the nearshore MHI, and
- Only a portion (39%) of that consumption potentially overlaps with fish families fished for recreation, and
- Apex predatory fish likely consume over 50 times more prey than the entire monk seal population

Also, the nearshore recreational/subsistence catch is considerably larger than the nearshore commercial catch. Therefore, any hypothetical additional fish consumption by monk seals associated with marginal increases in the monk seal population due to Alternative 1, would likely represent a smaller portion of the recreational catch compared to the commercial catch. Given all these findings, any marginal increase in Hawaiian monk seal population due to Alternative 1 activities are anticipated to have negligible effects on recreational fishing.

<u>Conclusion for Direct and Indirect Effects on Recreational Fishing from Alternative 1 (Status Quo)</u>

None of the research and enhancement activities permitted under Alternative 1 would directly affect recreational fishing in MHI. Therefore, direct effects are likely to be negligible. Marginal increases in the Hawaiian monk seal population growth rate in the MHI could possibly have an indirect adverse effect on recreational fishing due to possible decreases in fish caught for recreational purposes or increases in interactions with monk seals that damage catch or gear. However, this effect is likely to be negligible.

4.8.3.2 Direct and Indirect Effects on Recreational Fishing of Alternative 2 – No Action (No New Permits After 2014)

Alternative 2 (No Action) entails the continuation of existing research as permitted under the existing permit (10137) until 2014. Once expired, these research and enhancement activities would cease. Unlike the activities under some other alternatives, there would be no field research to monitor populations, implement de-worming, or translocation.

The Hawaiian monk seal population in the MHI is anticipated to continue to increase regardless of the proposed alternatives. Under Alternative 2, given that most monk seal research and enhancement activities would cease after 2014, changes in the monk seal population due to Alternative 2 would be unlikely. Consequently, any potential indirect effects on recreational fishing associated with Alternative 2 are also unlikely. As discussed above, indirect effects on recreational fishing could stem from changes in the quantity of fish caught for recreational purposes, leading to modifications in the amount of fish consumed. Furthermore, effects on recreational fishing could stem from a change in the number of interactions between recreational fishing and Hawaiian monk seals.

Alternative 2 is not anticipated to have any direct effects on recreational fishing in the MHI. Because Alternative 2 is not likely to result in more than extremely marginal changes in the MHI monk seal population, indirect effects of Alternative 2 on recreational fishing due to either additional fish consumption by seals or additional seal interactions with the fishery, are expected to be negligible.

<u>Conclusion for Direct and Indirect Effects on Recreational Fishing from Alternative 2 (No Action)</u>

Alternative 2 is not anticipated to directly or indirectly affect recreational fishing in MHI. The overall effects of Alternative 2 are expected to be negligible.

4.8.3.3 *Direct and Indirect Effects on Recreational Fishing of Alternative 3 – Limited Translocation (Preferred Alternative)*

Alternative 3 entails the expansion of research and enhancement activities currently permitted, most of which are focused on improving the population status in the NWHI. The Alternative 3 expanded activities most relevant to the MHI are a vaccination program and behavioral modification activities. Vaccination could prevent Hawaiian monk seal population declines in the MHI if a disease outbreak occurs for which a safe and effective vaccine is available, and if a significant portion of the Hawaiian monk seal population can be vaccinated. Also, emergency response to a disease outbreak is already mandated under provisions of the MMPA's Marine Mammal Health and Stranding Response Program (MMHSRP) (Title IV, 16 U.S.C. 1421) and the permit held by the MMHSRP. Behavioral modification may also lead to marginal increases in the MHI monk seal population if seals with undesirable behaviors are able to remain in the wild. This would be expected to involve only very few seals. Importantly, behavioral modification is in part intended to reduce habitual seal interactions with fishing operations. If this effort succeeds, then Alternative 3 may *reduce* potential effects on fishing by minimizing interactions. Alternative 3 is not anticipated to have any direct effects on recreational fishing in the MHI.

Indirect effects of Alternative 3 on recreational fishing could be possible if there were marked changes in the availability of species fished for recreation and, consequently, the quantity of recreational catch, due to increased Hawaiian monk seal population. Furthermore, recreational fishing could be affected by Hawaiian monk seal interactions that could increase their costs from damages to their catch and gear due to depredation. Additionally, fishermen could bear additional costs resulting from idle time and fuel costs in an effort to avoid interaction with Hawaiian monk seals.

The Hawaiian monk seal population is anticipated to increase in the MHI regardless of the alternatives, but some activities under Alternative 3 may marginally enhance this growth. Sprague et al. (2013) estimated that

- An entire population of 200 monk seals consumes a maximum of 0.009% of the estimated available prey biomass in the nearshore MHI, and
- Only a portion (39%) of that consumption potentially overlaps with fish families fished for recreation, and
- Apex predator fish likely consume over 50 times more prey than the entire monk seal population

Also, the nearshore recreational/subsistence catch is considerably larger than the nearshore commercial catch. Therefore, any hypothetical additional fish consumption by monk seals associated with marginal increases in the monk seal population due to Alternative 3, would likely represent a smaller portion of the recreational catch compared to the commercial catch. Finally, while Alternative 3 activities may marginally increase the Hawaiian monk seal population, behavioral modification activities may succeed in reducing seal interactions with fisheries. Given all these findings, any marginal increase in Hawaiian monk seal population due to Alternative 3 activities are anticipated to have negligible effects on recreational fishing.

Conclusion for Direct and Indirect Effects on Recreational Fishing from Alterative 3 (Preferred Alternative)

None of the research and enhancement activities permitted under Alternative 3 would directly affect recreational fishing in the MHI. Therefore, direct effects are likely to be negligible. A marginal increase in the Hawaiian monk seal population growth rate in the MHI due to Alternative 3 is not likely to result in an indirect adverse effect on recreational fishing, especially coupled with actions designed to reduce fishery interactions. Therefore, this effect would likely be negligible.

4.8.3.4 Direct and Indirect Effects on Recreational Fishing of Alternative 4 – Enhanced Implementation

Alternative 4 entails expanded research and enhancement activities, most of which, as under Alternative 3, are focused on improving the population status in the NWHI. The Alternative 4 expanded activities most relevant to the MHI are potential two-stage translocation involving temporarily moving juvenile seals from the NWHI to the MHI, a vaccination program, and behavioral modification activities. It is anticipated that the benefit of Alternative 4 would primarily manifest as a reduction in the rate of decline in the NWHI as opposed to making significant contributions to the increase in MHI population growth that is naturally occurring (*i.e.,* without NMFS intervention). The proportion of seals temporarily translocated to the MHI under Alternative 4 would constitute a small proportion of the already naturally increasing seal population. Further, should the option to translocate seals from the NWHI to the MHI (allowed only under this alternative) be exercised, there would only be a temporary increase in the MHI population of monk seals due to that action because any translocated seals would be returned to the NWHI once they reached 2 or 3 years of age. Alternative 4 is not anticipated to result in any direct effects on recreational fishing in the MHI.

Indirect effects of Alternative 4 on recreational fishing could be possible if there were marked changes in the availability of species fished for subsistence and, consequently, the quantity of recreational catch, due to increased Hawaiian monk seal population. Furthermore, recreational fishing could be affected by Hawaiian monk seal interactions that could increase their costs from damages to their catch and gear. Additionally, fishermen could bear additional costs resulting from idle time and fuel costs in an effort to avoid interaction with Hawaiian monk seals.

Under this alternative, a maximum of 20 weaned pups per year could be translocated to the MHI from NWHI for the five-year permit period. Each group of monk seals would be returned to the NWHI once they reached 2 or 3 years of age. The maximum number of additional seals that would be present in a single year is 60 seals if it is assumed that:

- the maximum allowed number of juvenile monk seals per year (20) are translocated for at least 3 consecutive years;
- all of these are translocated from the NWHI to the MHI and not vice versa; and
- there is no mortality of translocated seals for three years;

While it is important to consider this scenario in order to understand what might happen if all of these seals survived, that would be very unlikely. A more realistic estimate of the maximum number of translocated monk seals in the MHI is derived by applying the survival rates of native-born MHI monk seals to translocated seals. Retaining the first two assumptions in the preceding bullets, this results in a projected maximum number of 51 additional seals. Again, while this analysis acknowledges that an additional 60 seals in these years would be unlikely, it uses this number (60) in order to present the greatest potential impact scenario for the purposes of evaluating potential effects on commercial fish in the MHI under Alternative 4.

Based upon the liberal consumption rates in Sprague et al. (2013) juvenile monk seals eat approximately 5 kg (11 lb) of prey per day. Therefore, the additional 60 juvenile monk seals that could potentially occur temporarily in the MHI under Alternative 4 would consume at most 60 x 5 = 300 kg (662 lb) of prey per day. This represents at most 0.0018% of the estimated standing biomass of reef fish in the nearshore habitats of the MHI. Furthermore, apex predatory fish are estimated to consume at least 220 times as much as would these 60 potential juvenile monk seals. Interactions between the translocated seals and recreational fishing could increase under Alternative 4, although as noted above, data are lacking to quantify the current level of interaction. Likewise, it is not possible to reliably predict how much those interactions might increase due to the potential temporary addition of 60 juvenile seals to the population. It is reasonable to expect that some of those additional seals would interact with fisheries, though the associated cost of those interactions to the fishermen is not known. However, as under Alternative 3, behavioral modification activities under Alternative 4, if successful, could mitigate fishery interactions with both translocated and seals native to the MHI. Given the exceedingly small potential increase in prey consumption, only part of which would potentially overlap with species fished for subsistence, and the potential increase in fishery interactions (though mitigated by behavioral modification), overall Alternative 4 activities are anticipated to have negligible effects on recreational fishing.

Conclusion for Direct and Indirect Effects on Recreational Fishing from Alterative 4 (Enhanced Implementation)

None of the research and enhancement activities permitted under Alternative 4 would directly affect recreational fishing in the MHI. Therefore, direct effects are likely to be negligible. A temporary increase in the MHI monk seal population due to Alternative 4, combined with implementation of a behavioral modification program, is not likely to result in an indirect adverse effect on recreational fishing. Therefore, this effect would likely be negligible.

4.8.3.5 Cumulative Effects of Alternatives on Recreational Fishing

This section presents the cumulative effects on recreational fishing in the context of past actions and the RFFAs.

Summary of Direct and Indirect Effects on Recreational Fishing

The alternatives are not anticipated to result in any direct effects on recreational fishing, given that the actions proposed (such as vaccinations, de-worming, translocation) will not likely occur in locations popular for fishing. Indirect effects on recreational fishing, such as a change in the number of fish caught for recreation or a reduction in the population of certain recreational fish species, are not expected to result due to Alternative 4 actions. Likewise, potential increases in fishing cost (*i.e.*, fuel and fishing time expended) due to interactions with Hawaiian monk seals are expected to be negligible given the marginal increase in the population of MHI monk seals expected to result from Alternative 4, and implementation of behavioral modification tools..

Direct and indirect effects of monk seal research and enhancement activities on recreational fisheries are evaluated in terms of potential increases or decreases in recreational catch. Table 4.9-7 summarizes the direct and indirect effects of the alternatives on recreational fisheries.

Table 4.9-7 Summary of Direct and Indirect Effects of the Alternatives on Recreational Fishing

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementation**
Changes in Recreational Fisheries	Negligible	Negligible	Negligible	Negligible

Past, Present and Future Actions and Events Contributing to Cumulative Effects on Recreational Fishing

Past, present and reasonably foreseeable future actions that may affect recreational fisheries catch are summarized in Table 4.9-8.

Table 4.9-8 Effects of Past, Present and Reasonably Foreseeable Future Actions on Recreational Fishing

Action / Event	Potential Effects	Description/Example
Natural Events		
Tsunami, Volcano, Earthquake, Hurricane; Japanese Tohoku earthquake and tsunami debris	• Changes to fish habitat • Injury or mortality to fish • Changes in prey due to ecosystem shift • Changes in fish age class recruitment	• 2011 Japanese Tohoku earthquake and tsunami debris • Debris increases likelihood of ingestion of debris by fish and affects habitat suitability.
Climate Change		• Subtropical Pacific ecosystem changes evident although modest relative to changes from increased fishing effort. However, future climate change projected to shift ecosystem towards smaller fish even if fishing remains constant (Polovina 2011). • Long-term dynamics are driven in large part by climate (ocean variability) (Baker et al. 2012). Variability in fish populations are affected by these changes and can be both beneficial and adverse.
Introduction of Invasive species		• Parasites have been shown to be significant stressors in many species. Reif e al. (2006). • Invasive fish species introduced through ballast water may cause changes ir fish population dynamics.
Predation by apex predatory fish nearshore (30m depth)	• Mortality of fish	• Apex predatory fish consume a minimum of 66,000 kg/day (146,000 lb/day) approximately 50 times more than a Hawaiian monk seal (Sprague et al. 2013).
Predation by Hawaiian monk seals nearshore (30m depth)	• Mortality of fish	• Estimated predation by 200 monk seals in MHI is approximately 1,300 k per day (2,900 lb per day) (Sprague et al. 2013)
Military activities		

<table>
<tr><td>U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST])</td><td rowspan="2">• Mortality of fish
• Fish habitat destruction
• Temporary or permanent area restrictions to fishing during training</td><td rowspan="2">• Possible yet unlikely temporary threshold shift (TTS) impact to fish sensory systems due to sonar and explosive detonations.
• Potential strike or contamination by torpedo and ship training activities.
• Possible entanglement of fish in parachute assemblies, remote.
• Detonation and explosive ordinance impacts to fish (i.e., mortality).
• Detonation impacts of buoys and RIMPAC and USWEX to fish.
• Impacts to fish to include TTS injury and mortality.
• Degradation or destruction of feeding habitat by underwater detonations and training activities.
• Possible, however unlikely, TTS impact to fish due to sonar and explosive detonations.
• Potential strike or mortality by training activities.
• Potential closure or fisheries restrictions in areas where training activities occur.</td><td rowspan="2">-</td></tr>
<tr><td>Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS)</td></tr>
<tr><td colspan="4">Commercial</td></tr>
</table>

Unregulated fishing (1913 - 2002) Sea cucumber harvest (1882) Black-lipped oyster harvest (1928-1930) Lobster harvest (1970-1999)	• Mortality of fish • Reproductive effects on fish	• Unregulated take, reducing long term sustainability of populations for future fisheries. • Long-term catch trends suggest that there has been approximately an 80 percent decline in the nearshore stocks this century. Overfishing is partially due to an increase in population, improved fishing technology, improved gear, and failure to recognize or follow traditional conservation practices. Additionally, the number of commercial permits issued to collect reef fish increased by 39 percent between 1995 and 1998 (NOAA 2013).	-
Commercial bottomfish fisheries	• Changes in fisheries catch/landings • Overharvest • Fish mortality or injury	• 1948 – 1978: number of trips per year per fishermen increased and has remained about 8 trips per year between 1980 and 2004. Data suggest there are more fishermen catching fewer fish. • Aggregated bottomfish stock is below maximum sustainable yield (a fisheries management metric) suggesting that overfishing is resulting in declines in fish populations. Overfishing is most severe in MHI (PIFSC 2011; Moffitt et al. 2006).	-
Commercial pelagic fisheries		• 1996-2006: Increased fishing effort with number of hooks set increasing four-fold. Catch rates for apex predators such as blue shark, bigeye and albacore tunas, shortbill spearfish, and striped marlin declined from 3 to 9% per year while catch rates for mahimahi, sickle pomfret, escolar, and snake mackerel, increased by 6 to 18% per year (Polovina 2009). • 1950 – 1990s: fishing impacts on marine ecosystems (Pauly 2005). Decreased catch rates for large fishes has continued through at least 2011 (Polovina 2011). • 2010: pelagic fishery landings 26.6 million pounds (WPacFin 2011). • 2014: 6% increased quota recommended for bottomfish due to improved reporting and reduction in management uncertainty about stocks (WPFMC 2013).	-/+

Recreational and subsistence fisheries		• No license requirements in Hawaii making it difficult to manage overfishing (Moffitt et al. 2006). • Though data are lacking, recreational overfishing very likely contributing to decreases in fish species and therefore declines commercial fisheries landings (PIFSC 2011). • Limited data on subsistence harvest of fish species in Hawaii make estimating harvest levels difficult. • 2013: daily commercial nearshore catch was estimated to be 1676 kg, the near-shore recreational and subsistence catch was estimated to be 2178 kg (Sprague et al. 2013) • Widely believed that nearshore recreational and subsistence catch is equal to or greater than the nearshore commercial fisheries catch, with more species taken using a wider range of fishing gear (Friedlander et al. 2004).	
Inter-Island Transmission Cable	• Disturbance to fishing vessels	• Impacts of cable installation are brief and minimal. Laying cable does cause some disturbance of the ocean floor, but within days the area returns to normal. • Impacts to fish may occur while laying the cable, including entanglement and mortality.	-
Special Coral Reef Ecosystem Fishing Permit to Kampachi Farms, LLC	• Aggregation of pelagic fish	• Culture and harvest a coral reef ecosystem management unit fish species kampachi (Seriola rivoliana, marketed as Kona Kampachi[supreg]) in a floating pen moored about 5.5 nm off the west coast of the Island of Hawaii in about 6,000 ft of water. A 132m [supcaret] 3 (approximately 21 feet in diameter) brass-link mesh aquapod (CuPod) tethered to a moored, 28-ft feed vessel would be used for harvesting. • Fishermen would be able to fish around the array. The small size of the array is not expected to have a large adverse impact on catches by other fishermen in the ocean in west Hawaii.	-
Wai`anae Wastewater Treatment Plan Modification Lā`ie Wastewater Collection System Expansion Phase II – Lā`ie	• Water quality improvements	• Wastewater treatment plant improvements would generally be expected to reduce contaminants and biological waste streams entering the coastal ecosystem. Thus, minimizing exposure of fish species to contaminants and biological waste would result in improvements in habitat and would likely be beneficial for fish.	+

Agriculture	• Nutrient pollution • Sedimentation	• Sediment runoff and pollution and nutrients from agricultural practices also widely impact coral reef habitat. • Sources of sediment on Hawaiian reefs include: improperly managed construction sites; cleared agricultural lands; heavy grazed lands; and eroding stream banks. Nutrients from fertilizers and pollutants such as bacteria from livestock, herbicides, and insecticides enter marine waters in runoff and seepage. Nutrient pollution and sediments from coastal development and farming can block sunlight, smother corals, and impede larval settlement (NOAA 2013).	**-**
Other Government Activities			

Hawai`i Environmental Justice Bill: Senate Bill 2145 EO 12898: Environmental Justice	• Protection of minority interests in fisheries	• To the extent that minority populations rely on fisheries (commercial, subsistence or recreational) for income or for food, protection of minorities from projects that may cause disproportionate impacts would result in benefits to these groups.	+
Closure of Bottomfish Fishery in the Hawaiian Archipelago (2006)	• Closed fishery	• 2006: regulations prohibited commercial fishing, except for the bottomfish fishery (and associated pelagic species catch), which had potential to continue until 2011 (U.S. Department of Commerce and Department of the Interior, 2006). • 2009 remaining permit holders surrendered permits to NMFS in exchange for compensation from Federal Government and fishery was closed. Total NWHI bottomfish catch in 2009 was 29 metric tons.	-
Hawaiian Spinner Dolphin Human Interaction Protection Measures	• Habitat protection for fish • Redistribution of fishing activities to other areas	• No new fishing regulations would result from designating potential time-area closures for human activities such as wildlife viewing, swimming, boating, or fishing. Fishing activities may move to other areas where no time-area closures are in effect though overall this is not expected to reduce fish catch. • Fish populations may benefit from spinner dolphin protection measures due to potential time-area closures in bays around the MHI; potential additional protection of habitat; added recruitment could benefit fisheries.	+
State of Hawai`i DLNR. Clearing of rivers, streams, beach areas Removal of marine debris from high entanglement zones	• Reduction in marine debris • Mortality • Injury	• Reduction in marine debris could reduce mortality or entanglement of fish. • Marine debris affects fish via ingestion (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). • Potential reduction in debris entanglement in commercial fishery nets.	+

Hawaiian Monk Seal Critical Habitat Designation	• Habitat protection	• No new fishing regulations would result from designating Hawaiian monk seal critical habitat. • Fish populations may benefit from Monk Seal Habitat designation due to the additional protection of habitat; added recruitment will benefit fisheries.	+
Fishery Ecosystem Plan for the Hawai`i Archipelago	• Mortality • Prey availability	• Fishery plan may promote more stable prey resources. • Researchers may enhance habitat for fish when they remove marine debris during field activities. Marine debris affects fish via ingestion of anthropogenic materials (e.g., plastics, pellets, fish hooks, etc.) and entanglement in derelict fishing gear (recreational or commercial fishing nets, lines, etc.). Removal of marine debris by researchers for Hawaiian monk seals would likely result in a beneficial effect on fish.	+ / -
Measures to End Bottomfish Overfishing in the Hawaiian Archipelago	• Indirect mortality • Prey availability	• Fishery plan may promote more stable prey resources.	+
Bottomfish and Seamount Groundfish Fisheries Management Plan (2005)	• Indirect mortality • Prey availability	• Fishery plan promotes more sustainable management of stocks and promotes stable prey resources.	+
Pilot Aquaculture Project (Tuna cultivation)	• Mortality • Disease • Genetic effects • Pollution	• Potential reduction in pressure on wild fish populations. • Escapement could impact native populations through disease and dilution of locally adaptive gene complexes, disrupt natural ecosystems and jeopardize recovery of depleted or endangered species. • Aquaculture facility can carry excessive nutrients, particulates, bacteria, other diseased organisms and polluting chemicals	+/-

__Cumulative Effects Conclusion for Recreational Fishing__

The direct and indirect effects on recreational fisheries associated with the Hawaiian monk seal research and enhancement alternatives are negligible because proposed activities would not result in changes to recreational fishing catch. Therefore, the contribution of monk seal research and enhancement to an overall cumulative effect from any of the alternatives is considered negligible.

Documented historical overfishing in the NWHI and MHI has adversely affected fish populations around Hawaii as shown in Table 4.8-19. The effects of ongoing subsistence and recreational fishing are not well understood due to lack of licensing requirements and reporting of catch. Notable fisheries management actions in the past include efforts to end bottomfish overfishing in the MHI and the FEPs for the various fisheries which would be expected to have beneficial effects on fish populations.

There is no license required for saltwater recreational fishing in Hawai`i and, therefore, it is difficult to regulate these fisheries. Fisheries regulations, such as plans to end bottomfish overfishing in the Hawai`i Archipelago, could indirectly affect recreational fishing, as commercial bottomfish fishermen will seek alternatives to supplement their incomes. This could result in changes in the populations of other fish species, including those popular for recreational fishing. The management measures considered in the "Draft Supplemental Environmental Impact Statement – Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region – Measures to End Bottomfish Overfishing in the Hawai`i Archipelago" (March 2006), which supplements the May 2005 Final Environmental Impact Statement, target a 15% or greater reduction in bottomfish fishing mortality in the MHI (except for the no action alternative). Alternatives include area closures, seasonal closures, catch limits, and combinations of the three.

In addition to this, the Western Pacific Regional Fishery Management Council is implementing "ecosystem-based" approaches to fishery management in the Hawaiian Archipelago. This is a move from the "species-based' approach. Notable RFFAs in this context are "Fishery Ecosystem Plan for the Hawaiian Archipelago" (September 2009) and "Fishery Ecosystem Plan for Pacific Pelagic Fisheries of the Western Pacific Region" (December 2005). Examples of implementation measures under these plans include, among others, ecosystem boundaries, area closures, size restrictions, seasonal closures, gear restrictions, etc.

Effects of development, pollution, and human modifications of the coastal environment have all had adverse effects on fish populations and, thus, fisheries due to changes in overall fish habitat conditions. The local and global economic recession in recent years resulted in a reduction of fish exports by commercial fishermen, leading to reduced commercial catch. Consequently, there was possibly more fish available for recreational purposes. Another effect of the global recession on recreational fishing was decrease in tourism, leading to lesser non-local recreational fishermen in the MHI and possibly consequently more fish available for local recreational fishermen, as well as for subsistence and commercial fishing. However, as the economy is beginning to recover, commercial catch is trending upwards and more tourists are visiting the MHI, which may increase recreational fishing pressure.

There are other ongoing federal government management actions to protect and enhance monk seal populations and other protected species such as spinner dolphins in the nearshore environment around Hawaiʻi. Designation of Hawaiian monk seal habitat is not anticipated to result in changes to fishing regulations. Protection of monk seal habitat may result in benefits to nearshore fish species through improved overall habitat protection. While it is difficult to determine these effects definitively at this time, improvements in habitat could result in better recruitment and increases in fish populations. Whether this would be of benefit to recreational fisheries cannot be determined at this time. Similar benefits could result from spinner dolphin protection measures such as time-area closures. Time-area closures however could result in limiting access to specific areas in bays around Hawaii. However, these potential spinner dolphin measures would not preclude fishermen from fishing in other areas where there were no closures thus the potential adverse effects of closures would likely be minimal.

Actions listed in Table 4.9-8 provide some overall perspective on actions and events that have had or could have effects (direct, indirect or cumulative) on recreational fisheries. While the net effects on recreational fishing from past and future actions are not known, Hawaiian monk seal research and enhancement actions are not likely to result in anything but negligible direct, indirect or cumulative effects on fisheries.

4.8.4 Cultural Resources, Traditional Cultural Practices, and Historic Properties

CULTURAL RESOURCES AND TRADITIONAL CULTURAL PRACTICES

A range of cultural resources (other than historic properties, which are discussed in the following section) and traditional cultural practices has the potential to be impacted by monk seal recovery actions proposed under this PEIS. The potential impacts can take two forms: 1) impacts resulting directly from the conduct of the recovery actions themselves, and 2) impacts resulting from the activities of seals influenced by the recovery actions, for example, seals that are translocated or seals that are subject to behavior modification techniques.

The cultural resources that may be directly affected by activities associated with Hawaiian monk seal recovery include shoreline resources such as native strand plants that are traditionally gathered for their medicinal properties. These plants could be accidentally trampled and damaged by NMFS staff and volunteers during observation, translocation, or other monk seal recovery related activities. Inshore resources such as fish, shellfish, and other marine organisms traditionally collected for food are much less likely to be affected, although patches of edible *limu* (seaweed) could be disturbed. Due to the temporary and transient nature of the physical activities proposed in the PEIS, it is unlikely that customary practices such as fishing, gathering, swimming, or surfing will be significantly affected by recovery activities themselves.

This section evaluates direct, indirect, and cumulative effects to cultural resources and practices that may occur as a result of the four proposed alternatives described in Section 2.6. The effects of proposed Alternatives on the cultural practice of subsistence fishing are addressed in Section 4.9.2.

4.8.4.1 Direct and Indirect Effects on Cultural Resources of Alternative 1 – Status Quo

Alternative 1, the Status Quo, involves the continuation of currently authorized activities past 2014. These include activities, such as monitoring and some sample collection that do not involve the capture and handling of seals, as well as activities that do involve the capture and handling of seals, such as marking, measuring, sample collection, vaccination, de-worming, disentanglement, removal, and translocation. Under this alternative, the translocation of seals only takes place within the MHI or within the NWHI. There is no translocation of seals from the NWHI to the MHI or from the MHI to the NWHI.

Activities conducted under Alternative 1 include aerial, vessel, and land-based surveys, and some handling and transportation of Hawaiian monk seals. Boats and land vehicles will be used to transport researchers and possibly animals. Researchers will traverse beach and dune areas on foot to reach monk seals. Recovery activities will be conducted throughout the project area, in the MHI, NWHI, and on Johnston Atoll. Researchers will seasonally (typically April or May through August) occupy existing campsites in the NWHI (see Section 3.3.1.9).

Direct impacts to cultural resources other than historic properties that could occur under Alternative 1 within the MHI include the disturbance, damage, or destruction of coastal plants that are used in *lāʻau lapaʻau* (traditional medicine). This could occur if researchers drive over or walk through areas where these plants grow. Training of researchers and volunteers to recognize and avoid native strand flora, as presented in Chapter 5, should serve to mitigate these potential impacts. Activities involved in the observation or translocation of monk seals, as conducted under Alternative 1 are unlikely to directly impact marine resources (fish, shellfish and other marine organisms) that are traditionally gathered for food. The only exception is the possibility that boat landings could disturb beds of *limu kohu* (*Asparagopsis sanfordiana*), *limu loloa* (*Gelindium spp*.), and other edible sea weeds that were traditionally gathered along the shoreline. Again, this potential impact can be mitigated by training researchers and volunteers to recognize and avoid these resources.

One of the roles of the existing stakeholder and community-based programs described in Chapter 5 has been to develop and maintain a network of Hawaiian cultural practitioners and *kūpuna* (elders) to advise NMFS on cultural matters and to conduct cultural protocols during Hawaiian monk seal response and other monk seal management and recovery-related activities. This network of culturally knowledgeable individuals can assist in developing a cultural awareness training program for monk seal researchers and volunteers.

Permits are required for access to conduct Hawaiian monk seal research and enhancement activities within the limits of the Monument. Any activities associated with monk seal recovery actions undertaken within the NWHI must therefore comply with Monument regulations and the terms and conditions of Presidential Proclamation 8031. Monument regulations state that "permittees [must] attend a cultural briefing on the significance of Monument resources to Native Hawaiians" and that there are "prohibitions against the disturbance of any cultural or historic property" (NOAA 2008b). Under the terms of the Monument permit, researchers and volunteers involved in monk seal recovery actions are required to coordinate their activities with Monument staff to ensure that they do not adversely impact any of the Monument's cultural resources.

Public consultation undertaken in conjunction with this PEIS has revealed some concerns regarding the potential or perceived indirect impacts of current Hawaiian monk seal recovery activities on traditional use of marine resources within the MHI. Many subsistence fishers perceived monk seals to be direct competitors for marine resources. Others felt that the presence of a Federally recognized endangered species within shoreline areas where they normally fished would restrict their access to those areas. These concerns have been addressed in detail in Section 4.9.2 (Subsistence Fishing), where the effects of all alternatives on fishing were determined to be negligible. The public outreach and community collaboration programs outlined in Chapter 5 can assist in resolving the concerns of subsistence fishers regarding monk seal recovery actions.

In summary, Alternative 1 is expected to result in negligible to minor adverse impacts on cultural resources and practices. As defined in Table 4.4-7, minor adverse impacts entail "possible contact with cultural resources, but no effect" on cultural resources or cultural practices due to the temporary nature of contact. Any possible effect is expected to be mitigated as discussed above and in Sections 5.4 – 5.6.

4.8.4.2 Direct and Indirect Effects on Cultural Resources of Alternative 2 – No Action (No New Permits After 2014)

Under Alternative 2, presently authorized activities as permitted under the existing permit (10137) will continue until 2014. Once the present permit expires, most research and enhancement activities would cease. After 2014 there would be no field research to monitor Hawaiian monk seal populations, implement de-worming, or conduct translocation. During the execution of the current permit through 2014, the potential impacts to cultural resources and traditional practices would be the same as for Alternative 1, and the same precautions are recommended. After the current permit expires, activities would be limited to remote observation and some collection of samples from materials left by monk seals. No monk seal translocation or handling would occur. Therefore, after 2014, Alternative 2 would involve less boat and land vehicle traffic, and less shoreline activity. The likelihood that shoreline resources would be directly impacted would be greatly reduced. Cultural awareness training for researchers and volunteers involved in monk seal recovery actions would still be recommended so as to help mitigate potential direct impacts.

In summary, Alternative 2 is expected to result in negligible to at most minor adverse impacts on cultural resources and practices. As defined in Table 4.4-7, minor adverse impacts entail "possible contact with cultural resources, but no effect on" cultural resources or cultural practices due to the temporary nature of contact. Any possible adverse effect is expected to be mitigated as discussed above and in Sections 5.4 – 5.6.

4.8.4.3 Direct and Indirect Effects on Cultural Resources of Alternative 3 – Limited Translocation (Preferred Alternative)

Under Alternative 3 currently authorized activities under Alternative 1 would be continued and additional activities would be conducted. These additional actions would include increased permitted takes of Hawaiian monk seals for vaccination, deworming, and other activities. Alternative 3 would also include a seal behavior modification program intended to mitigate human-monk seal interactions. This program would serve to mitigate interactions between seals and people engaged in cultural practices such as subsistence fishing and other ocean use activities.

Under Alternative 3 the permitted scope and number of translocations would be expanded. This would include the translocation of monk seals within the MHI or within the NWHI, as well as the translocation of a limited numbers of seals from the MHI to the NWHI. As a result, boat and land vehicle activity, as well as shoreline activities, could be greater under Alternative 3 than under Alternatives 1 or 2. For example, approximately twenty-five more weaned pups could be translocated annually within the MHI under Alternative 3 than under Status Quo (Alternative 1). The direct effects of this increased activity on cultural resources could be successfully mitigated through the implementation of the training program recommended under Alternative 1.

As discussed in Section 4.9.2.3, the marginal increase in the Hawaiian monk seal population growth rate in the MHI resulting from Alternative 3's survival enhancement activities is not likely to result in an indirect adverse effect on subsistence fishing.

In summary, Alternative 3 is expected to result in negligible to at most minor adverse impacts on cultural resources and practices. As defined in Table 4.4-7, minor adverse impacts entail "possible contact with cultural resources, but no effect on" cultural resources or cultural practices due to the temporary nature of contact. Any possible effect is expected to be mitigated as discussed above and in Sections 5.4 – 5.6.

4.8.4.4 *Direct and Indirect Effects on Cultural Resources of Alternative 4 – Enhanced Implementation*

Alternative 4 would encompass all of the activities permitted under Alternative 3, plus two-stage translocation of Hawaiian monk seal pups from NWHI to MHI, and then back to the NWHI when the seals reach age two or three years. This translocation program would be a phased process with a gradual increase in seal numbers. Any adverse interactions with humans occurring as a result of translocations would influence whether and at what level the program would continue. The increased capture and transport of the seals under Alternative 4 would result in increased boat and land vehicle traffic, as well as pedestrian traffic to and from capture sites. The mitigation measures recommended under Alternatives 1 and 3 and in more detail in Sections 5.4 – 5.6 should ensure that impacts to cultural resources remain negligible to minor.

Concerns were expressed during public meetings held in association with the PEIS that the introduction of increased numbers of monk seals to the MHI from the NWHI under alternative 4 would result in a depletion of fish stock, directly impacting the livelihood of fishers practicing traditional subsistence fishing. This potential is evaluated in detail in Section 4.9.2.4, and the temporary increase in the MHI monk seal population associated with two-stage translocation under Alternative 4 would be likely to have negligible indirect adverse effects on subsistence fishing.

In summary, Alternative 4 is expected to result in negligible to at most minor adverse impacts on cultural resources and practices. As defined in Table 4.4-7, minor adverse impacts entail "possible contact with cultural resources, but no effect on" cultural resources or cultural practices due to the temporary nature of contact. Any possible effect is expected to be mitigated as discussed above and in Sections 5.4 – 5.6.

4.8.4.5 *Cumulative Effects on Cultural Resources and Traditional Cultural Practices*

<u>Summary of Direct and Indirect Effects on Cultural Resources</u>

As described above, the effects of research and enhancement activities proposed under Alternatives 1, 2, 3, and 4 could result in negligible to at most minor direct and indirect effects on cultural resources and traditional cultural practices within the affected environment. Current and proposed research and enhancement activities would occur infrequently in limited areas along the shorelines of both the MHI and the NWHI. Due to the restricted nature of the activities, the direct effects would also be limited. The recommended mitigation measures described above and in Sections 5.4 – 5.6 would serve to minimize these potential effects. Possible indirect effects to cultural resources and traditional cultural practices from Hawaiian monk seal recovery actions would primarily be associated with the possible impacts of increased monk seal presence on traditional subsistence fishing practices in the MHI. These impacts were found to be negligible in Section 4.9.2 for all alternatives, with impacts potentially additionally mitigated by the behavioral modification programs instituted under Alternatives 3 and 4. The mitigation programs are designed to reduce interactions between monk seals and people engaged in traditional cultural practices such as subsistence fishing and other ocean use activities.

Direct and indirect effects of monk seal research and enhancement activities on cultural/traditional practices and cultural and historic properties are evaluated in terms of how cultural practices might be impeded or properties might be altered. Table 4.9-9 summarizes the direct and indirect effects of the alternatives on cultural/traditional practices and cultural and historic properties.

Table 4.9-9 Summary of Direct and Indirect Effects of the Alternatives on Cultural Resources and Traditional Cultural Practices

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementation**
Changes in Cultural Resources or Traditional Cultural Practices	Negligible to Minor	Negligible to Minor	Negligible to Minor	Negligible to Minor

Past, Present and Future Actions and Events Contributing to Cumulative Effects

Past, present and reasonably foreseeable future actions that may affect cultural/traditional practices and cultural and historic properties are summarized in Table 4.9-10.

Table 4.9-10 Effects of Past, Present and Reasonably Foreseeable Future Actions on Cultural and Historic Practices and Properties

Action / Event	Potential Effects	Description/Example	Effect
Natural Events			
Tsunami, Volcano, Earthquake, Hurricane Japanese Tohoku earthquake and tsunami debris	• Damage to cultural resources or properties • Restricted access to traditional areas for cultural practices •	• 2011 Japanese Tohoku earthquake and tsunami debris • Storm damage to cultural flora and fauna. • Debris increases likelihood of damage to cultural flora and fauna.	-
Climate Change		• Subtropical Pacific ecosystem changes evident. Future climate change projected to shift ecosystem towards smaller fish even if fishing remains constant (Polovina 2011). • Long-term dynamics are driven in large part by climate (ocean variability) (Baker et al. 2012). Variability in fish populations are affected by these changes and can be both beneficial and adverse.	+/-
Introduction of Invasive species		• Parasites have been shown to be significant stressors in many species (Reif et al. 2006). • Invasive plants may outcompete native plants used for cultural practices.	-
Predation by apex predatory fish nearshore (30m depth)	• Mortality of fish	• Apex predatory fish consume a minimum of 66,000 kg/day (146,000 lb/day) approximately 50 times more than a Hawaiian monk seal (Sprague et al. 2013). Predatory fish may consume smaller fish sought for cultural practices.	-/+
Military activities			

U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST]) Surveillance Towed Array Sensor System Low-Frequency Active (SURTASS)	• Acoustic or physical stressors on cultural resources and historic properties	• "Acoustic stressors resulting from underwater explosions creating shock waves and cratering of the seafloor would not affect submerged cultural resources. Training and testing would continue only in areas currently utilized for these activities. As a result, effects on cultural resources are not anticipated within the US territorial waters because measures have been previously implemented to protect these resources" (HSST EIS/OEIS 2013). • Physical stressors resulting from use of seafloor devices during training and testing could affect submerged cultural resources however measures are currently implemented to mitigate these effects" (HSST EIS/OEIS 2013). • To the extent that HSST activities could affect culturally important marine flora and fauna used in traditional practices, potential impacts to cultural resources could occur though based on available information the nature and extent of these impacts cannot be defined at this time.	-
Commercial			

Unregulated fishing (1913 - 2002) Sea cucumber harvest (1882) Black-lipped oyster harvest (1928-1930) Lobster harvest (1970-1999)	• Mortality of fish • Reproductive effects on fish	• Unregulated take, reducing long term sustainability of marine fish populations for cultural practices. • Long-term catch trends suggest that there has been approximately an 80 percent decline in the nearshore stocks this century. Overfishing is partially due to an increase in population, improved fishing technology, improved gear, and failure to recognize or follow traditional conservation practices. Additionally, the number of commercial permits issued to collect reef fish increased by 39 percent between 1995 and 1998 (NOAA 2013).	-
Commercial bottomfish fisheries	• Competition for culturally important fish and other marine fauna	• Aggregated bottomfish stock is below maximum sustainable yield (a fisheries management metric) suggesting that overfishing is resulting in declines in fish populations. Overfishing is most severe in MHI (PIFSC 2011; Moffitt et al. 2006). • Overfishing may affect the availability of culturally important fish.	-
Commercial pelagic fisheries		• 1950 – 1990s: fishing impacts on marine ecosystems (Pauly 2005). • 2010: pelagic fishery landings 26.6 million pounds (WPacFin 2011). • 2014: 6% increased quota recommended for bottomfish due to improved reporting and reduction in management uncertainty about stocks (WPFMC 2013). • To the extent that commercial fisheries compete for resources with cultural uses, the availability of fish and other marine fauna for cultural practices may be affected though the nature and extent of this impact cannot be determined best on available data. However, recreational and subsistence fisheries likely harvest more fish than commercial fisheries as described below.	-

Recreational and subsistence fisheries		• No license requirements in Hawaii making it difficult to manage overfishing (Moffitt et al. 2006). • Though data are lacking, recreational overfishing very likely contributing to decreases in fish species and therefore declines commercial fisheries landings (PIFSC 2011). • Limited data on subsistence harvest of fish species in Hawaii make estimating harvest levels difficult. • 2013: daily commercial nearshore catch was estimated to be 1676 kg, the near-shore recreational and subsistence catch was estimated to be 2178 kg (Sprague et al. 2013) • Widely believed that nearshore recreational and subsistence catch is equal to or greater than the nearshore commercial fisheries catch, with more species taken using a wider range of fishing gear (Friedlander et al. 2004). • These data suggest that subsistence and recreational fishing may have a greater impact on the availability of resources for cultural practices than commercial fisheries.	-
Wai`anae Wastewater Treatment Plan Modification Lā`ie Wastewater Collection System Expansion Phase II – Lā`ie	• Water quality improvements	• Wastewater treatment plant improvements would generally be expected to reduce contaminants and biological waste streams entering the coastal ecosystem. Thus, minimizing exposure of marine fauna to contaminants and biological waste would result in improvements in habitat and would likely be beneficial for species used in cultural practices.	+

Agriculture	• Nutrient pollution • Sedimentation	• Sediment runoff and pollution and nutrients from agricultural practices widely impact coral reef habitat where cultural resources may be found. • Sources of sediment on Hawaiian reefs include: improperly managed construction sites; cleared agricultural lands; heavy grazed lands; and eroding stream banks. Nutrients from fertilizers and pollutants such as bacteria from livestock, herbicides, and insecticides enter marine waters in runoff and seepage. Nutrient pollution and sediments from coastal development and farming can block sunlight, smother corals, and impede larval settlement (NOAA 2013). • To the extent that culturally important resources are located in areas where sediment runoff and pollution are problematic, cultural resources could be adversely affected.	-
Other Government Activities			

Hawai`i Environmental Justice Bill: Senate Bill 2145 EO 12898: Environmental Justice	• Protection of minority interests for cultural practices	• To the extent that minority populations rely on subsistence fisheries for cultural practices, protection of minorities from projects that may cause disproportionate impacts would result in benefits to these groups.	+
Closure of Bottomfish Fishery in the Hawaiian Archipelago (2006)	• Closed fishery	• 2006: regulations prohibited commercial fishing, except for the bottomfish fishery (and associated pelagic species catch), which had potential to continue until 2011 (U.S. Department of Commerce and Department of the Interior, 2006). • 2009 remaining permit holders surrendered permits to NMFS in exchange for compensation from Federal Government and fishery was closed. Total NWHI bottomfish catch in 2009 was 29 metric tons. • Closure of the commercial fishery may have increased the amount of fish species available for cultural use though the extent of this change is difficult to assess using currently available data.	+
Hawaiian Spinner Dolphin Human Interaction Protection Measures	• Redistribution of cultural activities to other areas • Protection of culturally significant historic properties	• Cultural practices may move to other areas where no time-area closures are in effect though overall this is not expected to have a long term negative on cultural practices. • Historic properties may benefit from spinner dolphin protection measures due to potential time-area closures in bays around the MHI; potential additional protection of habitat and better recruitment of marine fauna could benefit and therefore provide more resources for cultural use.	+
State of Hawai`i DLNR. Clearing of rivers, streams, beach areas Removal of marine debris from high seas	• Reduction in marine debris	• Reduction in marine debris could minimize potential damage to culturally important flora and fauna. •	+

Hawaiian Monk Seal Critical Habitat Designation	• Habitat protection	• Marine fauna populations may benefit from Monk Seal Habitat designation due to the additional protection of habitat and better recruitment of marine fauna could benefit and therefore provide more resources for cultural use.	+
Fishery Ecosystem Plan for the Hawai`i Archipelago	• Improved protection of culturally important species	• Fishery plan may promote more stable prey resources important for cultural practices.	+ / -
Measures to End Bottomfish Overfishing in the Hawaiian Archipelago		• Fishery plan may promote more stable prey resources that are important for cultural practices.	+

__Cumulative Effects Conclusion for Cultural Resources__

Among the primary past human activities that have affected cultural resources and traditional cultural practices within the affected environment is the extensive coastal development (residential, commercial, and governmental) that has taken place within the MHI since the 1950s. Areas of native coastal vegetation have been disturbed and shoreline access has been restricted. Overfishing from commercial, recreational and even subsistence fishing (PIFSC 2011; Moffitt et al. 2006; Polovina 2011) has also resulted in a depletion of traditional marine subsistence resources. Past military operations have resulted in coastal disturbance on Midway and some of the other NWHI. Significant storm events such as hurricanes and tsunami events have impacted traditional cultural resources both in the MHI and the NWHI due to storm damage or debris. Continued development and overfishing have the potential to further impact these resources.

The contribution of any of the Alternatives to a cumulative impact on cultural resources and traditional cultural practices is considered negligible in light of other stressors described above such as coastal development. In addition, the mitigation measures outlined above and discussed in more detail in Chapter 5 would minimize any long term effects of all Alternatives on cultural resources and traditional cultural practices.

HISTORIC PROPERTIES

As described in Section 3.4.7.3, a variety of historical properties and traditional historic properties are present within the project area for proposed Hawaiian monk seal recovery actions. These sites are most abundant within the MHI, but also occur in the NWHI. The effects to these resources from the recovery actions proposed in this PEIS may be either direct or indirect. Direct effects are those that physically alter the historic property in some way, while indirect effects diminish some significant aspect of the property, but do not physically alter it. The purpose of this section is to identify direct, indirect and cumulative effects to cultural and historical resources that may result from proposed monk seal recovery actions.

Potential direct impacts to historic and cultural resources can result from the physical activities associated with monk seal recovery actions or from the activities of monk seals relocated as part of the recovery effort. Pedestrian and vehicle traffic through remote areas in order to access seal locations and vessel traffic to access seals on remote beaches have the greatest potential to affect historic and cultural resources. Land based pedestrian and vehicle traffic has the potential to directly impact fragile stacked stone structures, subsurface archaeological deposits, and human burials. These sites may be located along the route of travel from the established road to the study or translocation area, on the beach itself, or in adjacent sand dunes. There is much less likelihood that the activities will affect areas that may be eligible for listing as Traditional Cultural Properties. It is important, however, that NMFS staff and volunteers be aware of such areas and treat them with respect. Vessel anchoring has the potential to directly impact marine wreck sites and other underwater historic properties. Due to the short term nature of monk seal recovery activities there is much less potential for indirect effects on historic properties, such as long-term visual impacts.

During their normal haul out activities, Hawaiian monk seals seldom venture further inland than the high tide line, and therefore translocated seals are unlikely to adversely impact coastal historic and cultural sites. One possible exception is coastal fishponds. A number of traditional *loko iʻa* (fishponds), located along the coastlines of the MHI, have been returned to operation in the last few years. A translocated monk seal that managed to enter such a pond could feed on the fish being raised there, thus disrupt aquaculture operations. The physical activities involved in removing the monk seal from within the pond could possibly result in damage to the structure.

4.8.4.6 Direct and Indirect Effects on Historic Properties of Alternative 1 – Status Quo

Alternative 1, the Status Quo, involves the continuation of currently authorized activities past 2014. These include activities such as monitoring and some sample collection that do not involve the capture and handling of seals, as well as activities that do involve the capture and handling of seals (marking, measuring, sample collection, vaccination, de-worming, disentanglement, carcass removal, translocation). Under this alternative, the translocation of seals only takes place within the MHI or within the NWHI (i.e., no translocation of seals from the NWHI for release in the MHI or from the MHI to the NWHI).

Activities conducted under Alternative 1 may include aerial, vessel, and land-based surveys, as well as some handling and translocation of monk seals. Boats and land vehicles will be used to transport researchers and possibly animals. Researchers will also traverse beach and dune areas on foot to reach monk seal locations. Recovery activities may be conducted throughout the APE, in the MHI, NWHI, and on Johnston Atoll. Researchers will seasonally (typically April or May through August) occupy existing camp sites in the NWHI (see Section 3.3.1.9).

Monk seal recovery actions are likely to take place in both well-traveled beach areas and in more remote locations that have not been subject to much human traffic. The remote areas are fragile and susceptible to disturbance. Archaeological sites located along the path of access to and from monk seal locations have the potential to be affected. Stacked stone structures and surface scatters of cultural material could be impacted by vehicle or pedestrian traffic, as could fragile dune areas that may contain buried cultural deposits or human remains. In order to mitigate potential impacts, researchers and volunteers undertaking monk seal recovery activities would need to recognize and avoid these sensitive sites and areas. At times researchers will be required to set up temporary campsites near a seal (often a mother and weaning pup) to monitor and protect the seal(s). In these instances, care will need to be taken to avoid establishing campsites on or near historic or cultural sites. While vessel-based activities are less likely to impact historic sites, anchoring could result in damage to marine wreck sites.

There is also the possibility that Hawaiian monk seals may enter fishponds on their own accord and may have to be physically removed from them. The activities associated with the removal of a monk seal from the interior of a fishpond have the potential to result in damage to the fishpond walls and other structural features.

The mitigation measures outlined at the end of this section and further discussed in Chapter 5 have been designed alleviate the potential adverse effects of the activities described above on historic and cultural resources. If these recommended measures are followed, research and enhancement activities authorized under Alternative 1 would not result in any direct impacts to archaeological and cultural sites.

In summary, Alternative 1 is expected to result in negligible to at most minor adverse impacts on historic properties. As defined in Table 4.4-8, minor adverse impacts entail "possible contact with (a) site (or property), but no effect." Any possible effect is expected to be mitigated as discussed above and in Sections 5.4 – 5.6.

4.8.4.7 *Direct and Indirect Effects on Historic Properties of Alternative 2 – No Action (No New Permits After 2014)*

Under Alternative 2, presently authorized activities as permitted under the existing permit (10137) will continue until 2014. Once the present permit expires, most research and enhancement activities would cease. After 2014 there would be no field research to monitor populations, implement de-worming, or conduct translocation. During the execution of the current permit through 2014, the potential impacts to cultural resources and traditional practices would be the same as for Alternative 1, and the same precautions would be taken. After the current permit expires, activities would be limited to remote observation and some collection of samples from materials left by Hawaiian monk seals. No monk seal translocation or handling would occur except potentially under the Marine Mammal Health and Stranding Response Program. Therefore, after 2014, Alternative 2 would involve less boat and land vehicle traffic, and less shoreline activity. The potential for adverse impacts to shoreline cultural and historic resources would be greatly reduced. Mitigation measures associated with monk seal recovery actions (discussed below) would still be recommended for the duration of the permit so as to help mitigate potential direct and indirect impacts.

In summary, Alternative 2 is expected to result in negligible to at most minor adverse impacts on historic properties. As defined in Table 4.4-8, minor adverse impacts entail "possible contact with (a) site (or property), but no effect." Any possible effect is expected to be mitigated as discussed above and in Sections 5.4 – 5.6.

4.8.4.8 *Direct and Indirect Effects on Historic Properties of Alternative 3 – Limited Translocation (Preferred Alternative)*

Under Alternative 3 currently authorized activities under Alternative 1 would be continued and additional activities would be conducted. These additional actions could include increased handling of Hawaiian monk seals for vaccination, de-worming, and other activities. Alternative 3 would also include a seal behavior modification program intended to prevent or reduce human-seal seal interactions, including interactions with people engaged in cultural practices. The scope and number of permitted translocations would also be expanded. This would include the potential for translocation of monk seals within the MHI or within the NWHI, as well as the potential for translocation of monk seals from the MHI to the NWHI. As a result, boat and land vehicle activity, as well as shoreline activities, could be greater under Alternative 3 than under Alternatives 1 or 2. For example, approximately 25 more weaned pups may be translocated annually within the MHI under Alternative 3 than under Status Quo (Alternative 1). Despite the increase in monk seal recovery activities under Alternative 3, the direct effects of these activities could be successfully mitigated through the behavior modification action and implementation of the mitigation measures outlined below.in Chapter 5.

In summary, Alternative 3 is expected to result in negligible to at most minor adverse impacts on historic properties. As defined in Table 4.4-8, minor adverse impacts entail "possible contact with (a) site (or property), but no effect." Any possible effect is expected to be mitigated as discussed in Sections 5.4 – 5.6.

4.8.4.9 *Direct and Indirect Effects on Historic Properties of Alternative 4 – Enhanced Implementation*

Alternative 4 would encompass all of the activities permitted under Alternative 3, plus two-stage translocation of Hawaiian monk seal pups from NWHI to MHI, and then back to the NWHI when the seals reach age two or three years. This translocation program would be a phased process with a gradual increase in seal numbers. Any adverse interactions with humans occurring as a result of translocations would influence whether and at what level the program would continue. The increased capture and transport of the seals under Alternative 4 would result in increased boat and land vehicle traffic, as well as pedestrian traffic to and from capture sites. As a result of potentially increased translocation activities carried out under Alternative 4, a maximum of sixty additional monk seals could be present temporarily within the MHI. The potential exists that some of these introduced seals may find their way into coastal fishponds or fish traps. The monk seal behavior modification program included in Alternatives 3 and 4 could help prevent or mitigate the impact of seals on coastal fishponds and fish traps. In addition, the monk seal removal measures outlined below and discussed in detail in Section 5.6 should allow these errant seals to be successfully removed without damage to the historic structures. The mitigation measures recommended under Alternatives 1, 2 and 3 (and discussed further in Chapter 5) would not change with Alternative 4. The implementation of these mitigation measures should ensure that impacts to historic and cultural sites remain negligible to minor at most.

In summary, Alternative 1 is expected to result in negligible to at most minor adverse impacts on historic properties. As defined in Table 4.4-8, minor adverse impacts entail "possible contact with (a) site (or property), but no effect." Any possible effect is expected to be mitigated as discussed in Sections 5.4 – 5.6.

4.8.4.10 *Cumulative Effects of the Alternatives on Historic Properties*

The analysis of cumulative effects on historical properties, including traditional cultural properties, considers the potential direct and indirect effects of proposed alternatives within the APE, as well as external (not research or enhancement) past activities that may have resulted in substantial impacts (see Table 4.4-10). In addition, any external future actions that are reasonably foreseeable, referred to as RFFAs, must be considered (see Table 4.4-10 for the list of RFFAs considered in this PEIS).

Summary of Direct and Indirect Effects on Historic Properties

The effects of research and enhancement activities proposed under any of the proposed Alternatives could result in negligible to minor direct and indirect effects on cultural and historic resources within the project area. Research and enhancement activities would be temporary and would occur in a very limited area along and adjacent to the shoreline within the MHI and NWHI where those resources that do occur could be successfully avoided. Mitigation measures presented in Sections 5.4 – 5.6 should mitigate any potential adverse effects.

Table 4.9-11 Summary of Direct and Indirect Effects of the Alternatives on Cultural and Historic Properties

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementation**
Changes in Cultural and Historic Properties	Negligible to Minor	Negligible to Minor	Negligible to Minor	Negligible to Minor

Past, Present and Future Actions and Events Contributing to Cumulative Effects on Historic Properties

Past, present and reasonably foreseeable future actions that may affect cultural/traditional practices and cultural and historic properties are summarized in Table 4.9-10 presented in Section 4.9.4.5.

Past actions on cultural and historic properties within the Project Area that may have caused impacts included but are not limited to coastal human settlements or development (earth moving activities for residential, commercial, government or transportation projects), military operations or warfare, looting or other deleterious activities, and significant storm events such as a hurricane or tsunami. While awareness and protection of cultural and historic resources throughout Hawaiʻi is supported through legislation such as the NHPA and State regulations, potential impacts to these resources could still occur as a result of the same activities and events listed as past actions.

Among the primary past actions that have affected historic properties within the project area is the extensive coastal development (residential, commercial, and governmental) that has taken place within the MHI since the 1950s. Both surface structures and buried cultural deposits have been disturbed or destroyed completely. While awareness of cultural and historic resources throughout Hawaiʻi has increased in recent decades, and their protection is supported through legislation such as the NHPA and State regulation, impacts to these resources continue to occur. Significant storm events such as a hurricanes and tsunami have also affected historic properties both in the MHI and the NWHI. Past military operations have resulted in coastal disturbance on Midway and some of the other NWHI. Since the establishment of the Monument, adverse impacts to cultural and historic resources there have been greatly diminished.

Cumulative Effects Conclusion for Historic Properties

Given the temporary and limited nature of the monk seal recovery actions addressed in this PEIS, the likelihood of adverse impacts to cultural and historic properties is low. The implementation of the mitigation measures presented below will further reduce the potential for adverse effects. The contribution of Alternatives 1, 2, 3, and 4 to cumulative effects on cultural and historic resources is therefore negligible in light of other external activities that may be impacting historic properties throughout Hawaii.

4.8.5 Recreation and Tourism

This section addresses potential direct, indirect and cumulative effects of the alternatives on recreation and tourism in the MHI. In general, there are two potential types of effects on recreation and tourism of any type of action: effects on the recreation and tourism economy that may result from changes in the number of visitors and their expenditures, and effects on the level of enjoyment and value of the experience to the recreators/tourists themselves. These two types of effect are closely related as the level of visitor enjoyment also affects the number of visitors and their expenditures. Based on these types of potential effect, Table 4.4-6 in Section 4.4.3 summarizes the criteria used to evaluate effects of the alternatives on recreation and tourism. As indicated in the table, the number of recreation and tourism trips is the primary criteria used to evaluate effects on recreation and tourism.

The alternatives are not expected to result in direct effects on recreation or tourism because such actions as vaccination or translocation will not likely occur in locations popular for recreation or tourism activities. However, it is possible that there may be indirect effects on recreation or tourism if an Alternative affects the monk seal population in the MHI, and then the monk seal population, in turn, affects the number or value of recreation/tourism trips.

Changes in the monk seal population could affect recreation and tourism activities if the size of the population affects any of the four characteristics of recreation/tourism resources:

1. Quality or quantity of recreation/tourism resources,
2. Level of access to recreation/tourism resources,
3. Public safety associated with use of recreation / tourism resources, and
4. Cost of recreation/tourism resources.

The following discussion analyzes the potential for monk seal populations to affect recreation and tourism through these four pathways.

4.8.5.1 Quality/Quantity of Recreation Resources

Tourism is the #1 industry in Hawaii in terms of value to the state's economy (State of Hawaii Department of Business, Economic Development & Tourism, 2011). Hawaii Tourism Authority surveys indicate that visitors view Native Hawaiian culture and natural beauty as major assets of Hawaii as a destination. Wildlife-related recreation, including whale watching, is popular in Hawai'i. Many people enjoy viewing wildlife, particularly marine mammals such as whales and monk seals, in their native habitat. A Sierra Club survey of visitors to Maui found that excursions into nature were the most memorable part of most people's trips to Hawaii (53.4%) (Sierra Club Maui Group, 1998). Economically, wildlife viewing opportunities are worth hundreds of millions of dollars to Hawaii's $10 billion a year tourism industry. And tourists are willing to pay more to protect Hawaii's environment: 81% expressed willingness to contribute $1 per day in addition to their room rate to preserve natural areas, coastline and Hawaiian cultural sites. Over 90% of visitors to Hawaii indicated that the preservation of natural areas would be an important factor in their decision to return to the islands (Sierra Club Maui Group, 1998; Dayer *et al.* 2006). Native threatened and endangered species are also important to Hawaii's residents. Based on a 2004 "Wildlife Values in the West" survey, a large majority of Hawaii's residents (71.4%) strongly agree that it is important to take steps to prevent the extinction of endangered species (Dayer *et al.* 2006). To the extent that the monk seal population in the MHI increases due to an alternative, the alternative may indirectly enhance the recreation/tourism experience through increased wildlife viewing opportunities and benefit the recreation/tourism economy.

Increases in the monk seal population could potentially affect recreational fishing, but all such effects under all alternatives are expected to be negligible (See Section 4.9.3). It is possible that such changes in fish abundance associated with change in the monk seal population due to the alternatives may also affect other aquatic recreation activities, such as snorkeling. However, as noted in Section 4.9.3, effects on the abundance of fish species due to any of the alternatives are expected to be negligible.

Therefore, it is expected that any measurable effects on the quality/quantity of recreation resources in the MHI due to the alternatives would be related to changes in wildlife viewing opportunities, specifically, monk seal viewing opportunities that would be enhanced with increased populations of monk seal.

4.8.5.2 Access to Recreation / Tourism Resources

Many recreation and tourism activities in Hawai`i are beach and water-related. Recreation and tourism can be affected if an alternative affects access to recreational resources, such as shoreline or waters for boating. NMFS does not use beach closures as a part of their seal management strategy at present, and no such management is part of any of the alternatives. At times, NMFS does establish temporary protective zones on beaches for seals, particularly areas where monk seals are pupping. These protective zones are not closures and do not prohibit access, but simply discourage people from approaching the monk seals too closely. If an alternative were to increase the monk seal population such that more monk seals are pupping on public beaches and more protective zones are established, access to some areas of some beaches would be discouraged. It is expected that the benefit of viewing the monk seals would outweigh any adverse effects of reduced access, resulting in a net positive for tourists and recreationists. Pupping in such areas would provide high quality wildlife viewing opportunities for beach recreationists. Many tourists and recreationists actively seek and value marine wildlife viewing opportunities, as indicated by the popularity of such activities as whale watching tours, snorkeling, and scuba diving. Furthermore, reduced access from the establishment of protective zones is not mandatory, but is rather a recommendation. So no enforced access reduction is expected to occur.

At times, NMFS does establish temporary protective zones on beaches for seals. These protective zones are not closures and do not prohibit access, but simply discourage people from approaching the monk seals too closely.

4.8.5.3 Public Safety

It is also possible that increased monk seal populations due to an alternative could result in increased human-seal interactions, with potential implications for public safety. However, as discussed in more detail in Section 3.4.9 *Public Safety*, there are few reported incidents of adverse human-seal interactions. Alternatives 3 and 4 include provisions for behavior modification to develop new strategies for resolving conflicts with habituated seals that might pose a risk to public safety. Given the short-term and marginal increase in the population of monk seal in the MHI under the alternatives and the fact, under Alternative 4 (the only alternative allowing two-stage translocation of young seals from the NWHI to the MHI) no translocated seals will pup in the MHI (they will be moved back to NWHI prior to reaching breeding age), the public safety implications, and attendant effects on recreation and tourism resources due to the proposed alternatives, are expected to be negligible. In fact, behavioral modification activities proposed under Alternatives 3 and 4 are intended, in part, to mitigate seals behaving in a way that involves public safety concerns.

Despite evidence of shark predation on Hawaiian monk seal there is no evidence that more monk seals in the MHI will lead to more shark attacks on humans. For example, while the monk seal population has increased in the MHI over the past 10 years, incidents of shark attacks on people have shown no corresponding increase (see Table 3.3-6).

4.8.5.4 *Cost of Recreation Resources*

Changes in cost can also affect recreation and tourism. However, it is not expected that there would be any direct or indirect effects on the cost of business for recreation or tourism service providers that would translate into changes in prices, or any effects on costs of admission to parks and other recreational areas. Therefore, it is not expected that changes in the monk seal population due to any of the alternatives would affect the cost to tourists or recreationists of enjoying recreational resources in Hawai'i.

4.8.5.5 *Direct and Indirect Effects on Recreation Resources of Alternative 1 – Status Quo*

Under Alternative 1, the Hawaiian monk seal population in the MHI is anticipated to increase due to the apparent favorable conditions for continued growth as evidenced by the demographics of the Hawaiian monk seal population (Baker *et al.* 2011*a*) independent of any actions taken by NMFS. While this growth that is occurring naturally already may be enhanced by Alternative 1 activities such as de-hooking, disentanglement, and weaned pup translocation measures, the contribution of Alternative 1 activities to any increase in the monk seal population would be marginal. As discussed above, increases in the MHI monk seal population may affect recreation and tourism if any of the following characteristics of recreation/tourism resources are affected: quality/quantity of resources, level of access, public safety, and cost. Alternative 1 is not expected to have any direct effects on these characteristics.

Indirect effects of Alternative 1 related to increases in the monk seal population are expected to be primarily limited to effects on the quantity of recreation resources, specifically the quantity of monk seal viewing opportunities. As many people enjoy viewing wildlife, increases to the monk seal population would likely enhance wildlife viewing recreation, and consequently, enhance the visitor experience.

Increases in the monk seal population associated with Alternative 1 may limit small portions of some public beaches if more protective zones are established to discourage people from approaching monk seals too closely. However, the benefits associated with increased wildlife presence on such beaches are expected to outweigh any adverse effects due to changes in access. Some weaned pup translocations within the MHI are intended to move pups away from areas where they may be interacting with people and pose a public safety risk. By translocating seals that may be socializing with humans, public safety as well as safety for the seals, would likely be improved. Finally, any small increases in the monk seal population due to alternative 1 would have negligible effects on public safety and cost of recreation experiences.

Conclusion for Direct and Indirect Effects on Recreation Resources from Alternative 1 (Status Quo)

There are negligible direct effects of Alternative 1 anticipated for recreation and tourism activities in Hawai`i. Marginal increases in the MHI monk seal population due to Alternative 1 may have an indirect effect on recreation and tourism activities, but is likely to be negligible due to the small population increase predicted. In summary, direct and indirect effects on recreation and tourism due to changes in the monk seal population under Alternative 1 are expected to be negligible but may result in positive effects on wildlife viewing opportunities.

4.8.5.6 Direct and Indirect Effects on Recreational Resources of Alternative 2 – No Action (No New Permits or Authorizations)

Alternative 2 (No Action) entails the continuation of existing research as permitted under the existing permit (10137) until 2014. Once expired, these research and enhancement activities would cease. Unlike the activities under some other alternatives, there would be no field research to monitor populations, implement de-worming, or translocation.

As discussed above, changes in the MHI monk seal population may affect recreation and tourism if any of the following characteristics of recreation/tourism resources are affected: quality/quantity of resources, level of access, public safety, and cost. Alternative 2 is not expected to have any direct effects on these characteristics.

Indirect effects of Alternative 2 related to changes in the monk seal population would likely be primarily limited to effects on the quantity of recreation resources, specifically the quantity of monk seal viewing opportunities. As many people enjoy viewing wildlife, a smaller increase in the monk seal population compared to Alternative 1 will result in smaller positive effects on wildlife viewing recreation, and consequently, the visitor experience.

Changes in the monk seal population under Alternative 2 would be negligible as no research or enhancement would occur after 2014. Activities that could occur prior to that date are not anticipated to result in notable changes to beach access if protective zones were established to discourage people from approaching monk seals too closely. However, as the benefits associated with increased wildlife presence on such beaches are expected to outweigh any adverse effects due to changes in access, Alternative 2 is expected to provide fewer benefits to recreation/tourism than Alternative 1. Some weaned pup translocations within the MHI are intended to move pups away from areas where they may be interacting with people and pose a public safety risk. By translocating seals that may be socializing with humans, public safety as well as safety for the seals, would likely be improved. Under Alternative 2 effects on public safety and cost of recreation experiences are expected to be negligible.

<u>Conclusion for Direct and Indirect Effects on Recreational Resources from Alterative 2 (No Action)</u>

There are negligible to no direct effects of Alternative 2 anticipated for recreation and tourism activities in Hawai`i. Compared to Alternative 1, MHI monk seal population may increase slightly less, resulting in less indirect effect on recreation and tourism activities. In summary, Alternative 2 is expected to provide fewer benefits to recreation/tourism than Alternative 1 due to fewer wildlife viewing opportunities from a smaller monk seal population.

4.8.5.7 *Direct and Indirect Effects on Recreational Resources of Alternative 3 – Limited Translocation (Preferred Alternative)*

Alternative 3 entails the expansion of research and enhancement activities currently permitted, most of which are focused on improving the population status in the NWHI. The Alternative 3 expanded activities most relevant to the MHI are a vaccination program and behavioral modification activities.

Under Alternative 3, changes in the MHI monk seal population could affect recreation and tourism if any of the following characteristics of recreation/tourism resources were affected: quality/quantity of resources, level of access, public safety, and cost. Alternative 3 is not expected to have any direct effects on these characteristics.

Indirect effects of Alternative 3 related to increases in the monk seal population are expected to be primarily limited to effects on the quantity of recreation resources, specifically the quantity of monk seal viewing opportunities. As many people enjoy viewing wildlife, a larger increase in the monk seal population compared to Alternative 1 will result in larger positive effects on wildlife viewing recreation, and consequently, the visitor experience.

Increases in the monk seal population under Alternative 3 could reduce access to some additional public beaches, compared to Alternative 1, if more protective zones were established to discourage people from approaching monk seals too closely. However, as the benefits associated with increased wildlife presence on such beaches are expected to outweigh any adverse effects due to changes in access, Alternative 3 is expected to provide greater benefits to recreation/tourism than Alternative 1. Changes in the monk seal population due to Alternative 3 would have negligible effects on the cost of recreation experiences. Behavioral modification proposed under Alternative 3 is intended to reduce public safety concerns by reducing human-seal interactions. This would likely result in a moderate beneficial effect on public safety.

<u>Conclusion for Direct and Indirect Effects on Recreational Resources from Alternative 3 (Preferred Alternative)</u>

There are negligible to no direct effects of Alternative 3 anticipated for recreation and tourism activities in Hawai`i. Compared to Alternative 1, the MHI monk seal population may increase slightly more, resulting in greater indirect effect on recreation and tourism activities. However, public safety would likely benefit from reduced human-seal interactions from the combination of behavioral modification and translocating seals that may become socialized. Alternative 3 is expected to provide more benefits to recreation and tourism than Alternative 1 due to the potential for more wildlife viewing opportunities of monk seals as well as improve public safety by reducing human-seal interactions. Therefore, the effect of Alternative 3 on tourism and recreation is likely to be moderate and beneficial.

4.8.5.8 *Direct and Indirect Effects on Recreational Resources of Alternative 4 – Enhanced Implementation*

Alternative 4 entails expanded research and enhancement activities, most of which, as under Alternative 3, are focused on improving the population status in the NWHI. The Alternative 4 expanded activities most relevant to the MHI are potential two-stage translocation involving temporarily moving weaned seals from the NWHI to the MHI, a vaccination program, and behavioral modification activities. The benefit of Alternative 4 is expected to primarily manifest as a reduction in the rate of decline in the NWHI as opposed to making significant contributions to the increase in MHI population growth naturally occurring (*i.e.,* without NMFS intervention). The proportion of seals temporarily translocated to the MHI under Alternative 4 would comprise a small portion of the total MHI monk seal population. Further, should the option to translocate seals from the NWHI to the MHI (allowed only under this alternative) be exercised, there would only be a temporary increase in the population of monk seals due to that action because seals would be returned to the NWHI once they reach age 2 or 3 yr.

As discussed above, changes in the MHI monk seal population may affect recreation and tourism if any of the following characteristics of recreation/tourism resources are affected: quality or quantity of resources, level of access, public safety, and cost. Alternative 4 is not expected to have any direct effects on these characteristics.

Indirect effects of Alternative 4 related to increases in the monk seal population are expected to be primarily limited to effects on the quantity of recreation resources, specifically the quantity of monk seal viewing opportunities. As many people enjoy viewing wildlife, a larger increase in the monk seal population compared to Alternative 1 will result in larger positive effects on wildlife viewing recreation, and consequently, the visitor experience.

Similar to Alternative 3, increases in the monk seal population under Alternative 4 could reduce access to some additional public beaches, compared to Alternative 1, if more protective zones were established to discourage people from approaching monk seal too closely. However, as the benefits associated with increased wildlife presence on such beaches are expected to outweigh any adverse effects due to changes in access, Alternative 4 could provide slightly greater benefits to recreation/tourism than Alternative 1. Changes in the monk seal population due to Alternative 4 would have negligible effects on public safety and cost of recreation experiences. Public safety would likely benefit from reduced human-seal interactions from the combination of behavioral modification and translocating seals that may become socialized. For this reason, the overall effect of Alternative 4 on public safety would likely be moderate and beneficial.

Conclusion for Direct and Indirect Effects on Recreational Resources from Alterative 4 (Enhanced Implementation)

Under Alternative 4, behavioral modification would likely reduce the number of human-seal interactions, thereby improving public safety and safety for seals. Assuming there would be better seal survival, more wildlife viewing opportunities from a larger monk seal population could occur. The overall effect of Alternative 4 on public safety would likely be moderate and beneficial.

4.8.5.9 Cumulative Effects of Alternatives on Recreation and Tourism

Summary of Direct and Indirect Effects on Recreational Resources

As summarized in Table 4.9-12, the alternatives are not expected to result in any direct effects on recreation or tourism as such actions as vaccination or translocation will not likely occur in locations popular for recreation or tourism activities. However, it is possible that there may be indirect effects on recreation or tourism if an alternative affects the monk seal population in the MHI, and then the monk seal population, in turn, affects the number or value of recreation/tourism trips. In particular, indirect effects include changes in recreation opportunities related to monk seal wildlife viewing. Many people enjoy viewing wildlife, particularly marine mammals such as whales and the monk seal, in their native habitat. To the extent that the monk seal population in the MHI increases due to an Alternative, the Alternative may indirectly enhance the recreation/tourism experience through increased wildlife viewing opportunities and benefit the recreation/tourism economy.

Table 4.9-12 Summary of Direct and Indirect Effects of the Alternatives on Recreation or Tourism

	Alternative 1 **Status Quo**	**Alternative 2** **No Action; No Permit After 2014**	**Alternative 3** **Limited Translocation (Preferred Alternative)**	**Alternative 4** **Enhanced Implementation**
Changes in Recreation or Tourism	Negligible	Negligible	Moderate Beneficial	Moderate Beneficial

Past, Present and Future Actions and Events Contributing to Cumulative Effects on Recreation and Tourism

Past, present and reasonably foreseeable future actions that may affect recreation and tourism are summarized in Table 4.9-13.

ble 4.9-13 Past, Present and Reasonably Foreseeable Future Actions on Recreation and Tourism

Action / Event	Potential Effects	Description/Example	Effect
Natural Events			
Tsunami, Volcano, Earthquake, Hurricane	• Damage to recreation and tourism resources • Restricted access to recreation and tourism resources	• 2011 Japanese Tohoku earthquake and tsunami debris • Storm damage to recreation and tourism resources. • Debris increases likelihood of damage or restricted access to recreational or tourism areas.	-
Japanese Tohoku earthquake and tsunami debris			
Climate Change		• Subtropical Pacific ecosystem changes evident. Future climate change projected to shift ecosystem towards smaller fish even if fishing remains constant (Polovina 2011). • Long-term dynamics are driven in large part by climate (ocean variability) (Baker et al. 2012). Variability in fish populations are affected by these changes and can be both beneficial and adverse.	+/-
Military activities			

U.S. Navy Training - Hawai`i Range Complex (Hawaii Southern California Training and Testing Activities [HSST])	• Visibility of Naval Ships off the coast • Interference with recreation (i.e., surfing or wildlife viewing)	• "Navy vessels present on the waters of the HRC represent a small fraction of the overall commercial and recreational boat traffic and, correspondingly, account for only a small fraction of the potentially restrictive circumstances present in the open-ocean area around Hawaii" (HSST EIS/OEIS 2013). • Tourism and recreational activities would be closer to shore than Naval activities thus interference of Navy training or other activities is not expected (HHST EIS OEIS 2013).	-
Commercial			

Unregulated fishing (1913 - 2002)	• Decreased population of marine species important for tourism (i.e., wildlife viewing, etc.)	• Unregulated take, reducing long term sustainability of marine fish and other marine fauna populations important for sustaining tourism or recreation (i.e., wildlife viewing, snorkeling tours, etc.).	**-**
Sea cucumber harvest (1882)			
Black-lipped oyster harvest (1928-1930)			
Lobster harvest (1970-1999)			
Commercial bottomfish fisheries	• Decreased population of fish important for wildlife viewing or other recreation	• Aggregated bottomfish stock is below maximum sustainable yield (a fisheries management metric) suggesting that overfishing is resulting in declines in fish populations. Overfishing is most severe in MHI (PIFSC 2011; Moffitt et al. 2006). • Overfishing may affect the availability of fish for wildlife viewing.	**-**
Commercial pelagic fisheries		• 1950 – 1990s: fishing impacts on marine ecosystems (Pauly 2005). • 2010: pelagic fishery landings 26.6 million pounds (WPacFin 2011). • 2014: 6% increased quota recommended for bottomfish due to improved reporting and reduction in management uncertainty about stocks (WPFMC 2013). • Overfishing may affect the availability of fish for wildlife viewing..	**-**
Recreational and subsistence fisheries		• No license requirements in Hawaii making it difficult to manage overfishing (Moffitt et al. 2006). • Though data are lacking, recreational overfishing very likely contributing to decreases in fish species and therefore declines commercial fisheries landings (PIFSC 2011). • While recreational fishing is an important component of tourism and recreation overall, the impacts of recreational fishing on other tourism could be adverse if fish populations become overfished.	**-**
Wai`anae Wastewater Treatment Plan Modification	• Water quality improvements	• Wastewater treatment plant improvements would generally be expected to reduce contaminants and biological waste streams entering the coastal ecosystem. This would be beneficial for tourism and recreation due to improved water quality as well as indirect beneficial effects on marine flora and fauna sustainability.	**+**
Lā`ie Wastewater Collection System Expansion Phase II – Lā`ie			

Agriculture	• Nutrient pollution • Sedimentation	• Sediment runoff and pollution and nutrients from agricultural practices widely impact coral reef habitat where cultural resources may be found. • Sources of sediment on Hawaiian reefs include: improperly managed construction sites; cleared agricultural lands; heavy grazed lands; and eroding stream banks. Nutrients from fertilizers and pollutants such as bacteria from livestock, herbicides, and insecticides enter marine waters in runoff and seepage. Nutrient pollution and sediments from coastal development and farming can block sunlight, smother corals, and impede larval settlement (NOAA 2013). • Increased sedimentation and pollution would result in more contaminants and biological waste streams entering the coastal ecosystem. This would have a negative effect on tourism and recreation due to poor water quality as well as indirect adverse effects on marine flora and fauna sustainability.	-
Other Government Activities			

Closure of Bottomfish Fishery in the Hawaiian Archipelago (2006)	• Closed fishery	• 2006: regulations prohibited commercial fishing, except for the bottomfish fishery (and associated pelagic species catch), which had potential to continue until 2011 (U.S. Department of Commerce and Department of the Interior, 2006). • 2009 remaining permit holders surrendered permits to NMFS in exchange for compensation from Federal Government and fishery was closed. Total NWHI bottomfish catch in 2009 was 29 metric tons. • Closure of the commercial fishery may have increased the diversity and populations of fish species important for tourism and recreation (i.e., snorkeling tours, wildlife viewing, etc.).	+
Hawaiian Spinner Dolphin Human Interaction Protection Measures	• Redistribution of tourism and recreation activities to other areas • Protection of natural habitats valued by tourists and recreationists	• Recreation or tourism may move to other areas where no time-area closures are in effect though overall this is not expected to have a long term negative impacts on overall tourism or recreation. • Natural habitats and species (i.e., spinner dolphins) would benefit from protection measures due to potential time-area closures in bays around the MHI. The additional protection of habitat and better recruitment of marine fauna is likely valued by many tourists and recreationists.	+
State of Hawai`i DLNR. Clearing of rivers, streams, beach areas Removal of marine debris from high seas	• Reduction in marine debris	• Reduction in marine debris could result in safer, cleaner recreation and tourism areas.	+
Hawaiian Monk Seal Critical Habitat Designation	• Habitat protection	• Restrictions on beach activities would likely have negligible effects on beach access or areas important for recreation. • Marine fauna populations may benefit from Monk Seal Habitat designation due to the additional protection thus benefitting valued resources important for recreation and tourism.	+

Measures to End Bottomfish Overfishing in the Hawaiian Archipelago	• Improved protection of important species for recreation and tourism	• Fishery plan may promote more stable prey resources that are important for tourism and recreation.	+

The primary past effect on recreation and tourism in the MHI is the national and global economic decline in recent years that resulted in reduced tourism to the MHI. According to the Hawai`i Tourism Authority, in 2006 and 2007, there were a total of 69.1 million visitor days in Hawai`i. Visitor days decreased to 63.1 million in 2008 and then decreased further to 60.3 million in 2009. Tourism visits in 2010 started recovering (as discussed in Affected Environment section), with an increase of nearly 9 percent over 2009 visitor days.

Global health concerns can also limit air travel and affect the number of visitors to the MHI. For example, the 2009 H1N1 flu virus affected the number of visitors to Hawai`i, particularly from China, Taiwan, Singapore, and Japan (HTA, 2009).

While global economic and health concerns have affected the number of total visitors, visitor surveys show that the level of satisfaction and the likelihood of repeat visits by Hawai`i tourists has actually increased from 2005 to 2009, indicating that visitor perception of the overall quality of recreation and tourism resources in Hawai`i is becoming more positive (HTA 2009).

Reasonably foreseeable future wildlife management that may affect recreation and tourism on beaches and near shore areas include potential restrictions on human interaction with spinner dolphins in Hawai`i. NOAA is currently preparing an EIS (Spinner Dolphin Human Interaction EIS) regarding conservation measures to protect wild spinner dolphins. Among other potential effects, these management actions may limit opportunities for 'swim with wild dolphin' tours or boating tours that closely approach the spinner dolphins. Other future conservation efforts by NMFS and the State of Hawai`i may also affect recreation and tourism on the MHI, with potential positive effects (i.e. enhanced wildlife populations and therefore increased chances of wildlife viewing) and potential adverse effects (*i.e.,* decreased proximity of access) on wildlife-viewing opportunities.

Cumulative Effects Conclusion for Recreation and Tourism

The alternatives would take place against a backdrop of recovering recreation and tourism levels. However, as discussed above, the direct and indirect effects of the alternatives on recreation and tourism are expected to be negligible. As the direct and indirect effects are anticipated to be so small, none of the alternatives is expected to contribute to overall cumulative effects on recreation and tourism.

4.8.6 Environmental Justice

CEQ, which has oversight of Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, issued guidance in 1997 for implementing the EO. Since then, some federal agencies such as the Department of Energy's (DOE) Office of NEPA Policy and Compliance, have provided additional detailed guidance for implementation through NEPA. In addition to NMFS' guidance for environmental justice implementation through NEPA, CEQ and DOE guidance was also followed in this analysis.

The legal foundations for environmental justice in Hawai`i were also considered in this analysis, including but not limited to the Hawai`i Constitution, Hawai`i Revised Statutes, and the Hawai`i Environmental Justice Bill – Act 294 as presented in Kahihikolo (2008).

EPA defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA 2011). Fair treatment is further explained to mean that no population group of any makeup should "bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies" (EPA 2011).

For each alternative, this analysis considered if disproportionately high and adverse human health or environmental (inclusive of the social and economic environment) effects would occur to minority and low-income populations that would appreciably exceed effects to the general population or other comparison group. Specifically, this analysis considered if there were different or unique exposure pathways, exposure rates, special sensitivities, or different uses of natural resources (Office of NEPA Policy and Compliance 2004; CEQ 1997).

As noted in Section 3.4.10 in Table 3.4-12 Study Area Race and Ethnicity 2010, a high percentage of minority populations exist in the state of Hawai`i in all counties and islands, ranging from 64.2% on the island of Maui (Maui County) to 86.0% on Lāna`i (Maui County). Statewide, the average presence of minority populations is 75.3%. With the entire state of Hawai`i comprising the Project Area, all communities are assumed to be minority population communities.

Table 3.4-13 Study Area Income Below Poverty Level 2010, presents the percentage of Hawaiian residents with low-income living on each of the islands and collectively from a statewide perspective. The threshold for analysis is the state of Hawai`i poverty level, which is approximately 9.6% of residents earning incomes below the poverty level. The counties and islands with greater percentages of residents living in poverty include Molokai (13.4%) and the Big Island (14.4%). The counties and islands with lesser percentages of residents living in poverty include the City and County of Honolulu (8.8%), Maui and Lāna`i in Maui County (8.9% and 2.9% respectively), Kaua`i County (8.8%), Honolulu County (8.8%), and Kalawao County (4.1%).

Using the State's poverty level rate as a threshold, disproportionately high and adverse human health and environmental effects experienced by the communities on the islands of Kaua`i, Moloka`i, and the Big Island would trigger environmental justice concerns. However, all communities in the Project Area are assumed to be those of minority makeup; therefore, any disproportionately high and adverse human health or environmental effects to the populations of Hawaiian communities would raise environmental justice concerns that would need to be addressed and potentially mitigated.

In the context of effects to environmental justice communities for this PEIS, specific concerns would arise from potential effects to subsistence fishers who target a fish species that overlaps with one of the various fish species the monk seal includes in their diet. Any such overlap would have to decrease availability of targeted fish species to fishers, and this decreased availability would have to result from an alternative. As described in Section 4.9.3, effects of the alternatives on subsistence fishing are likely to be negligible.

As described in Section 3.4.4, the State defines subsistence fishing as the customary and traditional Native Hawaiian uses of renewable ocean resources for direct personal or family consumption or sharing. As Native Hawaiians are a minority population covered under environmental justice, this analysis considers that potential effects to subsistence could merit potential environmental justice concerns. Economic effects realized from commercial and recreation fishing could also warrant potential environmental justice concerns. Additionally, environmental justice concerns could arise from effects to cultural resources and historic properties meaningful to Native Hawaiians and potentially other minority groups. Mitigations to address any potential disproportionately high and adverse environmental effects to environmental justice communities would be developed and implemented as appropriate.

With regard to human health, potential effects would result from a significant decrease in subsistence fish if they were the primary sustenance for a family or individual for cultural or economic reasons. No alternatives would result in human health effects from the perspective of diminished resources impacting diet; therefore, environmental justice communities would not experience disproportionately high or adverse human health effects.

Under all alternatives, NMFS would continue to conduct education and outreach efforts (to varying degrees), ensuring that environmental justice communities are included in those efforts so that these populations are aware of best practices around wild Hawaiian monk seals. These efforts are conducted in part to limit highly unlikely potential negative consequences of interaction with the wild animals.

4.8.6.1 *Direct and Indirect Effects on Environmental Justice of Alternative 1 – Status Quo*

Under Alternative 1 Status Quo, the current level of research and enhancement activities would be sustained through the next permit cycle. The population of monk seals is expected to naturally increase in the MHI for the timeframe of this PEIS with this level of research and enhancement activities. However, the overall population will decrease. As such, effects to fishery resources (commercial, subsistence, or recreation) that low-income and minority populations might depend on would likely continue with their current trends, barring any unforeseen disruptive natural occurrences. Additionally, minor effects to cultural resources and historic properties would be expected under this alternative.

Disproportionately high and adverse effects to environmental justice communities would not be likely because negligible to no effects on fishery resources are expected, and only potential minor adverse effects on cultural resources and historic properties are expected. NMFS implements best management practices and other mitigations are also in place to minimize or eliminate potential effects to these resources in an effort to ensure major adverse effects are not suffered by Native Hawaiians, other minority populations, and/or low-income populations.

4.8.6.2 *Direct and Indirect Effects on Environmental Justice of Alternative 2 – No Action (No New Permits After 2014)*

If no action is taken with regard to issuing new permits for research and enhancement for Hawaiian monk seals after 2014, then the number of seals is likely to decrease in the NWHI and increase in the MHI. Although fishing occurs in the MHI where the monk seal population is increasing naturally, on fishing are expected to be negligible. Cultural resources and historic properties effects are expected to be minor under this alternative.

As no fishery, economic, or cultural effects would appreciably exceed effects to the general population, it is unlikely disproportionately high and adverse effects to environmental justice communities would result. For the remainder of the current permit cycle, NMFS would continue to implement best management practices and have other mitigations in place to ensure major adverse effects are not suffered by Native Hawaiians, other minority populations, and/or low-income populations.

4.8.6.3 *Direct and Indirect Effects on Environmental Justice of Alternative 3 – Limited Translocation (Preferred Alternative)*

Alternative 3 Limited Translocation encompasses all activities in Alternative 1 Status Quo; plus increased activities as detailed in Section 2.9.

Although the rate of MHI monk seal population growth may increase marginally due to Alternative 3 activities, the potential fisheries effects are expected to be negligible. Consequently, disproportionately high and adverse effects to environmental justice communities would not be likely because negligible effects on fishery resources are expected, and only potential minor adverse effects on cultural resources and historic properties are expected. As in the previous two alternative scenarios, NMFS would continue to implement best management practices and maintain other mitigations to minimize or eliminate potential effects to these resources in an effort to ensure major adverse effects are not suffered by Native Hawaiians, other minority populations, and/or low-income populations.

4.8.6.4 *Direct and Indirect Effects on Environmental Justice of Alternative 4 – Enhanced Implementation*

Alternative 4 Enhanced Implementation differs from Alternative 3 with regard to the way translocations would be conducted. Under this alternative, weaned Hawaiian monk seals could be moved from the NWHI to the MHI, and then taken back to the NWHI when they reach the age of 2 to 3 years. Details of this alternative are included in Section 2.10 Alternative 4 Enhanced Implementation.

Effects under Alternative 4 are expected to be negligible. Disproportionately high and adverse effects to environmental justice communities would not be likely, as negligible effects on fishery resources are expected, and only potential minor adverse effects on cultural resources and historic properties are expected. As in the previous two alternative scenarios, NMFS would continue to implement best management practices and maintain other mitigations to minimize or eliminate potential effects to these resources in an effort to ensure major adverse effects are not suffered by Native Hawaiians, other minority populations, and/or low-income populations.

4.8.6.5 *Cumulative Effects of Alternatives on Environmental Justice*

As discussed, anticipated environmental effects that could potentially raise environmental justice concerns would be negligible and not likely to be disproportionately borne by Native Hawaiians, other minority populations, and/or low-income populations. Nor would any of these effects appreciably exceed effects to the general population. Further, human health effects are not expected.

Also, under all alternatives, NMFS would continue to conduct education and outreach efforts, ensuring that environmental justice communities are included in those efforts so that these populations are aware of best practices around wild Hawaiian monk seals. To further minimize any potential for disproportionately high and adverse effects to environmental justice communities, NMFS would continue to implement best management practices and maintain other mitigations to minimize and/or eliminate potential effects to socioeconomic resources.

All alternatives would result in negligible effects to fisheries, economics, and cultural resources. As a result, the alternatives are not likely to contribute cumulative effects that would raise environmental justice concerns.

4.8.7 *Military Activities*

Military operations and exercises occur along the shoreline and in the offshore areas within the Project Area described in Section 1.3 *Description of the Project*

Area. The Army installations (DMR and MMR) together have approximately three miles of shoreline. The shoreline area adjacent to the U.S. Coast Guard (USCG) installation has been removed from base operations.

As described in Section 3.4.12.3, NMFS currently has an MOU with the USCG to assist with translocation activities that are part of the Marine Mammal Health and Stranding Response Program (MMHSRP) (Permit 932-1905). Thus, the translocation described in this assessment would not necessarily involve the USCG. The USCG area operates in an area of approximately 14.2 million square miles in and around the Hawaiian Archipelago (USCG and NOAA, 2010; see Section 3.4.12.3 *Coast Guard*).

The U.S. Marine Corps (USMC) operates in approximately 12.5 miles of shoreline and nearly four square miles of area directly offshore of the Marine Corps Base Hawai`i (MCBH).

Both the Air Force and the Navy operate in approximately 40 miles of shoreline (Pearl Harbor and PMRF) and approximately 1,200 square miles of ocean in and around the Hawaiian Archipelago.

This section discusses the potential direct and indirect effects for military installations in Hawai`i. There would be no direct effects associated with any of the alternatives. Indirect effects for the Navy, USMC and the Air Force are based upon whether or not the proposed alternatives would be likely to result in changes to military operations, exercises or military response efforts throughout the Project Area. As described in Chapter 3, the Hawaiian monk seal are located where the majority of military activities occur in Hawai'i.

4.8.7.1 *Direct and Indirect Effects on Military Actions of Alternative 1 – Status Quo*

Under Alternative 1 Status Quo, the current NMFS Research and Enhancement Permit (10137) would continue until expiring in 2014. Following this date, subsequent permits will be issued to continue the research and enhancement activities that are currently permitted. For a complete description of permitted research under Alternative 1, please refer to Section 2.6 *Alternatives Carried Forward for Analysis*.

Under Alternative 1, the Hawaiian monk seal population in the MHI is anticipated to increase due to the apparent favorable conditions for continued growth as evidenced by the demographics of the Hawaiian monk seal population (Baker et al 2011*a*) independent of actions take by NMFS. While this growth may be enhanced by Alternative 1 activities such as de-hooking, disentanglement, and weaned pup translocation measures, the contribution of Alternative 1 activities to any increase in the monk seal population would be marginal. As described above, NMFS may cordon off small sections of beaches where monk seals haul out but this would be temporary until the seal moved or swam away.

Under Alternative 1, at most 85 Hawaiian monk seals can be translocated by boat, vehicle, or aircraft per year (Table 2.10-1). While the *Coast Guard* does assist NMFS with the translocation of Hawaiian monk seals, approximately three to five annually, these translocation activities are authorized under NMFS permit 932-1905 and not under Permit 10137. NMFS may involve USCG in future translocations if the activity fits within existing operations and does not require significant effort. Thus the majority of these 85 possible translocations would not involve *Coast Guard* assistance (NMFS pers. comm. 2011). Any small areas to be cordoned off around seals would not likely affect USCG activities and would therefore be negligible.

As previously described, the MHI Hawaiian monk seals population is naturally increasing independent of any research or enhancement taken by NMFS. The implementation of Alternative 1 may have a negligible indirect effect on MHI Hawaiian monk seal population beyond that of natural MHI population growth due to de-hooking, disentanglement and weaned pup translocation. However, it is anticipated that this small population effect will have negligible indirect effects upon military training and operations within the MHI.

Conclusion for Direct and Indirect Effects on Military Activities from Alterative 1 (Status Quo)

None of the research methods permitted under Alternative 1 would directly affect military activities or operations in Hawai`i. Furthermore, it is unlikely that Hawaiian monk seal population changes within the MHI resulting from enhancement activities would indirectly affect military training activities or operations. Therefore, direct and indirect effects are likely to be negligible.

4.8.7.2 Direct and Indirect Effects on Military Activities of Alternative 2 – No Action (No New Permits After 2014)

Under the No Action Alternative, existing research as permitted under the current permit (10137) would continue until 2014. Once this permit expires, no research or enhancement activities on monk seals would occur. Unlike the activities under other alternatives, there would be no field research to monitor populations, implement de-worming, or translocation once the permit expires in 2014.

As discussed above, demographic data for monk seals suggests that the Hawaiian monk seal population in the MHI is anticipated to continue to increase regardless of NMFS actions. Under Alternative 2, given that most monk seal research and enhancement activities would cease after 2014, potential effects on military activities under Alternative 2 would not likely occur and are therefore considered negligible.

It is unlikely that Alternative 2 would result in any direct or indirect affect on the military in Hawai`i. Under Alternative 2, regardless of any NMFS action, the MHI Hawaiian monk seal population is anticipated to grow, however under this

Alternative this increase is expected to be lower than all other Alternatives. Indirect effects of Alternative 2 might include fewer occasions of cordoning off areas near military installation shorelines and fewer instances of Navy training exercise conflicts. However, the potential effects of Alternative 2 would likely be negligible for all branches of the military.

Conclusion for Direct and Indirect Effects on Military Activities from Alternative 2 (No Action)

It is anticipated that there would be no direct affects to military activities or operations in Hawai`i resulting from Alternative 2. Given that most research and enhancement would cease once the permit expires in 2014, military activities are not likely to be affected and therefore, potential effects would be considered negligible.

4.8.7.3 Direct and Indirect Effects on Military Activities of Alternative 3 – Limited Translocation (Preferred Alternative)

Under Alternative 3, the research and enhancement activities currently permitted would be expanded (see section 2.6 for details).

Alternative 3 entails the expansion of research and enhancement activities currently permitted, most of which are focused on slowing Hawaiian monk seal population decline within the NWHI. The expanded activities under Alternative 3 would include translocation, vaccination, behavioral modification, and deworming none of which, themselves would likely affect military activities. Emergency response to a disease outbreak is already mandated under provisions of the MMPA's Marine Mammal Health and Stranding Response Program (MMHSRP)(Title IV, 16 U.S.C. 1421) and the permit held by the MMHSRP.

The implementation of Alternative 3 could result in translocations of seals (see Appendix F, Take Tables) by boat, vehicle, or aircraft. While the Coast Guard does assist NMFS with the translocation of approximately three to five Hawaiian monk seals annually, these translocation activities are authorized under NMFS permit 932-1905 and not under Permit 10137. Therefore, these possible translocations would not involve *Coast Guard* assistance (NMFS 2011).

The geographic extent of haul out occurrences within the MHI is not likely to expand as a result of NMFS actions, rather independent of such actions as the natural population growth in the MHI may continue to alter their distribution (Baker *et al.* 2011). While it is noted that the frequency of these events could increase it is not likely to be attributable to NMFS actions under Alternative 3 and the effect of increased haulouts on military operations is anticipated to be negligible for each military branch.

The marginal population increase in monk seal populations in the MHI due to research and enhancement activities are not likely to result in any change in the number of conflicts with Navy training activities. It is anticipated that the number of Navy training exercises affected by monk seal is to be negligible.

Conclusion for Direct and Indirect Effects on Military Activities from Alternative 3 (Preferred Alternative)

None of the research methods permitted under Alternative 3 would directly affect military activities or operations in Hawai`i. Furthermore, it is unlikely that Hawaiian monk seal population changes within the MHI resulting from enhancement activities will indirectly affect military training activities or operations. Therefore, direct and indirect effects of Alternative 3 are likely to be negligible.

4.8.7.4 *Direct and Indirect Effects on Military Activities of Alternative 4 – Enhanced Implementation*

Under Alternative 4, the research and enhancement activities would be the same as presented for Alternative 3 with the addition of the potential to translocate weaned seals from areas of low survival in the NWHI to areas of higher survival in the MHI temporarily until age 2 or 3 yr at which point they would be returned to the NWHI.

Alternative 4 entails expanded research and enhancement activities, most of which, as under Alternative 3, are focused on improving the population status in the NWHI. The Alternative 4 expanded activities most relevant to the MHI are potential two-stage translocation involving temporarily moving juvenile seals from the NWHI to the MHI, a vaccination program, and behavioral modification activities. It is anticipated that Alternative 4 will exhibit the greatest benefit to Hawaiian monk seal populations relative to all alternatives. However, that benefit is expected to primarily manifest as a reduction in the rate of decline in the NWHI as opposed to making significant contributions to the already underway MHI population growth.

The implementation of Alternative 4 could result in additional monk seal translocation activities each year for 5 years. While the Coast Guard does assist NMFS with the translocation of Hawaiian monk seals, approximately three to five annually, these translocation activities are authorized under NMFS permit 932-1905 and not under Permit 10137. Therefore, these possible translocations would not involve Coast Guard assistance (NMFS 2011).

Indirect effects of Alternative 4 on military activities could occur if there were marked changes in the population of Hawaiian monk seals within the MHI due to NMFS action. Under this alternative, up to a maximum of 60 translocated (from the NWHI) juvenile Hawaiian monk seals could be present in the MHI in some years. This temporary increase in the Hawaiian monk seal population is anticipated to have negligible effect on military training activities and operations.

Conclusion for Direct and Indirect Effects on Military Activities from Alternative 4 (Enhanced Implementation)

None of the activities permitted under Alternative 4 would directly affect military activities or operations in Hawai`i. Furthermore, it is unlikely that temporary Hawaiian monk seal population increases within the MHI resulting from enhancement activities would indirectly affect military training activities or operations. Therefore, direct and indirect effects would likely be negligible.

4.8.7.5 Cumulative Effects of Alternatives on Military Activities

Research and enhancement activities would likely result in negligible direct and indirect effects on military operations under all alternatives. Thus, cumulative impacts of proposed research and enhancement activities under any Alternative would not likely contribute to any cumulative effect on military activities.

4.9 SUMMARY OF EFFECTS ON ALL RESOURCES

The following tables (Tables 4.10-1 through 4.10-12) summarize the direct, indirect, and cumulative effects under each alternative for resources where environmental consequences were evaluated. More detailed discussions of direct, indirect, and cumulative effects can be found in Sections 4.8 through 4.10.

Table 4.10-1 Summary of Direct/Indirect and Cumulative Effects – Hawaiian Monk Seals

	Alternative 1: Status Quo	Alternative 2: No Action No Permit After 2014	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
HAWAIIAN MONK SEALS				
DIRECT / INDIRECT EFFECTS				
Mortality	**Minor Adverse** - could result in a reduction of total abundance of 9 seals, representing a 1% decline.	**Negligible** - after the permit expires in 2014, no additional research or enhancement would occur on wild seals.	**Minor to Moderate Adverse** - small changes in the population, a small number of individuals would be affected, although levels of take are not likely to be realized.	**Minor to Moderate Adverse –** same as Alternative 3.
Reproduction	**Negligible** - precautionary measures undertaken such that no adult female is captured that appears to be pregnant.	**Negligible** - after the permit expires in 2014, no additional research or enhancement would occur on wild seals.	**Negligible** - same as Alternative 1.	**Negligible** - same as Alternative 1.
Contribution to Conservation Objectives	**Moderate beneficial** - addresses conservation though not at a level that would be expected to result in notable effects on recovery.	**Major adverse** - after the permit expires in 2014, no additional research or enhancement would occur on wild seals. No contribution towards conservation objectives after 2014.	**Major beneficial** - provides a variety of ways to conduct enhancement at any one time. Benefits are more likely to be long-term.	**Major beneficial** - flexibility to adapt to potential future conditions that might make translocations from the NWHI to MHI even more beneficial would allow NMFS to adapt strategies to a greater range of future scenarios for promoting survival.
CUMULATIVE EFFECTS				
Mortality	**Negligible** - Relative to mortalities caused by predation, starvation, entanglement, intentional lethal shootings by humans and potential diseases, contribution of effects of Alternative would be negligible.	**Negligible** – after the permit expires in 2014, no additional research or enhancement would occur on wild seals.	**Negligible** - same as Alternative 1.	**Negligible** - same as Alternative 1.
Reproduction	**Negligible** - alternatives vary in the amount of research- and enhancement-related disturbance although none of the proposed alternatives are expected to contribute anything but negligible effects on reproduction.	**Negligible** - after the permit expires in 2014, no additional research or enhancement would occur on wild seals.	**Negligible** - same as Alternative 1.	**Negligible** - same as Alternative 1.

	Alternative 1: Status Quo	Alternative 2: No Action No Permit After 2014	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
Contribution to Conservation Objectives	**Moderate beneficial contribution –** addresses conservation though not at a level that would be expected to result in notable cumulative effects on recovery.	**Major adverse contribution** - no additional research or enhancement would occur on wild seals could result in higher seal mortality.	**Major beneficial contribution** - provides a variety of ways to conduct enhancement at any one time. Benefits are more likely to be long-term.	**Major beneficial contribution –** enhanced translocation promotes greatest flexibility in translocation options along with all actions contained in Alternative 3.

Table 4.10-2 Summary of Direct/Indirect and Cumulative Effects – Sea Turtles

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
		SEA TURTLES		
DIRECT / INDIRECT EFFECTS				
Mortality	**Negligible** - Injury or mortality affecting sea turtles rare.	**Negligible** - no research or enhancement on wild seals after 2014.	**Negligible**- injury or mortality due to collisions with sea turtles extremely rare; no effect on population/species level. Despite slight increase in level of activities, BMPs and other mitigations minimize risks for collisions with turtles.	**Negligible** - same as Alternative 3.
Reproduction	**Negligible**- disturbance is not likely to result in effects on sea turtle reproduction.	**Negligible** - no research or enhancement on wild seals after 2014.	**Negligible** - while level of disturbance may increase, this is not likely to cause measurable changes in sea turtle reproduction.	**Negligible** – same as Alternative 3.
CUMULATIVE EFFECTS				
Mortality and Reproductive Effects	**Negligible contribution** - compared with other external sources of mortality, BMPs and other mitigation measures minimize risk of mortality and potential effects on reproduction.	**Negligible contribution** - no research or enhancement on wild seals after 2014. Contribution to sea turtle population declines negligible.	**Negligible contribution** - despite slight increase in research and enhancement, compared with other external sources of mortality, BMPs and other mitigation measures minimize risk of mortality and potential effects on reproduction.	**Negligible contribution** – same as Alternative 3.

Table 4.10-3 Summary of Direct/Indirect and Cumulative Effects – Cetaceans

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
CETACEANS				
DIRECT / INDIRECT EFFECTS				
Mortality	**Negligible** - injury or mortality due to collisions with cetaceans from activities such as vessel surveys extremely rare.	**Negligible** - no research or enhancement on wild seals after 2014.	**Negligible** – same as Alternative 1.	**Negligible** – same as Alternative 1.
Reproduction	**Negligible** - vessel activity infrequent; disturbance would be short-term and not likely to result in reproductive effects.	**Negligible** - no research or enhancement on wild seals after 2014.	**Negligible** – same as Alternative 1.	**Negligible** – same as Alternative 1.
CUMULATIVE EFFECTS				
Mortality and reproductive effects	**Negligible contribution** - potential effects of all alternatives on mortality or reproduction negligible at the population level relative to other external stressors. BMPs and other mitigation measures in place to minimize risks of collisions and disturbance. Vessel activity infrequent and not likely to result in any long-term effects. Under Alternative 2, no research or enhancement on wild seals after 2014. Contribution to cetacean population declines negligible. Long-term effects on reproduction negligible.			

Table 4.10-4 Summary of Direct/Indirect and Cumulative Effects – Fish

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
FISH				
DIRECT / INDIRECT EFFECTS				
Mortality	**Negligible** - given the wide variety of fish consumed by monk seals, long-term decline in fish populations not likely.	**Negligible** - no research or enhancement on wild seals after 2014.	**Negligible** – same as Alternative 1.	**Negligible** – same as Alternative 1.
CUMULATIVE EFFECTS				
Mortality	**Negligible contribution** -relative to other external sources of fish mortality, research and enhancement alternatives are not likely to result in any measurable effects on mortality.	**Negligible contribution** - no research or enhancement on wild seals after 2014.	**Negligible contribution** - same as Alternative 1.	**Negligible contribution** - same as Alternative 1.

Table 4.10-5 Summary of Direct/Indirect and Cumulative Effects – Birds

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
		BIRDS		
DIRECT / INDIRECT EFFECTS				
Productivity	**Minor adverse** effects expected from human disturbance on beach-nesting seabirds. **Negligible** effects on shorebird productivity. **Minor adverse** effects on Laysan Finch from research and enhancement camp activities.	**Negligible** - no research or enhancement on wild seals after 2014.	**Negligible to Minor adverse** – same as Alternative 1.	**Negligible to Minor adverse** – same as Alternative 1.
Survival	**Minor adverse** - periodic effects on avian survival due to potential collisions with aircraft and fencing from monk seal holding pens, and camp activities.	**Negligible** - no research or enhancement on wild seals after 2014.	**Minor adverse** – same as Alternative 1.	**Minor adverse** - same as Alternative 1.
Habitat Alteration	**Minor adverse** - strict protocols for entering the NWHI prevent the spread of invasive species. Despite protocols, minor effects on habitat, survival, and productivity due to introduction of invasive species.	**Negligible** - no research or enhancement on wild seals after 2014.	**Minor adverse** - increased translocation of seals from MHI to NWHI may introduce invasive species to the Monument but would be mitigated through strict protocols.	**Minor adverse** – same as Alternative 3.
CUMULATIVE EFFECTS				
	Minor adverse contribution– Relative to other sources of mortality and effects on productivity such as longline fisheries, climate change, invasive species and marine debris, the contribution of research and enhancement activities is considered minor adverse for avian mortality, productivity and habitat. Precautions would be implemented to avoid take of birds and nesting birds on beaches would be avoided.			

Table 4.10-5 Summary of Direct/Indirect and Cumulative Effects – Corals

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
CORALS				
DIRECT / INDIRECT EFFECTS				
Damage to coral and live rock.	**Negligible** effects due to strict protocols to minimize damage.	**Negligible** - no research or enhancement on wild seals after 2014.	**Negligible**– Some increase in activities that could impact corals, but adherence to strict protocols maintained.	**Negligible**– same as Alternative 3.
CUMULATIVE EFFECTS				
Damage to coral and live rock.	**Negligible contribution.** Considering that there would only be negligible direct and indirect effects are anticipated under any of the Alternatives, there would be no contribution of monk seal research and enhancement activities to a cumulative impact on coral species.			

Table 4.10-6 Summary of Direct/Indirect and Cumulative Effects – Invasive Species

	Alternative 1: Status Quo	Alternative 2: No Action No Permit After 2014	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
INVASIVE SPECIES				
DIRECT / INDIRECT EFFECTS				
Spread of Invasive Species	**Minor adverse** - strict protocols described for entering the NWHI under a Monument permit prevent the spread of invasive species.	**Negligible** - after the permit expires in 2014, no additional research or enhancement would occur on wild.	**Minor adverse** - strict protocols for entering the Monument would help prevent spread of invasive species; however, increased activity may slightly increase chances of doing so.	**Minor adverse** – same as Alternative 3.
CUMULATIVE EFFECTS				
Spread of Invasive Species	**Negligible** – given the high population and level of ecotourism, recreation, fishing, and other human activities in the MHI, research and enhancement activities proposed would be expected to result in negligible effects. Strict protocols for entering the Monument limit spread of invasive species.	**Negligible** – after the permit expires in 2014, no additional research or enhancement would occur on wild seals thus there would be no potential to spread invasive species	**Negligible** – despite increased translocation of seals from MHI to NWHI, spread of invasive species would be negligible and be mitigated through strict monument protocols. High population and level of ecotourism, recreation, fishing, and other human activities in the MHI would be expected to have a greater probability to spread invasive species.	**Negligible** – same as Alternative 3.

Table 4.10-7 Summary of Direct/Indirect and Cumulative Effects – Commercial Fisheries

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
		COMMERCIAL FISHERIES		
DIRECT / INDIRECT EFFECTS				
Commercial Landings	**Negligible** – no direct effect on commercial fishing. Marginal Hawaiian monk seal population increase within the MHI not likely to result in indirect effect on commercial fishing. While indirect effects on commercial fishing could stem from costs associated with interactions between fishers and Hawaiian monk seals, these are likely to be negligible.	**Negligible** – after the permit expires in 2014, no additional research or enhancement would occur on wild seals.	**Negligible** – no direct effect on commercial fishing in MHI. Analysis does not indicate that the effects of the alternative on the number of monk seals would measurably affect the amount of fish available to be harvested commercially, or the number of interactions with commercial fishing. Behavioral modification may reduce seal interactions with fishing operations. Marginal monk seal population increase not likely to result in an indirect adverse effect on commercial fishing.	**Negligible** – same as Alternative 3. Small, temporary monk seal population increase in MHI not likely to result in an indirect adverse effect on commercial fishing.
CUMULATIVE EFFECTS				
Commercial Landings	**Negligible contribution** - Commercial fishing in the MHI could be affected by fisheries management actions in Hawai'i, as well as the local and global economy. Overfishing could result in reduction in fish populations for sustainable harvest. Offshore military activities could have temporary effects on fishing through access restrictions or TTS on fish hearing due to underwater training. The direct and indirect effects associated with the Alternatives are expected to be negligible, thus would not contribute to the overall cumulative effects on subsistence fishing. Direct and indirect effects associated with the alternatives are negligible and would not contribute to overall cumulative effects on commercial fishing.			

Table 4.10-8 Summary of Direct/Indirect and Cumulative Effects – Subsistence Fisheries

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
SUBSISTENCE FISHERIES				
DIRECT / INDIRECT EFFECTS				
Subsistence Catch	**Negligible** - no direct effect on subsistence fishing. Marginal Hawaiian monk seal population increase within the MHI not likely to result in indirect effect on subsistence fishing. While indirect effects on subsistence fishing could stem from costs associated with interactions between fishers and Hawaiian monk seals, these are likely to be negligible.	**Negligible** – after the permit expires in 2014, no additional research or enhancement would occur on wild seals.	**Negligible** – no direct effect on subsistence fishing in MHI. Analysis does not indicate that the effects of the alternative on the number of monk seals would measurably affect the amount of fish available to be harvested for subsistence, or the number of interactions with subsistence fishing. Behavioral modification may reduce seal interactions with fishing operations. Marginal monk seal population increase not likely to result in an indirect adverse effect on subsistence fishing.	**Negligible** – same as Alternative 3. Small, temporary monk seal population increase in MHI not likely to result in an indirect adverse effect on subsistence fishing.
CUMULATIVE EFFECTS				
Subsistence Catch	**Negligible contribution** – Subsistence fishing in the MHI could be affected by fisheries management actions in Hawai`i, as well as the local and global economy. Overfishing could result in reduction in fish populations for sustainable harvest. Offshore military activities could have temporary effects on fishing through access restrictions or TTS on fish hearing due to underwater training. The direct and indirect effects associated with the Alternatives are expected to be negligible, thus would not contribute to the overall cumulative effects on subsistence fishing.			

Table 4.10-9 Summary of Direct/Indirect and Cumulative Effects – Recreational Fisheries

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
RECREATIONAL FISHERIES				
DIRECT / INDIRECT EFFECTS				
Recreational Catch	**Negligible** – no direct effects on recreational fishing in MHI. No decrease in fishing trips or in number of fish caught for recreation. While indirect effects on recreational fishing could stem from costs associated with interactions between fishers and Hawaiian monk seals, these are likely to be negligible.	**Negligible** – after the permit expires in 2014, no additional research or enhancement would occur on wild seals.	**Negligible** – no direct effect on recreational fishing in MHI. Analysis does not indicate that the effects of the alternative on the number of monk seals would measurably affect the amount of fish available to be harvested for recreation, or the number of interactions with recreational fishing. Behavioral modification may reduce seal interactions with fishing operations. Marginal monk seal population increase not likely to result in an indirect adverse effect on recreational fishing.	**Negligible** – same as Alternative 3. Small, temporary monk seal population increase in MHI not likely to result in an indirect adverse effect on recreational fishing.
CUMULATIVE EFFECTS				
Recreational Catch	**Negligible contribution** – recreational fishing in the MHI could be affected by fisheries management actions in Hawai'i, as well as the local and global economy. Overfishing could result in reduction in fish populations for sustainable harvest. Offshore military activities could have temporary effects on fishing through access restrictions or TTS on fish hearing due to underwater training. Direct and indirect effects associated with the alternatives are negligible, thus would not contribute to the overall cumulative effects on recreational fishing.			

Table 4.10-10 Summary of Direct/Indirect and Cumulative Effects –Cultural Resources and Traditional Cultural Practices; and Historic and Traditional Cultural Properties

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
CULTURAL RESOURCES AND TRADITIONAL CULTURAL PRACTICES				
DIRECT / INDIRECT EFFECTS				

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
Traditional Fishing and Gathering Resources and Activities	**Minor adverse –** The temporary and geographically limited nature of monk seal recovery activities limits the potential direct and indirect effects to cultural resources. Pedestrian traffic to and from monk seal locations in remote areas could cause minor disturbance to native medicinal plants located along the path of access. Marine resources are not likely to be impacted by vessel based activities. These effects are expected to be mitigated by the implementation of the mitigation measures presented in Chapter 5.	**Minor adverse –** The potential effects listed under Alternative 1 would remain until after the permit expires in 2014. Beyond that point no additional research or enhancement would occur on wild seals.	**Minor adverse –** The temporary and geographically limited nature of monk seal recovery activities limits the potential direct and indirect effects to cultural resources. Increased handling and translocation of monk seals under Alternative 3 would slightly increase the potential for effects to cultural resources and traditional customary practices. Pedestrian traffic to and from monk seal locations in remote areas could cause minor disturbance to native medicinal plants located along the path of access. Marine resources are not likely to be impacted by vessel-based activities. The indirect effects of potential marginal increases in the MHI monk seal population growth associated with the alternative could include locally increased interactions between monk seals and traditional fishers. These effects can be mitigated by the seal behavior modification actions included under Alternative 3 and by the implementation of the mitigation measures presented in Chapter 5.	**Minor adverse –** The temporary and geographically limited nature of monk seal recovery activities limits the potential direct and indirect effects to cultural resources. The increased handling and translocation of monk seals under Alternative 4 would slightly increase the potential for effects to cultural resources and traditional customary practices. Pedestrian traffic to and from monk seal locations in remote areas could cause minor disturbance of native medicinal plants located along the path of access. Marine resources are not likely to be impacted by vessel-based activities. Temporary translocation of seals from the NWHI is expected to have negligible impact on subsistence fishing (See Section 4.9.2) and on traditionally collected marine resources. The indirect effects of monk seal translocation from the NWHI and within the MHI could include increased interactions between monk seals and traditional fishers. These effects can be mitigated by the seal behavior modification actions included under Alternative 4 and by the implementation of the mitigation measures presented in Chapter 5.
CUMULATIVE EFFECTS				
Traditional Fishing and Gathering Resources and Activities	**Negligible contribution –** The temporary nature of monk seal research and enhancement activities and their restriction to the shoreline and immediate off-shore zones would limit direct and indirect effects on cultural resources and traditional practices. Some potential exists for minor impacts on shoreline plant resources, and to a lesser extent on marine resources, but these can be mitigated by the implementation of mitigation measures presented in Chapter 5.5. The potential for increased interactions between monk seals and traditional fishers could be mitigated by the seal behavior modification actions and by the implementation of the other mitigation measures. These would serve to make the contribution of any alternative to cumulative effects on cultural resources and traditional practices negligible.			

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
		HISTORIC AND TRADITIONAL CULTURAL PROPERTIES		
DIRECT / INDIRECT EFFECTS				
Archaeological Sites, and other Historic Sites, and Cultural Properties	**Minor adverse** – The temporary and geographically limited nature of monk seal recovery activities limits the potential to impact cultural and historic properties. Pedestrian traffic to and from monk seal locations in remote areas could directly affect archaeological sites located along the path of access. Shipwrecks and other offshore sites have the potential to be impacted by vessel based activities. The removal of monk seals from within coastal fish ponds could possibly result in minor structural damage to these sites. These effects can be mitigated by implementation of the mitigation measures presented in Section 5.5.	**Minor adverse** – The potential effects listed under Alternative 1 would remain until after the permit expires in 2014. Beyond that point no additional research or enhancement would occur on wild seals.	**Minor adverse** – The temporary and geographically limited nature of monk seal recovery activities limits the potential to impact cultural and historic properties. Increased handling and translocation of monk seals under Alternative 3 would increase the potential for effects to cultural and historic properties. Pedestrian traffic to and from monk seal locations in remote areas could directly affect archaeological sites located along the path of access. Shipwrecks and other offshore sites have the potential to be impacted by vessel-based activities. The removal of monk seals from within coastal fish ponds could possibly result in minor structural damage to these sites. These effects can be mitigated by the seal behavior modification actions included under Alternative 3 and by implementation of the mitigation measures presented in Section 5.5.	**Minor adverse** – The temporary and geographically limited nature of monk seal recovery activities limits the potential to impact cultural and historic properties. As with Alternative 3, the increased handling and translocation of monk seals would increase the potential for effects to cultural and historic properties. Pedestrian traffic to and from monk seal locations in remote areas could directly affect archaeological sites located along the path of access. Shipwrecks and other offshore sites have the potential to be impacted by vessel-based activities. The removal of monk seals from within coastal fish ponds could possibly result in minor structural damage to these sites. These effects can be mitigated by the seal behavior modification actions included in Alternative 4 and by implementation of the mitigation measures presented in Section 5.5.
CUMULATIVE EFFECTS				
Archaeological Sites, and other Historic Sites, and Cultural Properties	**Negligible contribution** – The temporary nature of monk seal research and enhancement activities and their restriction to the shoreline and immediate off-shore zones would limit encounters with cultural or historic properties. Some potential exists for direct impacts on archaeological sites, but these can be mitigated by the implementation of mitigation measures presented in Section 5.5. Compared to other sources of disturbance to cultural and historic resources including development, major storm events, previous military actions (*i.e.,* warfare), looting or other deleterious activities, the contribution of any alternative to cumulative effects on cultural and historic resources would be negligible.			

Table 4.10-11 Summary of Direct/Indirect and Cumulative Effects – Recreation and Tourism

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
RECREATION AND TOURISM				
DIRECT / INDIRECT EFFECTS				
Recreation Experience and Cost, and Public Safety	**Negligible** - small portions of some public beaches may be cordoned off but benefits associated with increased wildlife presence. Pup translocations would continue to minimize human-seal interactions.	**Negligible** - after the permit expires in 2014, no additional research or enhancement would occur on wild seals. While there is potential for increased seal-human interactions due to lack of behavioral modification, any change in these interactions is still likely to be negligible.	**Moderate beneficial** – same as Alternative 1. Potential for more wildlife viewing opportunities of monk seals. Despite evidence of shark predation on seals, there is no evidence that more monk seals in the MHI will lead to more shark attacks on humans. Public safety would likely benefit from reduced human-seal interactions from the combination of behavioral modification and translocating seals that may become socialized.	**Moderate beneficial** – same as Alternative 3.
CUMULATIVE EFFECTS				
Recreation Experience and Cost, and Public Safety	**Negligible contribution** - alternatives would take place against a backdrop of recovering recreation and tourism levels due to the nation's economic downturn. Direct and indirect effects are anticipated to be so small, none of the alternatives is expected to contribute to overall cumulative effects on recreation and tourism.			

Table 4.10-12 Summary of Direct/Indirect and Cumulative Effects – Environmental Justice

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
ENVIRONMENTAL JUSTICE				
DIRECT / INDIRECT EFFECTS				
Disproportionate Effects on Minority Populations	**Negligible -** disproportionately high and adverse effects to environmental justice communities would not be likely because negligible to no effects are expected to fishery resources or cultural resources and historic properties.	**Negligible** - after the permit expires in 2014, no additional research or enhancement would occur on wild seals. While there is potential for increased seal-human interactions due to lack of behavioral modification, any change in these interactions is still likely to be negligible.	**Negligible -** same as Alternative 1.	**Negligible -** same as Alternative 1.
CUMULATIVE EFFECTS				
Disproportionate Effects on Minority Populations	**Negligible contribution** - none of the alternatives would likely contribute to cumulative effects that would raise environmental justice concerns.			

Table 4.10-13 Summary of Direct/Indirect and Cumulative Effects – Military Activities

	Alternative 1: Status Quo	Alternative 2: No Action	Alternative 3: Limited Translocation (Preferred Alternative)	Alternative 4: Enhanced Implementation
MILITARY ACTIVITIES				
DIRECT / INDIRECT EFFECTS				
Military Activities	**Negligible –** no direct effect on military activities. Translocation of seals would likely not involve USCG. Any small areas to be cordoned off around seals would not likely affect military activities or operations.	**Negligible** - after the permit expires in 2014, no additional research or enhancement would occur on wild seals.	**Negligible –** same as Alternative 1.	**Negligible –** same as Alternative 1.
CUMULATIVE EFFECTS				
Military Activities	**Negligible contribution** -RFFAs that may potentially affect military activities and operations may include but are not limited to those actions that could alter the ability of the military to carry out missions, additional administrative requirements, new restrictions or changes to areas where operations may occur, or other potential natural disasters such as tsunamis or hurricanes, etc. Direct and indirect effects associated with alternatives would be negligible, thus would not contribute to the overall cumulative effects on military activities.			

5.0 NEPA COMPLIANCE, IMPLEMENTATION, AND ADAPTIVE MANAGEMENT

5.1 IMPLEMENTATION OF THE HAWAIIAN MONK SEAL RECOVERY ACTIONS PEIS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT

The purpose of this chapter is to:

1) Explain procedures that will be used to implement future National Environmental Policy Act (NEPA) compliance on permitting activities addressed in the Hawaiian Monk Seal Recovery Actions Programmatic Environmental Impact Statement (PEIS);
2) Document actions planned or underway to address concerns raised during preparation of this PEIS regarding translocation, vaccinations, behavioral modification, and stakeholder and community coordination; and
3) Provide an overview of additional activities (or mitigation measures) intended, in part, to support successful implementation of Hawaiian monk seal research and enhancement actions, and to mitigate potential adverse impacts that have been identified during the course of the NEPA process.

A number of recommendations for further actions were made during the comment period that fall within two general categories:

- Monitoring plans for the translocation and vaccination processes, and
- Additional outreach and coordination with local communities, stakeholders and partners.

The National Marine Fisheries Service (NMFS) determined it was most appropriate to address these issues outside the scope of any one alternative as these issues and recommendations are considered significant enough that they should be considered and implemented independent of any selected alternative.

5.1.1 Need for NEPA Compliance

This PEIS addresses research and enhancement permit activities that are proposed in the foreseeable future. NMFS staff, the permit applicant, and the general public should understand the process for preparing research and enhancement permit applications and how they would be reviewed for NEPA compliance using this PEIS. In addition to providing an overview of the NEPA compliance requirements, the following sections provide:

- Guidance to the Pacific Islands Fisheries Science Center (PIFSC) in preparing their permit applications;

- Information for other stakeholders regarding the level of subsequent NEPA review that would take place and when; and
- Monitoring plans for specific research and enhancement activities proposed under Alternatives 3 and 4.

5.1.2 *NEPA Compliance Review of Research and Enhancement Permit Applications using the PEIS*

The Hawaiian Monk Seal Recovery Actions PEIS covers proposed research and enhancement programs for monk seals over the next 10 years. Within this 10-year timeframe, permit applications will require a NEPA compliance review of the information presented in this PEIS. Future NEPA compliance reviews will depend on the scope of the proposed research and enhancement. Subsequent site-specific or more detailed actions within the scope of this PEIS and associated Record of Decision (ROD) will tier from the background information and evaluation of impacts presented herein. Tiered NEPA documents will focus on issues "ripe for decision" (CEQ 1986). This process is described in more detail in Section 5.1.2.1 below.

Public notice of receipt of a new 5-year permit application submitted by PIFSC (File No. 16632) was published in the *Federal Register* on March 1, 2013 for a 45-day comment period (78 FR 13863). This application includes activities described in the Preferred Alternative (Alternative 3 – Limited Translocation). NMFS anticipates future submission of permit applications and permit amendments over the duration of this PEIS, as issued permits are only valid for a five year period and may be amended independent of or in response to a request from a permit holder.

Permit applications for research and enhancement activities can be submitted at any time throughout the year, with one year lead-time recommended. At the time of submission, the NMFS Office of Protected Resources, Permits and Conservation Division determines if the proposed activity is covered by the assessment of impacts in this PEIS. Additional information about the permit process can be found on the NMFS Office of Protected Resources website at http://www.nmfs.noaa.gov/pr/permits/.

The Record of Decision (ROD) for this PEIS (which will be published after the PEIS is made final) will identify any conditions of approval relevant to permit applications, and will provide a listing of research and enhancement permit activities addressed by Alternative 3 (Preferred) identified in the Final PEIS. Both the PEIS and the ROD represent decision documents that will be used for the purpose of documenting NEPA compliance of ongoing and future activities addressed within the PEIS.

Proposed research and enhancement permit activities identified and analyzed within Alternative 3 (Preferred) will be subject to routine NEPA compliance, as described in the following subsection (Section 5.1.1.2 Permit Review Procedures). Proposed research and enhancement permit activities not identified and analyzed in Alternative 3 (Preferred) will be subject to a separate NEPA compliance review, the level of which will be determined when the application is submitted.

5.1.2.1 *Permit Review Procedures*

Applications for new permits (including application File No. 16632) and amendments or modifications to permits for research or enhancement activities on Hawaiian monk seals will be reviewed by the NMFS Office of Protected Resources. New permit application and permit amendments are processed using the following procedures with respect to NEPA compliance:

- NMFS review of the permit application and the Final Hawaiian Monk Seal Recovery Actions PEIS and ROD to determine if the proposed research and enhancement is within the scope of Alternative 3 (Preferred). In addition, permit applications are distributed for a 30-day public review and comment;
- A Memorandum to the File will be prepared if the proposed research or enhancement activities in the permit application was identified and analyzed within the range of alternatives presented in the Final PEIS. The Memorandum would document that NEPA compliance for issuance of the permit is provided by the Final PEIS and any conditions of approval apply as documented in the ROD. A copy of the ROD would be attached to the Memorandum;
- Site-specific or more detailed actions may tier from this PEIS in the form of an Environmental Assessment (EA), EA accompanied by a Finding of No Significant Impact (FONSI), or Environmental Impact Statement (EIS), depending on the potential impacts of the activity. These tiered documents would be very focused, incorporating by reference much of the detailed background information and evaluation of impacts presented herein; and
- For any research and enhancement activities proposed in future permit applications that is not within the range of alternatives presented and analyzed in this PEIS, a Categorical Exclusion, EA or EIS would be prepared. The level of NEPA analysis will depend on the potential effects of the proposed new activity.

5.1.2.2 *Reporting Requirements*

NMFS Office of Protected Resources requires annual and final reports from permit holders. Special reports are also required for activities including, but not limited to live captures; lethal takes; initial importation of marine mammal parts;

and transfer, export, or re-importation of marine mammal parts. In addition, permit holders must report on unexpected events they observe that could impose significant adverse effects upon the permitted species or the ecosystem of which they are part (Reporting and Recordkeeping Requirements Final Rule 1996).

NMFS Office of Protected Resources has a publicly accessible, web-based permit application and permit tracking system that includes information on: project information and description; location and take information; NEPA evaluation; project contacts; permit status; permit modifications; and reports. This web page is publicly accessible by interested parties (https://apps.nmfs.noaa.gov/).

The NMFS PIFSC has a publications webpage that includes technical memoranda, journal publications, data reports, conference proceedings, etc. and more related to Hawaiian monk seal research, which is publicly accessible by interested parties (http://www.pifsc.noaa.gov/psd/).

The NMFS Office of Protected Resources also has a publication web page that includes current and past Stock Assessment Reports for Hawaiian monk seals. PIFSC research and monitoring data is used to generate these reports, which include population trends and abundance estimates, distribution, factors limiting recovery, and other information pertinent to the status of Hawaiian monk seals. Please see http://www.nmfs.noaa.gov/pr/sars/.

5.2 MONITORING PLAN FOR THE TWO-STAGE TRANSLOCATION PROCESS

Concerns were raised during scoping and the public comment process regarding the two-stage translocation process as proposed under Alternative 4, in which weaned pups could be collected in the NWHI and released in the MHI. Specifically, some stakeholders wanted details about how researchers would choose release sites in the MHI and how the process would be evaluated for effectiveness over time.

The Preferred Alternative (Alternative 3) involves implementing a two-stage translocation program whereby weaned pups are taken from areas of lower survival to areas of higher survival within the NWHI, within the MHI, or from the MHI to the NWHI. This excludes taking weaned pups born in the NWHI to the MHI. This translocation would include the option of returning the translocated seals to their birth location or nearest appropriate site at age 2 years and older. Note that seals born in the MHI and previously translocated to the NWHI may be returned to the MHI.

The generalized two-stage translocation strategy is detailed in Appendix E. The specific provision for translocating pups from the NWHI and releasing them in the MHI an option included only in Alternative 4 (Enhanced Translocation). A multitude of variables exist that contribute to uncertainty of outcomes, thus the translocation program would be monitored and guided by a complex and adaptive decision framework described in Appendix E.

A 'decision framework' is a tool that helps guide decisions throughout a process, in this case, the monk seal translocation process. Many of the inputs to the decision framework rely on direct observation of key indicators such as population status, juvenile survival rates, and outcomes from previous translocation actions. Also, at various points in the decision framework, researchers would use a computer model (called a stochastic simulation model) updated with the most recent seal population data to estimate the likely range of benefits associated with different choices.

Two decision trees, one for each of the two stages of the translocation strategy, have been developed to support decision-making and assessment as translocation projects progress. The Stage 1 decision tree addresses translocation of weaned Hawaiian monk seal pups from areas of lower survival to areas of higher survival. The Stage 2 decision tree addresses returning previously translocated seals from the recipient site to their donor sites. The decision framework is described in detail in Appendix E and is briefly characterized below.

The decision framework consists of several progressive steps and is designed to structure the decision making process so as to maximize the benefits and reduce the risks associated with the translocation project, including the following:

- NMFS would carefully choose the donor and recipient sites to achieve the greatest possible benefit (in terms of increasing juvenile survival and enhancing the population);
- Public input would also play a role in deciding the most appropriate release sites if translocations of weaned pups were done from the NWHI to the MHI (as proposed under Alternative 4). Specific release sites would be chosen both to minimize potential conflict with beach and ocean users and maximize the chances that the translocated seals would be successful. Seals would likely be most successful when they are released in remote areas where they are less likely to encounter people. It should be recognized that weaned seals will begin to travel around the island where they were released and will even swim between islands;
- Monk seal monitoring and intervention activities critical to a successful two-stage translocation between the NWHI and MHI (as proposed under Alternative 4) would require further development and refinement; these monitoring and intervention activities could be developed and refined under Alternative 3 (Preferred) or Alternative 4;
- NMFS would monitor recipient sites to ensure the capacity of a site to support additional monk seals is not exceeded. This would be determined from observations of juvenile condition and survival at each site, supplemented by simulation modeling to better quantify the probable benefit;

- NMFS would suspend translocation actions in response to unforeseen developments such as the failure to return previously translocated seals to their natal site or region once they reach the stipulated age;
- While seals are in the wild at the recipient site, NMFS would monitor them to learn as much as possible about their location, activities, health and welfare, and whether any human-seal interactions were occurring. Initially seals would typically be monitored with satellite transmitters, and later through regular population assessments; or, if in the MHI, through the established Hawaiian monk seal sighting network; and
- Translocated seals that become socialized or involved in human-seal interactions would be managed in the same fashion as other seals through behavior modification or other measures appropriate to the situation.

Proper care and safe transport of seals as well as mitigating risks of transmitting disease via translocations are other important considerations that NMFS has accounted for. Details of the measures involved in selection, health screen, care in captivity, quarantine and unforeseen contingencies are addressed in Appendix F. NMFS has a great deal of experience handling and transporting monk seals, especially weaned pups, and best practices developed to date will be employed. As new information accrues during the implementation of future translocations, this would augment and help refine protocols further.

As envisioned, the translocation project would initially be implemented as a small-scale experiment. The first phase may involve the experimental translocation of a small number of juvenile or sub-adult seals from one site to another (*e.g.,* from MHI to NWHI) to better assess how well the second stage of the translocation would proceed. As the project proceeds, results from the preceding actions would be used to inform future efforts and better predict the expected outcome from each candidate action. For example, researchers are particularly interested in knowing how survival of translocated seals would differ from those that have spent their entire lives at a site. Once there are data with which to assess that difference, it would be used to better refine the predictions from the simulation model.

Two particular areas of concern for Hawaiian monk seals with two-stage translocation include:

- Minimizing the risk of disease transmission; and
- Minimizing stress and the potential for harm during the actual process of capturing, transporting and releasing seals.

These details are covered in depth in Appendix F. In brief, seals being considered for translocation would be given a thorough health screening prior to completion of the translocation operation. Veterinary care would be provided from the point of capture until release, and quarantine procedures would be followed as appropriate to avoid transporting an ill animal and exposing other seals to infectious disease. Translocated seals would also be monitored closely after release to detect any health problems that may arise.

5.3 PLAN FOR THE VACCINATION PROCESS

The proposed vaccination program is somewhat unique among the actions in this PEIS, in that it is designed to address a potential, rather than a realized, threat to the Hawaiian monk seal. That is, according to research to date, infectious disease does not currently appear to be significantly impacting the species. However, there is great potential for infectious disease to have devastating effects on the species.

Two factors make disease outbreaks especially concerning:

1) Hawaiian monk seals have been largely isolated for most of their evolutionary history in the Hawaiian Archipelago. Until humans arrived on the islands, there were no terrestrial mammals (and their associated diseases) except the Hawaiian hoary bat. Now there are numerous domestic, feral and invasive mammals on the islands that pose a threat as disease vectors.

2) The monk seal population is already quite small and has extremely low genetic diversity, which may make the species especially vulnerable to the outbreak of a new disease.

Because of these concerns, NMFS is committed to being prepared to rapidly respond to, if not prevent, outbreaks of the perceived greatest viral disease threats through vaccination research and enhancement activities. There are currently two types of viral disease that pose a great potential threat to monk seals, but for which vaccines have already been developed.

Morbilliviruses are a group of related viruses that cause disease in a wide variety of species. Morbillivirus outbreaks have caused mass die offs in other seal populations, including a 1988 event in which approximately 18,000 (70% of the population) harbor seals (*Phoca vitulina*) in Europe died from Phocine Distemper Virus (PDV) infection (Heide-Jørgensen *et al.* 1992). A second outbreak occurred in the North Sea in 2002, which killed over 20,000 harbor seals (Jensen *et al.* 2002). Outbreaks of canine distemper virus (CDV) killed 5-10,000 Baikal seals (*Pusa sibirica*) in 1987-1988 (Grachev *et al.* 1989) and 10,000 Caspian seals (*P. caspica*) in 2000 (Kennedy *et al.* 2000).

West Nile virus (WNV) is a mosquito-borne pathogen that causes disease in a wide variety of wildlife, domesticated species and humans. WNV is currently not present in Hawaii, and the State has rigorous surveillance and response plans for this virus due to its public health importance. Although WNV has not been known to affect wild marine mammals to date, the death of a captive monk seal in Texas from WNV infection indicates monk seals are susceptible. It has also killed captive harbor seals in the mainland U.S. Thus, the possibility of extensive mortality in monk seals exists if the virus were to be introduced to Hawaii.

Fortunately, vaccines are in existence for both WNV and morbillivirus. There are two main concerns when giving an existing vaccine to a new species. The first is that the vaccine is safe (does not cause disease or any dangerous reaction) and the second is that it is effective (actually protects the animal from disease as intended). Both the vaccines for WNV and CDV have been proven safe and effective in other species and have been tested on some captive monk seals with no ill effects (see Appendix D).

The proposed vaccination activities (detailed in Appendix D) for Hawaiian monk seals involve two primary elements as follows:

1) Continue research to test these vaccines on captive seals, confirm the vaccines' safety, and determine whether the expected immune response occurs by following up with blood tests; and

2) Be prepared with response plans should a "trigger" occur (for example, a case of morbillivirus in a wild monk seal). Even in the case of such a response, vaccinations would be initially limited to the population perceived to be at immediate risk, and would be expanded only after confirmation of safety and efficacy.

Prophylactic (preventative) vaccination may be considered in the future, but again, only after careful and conservative incremental testing proves that such an approach would be safe and effective.

5.4 PLAN FOR DEVELOPMENT OF A BEHAVIOR MODIFICATION PROGRAM

As described in Section 2.6, a variety of aversive and disruptive stimuli may be considered for behavioral modification.

Behavioral modification that does not involve the use of aversive stimuli and which does not necessitate a research permit includes humans altering their behavior in the presence of a curious seal by avoiding eye contact and ignoring the seal; refraining from making noise near, touching, swimming with, and feeding seals; and moving away and leaving an area when seals actively approach humans. Following these guidelines would be an essential component to preventing the development of abnormal socialization of seals with humans. These guidelines are available on the NMFS web site

http://www.fpir.noaa.gov/PRD/prd_good_neighbors.html and are an important component of ongoing outreach efforts.

The Hawaiian monk seal behavior modification program would be a joint effort between NMFS and their partners. This partnership would also have a public nexus as it would require participation by the community in reporting and describing seal behaviors/interactions throughout the process. NMFS would establish a Behavior Modification Advisory Committee that would consist of a group of researchers and managers (internal and external) to help with the development and implementation of the program. This committee would also serve to determine if an animal of concern is a candidate for behavioral modification, continue to advise as each case progresses, and provide recommendation for modifying or escalating techniques.

The program would also consist of implementation teams. These are the groups that would be on-site monitoring and documenting behaviors/interactions and applying any behavioral modification methods. Implementation teams would receive training to maintain consistent data records, safety protocols, and application of behavior modification techniques. It is important that these techniques be administered properly according to a standardized research plan designed to address the specific behaviors displayed by each seal, and that the efficacy of methods applied be accurately recorded. Therefore, only people that have proper authorization and training would be allowed to apply behavioral modification techniques, including aversive conditioning techniques. A core mission of these teams would also be conducting outreach to explain the actions being undertaken and educating the public on proper behaviors to prevent the socialization of seals with humans.

Behavioral modification techniques would be applied only in situations where wild seals are beginning to regularly demonstrate behaviors that put themselves or humans at risk. Some examples include (but are not limited to):

1) Regularly interacting with snorkelers, divers or other ocean users. These interactions are directed behavior towards humans, which could include rubbing, scratching, biting, soliciting feeding, and more. Early on when these behaviors are novel or low in terms of aggression, low-level aversive stimuli or alternatively, positive stimuli or removing the positive stimuli to redirect behaviors, may be applied. If these behaviors are more ingrained the level of aversive stimuli applied may be escalated as appropriate.

2) Regularly interacting with fishermen or fishing gear. Seals that repeatedly target nets or fishing lines are at risk of drowning, hooking, entanglement and other injuries. Some deterrents may be effective at discouraging seals from supplementing their diet by depredating fishing gear.

There are a number of aversive or possibly positive stimuli that could be used for monk seals. It is difficult to predict the efficacy of any technique until it is applied. Any method would be carefully tested in an experimentally rigorous fashion to determine it is safe and effective prior to being adopted as an approved tool for monk seal behavior modification. Hawaiian monk seals or other pinnipeds in captivity may be used to test each method prior to initiating research trials on wild monk seals.

The successful development of this program would depend in large part on public input and cooperation. Of particular importance would be immediate notification of any seal exhibiting the early stages of habituated behavior. This would require ongoing dialogue with ocean users and interest groups likely to encounter seals in their recreation or commercial activities. By identifying which tools are most appropriate for each situation, and having an implementation team trained in the proper application of each technique, NMFS hopes to reduce the likelihood that monk seal recovery in the MHI would be accompanied by undue hardship or inconvenience for the public.

5.5 MITIGATING POTENTIAL IMPACTS TO CULTURAL RESOURCES, CULTURAL PRACTICES, AND HISTORICAL PROPERTIES

NMFS intends to implement activities (or mitigation measures) described below that are specifically designed to mitigate potential adverse impacts to cultural resources and practices, and historic properties, including traditional cultural properties. This section provides an overview of these mitigation measures and further description is provided in Appendices L and M. Additional activities that engage the local community, such as those described in Section 5.6, are also expected to support this type of mitigation through improved community participation and communications with NMFS.

5.5.1 Coordination with the State of Hawaii, State Historic Preservation Division

As mentioned in Section 3.4.7, the Hawaiʻi State Historic Preservation Division (SHPD) is currently updating its Geographic Information System (GIS) database of historic properties located within the MHI. This database will show the exact location of all historic properties (including traditional cultural properties) for which accurate location coordinates are available. Once the database is fully operational, it will be possible to quickly identify any documented sites located within the vicinity of the proposed research and enhancement activities. The SHPD GIS database can serve as a useful tool in assessing locations where the activities will be implemented to avoid impacting known historic properties. Teams planning recovery activities should be able to ascertain the types and locations of the identified historic properties located within the areas in which the activities will be implemented. This information, supplemented by knowledge from local individuals, can help in determining where and how to conduct activities to minimize direct impact on historic properties. In addition, SHPD staff is located in each county and possess a wide knowledge base of documented historic properties on their respective islands. The SHPD staff may be able to suggest areas that would be suitable and unsuitable for the translocation of seals. They can also provide assistance in planning monitoring or medical related activities. Whenever possible, NMFS staff will consult with SHPD during the planning of monk seal activities so as to obtain their input and guidance.

5.5.2 *Training in the Recognition, Avoidance, Reporting of Cultural Resources and Historic Properties*

While many of the archaeological and cultural sites located within the project area for proposed Hawaiian monk seal recovery actions have been previously identified, others remain either undiscovered or unrecorded. When appropriate and feasible, specific NMFS staff and volunteers conducting monk seal recovery actions will be designated to be responsible for recognizing, avoiding, and reporting cultural resources and historic properties in the field and these personnel will receive sufficient training to carry out this responsibility. The training will be developed by NMFS in close collaboration with the Hawaii SHPD and other qualified organizations and individuals. This training will include an overview of the types of cultural resources, archaeological sites, and historic properties (including traditional cultural properties) that are likely to be encountered, as well as instructions on their recognition and avoidance. Proper and respectful protocol to be practiced while working around cultural and historic sites would also be discussed. In addition, the training will cover the procedures for reporting the inadvertent discovery of unrecorded resources, archeological sites and/or historic properties, most particularly human remains, should they be encountered.

This course of training will also include the recognition of shoreline cultural resources, such as strand dwelling plants utilized in traditional medicine or edible seaweeds that were traditionally gathered along the shoreline. Such resources could be impacted by pedestrian or boat traffic associated with monk seal recovery related activities. Knowledge of such resources is expected to allow recovery teams to recognize and avoid impacting them.

5.5.3 *Procedures regarding Monk Seals in Fishponds*

NMFS will develop a protocol for dealing with the removal of Hawaiian monk seals if they enter traditional fishponds. This protocol would involve consultation with the landowner and/or kahu (caretaker) of the pond, SHPD, local Native Hawaiian Organizations (if appropriate), and other appropriate entities to plan and coordinate the safe removal of the monk seal in a manner that would have the least impact on the structural integrity of the fishpond.

5.5.4 *Northwestern Hawaiian Islands*

Permits are required for access to conduct Hawaiian monk seal research and enhancement activities within the limits of the Papahānaumokuākea Marine

National Monument. Any activities associated with monk seal recovery actions undertaken within the NWHI must therefore comply with Monument regulations and the terms and conditions of Presidential Proclamation 8031.

Monument regulations state that "permittees [must] attend a cultural briefing on the significance of Monument resources to Native Hawaiians" and that there are "prohibitions against the disturbance of any cultural or historic property" (NOAA 2008b). Thus, the "Monument permit program allows for a comprehensive review of proposed activities and will be administered to ensure compliance with Presidential Proclamation 8031, as well as other applicable Federal statutes (such as the NHPA) and state laws and regulations" (NOAA 2008b).

Under the terms of the Monument permit, researchers and volunteers involved in Hawaiian monk seal recovery actions coordinate their activities with the Monument archaeologist and historic preservation specialists to ensure that they do not adversely impact any of the Monument's historic properties. All researchers landing on Nihoa or Mokumanana (Necker) are instructed to limit their activities to coastal areas. The only exceptions are camping in designated camping areas and traveling between coastal areas.

The campsites in the NWHI to be used by researchers have already been in seasonal use since the 1980s, with rigorous protocols in place to protect the natural and cultural resources surrounding them (see Appendix G, Monument Permit PMNM-2011-017). These protocols will be followed by all researchers involved in Hawaiian monk seal recovery actions to ensure that use of the NWHI camps will not impact cultural and historic resources.

5.6 COORDINATION WITH STAKEHOLDERS AND COMMUNITIES

NMFS intends to further develop and maintain close coordination with key stakeholders, community members, and partners to facilitate implementation of the proposed recovery actions. Ocean-oriented stakeholders and community members, such as fishers, surfers, Native Hawaiian practitioners, coastal property managers, etc., are among those most likely to encounter monk seals or most likely to have unique knowledge or experience that would be useful for successful implementation of the proposed activities in the MHI. Government agency and non-government organizations have been, and will continue to be, essential partners in successful recovery action implementation. This section summarizes community-based programs NMFS has and/or will support to the maximum extent possible and discusses how these or similar programs could facilitate implementation of the proposed recovery actions.

5.6.1 Marine Mammal Response Network

NMFS manages the Marine Mammal Response Network in Hawaii in partnership with several government and non-government partners, and with oversight and authorization from the NMFS National Marine Mammal Health and Stranding Response Program. The network is comprised of island-based response coordinators who oversee the activities of numerous volunteers and partner agency staff. The network:

- Responds to monk seals (and other marine mammals) that are reported to be sick, injured, entangled, or hooked in the MHI.
- Responds to "routine" monk seal haul outs to monitor seals, and when seals are in areas of high human use, cordons off a "seal protection zone" around the seal to protect the seal from disturbance and alert the public that a seal is resting on the beach.
- Conducts outreach and education activities, such as giving presentations at schools and staffing information booths at community events.

The network has grown significantly over recent years, and now has hundreds of trained volunteers and NMFS-funded coordinators on almost every inhabited island in the MHI. The sighting data that accrue from this network of observers contribute directly to monk seal population assessment tasks in the MHI. For example, resights of known seals are used to calculate age-specific survival rates, reproductive rates, and movements. Sightings of previously unknown seals, along with any identifying marks that may distinguish them, are particularly useful because they help determine the number of seals present in the MHI.

The sighting data are also used to characterize seal distribution and haulout habitat and for a variety of other purposes. The sighting network is well suited for seal monitoring in the MHI, where seals are distributed over a vastly larger area and where it would take a very large staff to canvas and detect all of the seals now reported through the sighting network.

The Marine Mammal Response Network also includes a network of Hawaiian practitioners who advise NMFS on appropriate integration of Hawaiian cultural protocols with response activities.

Members of the network are active in community engagement, education and outreach related to Hawaiian monk seal recovery, and will support and/or participate in many of the community-based efforts that result from the MHI Monk Seal Management Plan, outreach plan and partnership programs described below.

5.6.2 Hawaiian Monk Seal Recovery Team

Pursuant to the ESA, NMFS may engage a recovery team as part of its endangered species recovery efforts. As indicated in ESA Sec 4(f)(2), "(t)he Secretary (of Commerce), in developing and implementing recovery plans, may procure the services of appropriate public and private agencies and institutions and other qualified persons. Recovery teams appointed pursuant to this subsection shall not be subject to the Federal Advisory Committee Act."

NMFS convened a Hawaiian Monk Seal Recovery Team (HMSRT) to support development of the revised Hawaiian Monk Seal Recovery Plan (2007). As of late 2013, PIRO was in the process of convening a new HMSRT to support implementation of the revised recovery plan, including implementation of research and enhancement actions proposed in this PEIS. The expected role of the new HMSRT will be to advise NMFS on a variety of matters concerning the conservation and recovery of the endangered Hawaiian monk seal. The new HMSRT is expected to focus, in particular, on matters related to implementing the revised Hawaiian Monk Seal Recovery Plan (2007) and any related policy documents or plans that arise from Hawaiian monk seal recovery plan implementation, such as the MHI Management Plan discussed in Section 5.6.3.

Members of the new HMSRT are expected to be selected to provide NMFS with advice from a wide range of relevant expertise, including expertise in Hawaiian culture practices, ocean-related tourism, subsistence and recreational fishing, etc. HMSRT advice may be related to evaluating research and enhancement actions, assessing the efficacy of achieving recovery criteria, and recommending new or emergency actions that enhance the recovery of the species.

NMFS expects that research and enhancement actions proposed in this PEIS will be considered by the HMSRT. NMFS recognizes that achieving successful Hawaiian monk seal conservation and implementation of the Hawaiian Monk Seal Recovery Plan, including the research and enhancement actions proposed in this PEIS, can be facilitated by considering a wide range of perspectives and knowledge held by a diverse group of people from Hawaii and elsewhere.

New HMSRT members will be selected to provide NMFS with knowledge, expertise, and experience that are otherwise not available within NMFS. HMSRT advice will represent the views of the team members and may not necessarily reflect the views and polices of NMFS or any other agency or organization.

5.6.3 *Main Hawaiian Islands Management Plan*

The Hawaiian Monk Seal Recovery Plan (NMFS 2007) directs NMFS to create a MHI Hawaiian Monk Seal Management Plan that addresses the full scope of monk seal management needs in the MHI. Considering this broad mandate, NMFS envisions a MHI Hawaiian Monk Seal Management Plan that will include roles for NMFS and partner government agencies, as well as non-government organizations (NGOs), communities, and individual stakeholders. Completing preparation of such a plan in a way that effectively engages our government and non-government partners and stakeholders is a high priority for NMFS.

The MHI Hawaiian Monk Seal Management Plan will be a strategic plan that presents management strategies and associated activities. These strategies are expected, in part, to facilitate successful implementation of the proposed research and enhancement actions, as well as to help mitigate potential adverse impacts associated with their implementation. The MHI management plan will play an important role in engaging communities, both in its preparation and implementation.

In preparing the MHI Hawaiian Monk Seal Management Plan, NMFS will continue to work collaboratively with partners, stakeholders, and communities to better define and elucidate threats to monk seals in the MHI and contributing factors. A specific planning methodology will be used to clarify the meanings of direct threats, indirect threats, and other terms used in discussing monk seal management in the MHI. In addition, the planning process will develop strategies and activities intended to reduce or eliminate the direct and indirect threats. Participatory development of the plan will allow for various groups and individuals to articulate their priorities for monk seal management, and shape a framework for how they would like to be engaged in the future.

NMFS and others have been developing management strategies and policies to address threats to monk seals in the MHI for more than 10 years. NMFS anticipates that all or most of the monk seal management activities currently underway or planned for near-term implementation, including many of the research and enhancement actions proposed in the PEIS, will be considered during development of the MHI Hawaiian Monk Seal Management Plan. The planning process will allow for the current efforts to be more systematically evaluated and integrated with additional management efforts (or "strategies" and "activities") that will be identified during the planning process.

In October 2002, The Workshop on the Management of Hawaiian Monk Seals on Beaches in the MHI was co-sponsored by the Marine Mammal Commission, NMFS, and the State of Hawaii, DLNR, Division of Aquatic Resources. Over a three-day period, stakeholders, including representatives from federal, state and city and county agencies, NGOs, and interested individuals discussed many issues of concern and importance. Comprehensive comments and suggestions were compiled in a final report. This report served as the first community-based scoping of management issues relevant to the creation of a comprehensive management approach for seals in the MHI.

In March 2006, NMFS PIRO sponsored a two-day MHI Hawaiian Monk Seal Management Workshop. Representatives from PIFSC, DLNR, HIHWNMS, and other agencies were in attendance. Areas of discussion included adaptive management approaches to high profile issues such as emerging disease concerns, pups born on popular beaches, techniques and issues dealing with conditioned or habituated seals, pups born near freshwater streams (with associated disease risk), captive care and rehabilitation of sick or injured seals, and volunteer network development and outreach. This was an important step in the continuing development of a MHI Hawaiian Monk Seal Management Plan.

Building on the results of the two workshops and other efforts, NMFS developed a Draft MHI Hawaiian Monk Seal Management Plan in 2010 and presented the draft plan to the Hawaiian Monk Seal Recovery Team in February 2011. The Recovery Team had significant concerns with the format of the draft management plan.

In response to these concerns, NMFS adopted a new planning approach, based on the Open Standards for the Practice of Conservation, which is described further below. Part of this new planning approach includes developing a comprehensive and effective management plan for monk seal in the MHI by engaging partners, stakeholders, and others with important knowledge and experience.

Meetings were held with an inter-agency working group in July 2012, as well as a workshop co-hosted by the Monk Seal Foundation to facilitate input from various partners, stakeholders, and community members with specific expertise, including recreational fishing, Hawaiian cultural practices, ocean-related tourism, etc. More meetings and engagement with fishermen, enforcement, Ocean Safety, and other groups and individuals will continue as the plan development continues.

5.6.4 Outreach Plan

Hawaiian monk seals face many threats across their range, from direct threats (direct causes of mortality) to indirect threats and contributing factors. There are also opportunities, such as public interest in conservation, which can contribute positively to recovery. Public knowledge and attitudes are at the root of nearly all the threats facing monk seals in the MHI.

While many people in Hawaii value the endangered and indigenous animals with which we share our ocean and beaches, there is also a lack of knowledge, sometimes leading to potentially unsafe interactions between seals and humans, and even animosity toward Hawaiian monk seals from some people and ocean user groups, often due to differing attitudes about seals. This underscores the need for improving and increasing outreach and effective flow of accurate information to the public.

For several years, NMFS has created an internal Hawaiian Monk Seal Recovery Program Outreach Plan. In the plan (usually updated annually), the Recovery Program identifies goals, objectives, and outreach strategies and messages for NMFS outreach efforts. However, because of the significant role that outreach can play in management, the internal outreach plan is being modified and adapted to fit within the MHI Hawaiian Monk Seal Management Plan discussed in Section 5.6.3.

The primary goal of the Outreach Plan is to use outreach and education to inform citizens and thus enable them to think critically, and make decisions about

Hawaiian monk seals based on sound science and cultural information, to facilitate monk seal population recovery. By effectively using outreach and education in both overarching and targeted strategies, we can widely broadcast the messages of the recovery program, while addressing community concerns and building public support (social and political) to reduce specific threats and achieve our recovery goals.

As part of the development of the outreach strategies related to the MHI Management Plan, significant input will be obtained from partners, stakeholders, and other individuals with expertise in conservation outreach and education. In the "Outreach Plan" section of the MHI Management Plan, NMFS will identify current overarching issues that are necessary to broadly influence threats to monk seals, and then use the Management Plan to determine where targeted outreach strategies can reduce or eliminate a specific threat.

5.6.5 Partnership Grants

Subject to available funding, NMFS PIRO has and will solicit competitive applications for partnerships supporting specific programmatic activities related to Hawaiian monk seal recovery, in particular activities related to recovery in the MHI. NMFS anticipates that priority will continue to be given to community-based and community- integrated projects or projects with an educational or outreach component geared to elevate public awareness and build capacity from the community level for Hawaiian monk seal recovery. This priority includes projects designed to achieve the following outcomes:

- Improve awareness and understanding among local residents regarding Hawaiian monk seal biology, endangered species status, and recovery issues and opportunities.
- Improve local resident understanding of, and participation in, activities that promote Hawaiian monk seal recovery, including community education and outreach, monk seal haul-out responses, seal behavior modification, seal relocation within the MHI, and mitigation of fishery interactions and other human-seal interactions.
- Facilitate productive communications between the NMFS Hawaiian monk seal recovery program and local residents, especially Native Hawaiian communities and fishermen.
- Host meetings with Hawaiian monk seal recovery program staff, volunteers, partners, fishermen, and other ocean users to help build and maintain productive working relationships and facilitate effective implementation of the Hawaiian Monk Seal Recovery Plan (2007), including development of the Main Hawaiian Islands Hawaiian Monk Seal Management Plan.

- Identify and describe constraints to, and opportunities for, enhanced collaboration between the NMFS Hawaiian monk seal recovery program and the local residents.
- Conduct all of the above in close collaboration with the NMFS Hawaiian monk seal recovery program and consistent with the NMFS Hawaiian Monk Seal Recovery Plan (2007).

Under this grant program, NMFS anticipates funding projects as grants or cooperative agreements. NMFS will be substantially involved in the management or operation of the program if a project is funded through a cooperative agreement. This substantial involvement may include, but is not limited to, partnering in collaborative efforts or re-direction of activities to meet regional interests. Substantial involvement may also include NMFS staff assisting in development of outreach materials and activities, development of meeting agendas and participant lists, conduct and facilitation of meetings, and recruitment, training and management of volunteers.

Funding for this program is contingent upon Congressional appropriations. Applicants are selected by NMFS on a competitive basis. More information about this program will be available via announcements of federal funding opportunities posted at: http://www.grants.gov.

Another opportunity for partnership grant funding is through the NMFS Protected Species Cooperative Conservation program. Through this program, NMFS has awarded a grant (under Section 6 of the Endangered Species Act) to DLNR to support Hawaiian monk seal (and sea turtle) conservation activities, including outreach and response coordination activities with local fishers. Continued implementation of Hawaii's Section 6 grant program could help enhance understanding and support of Hawaiian monk seal recovery actions within the fishing community and help NMFS further mitigate potential associated adverse impacts on fishing activities.

5.6.6 Incorporating Community Feedback into Research and Enhancement Activities

To support activities proposed in Alternative 3 (Preferred), coordination with community members should continue to draw on extensive two-way communication and information sharing between NMFS and the key stakeholders and community members as discussed above. This would be facilitated by continuing and expanding programs, such as those discussed above, that entail participatory planning and implementation, education and outreach, and other interactive and participatory activities.

If adequately engaged and motivated, local community members can support monitoring and reporting of location-specific and historical information that could be especially valuable before, during and after translocation within the MHI, behavior modification, and vaccination activities. This support could include monitoring and reporting of monk seals and assessment of various local environmental factors. For instance, with NMFS support and coordination, community members could monitor and report on the behavior of seals before and after behavior modification techniques are applied. In another example, community members could use their local environmental knowledge to help NMFS assess and select appropriate sites for the release of seals translocated within the MHI. The various types of community-based support can be summarized as follows:

Monk Seal Monitoring and Reporting:

- Detecting and reporting seal presence or absence;
- Documenting and confirming individual seal identification;
- Observing and reporting seal behaviors;
- Observing and reporting seal health and body condition; and
- Observing and reporting human-seal interactions, and fishery interactions.

Environmental and Habitat Assessment:

- Observing and reporting human uses – types and levels of shoreline use, fishing, etc.; and
- Observing and reporting monk seal uses – frequency of foraging, pupping, resting, molting, etc.

Community-based programs and activities, such as those described above, can be used to build capacity within local communities to conduct monitoring on temporal and spatial scales that would otherwise be extremely difficult to achieve. In addition to supporting wide spread coverage and timely monitoring and reporting, these programs could also help NMFS and its partners be more aware of, and responsive to, emerging opportunities and constraints to monk seal recovery throughout the MHI.

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6.0 LIST OF PREPARERS

6.1 NOAA NATIONAL MARINE FISHERIES SERVICE

PACIFIC ISLANDS REGIONAL OFFICE

Jeff Walters, PhD	Marine Mammal Branch Chief and Hawaiian Monk Seal Recovery Coordinator
Marilyn Luipold	Regional NEPA Coordinator
Rachel Sprague, PhD	Assistant Hawaiian Monk Seal Recovery Coordinator
David Schofield	Regional Marine Mammal Response Network Coordinator

PACIFIC ISLANDS FISHERIES SCIENCE CENTER

Jason Baker, PhD	Research Marine Biologist, Hawaiian Monk Seal Research Program
Charles Littnan, PhD	Supervisory Research Ecologist, Hawaiian Monk Seal Research Program
Matthew Vandersande, D.Env.	National Environmental Policy Act (NEPA) and Permits Coordinator, Director's Office

NATIONAL MARINE FISHERIES SERVICE HEADQUARTERS

Amy Sloan	Fisheries Biologist, Permits and Conservation Division, NMFS Office of Protected Resources
P. Michael Payne	Chief, Permits and Conservation Division, NMFS Office of Protected Resources
Christopher Holmes	NEPA Policy Analyst, NMFS Office of the Assistant Administrator

NATIONAL MARINE FISHERIES SERVICE CONTRACTORS

Albert Harting, PhD	Harting Biological Consulting

6.2 CONSULTANT TEAM LIST

Project Leader

Anne Southam	ERM – Project Manager, Consultant Team

Task Leaders

April Brehm	ERM – Public Involvement Lead
Sue Ban	Cardno ENTRIX – Marine Science Lead

Contributors

Rabia Ahmed	Cardno ENTRIX – Socioeconomics

Terry Antrobus	Cardno ENTRIX – Marine Science – Avian Ecologist
Krieg Brown	Cardno ENTRIX – Socioeconomics
Joe Casey	ERM – GIS
Jack Colonell. PE, PhD	ERM – Partner In Charge
Laura Desmond	ERM – Project Support
Lee Elder	Cardno ENTRIX – Socioeconomics
Benn Levine	ERM – Database Management
Amy Mai	Cardno ENTRIX – Marine Science
Terry O'Halloran	Change Strategies & Innovation Ocean Resource Management – Local Content
Jacquie Payette	ERM – Cultural and Historic Resources
Amanda Thronson	ERM – Marine Science
Barbara Wyse	Cardno ENTRIX - Socioeconomics

7.0 LIST OF FEDERAL AND STATE AGENCIES, ELECTED AND APPOINTED OFFICIALS, NATIVE ORGANIZATIONS AND OTHER NATIVE GROUPS, ADVOCACY GROUPS, AND OTHER POTENTIALLY INTERESTED PARTIES

AGENCIES

Malia Chow
NOAA Office of National Marine Sanctuaries HIHWNMS

Aaron Hebshi
Navy Region HI

Darcy Hu
NPS

Earl Miyamoto
Division of Aquatic Resources

Eric Roberts
US Coast Guard

Paul Dalzell
Western Pacific Fishery Management Council

Doug Staller
FWS

Christopher Holmes
NOAA-NMFS-OPR

Myron Honda
DOH-CWB

Hoku Johnson
NOAA Pupahanaumokuakea

Amy Klein
US Army Corps of Engineers

Lydia Munger-Little
NOAA PIRO

Watson Okubo
Department of Health

Amy Sloan
NOAA – NMFS – OPR

Matthew Vandersande
NOAA PIFSC

Lisa White
Division of Acquatic Resources

Paul Wong
NOAA HIHWNMS

ELECTED/APPOINTED OFFICIALS

Representative Tokioka

Bernard Carvalho, Jr.
County of Kaua'i Mayor

Alan Arakawa
County of Maui Mayor

William J. Aila, Jr.
Department of Land and Natural Resources

Gary Hooser
Office of Environmental Quality Control

NGO & ADVOCACY GROUPS

Keiko Bonk
Save Our Seal

Philip Fernandez

Cody Graham

Sean Harris
KAHEA

Marti Townsend
KAHEA

OTHER POTENTIALLY INTERESTED PARTIES

Aaron Agena

Kelii Alapai

Bud Antonelis

Kieran Lei ali'i A'okoa Rosas

Karen Ashley

Adam Asquith

Makana Bacon

Michele Bane

Bill & Brenda Barnard

Larry Basch

Brenda Becker

Austin Bello

Carl Berg

Hannah Bernard

Barbara & Robert Billand

John & Gina Biondi

Irene Bowie

Megan Brooker

Donna Brown

Nancy & Randal Bruckner

Chris Brun

Adrian Bulsum

Ben Butler

Suzanne Carlon

Billy Chang

Bradley Chiba

Bryson Chieto Koa Sakai-Soto

Kara Chow

Mani Christopher

Shanna & Forrest Cloud

Stuart Coleman

Ellen Coulombe

Amy Cremer

Ka'imipono Crivello

Henry Curtis

Kawika Cutchur

Steve Downey

Heather Driscoll

Camilla Dulac

Rondee Eckberg

Kekai Edens

Judy Edwards

Kelly Jean Evans

Ruth Evans

John & Liz Field

Michael Flaherty

Crystal & Kip Fryinaga

Leilani Furugon

Diane Gabriel

Inga Gibson

James Gomes

Krista Graham

Sue Green

Sean Guerin

James Haae

Wesley Haragioai

Randall Haraguchi

Cory Harden

George Harker

Robert Harris

Annie Hashimoto

Jundale Hashindo

Luana Heff

John Henderson

Sharron Henry

Paul Heraguchi

Colleen Heyer

Abraham Hiddy

Rich Hildebrand

Greg Holzman

Kalei Lehua O Panaewa Kahele

Richard Hurumoto

Wanda Ibia

Eric Ichimasa

Asuka Ishizaki

Rodney Izuo	Bruce Javellana	Carl Jelling
Hinaikamalama Joaquin	Thea Johanos	Ray Johnson
Millie Johnston	Dana Jones	Nathan Kaai
Shyneese	Makaala Kaaumoana	Greg Kahn
Hope Kallai	Kamoho'alii Kama	Kuhaapono Akio Kanakaole
Daniel Kanehola	Kimokeo Kapahulehua	Ke'eaumoku Kapu
Angie Kaufman	Kiana Kauwe	Joan Kealaliv
Kekahuna Keaweiwi	Keith Kenyon	Cheryl King
Faith Kinimaka	John Klein	Joyce Klein
Warmen Koga	Wulani Kohler	Kipukai Kualii
Frances Kweramurn	Ke Ana La'ahana	Gordon Labedz
Pita Lata	Leimoni & Marvin Lau	Michael Kumukauoha Lee
Princess Lehuanani	Quintin Leong	Bill Lewis
Jerrie Louis	Cheryl Lovell-Obatade	Marvin Lum
Gregory Macias	Lesley Macpherson	Thomas Makanani
George Matsuda	Mark Matsunaga	George Matsupa
Jane McClaran	Laura McCue	Joe McDonald
Mytrea McKeague	Ryan McKeague	Susan McMaki
Frank Medeirios	John Mestor	Scott Mijares
Kevin Millett	Joel Miyahiro	Mary Frances Miyaoshiro
Lloyd Miyashiro	Lloyd Miyashiro	Mary Miyashiro
Jen Miyosho	Isaac Moon	Shyla Moon
Yasu Morikawa	Roy Morioka	Roy Morioko
Bill Mossman	Mary Musacchio	Layne Nakagawa
Walter Naki	David Nichols	Marjorie Niegler
Amy Nordin	Jerry Norris	Akira Obatake
Dean Ogoshi	David Okamoto	Mimi Olry
Patrick Opay	Basil Oshiro	Keith Oshita
Tina Owens	Mark Oyama	Ke Kane Pa
Aimoku & Lehua Pali	Frank Parrish, PhD	Linda Paul
Jeffrey Pawloski	Randall Perez	Sharon Pomroy
Keoki Puaoi	Tineal Puaoi	Barbara Public
Darrell Rapozo	Walter Ritte Jr.	Justin Rivera
Wayne Riverea	Darron Roberts	Kim Rogers

Kimo Rosa	Lauren Roser	Rebecca Rogers
Dale Sarver	Victor Sasaki	Season Sakuiantay
Sharon Schiller	Robert Schmidt	Jace Schaefer
Callie Schwab	Sophia Senter	Jennifer Schultz, PhD
Tad Sheldon	Ray Shirakawa	Craig Severgace
Kitty Simonds	Colleen Sindzinski	Dennis Silva
Alice Smith	Caitlin Snyder	Rene Siracusa
Gregory Spencer	Kathryn Stanaway	William Snyder
Cheryl Sterling	Goldie Stewart	Stacey Stella
Mark Sullivan	Joel Sumida	Roxanne Stewart
Reid & Debbie Takayawa	Randall Takenala	Mahelani Sylva
Calvin Tani	Phillip & Elizabeth Tanner	Lane Tamuru
Teresa Tico	Heather Tipon	Ken Taylor
David Tsunehiru	Jason Turner, PhD	Erik Tong
Poola Villarimo	Duane Wakutle	Malie Unabia Verka
Nappes Watoya	Heide Joy Weber	Patrick Wardell
Barry & Mary Werthwine	Don White	Drake Wells
Robert Winter	Anita Wintner	Sue White
James Yamamoto	Naomi Yamamoto	Tracy Wurth
Lance Ymatsumoto	George Young	Clay Yamauces

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Appendix A
Agency Correspondence

Initial Agency Letters to U.S. FWS and State of Hawaiʻi DLNR Inviting Them to Cooperate

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

SEP 14 2010

Loyal Mehrhoff, Ph.D.
Field Supervisor
Pacific Islands Ecological Field Service Office
Fish and Wildlife Service
300 Ala Moana Blvd., Room 3-122
Honolulu, HI 96850-0056

Dear Dr. Mehroff:

The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) is planning to prepare a Programmatic Environmental Impact Statement (PEIS) regarding implementation of various research and enhancement activities designed to improve survival of Hawaiian monk seals (HMS) in the Northwestern Hawaiian Islands (NWHI). As you are aware, the NMFS Pacific Islands Regional Office (PIRO) and NMFS Pacific Islands Fisheries Science Center (PIFSC) are responsible for HMS recovery and research under the Endangered Species Act (ESA) (16 United States Code [U.S.C.] 1531 et seq.) and the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 et seq.).

The PEIS, in compliance with the National Environmental Policy Act (NEPA) (40 CFR Parts 1500-1508), will evaluate potential environmental, social, and economic impacts of implementing a range of research and enhancement activities stipulated in the HMS Recovery Plan (2007) to address low juvenile seal survival in the NWHI. As you know, low survival to reproductive age in the NWHI has been identified as a main factor driving the current steep HMS population decline.

Given the jurisdiction of USFWS within the proposed project area (the NWHI) and your agency's technical expertise regarding much of the subject matter to be covered in the PEIS, we are inviting your agency to participate as a cooperating agency on the proposed action pursuant to the Council on Environmental Quality's Regulations for Implementing NEPA (40 CFR 1501.6).

Should USFWS decide to work with NMFS as a cooprating agency, we suggest that we meet to discuss developing an MOU to deliniate our respective roles and responsibilities. Should you decide not to serve as a cooperating agency, please know that we will include USFWS in all of the public information gathering processes undetaken during the PEIS preparation. Regardless of your decision regarding this invitation, we look forward to continuing our coordination with USFWS on HMS recovery and research activities in the NWHI as co-trustees of the Papahanaumokuakea Marine National Monument.

We would appreciate being notified of your decision regarding this invitation on or before October 8, 2010. If you have any questions or would like to meet to discuss this request, please contact Jeff Walters, our Hawaiian monk seal recovery coordinator, at (808) 944-2235, or via email at jeff.walters@noaa.gov.

Sincerely,

Michael D. Tosatto
Acting Regional Administrator

cc: Barry Stieglitz, USFWS, Hawaiian and Pacific Islands NWR Complex

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

SEP 14 2010

Barry Stieglitz
Project leader
Hawaiian and Pacific Islands National Wildlife Refuge Complex
Fish and Wildlife Service
300 Ala Moana Blvd., Room 5-231
Honolulu, HI 96850-0056

Dear Mr. Stieglitz:

The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) is planning to prepare a Programmatic Environmental Impact Statement (PEIS) regarding implementation of various research and enhancement activities designed to improve survival of Hawaiian monk seals (HMS) in the Northwestern Hawaiian Islands (NWHI). As you are aware, the NMFS Pacific Islands Regional Office (PIRO) and NMFS Pacific Islands Fisheries Science Center (PIFSC) are responsible for HMS recovery and research under the Endangered Species Act (ESA) (16 United States Code [U.S.C.] 1531 et seq.) and the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 et seq.).

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Sincerely,

Michael D. Tosatto
Acting Regional Administrator

cc: Loyal Mehrfoff, USFWS, Pacific Islands Ecological Services

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

SEP 14 2010

Ms. Laura H. Thielen
Chairperson
Department of Land and Natural Resources
1151 Punchbowl St.
Honolulu, HI 96813

Dear Ms. Thielen:

The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) is planning to prepare a Programmatic Environmental Impact Statement (PEIS) regarding implementation of various research and enhancement activities designed to improve survival of Hawaiian monk seals (HMS) in the Northwestern Hawaiian Islands (NWHI). As you are aware, the NMFS Pacific Islands Regional Office (PIRO) and NMFS Pacific Islands Fisheries Science Center (PIFSC) are responsible for HMS recovery and research under the Endangered Species Act (ESA) (16 United States Code [U.S.C.] 1531 et seq.) and the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 et seq.).

The PEIS, in compliance with the National Environmental Policy Act (NEPA) (40 CFR Parts 1500-1508), will evaluate potential environmental, social, and economic impacts of implementing a range of research and enhancement activities stipulated in the HMS Recovery Plan (2007) to address low juvenile seal survival in the NWHI. As you know, low survival to reproductive age in the NWHI has been identified as a main factor driving the current steep HMS population decline.

Given the jurisdiction of DLNR within the proposed project area (the NWHI) and your agency's technical expertise regarding much of the subject matter to be covered in the PEIS, we are inviting your agency to participate as a cooperating agency on the proposed action pursuant to the Council on Environmental Quality's Regulations for Implementing NEPA (40 CFR 1501.6).

Should DLNR decide to work with NMFS as a cooprating agency, we suggest that we meet to discuss developing an MOU to deliniate our respective roles and responsibilities. Should you decide not to serve as a cooperating agency, please know that we will include DLNR in all of the public information gathering processes undetaken during the PEIS preparation. Regardless of your decision regarding this invitation, we look forward to continuing our coordination with DLNR on HMS recovery and research activities in the NWHI as co-trustees of the Papahanaumokuakea Marine National Monument.

We would appreciate being notified of your decision regarding this invitation on or before October 8, 2010. If you have any questions or would like to meet to discuss this request, please contact Jeff Walters, our Hawaiian monk seal recovery coordinator, at (808) 944-2235, or via email at jeff.walters@noaa.gov.

Sincerely,

Michael D. Tosatto
Acting Regional Administrator

Response by USFWS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Hawaiian and Pacific Islands National Wildlife Refuge Complex
300 Ala Moana Boulevard, Room 5-231
Box 50167
Honolulu, Hawaii 96850

TAKE PRIDE IN AMERICA

October 5, 2010

NMFS PIRO
Received
OCT - 6 2010

Michael D. Tosatto
Acting Regional Administrator
Pacific Islands Regional Office
National Marine Fisheries Service
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700

Dear Mr. Tosatto:

Thank you for your letter dated September 14, 2010, regarding an invitation to participate as a cooperating agency on the preparation of the Programmatic Environmental Impact Statement (PEIS) to improve the survivability of the Hawaiian monk seal (HMS). The Hawaiian and Pacific Islands National Wildlife Refuge Complex recognizes the importance of this National Environmental Policy Act (NEPA) action to evaluate potential environmental, social, and economic impacts of implementing a range of research and enhancement activities identified in the HMS Recovery Plan (2007) to address low juvenile seal survival in the Northwestern Hawaiian Islands. On behalf of the Fish and Wildlife Service (FWS), we accept your invitation to participate in the preparation of this PEIS as a cooperating agency in accordance with NEPA regulations and procedures.

Based on FWS legally mandated management responsibilities and technical expertise associated with protecting, conserving, and, where appropriate, restoring fish, wildlife and plants and their habitats within the Hawaiian Islands and Midway Atoll National Wildlife Refuges, we look forward to working together with you on this PEIS. We also support your suggestion to develop a Memorandum of Understanding to delineate our respective roles and responsibilities.

I would also like to take this opportunity to introduce you to Mr. Thomas R. Edgerton, who will be arriving in Honolulu on November 8, 2010, to fill the currently vacant FWS Superintendent position for the Papahānaumokuākea Marine National Monument. Tom will be your point of contact for this cooperative effort and will also be replacing Ms. Susan White as the Fish and Wildlife Service member of the Hawaiian Monk Seal Recovery Team.

If you have additional questions or need assistance prior to Tom's arrival, please contact Ray Born, our Acting Superintendent, at 808.742.9488 or via email at Ray_Born@fws.gov.

Sincerely,

Barry W. Stieglitz

Barry W. Stieglitz
Project Leader

Cc: Loyal Mehrhoff, USFWS, Pacific Islands Ecological Services

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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1601 Kapiolani Blvd., Suite 1110
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SEP 14 2010

Barry Stieglitz
Project leader
Hawaiian and Pacific Islands National Wildlife Refuge Complex
Fish and Wildlife Service
300 Ala Moana Blvd., Room 5-231

Dear Mr. Stieglitz:

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Anne Southam

From: Jeff Walters <Jeff.Walters@noaa.gov>
Sent: Wednesday, November 30, 2011 12:08 PM
To: Tom_Edgerton@fws.gov
Cc: Anne Southam
Subject: Re: Cooperating Agency for Hawaiian Monk Seal PEIS

Aloha Tom:

First, let me please extend my sincere apologies for the delay in responding to your email message below.

I have shared your message with my leadership and the PEIS team.

We understand and appreciate the rationale for your decision and agree that we have a good working relationship that will continue to draw on and strengthen as we develop the PEIS.

I will call and/or set up a meeting soon to give you an update on where we are in the PEIS process, share a revised time line, discuss your staff's engagement, etc. As we discussed at the recent MMB meeting, we are currently developing our responses to the comments received on the Draft PEIS.

Thanks again,

Jeff

Jeffrey S. Walters, Ph.D.
Marine Mammal Branch Chief
& Hawaiian Monk Seal Recovery Coordinator Protected Resources Division Pacific Islands Regional Office NOAA National Marine Fisheries Service
1601 Kapiolani Blvd., Suite 1110
Honolulu, HI 96814

Phone: (808) 944-2235
Email: jeff.walters@noaa.gov
Web: http://www.fpir.noaa.gov/PRD/prd_index.html

Tom_Edgerton@fws.gov wrote:
>
> Hi Jeff,
>
> Following our recent discussion, this is to formally document our
> agreement that the U.S. Fish and Wildlife Service (FWS) and NOAA
> National Marine Fisheries Service (NMFS) will no longer pursue
> completion of a formal MOU for the FWS to be a Cooperating Agency for
> development of the Hawaiian Monk Seal Programmatic Environmental
> Impact Statement.
>
> For the record, we had several reasons for this decision. For one, the

> FWS currently has limited staff capacity to provide the level of input
> that normally accompanies such a relationship. The Draft PEIS is
> already in an advanced stage of development and, without the formal
> MOU, the FWS has to date not been involved at the level normally
> expected by such a relationship. However this has not been an issue
> since the FWS does not have, nor does it expect, any major concerns
> regarding either the process or the proposed work addressed in the
> PEIS. The two agencies also have a good relationship, are already
> collaborating, and intend to continue working together whenever and
> wherever needed. In addition, the FWS intends to be a regular part of
> the public input process for review of the PEIS.
>
> In summary, representing our respective agencies, we agree that this
> is the best course of action and are comfortable that development of
> the HMS PEIS will in no way suffer due to the decision.
>
> Tom
>

> Tom Edgerton
>
> FWS Superintendent
> Papahanaumokuakea Marine National Monument National Wildlife Refuge
> System Honolulu, Hawaii
> Office: 808-792-9481
> Cell: 808-271-8637
> Fax: 808-792-9585

>
> "A team is a group of people that go out of their way to make each
> other look good." Unknown

Response by State of Hawai'i DLNR

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

GUY H. KAULUKUKUI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

April 19, 2011

Mr. Michael D. Tosatto
Regional Administrator
Pacific Islands Regional Office
National Marine Fisheries Service
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700

Dear Mr. Tosatto:

Thank you for your letter dated March 8, 2011, inviting the Department of Land & Natural Resources to participate in preparing the Programmatic Environmental Impact Statement (PEIS) for Hawaii monk seal recovery actions. We regret that we must decline your invitation to participate as a state cooperating agency in preparation of the PEIS. Our decision is based on severe staffing and budgetary constraints that our Department is presently facing. Unfortunately, we foresee further reduction in our workforce, considering the state of our State budget.

We will continue to be in close coordination with your staff during the development of the PEIS for Hawaiian monk seal recovery.

Sincerely,

WILLIAM J. AILA, JR.
Chairperson

ESA Section 7 Consultation Correspondence

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

FEB 13 2012

MEMORANDUM FOR: PR5 – Gina Shultz, Chief
Endangered Species Act Interagency Cooperation Division

FROM: PR1 – P. Michael Payne, Chief
Permits and Conservation Division

SUBJECT: Request for initiation of Section 7 Programmatic Consultation under the Endangered Species Act (File Nos. 10137 and 16632; and Programmatic Environmental Impact Statement for Hawaiian monk seal Recovery Actions)

The Permits and Conservation Division (PR1) proposes to issue a permit and a permit amendment to the NMFS Pacific Islands Fisheries Science Center (PIFSC), Hawaiian monk seal Research Program, to take Hawaiian monk seals (*Monachus schauinslandi*) for scientific research and enhancement purposes in the Hawaiian Archipelago and Johnston Atoll. The permits would be issued pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.), and the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.).

The PIFSC has requested an amendment to their existing Permit No. 10137-06 to conduct translocations of monk seals within the Northwestern Hawaiian Islands (NWHI), similar to that previously analyzed by the NMFS Endangered Species Division (PR3)[1] in a Biological Opinion for Permit No. 10137-01. Permit No. 10137-06 expires June 30, 2014. In compliance with the National Environmental Policy Act (NEPA), an environmental assessment (EA) was prepared for issuance of Permit No. 10137. This EA analyzed the effects of translocations within the NWHI. The translocations are proposed to take place in August 2012.

The PIFSC has also requested a new 5-year permit to include activities currently authorized plus expanded research and enhancement activities. This proposed permit (No. 16632) would expire 5 years after the date of issuance and would replace Permit No. 10137-06. The PIFSC is requesting activities under the new permit begin as early as April 2013.

PIRO, PIFSC, and PR1 have prepared a Draft Programmatic Environmental Impact Statement (PEIS) for Hawaiian monk seal Recovery Actions in compliance with NEPA. The purpose of the Draft PEIS is to evaluate the potential direct, indirect, and cumulative impacts on Hawaiian monk seals and other components of the human environment, from NMFS' funding, undertaking, and permitting research and enhancement activities on Hawaiian monk seals. The research and

1 The Endangered Species Division (PR3) was reorganized October 1, 2011; since then, section 7 consultations are conducted by the Endangered Species Act Interagency Cooperation Division (PR5).

enhancement priorities listed in the 2007 Hawaiian Monk Seal Recovery Plan provide a general framework for activities in the preferred alternative (Alternative 4) of the Draft PEIS and in the new permit application (File No. 16632).

PR1 concludes that issuing the permit amendment (No. 10137-07) and permit (No. 16632) to authorize the takes and carry out the activities described in the initiation package may adversely affect NMFS listed species, Hawaiian monk seals, but will not adversely modify designated critical habitat within the action area.

PR5 has determined that a programmatic consultation is appropriate for activities proposed under Alternative 4 in the Draft PEIS. Because the permit and the amendment cover, among other things, translocations within the NWHI, we are requesting PR5 consider both the permit and the amendment in the programmatic consultation. PR5 agreed to this approach on December 15, 2011.

To comply with ESA section 7 regulations (50 CFR 402.14(c)), an initiation package is provided. Please review the materials listed below and **respond no later than March 14, 2012** to inform me of whether the initiation package is complete or if additional information is needed.

Consultation history: Consultation on the proposed action first began when PIFSC, PR1, PR3, and NEPA staff attended a meeting in Sausalito, CA during May 8-12, 2009, to discuss the enhancement permit for expanded translocations, vaccinations, and captive care. The PEIS team (PIRO, PIFSC, and PR1), and PR3 later met in Seattle, WA during December 7-8, 2010, to discuss the analytical approach to assessing the impacts of the proposed activities on Hawaiian monk seals. Consulting biologists have attended bi-weekly calls on development of the Draft PEIS as requested. The Draft PEIS was made available to PR3 on March 24, 2011 during the NMFS-internal review of the draft, and comments were received from PR3 on April 7, 2011. The PEIS team and PR5 held meetings on several occasions during October and November 2011 to discuss the programmatic consultation.

Description of proposed action: The proposed action (as described in the PEIS) is funding, permitting, and carrying out recovery actions (research and enhancement activities) for the endangered Hawaiian monk seal. The purpose of permit issuance is to allow an exemption to the moratoria and prohibition on takes established under the MMPA and ESA (see Sections 1.5.2 and 1.5.3 of the Draft PEIS) so the proposed research and enhancement activities may be undertaken.

The PIFSC seeks a scientific research and enhancement permit amendment and permit to carry out take activities designed to recover the endangered Hawaiian monk seal. Research is intended to identify impediments to recovery, inform the design of conservation interventions, and evaluate those measures. Enhancement activities are designed to improve the survival and reproductive success of individual monk seals, with the intent to improve subpopulation and overall species' status.

Research activities covered by Permit No. 10137-06 include take associated with visual and photographic monitoring by ground, vessel, air, and remote video cameras; flipper tagging; pelage bleach marking; biological sampling for health screening; instrumentation for foraging studies; deworming research; necropsies; opportunistic tissue sampling (e.g., molt); and import/export of parts. Enhancement activities include translocations (within the NWHI or within the main Hawaiian Islands [MHI], but not between); removing aggressive adult male seals that harm or kill other seals; and, disentangling and de-hooking seals. Non-target seals may be disturbed during research and enhancement activities.

Alternative 4 of the Draft PEIS and draft Permit No. 16632 includes all currently permitted activities and further address the recommendations of the Hawaiian Monk Seal Recovery Plan by including new research and enhancement activities. New activities include but are not limited to:

- Expanding the scope and number of seal translocations, including (1) moving seals with unmanageable human interactions from the MHI to NWHI, (2) taking seals age three years and older from the MHI to NWHI to examine their subsequent survival, and (3) using a two-stage translocation program whereby weaned pups are taken from areas of lower survival to areas of higher survival. This could include moving seals from the NWHI to the MHI and vice versa.

- Researching and developing tools for modifying seal behavior related to interactions with humans and fishing gear in the MHI.

- Potentially implementing de-worming as a tool to improve juvenile survival.

- Supplementing monk seal diet using feeding stations in NWHI locations where seals are released after being cared for in rehabilitation.

- Conducting vaccination studies and potential use of vaccines to mitigate infectious diseases (West Nile Virus and Morbilliviruses).

- Conducting research on and potential use of chemical alteration of aggressive male monk seal behavior using a testosterone suppressant.

The purpose of each specific research and enhancement activity is described in the permit application (see Project Purpose: Hypothesis/Objectives and Justification), and in Section 2.5 of the Draft PEIS.

<u>Action area</u>: The action area is described in Section 1.3 of the Draft PEIS and includes the Hawaiian Archipelago and Johnston Atoll.

<u>Description of all listed species and/or critical habitat that may be affected by the action</u>:

(1) *Species description*: A complete description of the Hawaiian monk seal is provided in the Draft PEIS. This includes the species' distribution (Section 3.3.1.1), physical description and life

cycle (3.3.1.2), population status and trends (3.3.1.3), habitat requirements and critical habitat (3.3.1.4), foraging ecology (3.3.1.5), carrying capacity (3.3.1.6), threats to survival (3.3.1.7), and recovery plan priorities (3.3.1.8).

(2) *Proposed authorized take*: A list of the takes to be authorized for Hawaiian monk seals by activity and location can be found in the attached draft permits (see Appendix 1 of draft permits). Please note that the table in Permit No. 16332 includes updates since the Draft PEIS was published. Please refer to the permit tables for proposed take levels.

(3) *Other species*: There are no NMFS ESA-listed species that will be incidentally affected by the authorized activities. Sections 3.3.2 – 3.3.8 in Chapter 3 (Affected Environment) of the Draft PEIS describes non-target species in the action area. In Chapter 4 (Environmental Consequences), Sections 4.6 and 4.8.3 – 4.8.7 discuss how the non-target species may be affected, if at all, and what mitigation measures would be implemented to avoid or minimize take of non-target species.

In brief, spinner dolphins (*Stenella longirostris*) may be incidentally disturbed during research and enhancement activities. Green sea turtles (*Chelonia mydas*) on land and certain ESA-listed bird species may be affected by the proposed activities; however, these species are under the jurisdiction of the U.S. Fish and Wildlife Service, requiring consultation with that agency.

(4) *Species proposed listed*: The Hawaii insular stock of false killer whales (*Pseudorca crassidens*) is the only species proposed listed under the ESA in the action area. As described in Sections 3.3.3 and 4.8.4 of the Draft PEIS, NMFS does not anticipate impacts to this or other cetacean species (except spinner dolphins) from the proposed action.

(5) *Critical habitat*: Critical habitat for the Hawaiian monk seal was designated in 1986, revised in 1988, and is described in 50 CFR 226.201. It includes all beach areas and ocean waters out to 20 fathoms around the islands and atolls in the NWHI. Section 3.3.1.4 of the Draft PEIS also describes monk seal critical habitat.

On June 2, 2011, NMFS proposed to revise Hawaiian monk seal critical habitat (76 FR 32026). This would include an expansion of current critical habitat in the Northwestern Hawaiian Islands out to the 500 meter depth contour, and to include Sand Island at Midway Atoll. This proposed expansion would also include adding the main Hawaiian Islands (coastlines five meters inland from the shoreline and marine waters from the shoreline out to the 500 meter depth contour).

(6) *Other permits for take of monk seals*: Section 1.4 of the Draft PEIS describes the only two current permits authorizing direct takes of Hawaiian monk seals. These include PIFSC's Permit No. 10137-06 and Permit No. 932-1905/MA-009526 issued to the NMFS Marine Mammal Health and Stranding Response Program (MMHSRP). The MMHSRP ESA section 10 permit authorizes takes of Hawaiian monk seals for activities carried out under section 109h of the MMPA (i.e., response and rescue activities). Section 1.4 of the Draft PEIS describes how the MMHSRP activities are coordinated with PIFSC.

Description of the manner in which the action may affect Hawaiian monk seals, and analysis of cumulative effects:

(1) *Direct and indirect exposure*: The methods for carrying out the proposed research and enhancement activities, and how they will result in takes of Hawaiian monk seals, are described in the permit amendment application (File No. 10137-07), the File No. 16632 permit application (see Project Description/Methods and Appendices), and Section 2.5 of the Draft PEIS.

(2) *Minimization measures*: Conditions intended to minimize impacts from the proposed activities on monk seals are incorporated in the protocols in the permit applications, and also in Section 2.5 of the Draft PEIS. Conditions listed in the attached draft permits are also intended to minimize negative impacts from the proposed activities. Such conditions are also listed in Section 4.7 of the Draft PEIS.

(3) *Cumulative effects*: Section 4.5.1 of the Draft PEIS describes relevant past and present actions (federal and non-federal) within the action area. Section 4.5.2 of the Draft PEIS describes reasonably foreseeable future actions (federal and non-federal human-controlled actions and natural events).

(4) *Anticipated Responses*: Chapter 4 of the Draft PEIS (Section 4.8.1) and Appendix E (Proposed Translocation Plan, revised December 1, 2011) describe the anticipated responses and effects to Hawaiian monk seals from the proposed research and enhancement activities.

Relevant reports, including any EIS, EAs, BAs, or other analyses prepared on the proposal:

As mentioned above, a Draft PEIS has been completed for Hawaiian monk seal research and enhancement recovery actions. The Draft PEIS is available on our web site: http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonksealeis.htm.

An EA was prepared for issuance of Permit No. 10137; supplemental EAs were prepared for certain amendments to Permit No. 10137.

A PEIS was prepared for issuance of Permit No. 932-1905/MA009526. This PEIS is available on our web site: http://www.nmfs.noaa.gov/pr/health/eis.htm.

Other relevant studies or information available on the action, the affected species, or critical habitat:

Recent peer-reviewed publications on Hawaiian monk seals, including those in a special edition of the journal Aquatic Mammals dedicated to the genus *Monachus*, are provided. The 2010 stock assessment report for Hawaiian monk seals and annual reports for Permit No. 10137 and the MMHSRP permit are provided.

The initiation package includes the following attachments:

- Amendment application for the August 2012 translocations
- Draft Permit No. 10137-07
- Permit application for File No. 16632
- Draft Permit No. 16632

The initiation package includes the following documents on a CD submitted with this memo. These documents and electronic copies of the attached documents have also been placed on the shared G: drive under G:/Prall/Temp HI monk seals/PEIS sec 7 files:

- 10137 documents
    - Permit 10137 and amendments with associated applications, NEPA analyses, Biological Opinions and other section 7 analyses; and 10137 annual reports
- 16632 documents
    - File No. 16632 application and draft permit
- Critical habitat
    - Federal Register notices - designation and proposed revision
- Meeting notes and emails
    - May 2009 and December 2010 meeting notes
    - Email correspondence with consulting biologists
- MMHSRP documents
    - Biological Opinion for Permit No. 932-1905/MA009526
    - Permit No. 932-1905/MA-009526
    - Annual reports for monk seal response activities for MMHSRP's Permit No. 932-1905/MA-009526
- PEIS Word files
    - PEIS schedule
    - Chapters 1-5
    - Chapter 4 with monk seal analysis only
    - Revised Translocation Plan (December 2011)
    - Revised Vaccination Plan (October 2011)
- Publications and data
    - Aquatic Mammals special issue publications
    - Health and disease
    - Morphometrics and survival data
    - Translocations
    - Vaccinations
    - 2010 Stock Assessment report

If you have any questions or require additional information, please contact Amy Sloan or Joselyd Garcia-Reyes at 301-427-8401.

Attachments

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

FEB 27 2014

Memorandum For: Tammy C. Adams, Ph.D.
Acting Chief, Permits and Conservation Division

From: Cathryn E. Tortorici CET
Chief, Endangered Species Act Interagency Cooperation Division

Subject: Biological and conference opinion on the proposal to implement the Hawaiian monk seal research and enhancement program and issue scientific research permit number 16632, pursuant to Section 10(a)(1)(A) of the Endangered Species Act of 1973

Enclosed is the NOAA National Marine Fisheries Service (NMFS) biological and conference opinion on the effects of the implementation of the Hawaiian monk seal research and enhancement program and issuance of scientific research permit number 16632, prepared pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 USC 1531 *et. seq.*).

In this biological opinion, NMFS concludes that the implementation of the program and issuance of the permit is not likely to jeopardize the continued existence of the Hawaiian monk seal or result in the adverse modification or destruction of its critical habitat. We also conclude that the action may affect, but is not likely to adversely affect, the following ESA-listed species: sperm whale, blue whale, fin whale, humpback whale, sei whale, false killer whale (Hawaiian insular) green sea turtle (all other areas), hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle (North Pacific), and olive ridley sea turtle (all other areas). In this conference opinion, NMFS concludes that the implementation of the program and issuance of the permit is not likely to jeopardize the continued existence of the following ESA-proposed species: *Acropora paniculata*, *Monitpora flabellate*, *M. dilatata*, *M. turgescens*, *M. patula*, and *M. verrilli*.

This concludes formal consultation and conference on this action. Consultation on this issue must be reinitiated if: (1) the amount or extent of allowable take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion; (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

MAR 18 2013

Barry W. Stieglitz
Project Leader
Hawaiian and Pacific Islands Nat'l Wildlife Refuges and
Northwestern Hawaiian Islands Marine Nat'l Monument
300 Ala Moana Boulevard, Room 5-231
PO Box 50167
Honolulu, Hawai'i 96850

Dear Mr. Stieglitz,

The National Marine Fisheries Service (NMFS) requests consultation with the U.S. Fish and Wildlife Service (USFWS) under section 7 of the Endangered Species Act for incidental take of Laysan finch (*Telespyza cantans*) during field camps to take Hawaiian monk seals (*Monachus schauinslandi*) for research and enhancement purposes.

We also request concurrence from USFWS on our determination that the activities proposed may affect but will not likely adversely affect the green sea turtle (*Chelonia mydas*), Nihoa Miller bird (*Acrocephalus familiaris kingi*), Laysan duck (*Anas laysanensis*), and short-tail albatross (*Phoebastria albatrus*). We have determined that the proposed activities will not adversely modify or destroy designated critical habitat.

Enclosed is supporting documentation for these determinations and the USFWS 2009 biological opinion on incidental take of Laysan finch for Permit No. 10137. Please respond by April 15, 2013 to let us know if the enclosed initiation package is complete.

We propose to issue a new 5-year permit (Permit No. 16632) to the NMFS Pacific Islands Fisheries Science Center, Hawaiian monk seal Research Program (HMSRP) to replace their existing Permit No. 10137. The proposed start date for Permit No. 16632 is January 2014.

In compliance with the National Environmental Policy Act, NMFS is preparing a Final Programmatic Environmental Impact Statement (PEIS) for Hawaiian monk seal Recovery Actions, which includes activities proposed in the permit application. A Draft PEIS for Hawaiian monk seal Recovery Actions was made available to the public in 2011 (76 FR 51945). The intent of the PEIS is to evaluate the potential direct, indirect, and cumulative impacts on the human environment of the alternative approaches to implementing recovery actions, including research and enhancement activities requiring a permit.

If you have questions, please contact Amy Sloan (Amy.Sloan@noaa.gov) or Colette Cairns (Colette.Cairns@noaa.gov) by email or phone (301-427-8401).

Sincerely,

P. Michael Payne
Chief, Permits and Conservation Division
Office of Protected Resources
(phone: 301-427-8401)

Enclosures

cc: Patrice Ashfield, USFWS
Hoku Johnson, PMNM

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

JUN 5 - 2013

Loyal Mehrhoff, Ph.D.
Field Supervisor
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Suite 3-122
Honolulu, HI 96850

Dear Dr. Mehrhoff,

In a letter addressed to Mr. Barry Stieglitz, dated March 18, 2013, we requested consultation with the U.S. Fish and Wildlife Service (USFWS) under section 7 of the Endangered Species Act for incidental take of Laysan finch (*Telespyza cantans*) during field camps to take Hawaiian monk seals (*Monachus schauinslandi*) for research and enhancement purposes. We also requested concurrence that the activities proposed may affect but will not likely adversely affect the green sea turtle (*Chelonia mydas*), Nihoa Miller bird (*Acrocephalus familiaris kingi*), Laysan duck (*Anas laysanensis*), and short-tail albatross (*Phoebastria albatrus*). We have determined that the proposed activities will not adversely modify or destroy designated critical habitat.

The enclosed letter and consultation package were transmitted to Mr. Stieglitz via mail and email on March 18, 2013. On March 19, 2013, Mr. Stieglitz answered the email, indicating he would later respond with a point of contact for the consultation. On June 3, 2013, we were notified by Christine Ogura that section 7 consultation requests are handled by the Ecological Services Division and should be addressed you. Ms. Ogura verified the consultation package has been transmitted to your office.

Based on the guidance received from Ms. Ogura, we are requesting consultation with your office for incidental take of Laysan finch, and requesting concurrence that the green sea turtle, Nihoa Miller bird, Laysan duck, and short-tail albatross will not likely be adversely affected during Hawaiian monk seal research and enhancement activities. We propose to issue a new 5-year permit (Permit No. 16632) to the NMFS Pacific Islands Fisheries Science Center to replace their existing Permit No. 10137. The proposed start date for Permit No. 16632 is January 1, 2014. In compliance with the National Environmental Policy Act, NMFS is preparing a Final Programmatic Environmental Impact Statement (PEIS) for Hawaiian monk seal Recovery Actions, which includes activities proposed in the permit application. A Draft PEIS for Hawaiian monk seal Recovery Actions was made available to the public in 2011 (76 FR 51945). The intent of the PEIS is to evaluate the potential direct, indirect, and cumulative impacts on the human environment of the alternative approaches to implementing recovery actions, including research and enhancement activities requiring a permit.

Enclosed is supporting documentation for the consultation and the USFWS 2009 biological opinion on incidental take of Laysan finch for the current Hawaiian monk seal Permit No. 10137.

Please respond as soon as possible with a point of contact for the consultation and to let us know if the enclosed initiation package is complete. Correspondence regarding the consultation should be directed to Amy Sloan (Amy.Sloan@noaa.gov) and Colette Cairns (Colette.Cairns@noaa.gov); phone (301-427-8401).

Sincerely,

P. Michael Payne
Chief, Permits and Conservation Division
Office of Protected Resources
(phone: 301-427-8401)

Enclosures

cc: Barry Stieglitz, USFWS
Christine Ogura, USFWS
Hoku Johnson, PMNM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai`i 96850

In Reply Refer To:
2013-F-0237

FEB 2 0 2014

Tammy Adams, Ph.D
Acting Chief, Permits, Conservation and Education Division
Office of Protected Resources
United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Silver Spring, Maryland 20910

Subject: Biological Opinion for the Final Programmatic Environmental Impact Statement for Hawaiian Monk Seal Recovery Actions, Hawaii Archipelago and Johnston Atoll

Dear Ms. Adams:

This Biological Opinion responds to your request for initiation of formal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to the Endangered Species Act of 1973, as amended (Act). We initiated consultation on June 5, 2013. At issue are the impacts to the endangered Laysan finch (*Telespyza cantans*) resulting from Hawaiian monk seal (*Monachus schauinslandi*) recovery actions conducted by the National Marine Fisheries Service (NMFS) Pacific Islands Fisheries Center, Hawaiian monk seal Research Program (HMSRP) to continue population monitoring (including health, disease, and foraging research) on the endangered Hawaiian monk seal. In the course of conducting biological research on Hawaiian monk seals, researchers and technicians will camp and spend extended periods of time on Laysan Island and the islands in Pearl and Hermes Reef. In the past, seemingly benign activities such as camping or storage of supplies has led to the inadvertent death of several Laysan finches. This Biological Opinion will address the incidental take of the Laysan finch due to the presence of researchers working and camping on Laysan Island and the islands at Pearl and Hermes Atoll.

In your letter of June 5, 2013, you determined the proposed action "may affect but is not likely to adversely affect" the threatened green sea turtle (*Chelonia mydas*) on land, Nihoa millerbird (*Acrocephalus familiaris kingi*), short-tail albatross (*Phoebastria albatrus*), and Laysan duck (*Anas laysanensis*).

Green sea turtle

The action area for your potential impact to green sea turtles is the areas under the jurisdiction of the Service within the Monument. The green turtle nests in the NWHI and may be affected by the research activities when on land. Sleeping and basking green sea turtles are generally unaware of unobtrusive human presence. However, there is the possibility that some activities such as small boat transits and landings, capturing seals, and other research activities may startle basking turtles, causing them to relocate into the water. Best management practices have been included to minimize and avoid the unintentional harassment of basking and/or nesting green sea turtles while conducting research or camping on various islands. These measures include the following:

• Walking is prohibited on all beaches, from dusk to dawn, where adult turtles rest.
• All field camps will use maximum light control (shading, minimum wattage, etc.).
• All field camps must avoid disorienting hatchling turtles.

We concur with your determination that this action "may affect, but is not likely to adversely affect" terrestrial green sea turtles because researchers will follow the aforementioned minimization measures and adhere to best management practices to avoid basking and nesting green sea turtles.

Nihoa Millerbird

The Service in conjunction with American Bird Conservancy translocated 24 millerbirds from Nihoa Island to Laysan Island in September 2011, to decrease the risk of extinction from a catastrophic event on Nihoa. The Nihoa millerbirds on Laysan Island do not appear to show the same camp-following behavior as Laysan finch. Injury or death to Nihoa millerbirds is not expected from interactions with field camps and HMSRP activities on Laysan Island. It is possible that Millerbirds could be disturbed if they nest near field camps or if HMSRP researchers hike through the interior of the island.

We concur with your determination that this action "may affect, but is not likely to adversely affect Nihoa millerbirds because outlined activities are unlikely to result in adverse effects to the species.

Short-tail albatross

Short-tailed albatross have been sighted on Kure Atoll, Laysan Island and Midway Atoll where a pair has successfully nested each of the last two years. Albatross require a long straight-line ground trajectory to become airborne, and there is a small risk that they could fly into camera-mounted poles (e.g., at French Frigate Shoals or at other sites if erected) or shoreline pen fencing (erected temporarily to hold seals at any site) with possible injury. Camera-mounted poles have been maintained at French Frigate Shoals, and the HMSRP is not aware of any records of sea birds flying into the poles. Temporary pens have been seasonally maintained by HMSRP at Kure Atoll, Midway Atoll, and French Frigate Shoals for over ten years during summer months with no incidents of seabirds becoming entangled in the fence. However, during 3-month winter maintenance of a temporary pen at French Frigate Shoals in 2006, a single Laysan albatross (*P. immutabilis*) flew into the fencing and was injured, but survived.

The HMSRP will ensure that monk seal pens would not be placed in the vicinity of short-tailed albatross or their nests. For example, at Midway Atoll, the shore pen will not be on the same island where the short-tailed albatross decoys, sound recordings, and recent nesting occurred.

The placement of the pen would be on Sand Island, approximately 3 miles from the short-tailed albatross nesting location.

Monk seal shore pens will normally be erected in the fall, after the short-tailed albatross breeding season and fledging of hatchlings. However, pens could be erected at any time of year. If shore pens are erected, the height of the pen would be below 5 ft. HMSRP researchers would increase monitoring of pens on windy days. Pens would be dismantled immediately after use, which typically would not exceed two weeks for holding seals. In the unlikely event that a short-tailed albatross were to fly into a shore pen, the pen would be taken down and the Monument and Service would be contacted for guidance. HMSRP field camps in the North Western Hawaiian Islands are typically supplied and staffed using vessels, rather than aircraft. The use of an aircraft may occasionally occur at Midway Atoll or French Frigate Shoals, which could pose a risk to short-tailed albatross. Requirements of the Monument would be in place to ensure the overall effects of air strikes on albatross and other birds is minimal (PMNM 2008). These include:

- Night flights for most of the year at Midway;
- Vegetation management along the runways to modify bird flight and nesting behavior;
- Flight path advisories given to pilots; and
- Runway clearing of birds and other wildlife by personnel prior to landing and takeoffs.

We concur with your determination that this action "may affect, but is not likely to adversely affect" short-tail albatross because researchers will follow the aforementioned minimization measures and adhere to best management practices to avoid adverse impacts to short-tail albatross.

<u>Laysan duck</u>
The Laysan duck is found on Laysan Island and Midway Atoll. Although these ducks primarily use vegetated upland and lake/lowland habitats, a few ducks on Laysan use the camp area to get freshwater, insects, and shade (Service 2009a). Coastal habitats are used more frequently during the post-breeding season (September through February) than the breeding season. Flocks of up to 70 Laysan ducks were recorded on the coast during the post-breeding season (Service 2009a).

HMSRP researchers could disturb ducks near camp. There is a small possibility that ducks in coastal areas could fly or run into the temporary monk seal holding pens when foraging. However, Laysan ducks have never interacted with shore pens used by the HMSRP since 1981 and any such occurrence is not expected. Thus, no injury or mortality to Laysan ducks is expected.

We concur with your determination that this action "may affect, but is not likely to adversely affect Laysan duck because outlined activities are unlikely to result in adverse effects to the species.

This response represents the Service's Biological Opinion regarding the effects of the proposed project on the Laysan finch pursuant to the Act. This consultation is based on information obtained from research permit applications, your Final Programmatic Environmental Impact

Statement and other information available to us. A full administrative record is available at our office. Details of the proposed Hawaiian monk seal research and population enhancement activities can be found in the Final Programmatic Environmental Impact Statement for Hawaiian Monk Seal Recovery Actions, Hawaii Archipelago and Johnston Atoll.

CONSULTATION HISTORY

March 11, 2013. P. Michael Payne Chief, Permits, Conservation and Education Division, National Marine Fisheries Service sent Barry Stieglitz, Project Leader for the Hawaiian and Pacific Islands National Wildlife Refuges and Northwestern Hawaiian Islands Marine National Monument, a letter requesting formal consultation for activities related to Final Programmatic Environmental Impact Statement for Hawaiian Monk Seal Recovery Actions, Hawaii Archipelago and Johnston Atoll.

June 3, 2013. Christine Ogura, Acting Pacific Island and Remotes Refuge Manager, informed National Marine Fisheries Service that our office should take the lead on preparing this Biological Opinion.

June 5, 2013. Mr. Payne transmitted the letter requesting formal consultation for activities related to Final Programmatic Environmental Impact Statement for Hawaiian Monk Seal Recovery Actions, Hawaii Archipelago and Johnston Atoll.

July 15, 2013. Aaron Nadig, Service Fish and Wildlife Biologist, had a phone call with Amy Sloan, NMFS Office of Protected Resources to discuss past interactions with Laysan finch under previous Biological Opinion and proposed covered activities under the PEIS.

July 25, 2013. Ms. Sloan provided excerpts from PEIS and additional Laysan Finch information requested on July 15 phone conversation.

DESCRIPTION OF THE PROPOSED ACTION

The Final Programmatic Environmental Impact Statement for Hawaiian Monk Seal Recovery Actions, Hawaii Archipelago and Johnston Atoll (NMFS 2013) fully describes the proposed actions and is incorporated by reference herein. A brief description of the proposed action is provided below. This Biological Opinion will include effects from recovery actions conducted by the NMFS Pacific Islands Fisheries Center, HMSRP to continue population monitoring (including health, disease, and foraging research) on the endangered Hawaiian monk seal. This consultation covers only activities authorized or permitted within the Monument. The HMSRP proposes to continue existing permitted activities in the Hawaiian Archipelago and Johnston Atoll including:

- Population assessment of seals (e.g., ground surveys; flipper tagging and marking for identification);
- Health and disease studies (e.g., capture, sedation, tissue sampling, weights and morphometrics);

- Foraging studies (e.g., telemetry studies, scat collection);
- De-worming research (e.g., fecal samples, testing anti-parasite treatments);
- Translocation of weaned pups within the NWHI to improve juvenile survival;
- Mitigation of fishery interactions (e.g., disentanglement, removal of hooks); and
- Mitigation of adult male aggression (e.g., removal of aggressive males).

New activities proposed include:

- Expanding the scope and number of seal translocations, including:
    - moving seals with unmanageable human interactions from the MHI to the NWHI;
    - taking seals three years of age and older from the MHI to NWHI to examine their subsequent survival; and
    - using a two-stage translocation program where weaned pups are taken from areas of lower survival to areas of higher survival (no seals would be moved from the NWHI to the MHI as part of two-stage translocation under the proposed permit).
- Research and development of tools for modifying seal behavior to minimize interactions with humans and fishing gear in the MHI.
- Potential use of de-worming as a tool to improve juvenile survival.
- Supplementing monk seal diet using feeding stations in NWHI locations where rehabilitated seals are released.
- Vaccination studies and potential use of vaccines to mitigate infectious diseases including West Nile Virus and Morbilliviruses.
- Chemical alteration of aggressive male monk seal behavior using a testosterone suppressant.

Both NMFS and the Service maintain camps at Laysan Island. In addition to the camp at Laysan, NMFS personnel set up temporary field camps when they are working on the islands at Pearl and Hermes Atoll. Laysan finches are not fearful of humans and readily enter field camps in search of food and water. In the past, unfortunate incidents led to the mortality of several Laysan finches to include: (1) drowning in containers that filled with rain water during cloud bursts while biologist were away from the camp; (2) entrapment or entanglement in camping equipment such as tents; and (3) following a research vessel and flying down the smoke stack.

The action area pursuant to section 7 regulations consists of "all areas to be affected directly or indirectly by the Federal action." The action area for this Biological Opinion for Laysan finch is Laysan Island and the islands in Pearl and Hermes Reef. Currently there is no federally designated critical habitat for Laysan finch.

Conservation Measures to Avoid and Minimize Impacts to Laysan Finch

When used in the context of the ESA, "conservation measures" represent actions proposed by the Federal action agency that are intended to further the recovery of and/or minimize or compensate for project effects on the species under review. Because conservation measures are part of the

Project Description and committed to by the action agency, their implementation is required under the terms of the consultation.

In the past, seemingly benign activities such as camping or supply storage have led to the inadvertent death of several Laysan finches. The following Best Management Practices (BMPs) are incorporated to avoid and minimize take of Laysan finch:

To minimize accidental drownings:

a. Buckets will always be overturned so that they cannot collect rainwater.
b. Laundry buckets must have lids while laundry is soaking.
c. Buckets, bowls, and any other vessels large enough to hold a small bird containing water for dish washing or any other purpose will always be attended or covered securely.
d. Tarps (e.g., those covering propane) will be tucked in tightly so that they cannot collect rainwater.
e. Garbage cans used for desalinization will have netting placed between the can and the lid. Care will be taken to make sure the lids close properly; faulty positioning of hoses can interfere with proper closure.

To minimize accidental entanglement:

a. Loose threads on fabric will be burned to minimize the risk of entanglement. Birds' feet can become entangled when fabric is hung out to dry.
b. Loose threads will be cut off tents and tarps.
c. Anything with small mesh (e.g., mist nets) will be stored in closed ziploc bags to avoid entanglement.
d. Tent doors will be kept completely closed at all times (day and night) to preclude entry by birds.

To minimize impacts from general camping:

a. Camp supplies and water jugs will be aligned with ample space between rows so that small birds cannot become entrapped.
b. Storage jugs will always be capped.
c. Burn barrels will be attended at all times when burning trash. When burn barrels are not in use, any vents or rust-eaten holes in the barrel or lid will be covered with rocks or other objects.
d. For stability reasons, buckets will not be stacked more than two high. All personnel will watch for leaning buckets or water jugs and level the surface beneath leaning buckets, if necessary.
e. Birds will not be fed or allowed access to human food because dependency on the camp food by these birds may result in adverse impacts to them during or after camping periods.
f. Camp gear shall be checked daily during the nesting season to ensure finches are not building nests on or under camping gear.

Quarantine to Avoid Transport of Invasive Species

In addition to the measures described above, personnel working in the Monument must follow terrestrial quarantine protocols for moving between islands and packing for field camps (see

Appendix 1). These measures will minimize the potential for the introduction of non-native plant or insect taxa to the Monument. These strict quarantine measures will decrease the potential that invasive taxa will become established and modify the habitat for Laysan finch or green sea turtles.

STATUS AND ENVIRONMENTAL BASELINE OF THE SPECIES

Laysan Finch

Species Description

The Laysan finch is a member of the *Fringillidae* family with an overall length of 6 to 6.5 in (15 to 16 cm). It is one of four remaining finch-billed Hawaiian honeycreepers and is closely related to the smaller Nihoa finch. The Laysan finch is a large honeycreeper with a heavy bill. Males have yellow plumage with a whitish belly and a grey neck, while females are generally duller in color with brown streaking.

Listing Status

The Laysan finch was federally listed as endangered in 1967 (Service 1967).

Historical and Current Distribution

When discovered on Laysan in 1890, Laysan finches were considered "exceedingly common." Visitors to Laysan circa 1915 described the species as "abundant" and estimated 2,700 in 1911 and 4,000 in 1915. However, Laysan finches declined sharply after the vegetation on Laysan virtually disappeared subsequent to rabbit introduction circa 1903. As few as 100 Laysan finches may have remained in 1923 (Service 2008). Rabbit extirpation by members of the Tanager Expedition in 1923 undoubtedly saved the Laysan finch from extinction. An estimated 1,000 Laysan finches in 1936 increased to 5,000 by 1950. Service surveys in the 1970s and 1980s suggested as many as 10,000. Laysan finches were translocated to an island in Pearl and Hermes Atoll in 1967. There were 108 birds left on Laysan that year, which grew to an estimated 523 by 1983 (Service 2008).

Ecology

Laysan fiches lay their eggs generally late April to early June in clumps of bunchgrass, though other nesting sites, such as holes in rocky areas and even buildings (formerly present on Laysan), have been documented. *Eragrostis* spp. is currently the most common bunchgrass and most common nest site for shallow-cup nests averaging three eggs (range two to four). Nests are usually located several centimeters above the ground, centered in a grass clump, and well concealed. Incubation is about 16 days and the nestling period 15 days. Fledging is often in late July or early August (Service 2008).

Threats

Threats to Laysan finch are: 1) degradation and loss of habitat resulting from invasive alien species; 2) demographic effects of environmental stochasticity on small isolated populations; and 3) global warming and sea level rise that would increase storm frequency and magnitude increasing rainfall and wave height in Hawaiian Islands National Wildlife Refuge. In recent years, monotypic stands of the invasive plant *Verbesina encelioides* have been documented replacing much of the native vegetation on the Southeast Island of Pearl, thus reducing nesting and foraging resources for Laysan finches (Service 2008).

Environmental Baseline

The Laysan finch population on Laysan Island has been monitored on an annual basis since 1966 (except 1980–1982). The estimated 44-year average Laysan finch population size was 10,029 (Underwood 2013) with population appearing stable and most likely at carrying capacity. Population estimates have ranged from >20,000 in 1976 to approximately 3,600 finches in 2007. The population at Pearl and Hermes Atoll was estimated as 329 in 2010, down from 600 to 900 in 2003 and 1,105 in 2002 (Service 2008).

EFFECTS OF THE ACTION

Laysan Finch

The Laysan finch is a highly inquisitive bird that constantly inspects and probes all types of objects. While this behavior may benefit the species in its natural environment, it can be problematic in human-altered environments. The Laysan finch does not appear innately wary of manmade items, possibly because it evolved in isolation from human-altered environments. Situations that one would not normally think of as hazards to wildlife become sources of Laysan finch mortality such as drowning, entanglement and entrapment. Both NMFS and the Service maintain camps at Laysan Island. In addition to the camp at Laysan, NMFS personnel set up field camps when they are working on the islands at Pearl and Hermes Atoll. Since Laysan finches are tame to human presence, they enter these field camps in search of food and water. Unintentional mortality or serious injury of Laysan finches has occurred in the past, and in all likelihood will occur in the future. Past mortalities resulted from events such as drowning in camp containers filled with water, becoming trapped in camp tents and entanglement in loose strings and netting. In May 2009, seven to ten Laysan finches flew out to the R/V Oscar Elton Sette as it was taking researchers to an islet in the Pearl and Hermes Atoll. It is thought the birds may have flown out to the ship in search of food and water as these resources were scarce on the island. Unfortunately, several of the birds flew down the smokestack of the ship and one was killed. This is the first known occurrence of this behavior and subsequently it is believed this was an anomalous event. This is another example of the type of odd behavior exhibited by these birds that can lead to unanticipated mortality (Flint 2009, pers. comm.). In 2009, the Service issued incidental take of up to 10 Laysan finch mortalities over a five-year period in a Biological Opinion analyzing NMFS research of Hawaiian monk seals on Pearl and Laysan (Service 2009b); eight mortalities have occurred to date (Johanos 2011). Of those 8 in 2011, five Laysan finches died at Pearl and Hermes during a single incident after a lid was left off a pallet tub and then accumulated rainwater. In response to these unfortunate incidences, the HMSRP has reviewed its training protocols for staff working at Laysan Island and Pearl and Hermes, and placed a renewed emphasis on the avoidance and minimization measures described below. The March 2011 tsunami may have affected the Laysan finch on Laysan, but no carcasses were found (Rehkemper 2011). There were no lethal takes of Laysan finches in 2012.

The conservation measures described in the project description will reduce the risk of inadvertent mortality due to drowning, entanglement and/or entrapment of Laysan finches at the campsite.

In addition, reducing the risk by eliminating problematic situations such as turning over buckets and not stacking camp materials will reduce the potential for inadvertent mortality of Laysan finch. The conservation measures outlined in this biological opinion to minimize the risk of harm to Laysan finches have been followed by the researchers for several years. There has been a decrease in the number of Laysan finch mortalities associated with the campsites in recent years due to the strict adherence to these measures (Rehkemper 2009, pers. comm.).

Based on the bird's inquisitive nature and lack of fear of humans, it is imperative that researchers try to anticipate situations that may result in take of Laysan finches and use their best judgment to avoid potential situations that may lead to Laysan finch mortality. As demonstrated in the past, when experiencing water and food stress, these birds will exhibit unusual behavior when interacting with humans that has resulted in mortality. Researchers, in coordination with Refuge and Service biologists, will be able to decrease finch mortality by adaptively modifying activities or camp sites if and when a new situation arises that harms Laysan finch.

Invasive Species

The quarantine measures required for persons working in the Monument will minimize the potential for introducing non-native plant and insect taxa within the Monument. As demonstrated in numerous insular habitats, the unintentional introduction of non-native taxa has had unintended and devastating consequences for insular biota (Cuddihy and Stone 1990). It is already thought that the introduction of *Verbesina encelioides* has altered the ecology of Pearl and Hermes Reef to such an extent that Laysan finches are affected by the change in vegetation composition and structure. Since the researchers have been and will continue to strictly adhere to the quarantine requirements as outlined in Appendix 1, the likelihood of introduction of other non-native taxa is greatly reduced. This measure also reduces the risk that researchers will negatively impact Laysan finch through the introduction of invasive taxa.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur within the area of action subject to consultation. Future Federal actions will be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative for the proposed action. The Service maintains a camp on Laysan Island and in the past there have been occasional Laysan finch mortalities in the vicinity of the camp as a result of human actions. The Service is unaware of any other future State, local, or private actions that are reasonably certain to occur within the action area covered in this Biological Opinion and that would not be subject to consultation.

CONCLUSION

After reviewing the current status of the Laysan finch, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's Biological Opinion that implementation of the proposed action is not likely to jeopardize the continued survival and recovery of the Laysan finch in the wild. No critical habitat has been designated for this species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations promulgated pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

Based on Laysan finch mortality associated with human activity on Laysan and the islands at Pearl and Hermes Atoll in the past, it is the Service's opinion no more than two Laysan finch will be taken in the form of mortality per year, and a total of 20 individuals per decade as a result of HMSRP research and monk seal recovery activities.

The Service will not refer the incidental take of any migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §703-712), if such take is in compliance with the terms and conditions specified herein.

Effect of the Take
The take of two Laysan finches annually represents a small fraction of the approximately 10,029 birds on Laysan. The take would not be of sufficient size or magnitude to have population level effects. We have determined that this level of anticipated take is not likely to jeopardize the survival or recovery of the Laysan finch.

Reasonable and Prudent Measures
The reasonable and prudent measures given below, with their implementing terms and conditions, are designed to minimize the impacts of incidental take that might otherwise result from the proposed actions. If, during the course of the action, the level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of
the reasonable and prudent measures provided. In addition, the action that caused the taking must cease; the action agency must immediately provide an explanation of the causes of the

taking; and must review with the Service the need for possible modification of the reasonable and prudent measures. The following reasonable and prudent measure is necessary and appropriate to minimize the effect of take on Laysan finch.

1. NMFS shall minimize the potential for harassment, harm, or mortality of Laysan finch.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Service and any subsequent project applicant, must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following terms and conditions implement reasonable and prudent measure number one.

1. If any unforeseen activity or action results in the harm or mortality of Laysan finches, all practicable means will be taken to apply avoidance or minimization measures to reduce the risk of additional take from that activity.
2. All Laysan finch mortalities that are a result of actions which are associated with research activities described above shall be reported to our office within five (5) days of the incident.
3. If an incidental death occurs that has not been addressed in this Biological Opinion, the Service will be contacted as soon as logistically feasible to discuss the cause of the mortality and determine the most appropriate method to avoid future mortalities from this new risk factor.
4. Dead Laysan finches will be sent to Dr. Thierry M. Work at the National Wildlife Health Center, Honolulu Field Station (U.S. Geological Survey-Biological Resources Discipline) for a necropsy. The method of shipment and preservation will be determined in coordination with Dr. Work.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The term "conservation recommendations" has been defined as suggestions from the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relates only to the proposed action and do not necessarily represent complete fulfillment of the agency's 7(a)(1) responsibilities for these species.

1. As described above, *Verbesina encelioides* has invaded several islands within the Monument and has decreased the utility of these invaded islands as habitats for many bird species. The Service recommends the personnel implementing monk seal research and enhancement activities learn to identify *V. encelioides* and document its presence on each island. If the plant is identified where it has not been documented in the past, the plants

should be photographed and their locations mapped or marked by GPS. This information should be shared with Mr. Barry Stieglitz, Project Leader for the Hawaiian and Pacific Islands National Wildlife Refuges and Northwestern Hawaiian Islands Marine National Monument.

REINITIATION-CLOSING STATEMENT

This concludes formal consultation on this action. As required in 50 CFR § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease pending reinitiation.

As stated in the Conclusion (above), the Service's finding of non-jeopardy is based in large part on the conservation measures. Should there be a failure to carry out any or all of the described measures, or if the measures are not effective, or if these measures are modified in any way without Service coordination, reinitiation of consultation will be required. If you have any questions regarding this Biological Opinion, please contact Aaron Nadig at (808) 792-9400.

Sincerely,

Jess Newton

Jess Newton
Acting Deputy Field Supervisor:
Geographic Division

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Appendix 1

TAKE PRIDE® IN AMERICA

Appendix 1: Terrestrial Quarantine Protocol

PAPAHANAUMOKUAKEA MARINE NATIONAL MONUMENT TERRESTRIAL QUARANTINE PROTOCOLS FOR MOVING BETWEEN ISLANDS AND ATOLLS AND PACKING FOR FIELD CAMPS

February 2008

The islands and atolls of the Papahanaumokuakea Marine National Monument (Monument) and the Hawaiian Islands National Wildlife Refuge are special places providing habitat for many rare, endemic plants and animals. Many of these species are formally listed as Endangered under the Endangered Species Act. Endemic plants and insects, and the predators they support, are especially vulnerable to the introduction of competing or consuming species. Such introductions may cause the extinction of island and reef endemics, or even the destruction of entire island ecosystem or reef ecological communities. Notable local examples include the introduction of rabbits to Laysan Island in 1902, which caused the extinction of numerous plant and insect species, and three endemic land bird species; the introduction of rats to many Pacific Islands causing the elimination of many burrowing seabird colonies; the introduction of the annual grass, sandbur, to Laysan Island where it has crowded out native bunch grass thus, eliminating nesting habitat for the Endangered Laysan finch; and, the introduction and proliferation of numerous ant species throughout the Pacific Islands to the widespread detriment of endemic plant and insect species.

Several of the islands within the Monument are especially pristine, and as a result are rich in rare and special plants and animals. Nihoa Island has at least 17 endemic and rare insect species, five endangered plants and two endangered birds. Necker Island has endangered plants and 11 endemic insects. Laysan Island has endangered plants, nine endemic arthropods and the endangered Laysan finch and Laysan duck. Other islands in the Monument, such as Lisianski, and islands in Atolls such as Pearl and Hermes Reef and French Frigate Shoals provide homes for a variety of endemic and/or endangered species and require special protection from alien species.

Other Pacific Island such as Kure and the "high islands" (Oahu, Hawaii, Maui, Kauai, etc.) as well as, certain islands within Midway Atoll, Pearl and Hermes Reef and French Frigate Shoals have plants and/or animals that are of high risk for introduction to the relatively pristine islands discussed above. Of special concerns are snakes, rats, cats, dogs, ants and a variety of other insect and plant species. Harmful plant species of highest concern that we know of are *Verbesina encelioides, Cenchrus echinatus,* and *Setaria verticillata.*

The Co-trustees are responsible for the management and protection of the islands, reefs and wildlife of the Monument. No one is permitted to set foot within the Monument without the express permission of the Co-trustees through the permitting process. Because of the above concerns, the following restrictions on the movement of personnel and materials throughout the Monument exist.

Definitions:

New Off the shelf and never used anywhere but the island in question.

Clothing All apparel, shoes, and socks, over and under garments.

Soft Gear All gear such as daypacks, fanny packs, packing foam or similar material, camera bags, camera/binocular straps, microphone covers, nets, holding or weighing bags, bedding, tents, luggage, or any fabric or material capable of harboring seeds, spores, or insects.

Frozen Sealed in a clean or new container and put in a freezer for at least 48 hours to kill any insects or animals and damage any seeds that may be harbored within.

The following conditions and rules apply to the all islands within the Monument with the exception of those at French Frigate Shoals and Midway Atoll:

General Rules:

1. Regardless of origin or destination, inspect and clean all equipment, supplies, etc., just prior to any trip to the Monument. Carefully clean all clothing, footwear and soft gear following use to minimize risk of cross contamination of materials between islands.

2. Pack supplies in plastic buckets with fitted lids or other sealable metal or plastic containers so they can be thoroughly cleaned inside and out. Cardboard is not permitted on the islands. Cardboard boxes disintegrate in a short time and harbor seeds, animals, etc., which cannot be easily found or removed. Wood is not permitted unless sealed on all surfaces. Wooden boxes can also harbor insects and seeds and therefore are only allowed if they are well constructed (tight fitting seams are required). All wood must be treated, and inside and outside surfaces must be painted or varnished to provide a smooth, cleanable finish that seals all holes.
3. Freeze or tarp and fumigate then seal all equipment (clothes, books, tents, everything) just prior to departure. Food and cooking items need not be fumigated but should be cleaned and frozen, if freezable. Cameras, binoculars, radios, and other electronic equipment must be thoroughly cleaned, including internal inspection whenever possible, but do not need to be frozen or fumigated. Such equipment can only be packed in wooden crates if treated as in #2 above. Any containers must contain new, clean packing materials and be frozen or fumigated.
4. At present, Tern Island is the singular exception to the above rule, having less stringent rules due to the large number of previously established alien species. Careful inspection of all materials and containers is still required. However, it is acceptable to use wooden and cardboard containers for transporting supplies to Tern Island. Also, there is no requirement for freezing or fumigating items disembarked at Tern. Although requirements for Tern Island are more lax, the Monument is still concerned about the possibilities of new introductions. Do not wear clothing to Tern Island that has been worn at Pearl and Hermes, Midway Atoll or Kure Atoll.

5. To avoid transport of seeds from within the boats used between island and atolls in the Monument the following steps must be taken. For islands with safe or sandy landing conditions, one should keep quarantine shoes/socks inside quarantine containers until the island is reached. One should go ashore bare foot, and then don the quarantine shoes. Non-quarantine shoes should be removed in the small boat, put into a bucket or some kind of sealed container, and left enclosed in that container until the person departs the island. The sealed container, if clean on the outside, may be taken ashore, but should not be opened ashore. For landings which are rocky, rough, and relatively unsafe (such as Mokumanamana and Nihoa) for safety reasons, quarantine shoes should be donned when inside the small boats, but care should be taken to look for seeds and insects which may be in the small boat and ensure they do not get ashore.

Rules Regarding Clothing and Soft Gear:
1. Any personnel landing boats at any island should have clean clothes and shoes.
2. Any personnel going ashore at any island and moving inshore from the immediate area in which waves are breaking at the time of landing must have new footwear, new or island specific clothes and new or island specific soft gear. All must be frozen for at least 48 hours prior to landing.
3. At the discretion of the local FWS representative, personnel from the NOAA ships or any other vessel servicing the Monument may be allowed on shore to visit pre-designated areas for guided tours. For such tours, personnel must have new footwear, new clothes and new soft gear all frozen for at least 48 hours prior to landing.
4. Any personnel entering any vegetated area, regardless of how sparse the vegetation, must have new footwear, new clothes and new soft gear all frozen for at least 48 hours prior to landing.
5. Clothing or gear coming off Kure and Midway should never be moved to any of the other refuge islands. During transit, clothing and gear coming off Kure and Midway must be carefully sequestered to avoid contamination of gear bound for cleaner islands. Special care must be taken to avoid contaminating gear storage areas and quarters aboard transporting vessels with seeds or insects from these islands.

Rules Regarding Food:
1. All fresh food is prohibited.
2. Tomatoes (any variety), ray sunflower seeds, alfalfa seeds, mustard seeds.
3. Bulk dried fruits are allowed but should be frozen solid for at least one day to kill any insects.
4. Seeds from sprouting species such as alfalfa, mustard and cress, commonly used for sprouted greens, could potentially become established and cannot be brought to the islands. Other species, such as mung beans, soy beans, and radishes, would not likely to survive on the islands and can be used for fresh greens.
5. Soil can contain many seeds, eggs, larvae, etc., and cannot be transported to or between islands.
6. All other food that can be safely frozen (this does not apply to food in cans or glass jars) must be packaged in air tight containers just as all other gear and frozen for 48 hours.

<u>Additional Rules for Travel to Nihoa and Necker (Mokumanamana) Islands</u>:
Nihoa and Mokumanamana are the most pristine locations in the Monument. Nihoa is home to the highest number of federally listed endangered species in the Monument. Many areas of these small rugged islands are inaccessible. Introduction of any alien species could have disastrous results in a very short time. It would be almost impossible to mount any kind of control or eradication program on these islands should an alien species become established. Because of these reasons, access to Nihoa and Mokumanamana are strictly limited, and rules governing entry are more stringent. Access to Nihoa and Mokumanamana by permittees will only be allowed under the accompaniment and supervision of a U.S. Fish and Wildlife Service (Service) Representative. The representative, who shall be appointed by the U.S. Fish and Wildlife Service Monument Superintendent, will work with permittees to assure careful compliance with all rules for inspection, handling and preparation of equipment. The Service Representative will have the authority to control and limit access to various parts of the island to protect animals, plants and archaeological sites, especially endangered species. The Service Representative will have the authority to disallow access to the island, or order an immediate departure from the island if conditions for working on the island are not met or are violated in any way.

1. All field equipment made out of fabric material or wood must be new and never previously used in the Northwestern or main Hawaiian Islands. Equipment previously purchased or made for use on Nihoa and Mokumanamana that has been carefully sealed and stored while away from Nihoa and Mokumanamana, and not used elsewhere, may also be brought onto the island. Rules for freezing and/or fumigating are as described for other sites in the Monument (see above).
2. Clothing, footwear (shoes, slippers, socks, etc.), daypacks (soft gear) must be new, unused, or previously only used on Nihoa (or Mokumanamana) and carefully sealed and stored while off of the island. Hard gear such as camera and equipment must be thoroughly cleaned and inspected.

<u>Additional Rules for Travel Within Pearl and Hermes Atoll</u>:
In recent years *Verbesina encelioides* has been introduced to Southeast Island within Pearl and Hermes Atoll. This noxious weed has taken over a large portion of the island. To prevent the further spread of this weed to the other islands within this atoll the following precaution must be taken:

1. Every person should have one set of quarantine gear and clothing for Southeast Island and one set of quarantine gear and clothing for all other islands in the atoll. For instance the same clothing, and if needed camping gear, may be used at North and Seal Kittery, but anything used at southeast needs to stay off all other islands in the atoll. Do not use the outer islet clothing and gear on Southeast Island.
2. Carefully inspect small boats and their associated equipment when traveling between islands at Pearl and Hermes Atoll. Since folks likely take one anchor ashore and put one anchor in the water there is potential for seed dispersal on anchor lines as well as from within the small boats. This needs to be watched very carefully.

Coastal Zone Management Act Correspondence

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

APR 08 2013

Mr. Leo Asuncion, Manager
Hawaii Coastal Zone Management Program
Department of Business, Economic Development, and Tourism
P.O. Box 2359
Honolulu, HI 96804

Dear Mr. Asuncion:

In coordination with the National Marine Fisheries Service (NMFS), Pacific Islands Regional Office, the NMFS Pacific Islands Fisheries Science Center has submitted a permit application to conduct a suite of Hawaiian monk seal recovery activities under the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA). This ESA-MMPA permit application has been submitted to the NMFS Office of Protected Resources. We have evaluated the recovery activities described in the permit application and have determined that issuance of the ESA-MMPA permit is consistent to the maximum extent practicable with the enforceable policies of the approved Coastal Zone Management Program of the State of Hawaii. This consistency determination is submitted in compliance with the federal consistency regulations, 15 C.F.R. Part 930.

The application is for a 5-year permit to conduct research and enhancement activities designed to help recover the endangered Hawaiian monk seal. A copy of the permit application is enclosed for your reference and additional information regarding the permit application and the proposed recovery activities may be viewed online at: http://www.nmfs.noaa.gov/pr/permits/monkseal16632.htm.

The research activities proposed in the permit application are intended to identify impediments to recovery, inform the design of conservation (or enhancement) measures, and evaluate those measures. These research activities include, but are not limited to: visual and photographic monitoring, tagging, health screening, foraging studies, deworming research, experimental translocation, behavioral modification research, and vaccination research.

Enhancement activities proposed in the permit application are designed to improve the survival and reproductive success of individual monk seals, with the intent to improve subpopulation and overall species' status. These enhancement activities include deworming, translocation, hazing and removal of aggressive adult male seals that harm or kill other seals, disentangling, dehooking, treating injured seals in the wild, behavioral modification, vaccination, and supplemental feeding of post-release rehabilitated seals.

Types of seal translocations proposed include translocation within the NWHI, within the MHI, and from the MHI to the NWHI. Translocation from the NWHI for release in the MHI as part of a two-stage translocation program is not included in the permit application.

Because Hawaiian monk seals have an expansive natural range, the geographic area in which the proposed research and enhancement activities could be conducted includes almost all shorelines and nearshore waters throughout the Hawaiian Archipelago, including the Northwestern Hawaiian Islands (NWHI) and main Hawaiian Islands (MHI). Nevertheless, the actual spatial "footprint" of the activities themselves would be quite small in comparison, and the activities would rarely occur repeatedly in any one location. The activities would also be quite limited in terms of intensity and duration. Only a limited number of staff (usually less than 10) and only one or two vehicles and/or small vessels would be involved in conducting any of the activities, and the activities would usually be completed in one hour or less. In addition, none of the activities would entail alteration of any structure, shoreline, or seafloor substrate, nor would any activity entail any new restriction on resource use or access. All of these factors, which we believe limit potential adverse effects on coastal uses and resources, were considered in reaching our consistency determination.

Before and during implementation of the activities proposed in the permit application, NMFS intends to conduct a suite of measures designed, in part, to mitigate potential adverse effects on coastal uses and resources that might result from implementing the proposed activities. These mitigation measures, which were also considered in our consistency determination, include:

- Avoiding, to the maximum extent practicable, implementation in areas known to be used extensively for recreational, cultural, historic, and/or economic purposes.
- Developing a *Management Plan for Hawaiian Monk Seals in the Main Hawaiian Islands* using a participatory planning methodology.
- Seeking regular advice from a *Hawaiian Monk Seal Recovery Team*, composed of experts in relevant topics, including fishing, ocean recreation, ocean industry, and cultural protocols.
- Ensuring staff training in recognition and avoidance of cultural resources and historic properties.
- Developing protocols regarding management, handling and removal of monk seals that enter fishponds.
- Conducting education and outreach regarding the proposed activities and other aspects of Hawaiian monk seal conservation and biology.
- Maintaining close coordination with relevant federal, state and county agencies.

We also note that the proposed activities, which are intended to promote the recovery of Hawaiian monk seals, appear to be consistent with Hawaii's *Ocean Resources Management Plan* (2009). The proposed activities appear to be particularly relevant to the following strategic action: "Enhance the conservation of Hawaii's marine protected species, unique habitats and biological diversity." Conservation of Hawaiian monk seals is mentioned specifically in the section of the plan that discusses this strategic action.

We look forward to coordinating with you and your staff on your agency's review of this consistency determination. Please contact Jeff Walters at (808) 944-2235 or *jeff.walters@noaa.gov* if there are any comments or questions.

Sincerely,

Michael D. Tosatto
Administrator

Enclosure

cc: John Nakagawa, Hawaii CZMP

Response by State of Hawai'i CZM Program

OFFICE OF PLANNING
STATE OF HAWAII

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

NEIL ABERCROMBIE
GOVERNOR

JESSE K. SOUKI
DIRECTOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://hawaii.gov/dbedt/op/

Ref. No. P-13949

April 16, 2013

Mr. Michael D. Tosatto, Regional Administrator
Pacific Islands Regional Office
National Marine Fisheries Service
1601 Kapiolani Boulevard, Suite 1110
Honolulu, Hawaii 96814-4700

Attention: Mr. Jeff Walters

Dear Mr. Tosatto:

Subject: Hawaii Coastal Zone Management (CZM) Program Federal Consistency Review for Hawaiian Monk Seal Recovery Activities

The Hawaii CZM Program has reviewed the proposal by the National Marine Fisheries Service (NMFS), Pacific Islands Fisheries Science Center, to conduct various Hawaiian monk seal recovery activities under the Endangered Species Act and the Marine Mammal Protection Act. We will not be responding to the NMFS coastal consistency determination for the proposed activities due to the preemption of Hawaii CZM enforceable policies that are relevant to the taking of marine mammals. (See the attached letter from Jane C. Luxton, NOAA General Counsel, to Frank R. Jimenez, General Counsel of the Navy, June 20, 2008.)

Thank you for coordinating with the Hawaii CZM Program. If you have any questions, please call John Nakagawa of our CZM Program at 587-2878.

Sincerely,

Jesse K. Souki
Director

Enclosure

c: Department of Land and Natural Resources,
Division of Aquatic Resources (w/o enclosure)

National Historic Preservation Act Section 106 Consultation - Determination Letter to SHPO

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

NOV 12 2013

Mr. William J. Aila, Jr.
Hawaii State Historic Preservation Officer
Department of Land and Natural Resources
1151 Punchbowl St.
Honolulu, HI 96713

Dear Mr. Aila:

The purpose of this letter is to transmit the determination of the National Marine Fisheries Service (NMFS) regarding our consultation pursuant to Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C.§ 740f, implementing 36 C.F.R. Pt. 800 (2008), for our proposed undertaking to implement a suite of Hawaiian monk seal recovery actions.

NMFS has completed the consultation process under NHPA Section 106, and has made a determination of no historic properties affected. This means that we have found there are historic properties present in the area in which the undertaking will occur, but the undertaking will have no effect, as described in 36 C.F.R. Pt. 800.16.(i), upon the historic properties.

The enclosed report is provided to present a summary of our NHPA Section 106 compliance process as well as to serve as documentation, as specified in 36 C.F.R. Pt. 800.11.(d), of our determination of no historic properties affected. Descriptions of the undertaking and its area of potential effects are provided in Sections 4 and 2 of the report, respectively. Descriptions of the steps taken to identify historic properties are presented in Sections 3 and 7 of the report, which describe the research methodology and consultation process, respectively. The basis for determining that no historic properties are affected is presented in Sections 8 and 9 of the report.

As specified in 36 C.F.R. Pt. 800.4.(d)(1), we are notifying all consulting parties of our determination (via transmittal of a letter and the enclosed report) and making the documentation (i.e., the enclosed report) available to the public via our website.

As indicated in 36 C.F.R. Pt. 800.4.(d)(1), if we do not hear from you within 30 days of your receipt of this letter and enclosed documentation, we will assume there is no objection to our determination.

We appreciate your and your staff's efforts during this NHPA Section 106 compliance process. Please contact Jeff Walters, at (808) 944-2235 or *jeff.walters@noaa.gov*, if there are any questions.

Sincerely,

Michael D. Tosatto
Regional Administrator

Enclosure

Appendix B

Comment Analysis Report

Hawaiian Monk Seal Recovery Actions
Programmatic EIS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ADDENDA

ACRONYMS AND ABBREVIATIONS

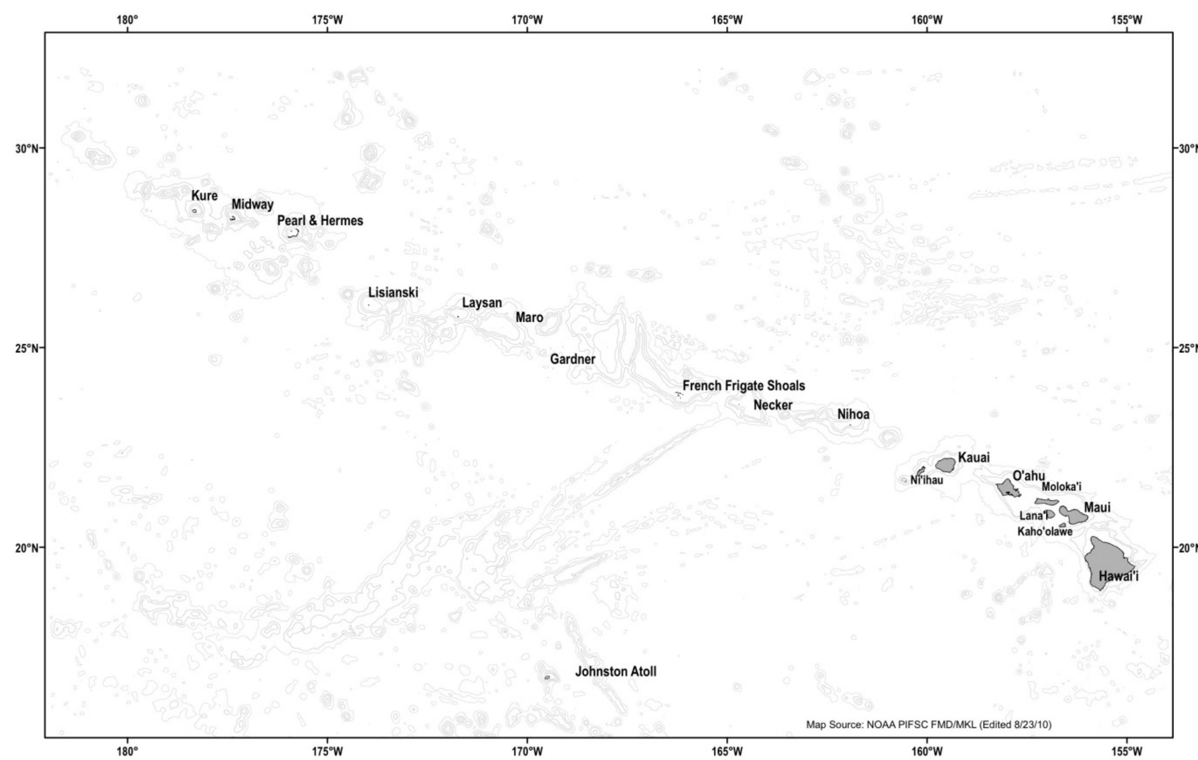
AWA	Animal Welfare Act
CAR	Comment Analysis Report
CFR	Code of Federal Regulations
DLNR	Department of Land and Natural Resources
ERM	ERM-West, Inc.
ESA	Endangered Species Act
FR	Federal Register
GnRH	gonadotropin-releasing hormone
HEPA	Hawai`i Environmental Protection Act
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
IACUC	Institutional Animal Care and Use Committee
ID	identification
MHI	main Hawaiian Islands
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NWHI	Northwestern Hawaiian Islands
PEIS	Programmatic Environmental Impact Statement
PIRO	Pacific Islands Regional Office
PIFSC	Pacific Islands Fisheries Science Center
PMNM	Papahānaumokuākea Marine National Monument
PSA	public service announcement
RFFA	Reasonably Foreseeable Future Action
SPZ	seal protection zone
U.S.	United States
UME	unusual mortality event
UH	University of Hawai`i
U.S.C.	United States Code

1.0 INTRODUCTION

The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) is responsible for management, conservation, and recovery of Hawaiian monk seals (*Monachus schauinslandi*), under the Endangered Species Act (ESA) (16 United States Code [U.S.C.] 1531 *et seq*.) and the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 *et seq*.). The NMFS Pacific Islands Regional Office (PIRO) and NMFS Pacific Islands Fisheries Science Center (PIFSC) are responsible for implementation of the Hawaiian Monk Seal Recovery Plan (NMFS 2007).

NMFS prepared a Draft Programmatic Environmental Impact Statement (PEIS) to assess the impacts of implementing specific research and enhancement activities to improve survival of Hawaiian monk seals. Conducting these activities and issuing a permit to conduct these activities constitute a federal action subject to compliance with the National Environmental Policy Act (NEPA) of 1969 (40 Code of Federal Regulations [CFR] Parts 1500 - 1508), a procedural law intended to facilitate better government decisions concerning any project that involves federal funding, work performed by the federal government, or permits issued by a federal agency.

Figure 1. Project Area Map



1.1 *THE ROLE OF PUBLIC COMMENT*

Solicitation of public comment on proposed research and enhancement activities is required under NEPA. Furthermore, NMFS must "assess and consider public comments both individually and collectively" (Title 40 CFR 1503.4). Most importantly, such comments are viewed by NMFS as critical in helping managers to shape responsible plans for Hawaiian monk seal recovery actions that best meet NMFS' mission.

During the formal comment period, the public reviewed and commented on the Draft PEIS on the proposed action. The comment period described in this document is part of a broader effort of public involvement and agency consultation described in Sections 1.8 and 5.6, and Appendix B (*Scoping Report*) of the Draft PEIS.

The comments received are analyzed and considered by NMFS management while developing the Final PEIS. Section 3.0, *The Comment Analysis Process*, of this Comment Analysis Report (CAR) provides a more complete discussion of how NMFS addresses public comments and the Executive Summary of the Final PEIS includes a summary of issues raised and where they were discussed in the Final PEIS.

1.2 *PUBLIC COMMENT PERIOD AND HEARINGS*

The Hawaiian Monk Seal Recovery Actions Draft PEIS was released for public review on August 12, 2011 on the project website: http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonkseal.htm.

The Notice of Availability (NOA) for the Draft PEIS was published in the *Federal Register* August 19, 2011 (76 Federal Register [FR] 51945), which began the official public comment period for this PEIS (see Attachment A). The public comment period lasted for 60 days and concluded on October 17, 2011. Six public hearings and an agency meeting on the Draft PEIS were held as shown in Table 1 below.

Table 1: Locations and Dates of the Public Hearings and Agency Meeting on the Draft PEIS

Location	Date	Time

Location	Date	Time
Honolulu, O`ahu	Monday, September 12, 2011	Agency Meeting: 10–11 a.m. Public Hearing: 5:30–8:30 p.m.
Kaunakakai, Moloka`i	Tuesday, September 13, 2011	Public Hearing: 6–9 p.m.
Hilo, Hawai`i	Wednesday, September 14, 2011	Public Hearing: 6–9 p.m.
Kīhei, Maui	Thursday, September 15, 2011	Public Hearing: 6–9 p.m.
Līhu`e, Kaua`i	Saturday, September 17, 2011	Morning Hearing: 9 a.m.–noon Evening Hearing: 4–7 p.m.

2.0 NUMBER OF COMMENTS RECEIVED

A total of 341 comment submissions were received from agencies and the public on the Hawaiian Monk Seal Draft PEIS as shown in Table 2. These submissions generated 1,180 substantive comments.

Table 2: Number of Public Comment Submissions By Type

Submission Type	Number of Submissions
Comment Letter (hard-copy or electronic, including e-mail attachments)	182
E-mail Message	48
Petition	1
Public Hearing Testimony	110
Total Number of Submissions	**341**

3.0 THE COMMENT ANALYSIS PROCESS

The analysis of public comments on the Draft PEIS was a multi-stage process that included coding, sorting, and summarizing public comment submissions into categories based on common themes.

All submissions including letters, testimony, and electronic comments were reviewed and logged into a database where each was assigned an automatic tracking number (Submission Identification [ID] number). When provided, the following information was also entered into the database: sender's name, address, affiliation (if any), type of submission (*i.e.*, individual submission or petition), date submitted, and comment text.

3.1 SORTING, ANALYSIS AND CODING

Each submission was reviewed by an analyst and divided into a series of 'comments', each having a unique Comment ID number. The goal of this process was to ensure that each substantive comment pertinent to the Draft PEIS was entered into the database. Substantive comments constitute assertions, suggested alternatives or actions, data, background information, or clarifications relating to the Draft PEIS document or its preparation. Analysts then assigned each substantive comment to an issue category as shown in Table 3.

Table 3: Issues Identified in Public Comments on the Draft PEIS

Issue	Issue Code	Number of Comments (includes double coded)
Alternatives	ALT	294
Behavior Modification	BEH	16
Cumulative Effects	CEF	37
Diseases	DIS	32
Ecosystem	ECO	27
Fisheries	FISH	176
General	GEN	181
Hawaiian Monk Seal Biology	BIO	78
Human-Seal Interactions	INT	49
Inadequate Information to Assess Effects/Unclear Information	INA	29
Management	MGT	28
Cultural	CUL	59
Public Coordination	PUB	36
Regulatory	REG	29
Socioeconomic	SOC	36
Translocation	TRAN	103
Total Number of Comments-Issues[1]		**1,210**

3.2 *COMMENT SUMMARY STATEMENTS*

A second review of the comments within each issue category was conducted to identify specific subcategories. These subcategories were then synthesized into succinct "Comment Summary Statements" that intend to capture the particular concern within each issue category. Comment Summary Statements are not intended to replace actual comments. Rather, they summarize for the reader the range of concerns on a specific issue.

Each Comment Summary Statement was given a three- or four-character code, identifying the general issue category (*e.g.*, DIS for Diseases), and numbered consecutively. For example, there are twenty-three Comment Summary Statements under ALT (ALT 01, 02, 03, etc.). Each substantive comment was assigned to one or more Comment Summary Statement depending

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[1] The number of actual substantive comments is 1,180 (Table 2). However, 30 comments were coded under two issue categories therefore resulting in 1,210 comment-issues.

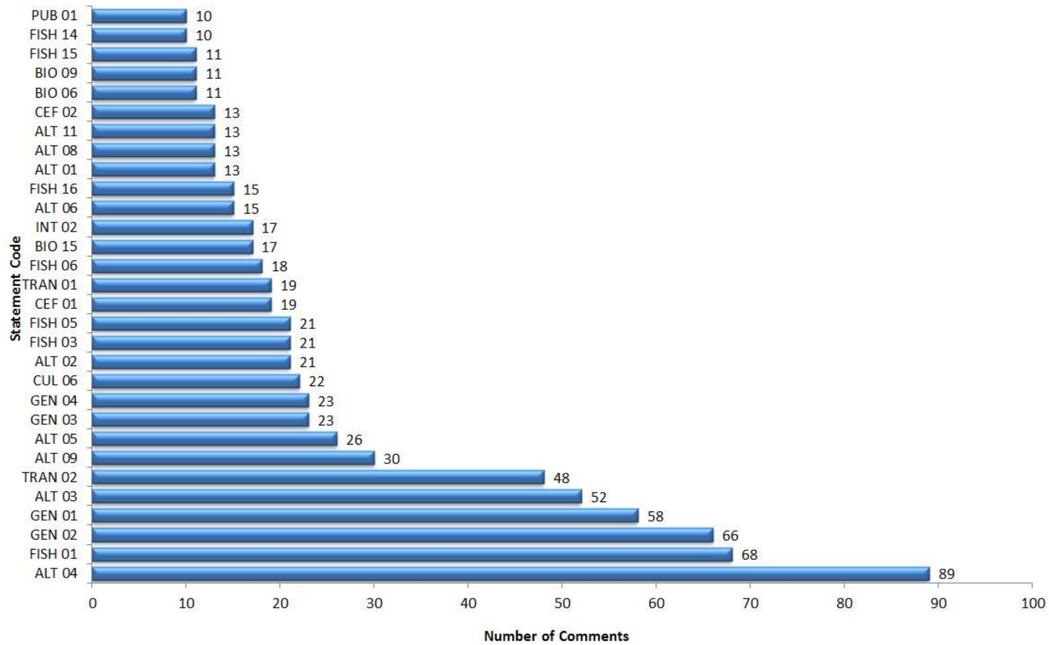
on content. Table 4 presents the entire list of Issues and the number of associated Comment Summary Statements within each category. Figure 2 shows the top 30 Comment Summary Statements with the highest number of comments.

Table 4: Number of Comment Summary Statements for each Issue

Issue	Number of Comment Summary Statements

Issue	Number of Comment Summary Statements
Alternatives (ALT)	23
Behavior Modification (BEH)	9
Cumulative Effects (CEF)	4
Diseases (DIS)	13
Ecosystems (ECO)	8
Fisheries (FISH)	16
General (GEN)	14
Hawaiian Monk Seal Biology (BIO)	17
Human-Seal Interactions (INT)	9
Inadequate Information to Assess Effects/Unclear Information (INA)	12
Management (MGT)	11
Native Hawaiian Concerns (CUL)	12
Public Coordination (PUB)	11
Regulatory (REG)	13
Socioeconomic Effects of Hawaiian Monk Seal Research and Enhancement (SOC)	10
Translocation (TRAN)	17

Figure 2. Top 30 Comment Summary Statements with the Highest Number of Comments



4.0 *RESPONSES TO PUBLIC COMMENTS*

NEPA requires government agencies to include in a Final EIS all the substantive comments received on the Draft. The Final document must include responses to the comments or comment summaries, and if changes to the Draft document are made as a result of those comments, indication of where they were made in the document.

This CAR provides a summary of the public comments and NMFS's responses to those comments on the Draft PEIS. Some public comments have been be responded to in their entirety within this CAR; other public comments refer readers to sections of the Final PEIS that provide additional information related to the comment. The Executive Summary of the Final PEIS summarizes where changes to the PEIS were made based on public comments. Responses to comments are organized by Comment Summary Statements and their associated code *(i.e.*, ALT 01).

To find responses to specific comments summarized in this section:

1. Look up the name of the organization's or individual's name in the Submission Index (Attachment B).
2. Note the Comment Summary Statement or Statements (*i.e.*, ALT 05, BEH 02, etc.) associated with that submission.
3. Return to this section to read the response.

ALT Alternatives

ALT 01 Comments in support of Alternative 1 Status Quo (no rationale provided).

Response: Despite the fact that Alternative 1 does address many of the Recovery Plan objectives (see Section 3.3.1.8) to varying degrees, Status Quo efforts have not reversed the decline. In addition, mitigation of disease risk and reduction of unmanageable human-seal interactions would be very limited under Alternative 1 measures.

ALT 02 Comments in support of Alternative 2 No Action, including comments that there would be no monk seal mortalities under this alternative because permitted take of seals would stop.

Response: The research and enhancement actions proposed in the Preferred Alternative would prevent far more mortalities than would be permitted as takes. The lack of future research and enhancement permits under Alternative 2 would likely result in higher monk seal mortality from the absence of activities like disentanglement or translocation of pups away from harmful situations. With the exception of activities that could be accomplished without permits, or those that are under the auspices of stranding response, none of the objectives of the Recovery Plan would be attained. Please also see response to ALT 16.

ALT 03 Comments in support of Alternative 3 Limited Translocation, including comments that prohibition of moving monk seals to the MHI would reduce undesirable human contact and comments that Alternative 3 is a win-win for monk seals and fishermen because it will help seals and allow fishermen to fish.

Response: While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does *not* include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI. However, a variety of translocation actions could occur under Alternative 3, including two-stage translocation *within* the NWHI, *within* the MHI, or from the MHI to the NWHI, with the option of returning the seals to their birth location or nearest appropriate site at age 2 years and older.

Implementing two-stage translocations from the NWHI to the MHI under Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation.

The necessary monitoring and intervention protocols are the same in Alternatives 3 and 4 and could be further developed under Alternative 3 (Preferred). NMFS would also conduct other important seal research and enhancement activities under Alternative 3 and engage the public in an effort to address concerns raised during the Draft PEIS public comment process. Some of these concerns were related to undesirable contact or interaction between humans and seals, which appear to be on the rise due to the naturally increasing population of monk seals in the MHI. This is occurring despite the fact that there are no current translocations to the MHI.

NMFS concluded that Alternative 3 would best achieve project goals consistent with the purpose and need statement, and complies with the various goals, objectives and requirements of the ESA, MMPA, and other applicable laws. Alternative 3 constitutes the most effective implementation of key elements in the Recovery Plan and is the agency's Preferred Alternative. It is a very broad program, including research on population biology, ecology, health studies, foraging research, and a suite of enhancement activities and tools designed to mitigate existing and emerging threats to the species.

As described in Section 5.6 of the Draft PEIS, NMFS has developed and disseminated guidelines for fishers and others to follow to prevent and mitigate human-seal interactions. Outreach and collaboration with fishers and other community members to further prevent and mitigate interactions was recommended in Draft PEIS Sections 5.6.3, 5.6.4 and 5.6.5. NMFS recognizes that even with effective guidelines, and outreach and collaboration in place, some human-seal interactions will likely still occur. In these cases, the most effective means of addressing this are the seal behavior modification measures proposed under both Alternatives 3 and 4.

In extreme cases, even seal behavior modification methods may not be effective and translocating seals away from populated areas may be necessary, and this measure is included in Alternatives 3 and 4. NMFS recognizes that no action or combination of actions proposed in the PEIS would completely eliminate the possibility of any and all human-seal interaction. NMFS believes that Alternative 3 (the Preferred Alternative) provides the best balance between actions to benefit monk seals while minimizing the impact of human-seal interactions.

In terms of adverse impacts on fishermen resulting from human-seal interactions, Sections 4.9.1 thru 4.9.3 in the Final PEIS (Environmental Consequences of the Alternatives on commercial, subsistence and recreational fisheries, respectively), have been revised to reflect a re-evaluation of potential impacts of the Alternatives on fisheries. This re-evaluation takes into consideration public comments, and additional information and analysis. Regarding the concern about continuing to allow fishermen to fish, the proposed action would implement research and enhancement activities under existing authorities and no new fishing restrictions or regulations are proposed under any Alternative.

ALT 04 ***Comments in support of Alternative 4 Enhanced Implementation. This alternative is the best option to promote the survival of Hawaiian monk seals and gives scientists a flexible, complete set of management tools. The evaluation of Alternative 4 in the PEIS is thorough and thoughtful. Promotion of monk seal reproduction is necessary to prevent the extinction of the seals. The benefits of this alternative outweigh the risks.***

Response: While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS (see response to ALT 03). The distinction between these two Alternatives is that Alternative 3 (Preferred) does not include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI.

Implementing two-stage translocations from the NWHI to the MHI under Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation.

The necessary monitoring and intervention protocols are the same in Alternatives 3 and 4 and could be further developed under Alternative 3 (Preferred). NMFS would also conduct other important seal research and enhancement activities under Alternative 3 and engage the public in an effort to address concerns raised during the Draft PEIS public comment process. Some of these concerns were related to undesirable contact or interaction between humans and seals, which appear to be on the rise due to the naturally increasing population of monk seals in the MHI. This is occurring despite the fact that there are no current translocations to the MHI.

NMFS concluded that Alternative 3 would best achieve project goals consistent with the purpose and need statement, and complies with the various goals, objectives and requirements of the ESA, MMPA, and other applicable laws. Alternative 3 constitutes the most effective implementation of key elements in the Recovery Plan and is the agency's Preferred Alternative. It is a very broad program, including research on population biology, ecology, health studies, foraging research, and a suite of enhancement activities and tools designed to mitigate existing and emerging threats to the species.

ALT 05 Comments opposing Alternative 2 No Action including comments that Alternative 2 does not do enough to help save Hawaiian monk seals.

Response: NMFS agrees that Alternative 2 would not contribute to Hawaiian monk seal recovery because all research and enhancement activities currently permitted would cease in 2014, and that higher monk seal mortality could further imperil the survival and recovery of the species in the absence of recovery activities, which is inconsistent with ESA and MMPA objectives.

ALT 06 Comments opposing Alternative 1 Status Quo including comments that Alternative 1 does not help protect Hawaiian monk seals.

Response: NMFS agrees that although Alternative 1 does address many of the Recovery Plan objectives (see Section 3.3.1.8) to varying degrees, Status Quo efforts have not reversed the decline and are unlikely to be sufficient in the future unless supplemented by additional interventions.

ALT 07 Comments opposing Alternative 3 Limited Translocation because it subjects seals to testing for a long time.

Response: NMFS' priority for this program is monk seal recovery, by enhancing the long-term survival of the species. All NMFS activities that involve "take" of monk seals (whether associated with research or enhancement activities) must be authorized under the ESA and MMPA. NMFS has conducted scientifically rigorous controlled studies and believes that its activities are safe for monk seals and do not cause adverse impacts on the monk seal population (Baker and Johanos 2002). Any permits issued would contain mitigation measures to avoid and minimize adverse impacts to individual monk seals and the population.

ALT 08 Comments opposing Alternative 4 Enhanced Implementation (no rationale given).

Response: NMFS acknowledges that some comments received did not support Alternative 4 as the Preferred Alternative. While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS (see response to ALT 03 and Alt04). The distinction between these two Alternatives is that Alternative 3 (Preferred) does not include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI.

Implementing two-stage translocations from the NWHI to the MHI under Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation.

ALT 09 NMFS needs to evaluate predator removal or supplemental feeding in the NWHI more thoroughly as alternatives in the PEIS. The PEIS is incomplete without considering these concepts and the rationale that there is a "lack of sufficient information" used to dismiss this alternative is inadequate. What is so hard about managing predators? Open up fishing in the NWHI.

Response: NMFS has considered reduction of competition and predation (PEIS Section 2.11.1) to benefit monk seals. With regard to competition, one alternative considered but discarded was to reduce populations of large predatory fish in the NWHI (Papahānaumokuākea Marine National Monument [Monument]) as a way to increase survival of Hawaiian monk seals. This proposal is based on the hypothesis that one of the primary factors limiting monk seal recovery in the NWHI is predation and direct or indirect competition with other predatory species such as sharks and jacks.

NMFS currently lacks sufficient information on NWHI food web dynamics to make a reliable prediction whether predator reduction would be an effective method for improving juvenile monk seal survival without unintended consequences. Compared to all other actions proposed in the preferred alternative, the results of large-scale predator management/removal is far more uncertain. It is not the ability to remove fish that is uncertain, but rather whether it would benefit monk seals without having unanticipated and undesirable environmental consequences. NMFS is not dismissing this concept indefinitely and plans to investigate it further with other agency and independent scientists outside the context of the PEIS. However, the time required to gather sufficient data in order to understand the impacts and effectiveness of reducing predatory fish populations would not be timely for the recovery of the monk seal – which makes predator reduction inconsistent with the Purpose and Need of this PEIS.

Removal of sharks that prey on seal pups at French Frigate Shoals has already been permitted and has been subject to the NEPA process, and the actions subject to this PEIS would complement these ongoing actions. Information regarding the effectiveness of predator removal is still being developed, and such activities alone are not expected to reverse the decline of the monk seal population.

NMFS has evaluated supplemental feeding and included the potential for feeding seals released to the wild in the NWHI after captive care in Alternatives 3 and 4. NEPA requires us to discuss a reasonable range of alternatives to the proposed action. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint, using common sense. Constructing and operating a captive facility (where monk seals could be fed) in the remote NWHI (PEIS Section 2.11.2) is not being analyzed because it is deemed logistically and economically infeasible. Furthermore, even assuming the necessary funding and technical support to build such a facility, the immediate need for monk seal recovery efforts, makes such an approach impractical and would not meet the purpose and need for the action (see also response to ALT 14).

ALT 10 I do not support reducing populations of large predatory fish.

Response: Limited removal of Galapagos sharks is currently permitted in some areas of the NWHI (i.e., French Frigate Shoals) to reduce direct predation on monk seals. The potential effectiveness of large-scale removal of large predatory fish (such as sharks and jacks) that compete with juvenile monk seals for food is uncertain. However, the time required to gather sufficient data in order to understand the impacts and effectiveness of reducing predatory fish populations would not be timely for the recovery of the monk seal – which makes predator reduction inconsistent with the Purpose and Need of this PEIS. It is uncertain whether such action would necessarily benefit monk seals without having other unanticipated and undesirable environmental consequences. This proposed action addresses research and enhancement activities under ESA and MMPA that are currently authorized and that may result in directed take of monk seals for the purpose of enhancing the species' survival and recovery. Please see the response to ALT09 for additional information.

ALT 11 No alternative should include moving seals from the NWHI to the MHI. If seals move here of their own accord, that is acceptable but NMFS should not be moving seals. NMFS should focus their resources on building a healthy population of Hawaiian monk seals that should be kept in the NWHI. NMFS should focus on where seals are born before managing seals in the MHI.

Response: NMFS is focused on building healthy populations of monk seals throughout the species' range, including both the NWHI and MHI. In the Draft PEIS, Alternative 4 was Preferred. However, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS (see response to ALT 03). Despite this, Alternative 4 meets the Purpose and Need for this PEIS and is therefore included for analysis. The distinction between these two Alternatives is that Alternative 3 (Preferred) does not include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI.

Implementing two-stage translocations from the NWHI to the MHI under Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation.

ALT 12 Using Palmyra as a wildlife refuge for monk seals should be considered a viable alternative in the PEIS. NMFS should consider restoring the historic range of the population of Hawaiian monk seals to Johnston Atoll, Christmas Island, Bismarck Island Chain or Kiribati Island.

Response: The known historical range of Hawaiian monk seals includes only the Hawaiian Archipelago and Johnston Atoll (Section 3.3.1.1), areas of which comprise the project area for this PEIS. There are no known sightings of monk seals at Palmyra, Christmas Island, the Bismarck Archipelago, nor Kiribati. Translocations to Johnston Atoll could occur under Alternatives 3 and 4, but if undertaken, would be done with much caution. Johnston Atoll is considered part of the monk seal's natural range, because of sporadic sightings of seals there over the past several decades. However, Johnston Atoll has never been known to host a self-sustaining population of seals. Monk seals do not seem to persist at Johnston Atoll for long periods and adult males that have been translocated to the atoll have not remained there very long (Baker et al. 2011). It may be that Johnston Atoll is not well suited as monk seal habitat, or perhaps there simply have not been enough seals to achieve the social cohesion necessary for a sustained resident monk seal population. NMFS has not dismissed the potential for a Johnston Atoll seal population and translocations to this site could occur as part of the proposed action.

ALT 13 Until cumulative effects of the entire Hawaiian monk seal recovery program as well as other NMFS management actions such as designating monk seal critical habitat and including monk seals in the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) are addressed, only Alternative 2 No Action can be supported.

Response: Please see the response to CEF 01.

ALT 14 NMFS should consider building a facility in the NWHI to help Hawaiian monk seals. The PEIS states that this alternative would be cost prohibitive and logistically challenging but how much will the proposed two-stage translocation cost? The PEIS does not include how much translocation will cost. NMFS can't say one alternative is cost prohibitive and another isn't if the costs are not presented in the PEIS.

Response: NMFS does not expect to incur substantial costs above the fiscal year 2009-2010 program operating budgets to begin implementing the translocation plan. This is especially true because Alternative 3 has been selected as the Preferred Alternative in the Final PEIS (please see response to Alt 11). By foregoing the option to conduct two-stage translocation between the NWHI and MHI, some costs associated with monitoring, mitigating human- and translocated-seal interactions, and perhaps quarantine costs may be reduced. NMFS has a history of successful translocations between islands in the NWHI (Baker et al. 2011). The proposed translocation plan has a strong foundation in science and the past experience of the research program. NMFS is confident that the translocations proposed under Preferred Alternative 3 could be accomplished within the existing field program infrastructure (i.e. using existing staff hired for the field camps, already-scheduled cruises to deploy and pick-up the field camps).

On the other hand, the concept of building a facility in the NWHI to provide long-term care for Hawaiian monk seals in captivity is logistically and economically infeasible at this time. The NWHI have been designated as the Papahānaumokuākea Marine National Monument, as well as a United Nations World Heritage Site. Human impacts in the Monument are minimized and heavily regulated to protect the native ecosystem. All access is subject to strict permitting requirements. Construction of a facility to hold monk seals in captivity in the NWHI could theoretically be possible at a site such as Midway Atoll, which has a working runway and other infrastructure. However, given the immediate need for monk seal recovery efforts and the many years that would be required to plan, permit, build and fund such a facility in the NWHI (if it could even be done), such an approach is impractical and does not meet the Purpose and Need of this PEIS. NMFS has provided additional discussion of the alternatives considered but not carried forward in the Final PEIS (PEIS Section 2.11).

ALT 15 I support Alternative 3 but am concerned about some of the intrusive research that it includes.

Response: Section 1.5 lists all the federal laws that NMFS researchers must abide by in order to do intrusive research on monk seals. Laws such as the Animal Welfare Act (AWA), MMPA, and ESA include strict requirements for minimizing impacts on the seals from research. The AWA requires that research on mammals be overseen by an Institutional Animal Care and Use Committee (IACUC), as described in Section 2.6.1.1 of the PEIS. For Hawaiian monk seal research, NMFS uses the IACUC established by the University of Hawai'i (UH) in addition to the NMFS IACUC as a form of independent review and because UH personnel are involved in much of the research. The purpose and functions of the IACUC include such things as inspecting and reporting on the facilities program for humane care and use of research animals; investigating complaints concerning animal welfare; and suspending activities related to the care and use of animals if deemed necessary.

Obtaining an ESA-MMPA permit to do research on an endangered marine mammal is a rigorous process that involves reviews by outside experts, including veterinarians and scientists. The ESA and MMPA permitting requirements are summarized in Section 2.6.3. These include, among other things, a requirement that the research activity is conducted in a humane manner and does not present unnecessary risks to the health and welfare of marine mammals. Humane methods are those involving the least amount of pain and suffering as is practicable. ESA-MMPA permits contain numerous conditions to minimize impacts to the seals from research. These are listed in Section 4.7 of the PEIS.

ALT 16 ***We support Alternative 2 because it will allow time for the NWHI to recover from overfishing and allow NMFS to stand back and reevaluate other alternatives available. Alternative 2 also reduces NMFS's expenditures while preparing for the future when Permit 10137 expires. Alternative 2 would protect monk seals from human intervention and decrease human contact, which might be best.***

Response: It is unclear whether fishing in the NWHI had an effect on monk seal foraging success, survival, and recovery. The cessation of the lobster fishery has apparently not resulted in a significant recovery of lobster stocks. The closure of the NWHI bottomfish fishery may result in an increase of those prey resources for monk seals, but it is not certain. What is certain is that the population of monk seals is continuing to decline in the NWHI. Without an ambitious recovery program, the population may decline to a point where recovery is highly unlikely. The activities proposed in the Preferred Alternative aim to increase the number of seals in the population and mitigate sources of mortality. Alternative 2 would not allow NMFS and its partners to implement the proposed behavior modification program and fisheries impact mitigation program, both proposed in the Preferred Alternative. Moreover, selection of Alternative 2 would result in the cessation of research and enhancement activities that have proven beneficial to the species in the past and prohibit the most promising new activities proposed for the future. NMFS would also be unable under Alternative 2 to evaluate population trends and know whether the various populations were recovering or declining further. Under the preferred alternative, NMFS would have the authorization to intervene at the appropriate level to foster the species recovery. Please also see response to ALT 02.

ALT 17 ***The evaluation of Alternative 4 in the PEIS is problematic. The PEIS states that potential impacts on commercial, subsistence, and recreational fishing of bringing 200 more seals to the MHI would be negligible. But the Federal Register notice for monk seal critical habitat states that this number of monk seals may impact the amount of prey species; therefore, there may be restrictions on the spatial and temporal extent of commercial fisheries.***

Response: As noted above, while Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS (please see response to Alt 03). Nevertheless, please note that Sections 4.9.1 thru 4.9.3 in the Final PEIS (Environmental Consequences of the Alternatives on commercial, subsistence and recreational fisheries, respectively), have been revised to reflect a re-evaluation of potential impacts of the Alternatives on fisheries.

This re-evaluation takes into consideration public comments, and additional information and analysis. The re-evaluation still leads to the conclusion that Alternative 4 would have negligible impacts on fisheries. Implementation of Alternative 4, if selected, would result in a maximum of 60 temporarily translocated seals in the MHI at any given time (Section 4.9.1.4 of PEIS). While under Alternative 4 a total of 200 weaned pups could be translocated to the MHI from the NWHI over a 10-year period, at most only 60 of these seals would be in the MHI at any given time since they would be returned to the NWHI when they reach 2 or 3 years of age. The analysis associated with the proposed rule to re-designate critical habitat for Hawaiian monk seals is based on the entire population of Hawaiian monk seals, including the naturally occurring population in the MHI, which exceeds the number of seals that could be temporarily translocated under the 2-stage translocation action included in Alternative 4.

In section 4.9.1 of the PEIS, we acknowledge that additional fish consumption by seals may occur if seals were translocated to the MHI. However, Hawaiian monk seals are known to prey on a wide variety of fishes, cephalopods (e.g., octopus), and crustaceans (e.g., crabs), some of which are not eaten or used by people. Further, fish eaten by monk seals would not necessarily have otherwise been available to fishermen. For example, those fish may have been eaten by another predatory fish, seabird, or marine mammal. Hawaiian monk seals are also known to forage over a wide range of areas, both in terms of depth and variety of habitats, many of which are not used by commercial fishermen.

The proposed rule to revise critical habitat and the PEIS are two separate monk seal conservation initiatives under consideration by NMFS. The ESA requires that NMFS consider the economic impacts of a critical habitat designation. This separate process is ongoing, and no final decision as to critical habitat has been made.

In the Final PEIS, Sections 4.9.1 thru 4.9.3 (Environmental Consequences of the Alternatives on commercial, subsistence and recreational fisheries, respectively), have been revised to reflect a re-evaluation of potential impacts of the Alternatives on fisheries. As part of the cumulative impact assessment on the socioeconomic environment in the Final PEIS, NMFS has also re-evaluated the impacts to fisheries that may result from the proposed research and enhancement activities and the critical habitat designation. Updates regarding the critical habitat designation may be found at: http://www.fpir.noaa.gov/PRD/prd_critical_habitat.html.

ALT 18 ***Though it may be out of the scope of the PEIS, NMFS should address juvenile survival and starvation through more focused management of fishery resources. The recovery of key prey species is vital as this important food resource is currently depleted. For example, stocking depleted lobster stocks or enhancing prey habitat might boost prey recovery.***

Response: This PEIS only applies to activities that involve direct interaction with monk seals requiring an ESA/MMPA permit, and general modification to fisheries resources management is not included in the alternatives considered. Although NMFS agrees that an effective monk seal conservation program would draw from and incorporate other management programs, at this point it is speculative to conclude that the recommended actions would enhance recovery of the monk seal.

There is currently no evidence that stocking depleted lobster stocks would enhance monk seal recovery, or that it would address the purpose and need identified in this PEIS. As described under the response to ALT 16, there is currently a lack of sufficient information on NWHI food web dynamics to reliably predict whether stocking lobster would be an effective method for improving juvenile monk seal survival without unintended consequences. Please also refer to section 2.11 in the PEIS for more discussion related to this comment.

ALT 19 Is the reason NMFS wants to bring seals to the MHI because no researchers want to live up in the NWHI where there are no cars or facilities?

Response: NMFS researchers do spend several months each year living in the NWHI in very rudimentary field camps. Each year, the number of researchers applying for temporary field camp jobs far exceeds the number of vacant positions. The lack of cars and facilities in the NWHI was unrelated to selection of translocation source or recipient sites (see Appendix E of Draft PEIS).

ALT 20 We support components of Alternatives 3 and 4 including: partnering with the State to develop a detailed outreach plan; consultation with the Department of Land and Natural Resources (DLNR) to identify translocation sites; a detailed monitoring plan; improved messaging plan emphasizing that translocation would be a pilot program; frequent communication with the State and development of a communication plan to alert State authorities for coordinating monitoring, outreach, and enforcement, and direct involvement in NOAA's decision framework.

Response: NMFS values its ongoing partnerships with DLNR and other state agencies regarding Hawaiian monk seal recovery, and will continue to place these partnerships among its highest priorities. This partnership entails developing and implementing all of the elements (outreach plan, etc.) listed in this comment. NMFS has provided a grant to DLNR under Section 6 of the ESA to help support DLNR's involvement in some of this work. See Section 5.6.3 of the PEIS for more description of how NMFS intends to work in collaboration with DLNR and other partner agencies and stakeholders.

ALT 21 The principal threats described in the 2007 Hawaiian Monk Seal Recovery Plan and the biological and ecological factors limiting monk seal recovery are not sufficiently addressed by any of the proposed alternatives. Merely increasing the scope of research is not a sufficient way to address the decline.

Response: NMFS believes that the actions proposed in Alternative 3 and 4 do more than merely increase the scope of research, they also propose new enhancement activities designed to increase the survival of the species. Research by itself is an important component of any effective long-term recovery action. In addition to necessary research, NMFS is also undertaking enhancement activities that will provide a more immediate conservation benefit. For example, there are several important new actions, including vaccinations (Appendix D), seal behavioral modification (Section 2.5), and temporary 2-stage translocation (Appendices E and F), that have been carefully developed and evaluated by NMFS and its scientific research partners to be the most promising and feasible actions that can be taken to address the principal threats described in the recovery plan. These threats include infectious disease, poor juvenile survival (food limitation), and human-seal interactions.

ALT 22 The controversial component of Alternative 4, translocation of seals to the MHI, is misunderstood. Only a limited number of female pups would be brought to the MHI and then after three years, would be returned to the NWHI. This would not result in a noticeable increase of seals in the MHI.

Response: As noted previously (please see response to Alt 03), NMFS has selected Alternative 3 as the Preferred Alternative in the Final PEIS, which precludes translocating weaned pups from the NWHI to the MHI as part of two-stage translocation.

Implementing two-stage translocations from the NWHI to the MHI under Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation.

ALT 23 The proposed alternatives are just modified versions of management actions already in place that have not reduced the decline in the monk seal population. NMFS should consider more management options.

Response: NMFS agrees that many elements of the alternatives are research and enhancement (or management) actions that have been in place for varying periods of time. Because this is a Programmatic EIS, all proposed actions requiring a permit under the MMPA or ESA and not otherwise covered under other NEPA documents, including those elements already in existence and new activities, are evaluated. NMFS disagrees that past actions have not reduced the rate of decline of the monk seal population. Actions such as disentanglement, de-hooking, mitigation of male aggression, and translocation have been successfully used to prevent monk seal mortalities. We acknowledge that past actions have been insufficient to halt or reverse the population decline, but NMFS contends that its actions have slowed the decline compared to what it would have otherwise been.

NMFS believes that an effective conservation program consisting of past actions that have proven successful in conjunction with previously unused methods is necessary to mitigate and reverse the population decline. For example, vaccination (Appendix D), behavioral modification (Section 2.5), two-stage translocation (as described in Appendices E and F and limited to the scope of the Preferred Alternative 3), and supplemental feeding (Section 2.5) are all programs and actions that currently do not exist. Further, NMFS will continue its efforts to identify new management options that may be effective in arresting the decline. Any new management options not covered by this PEIS will be fully analyzed in future NEPA evaluations.

BEH Behavior Modification

BEH 01 Hawaiian monk seals that have shown aggressive behavior should not be euthanized. Euthanizing seals is disrespectful and should not happen.

Response: Although every animal is important in a small population that continues to decline, concern for the overall species must be our priority. Since extremely aggressive males can threaten the lives of young seals, including the young females crucial to the species' future survival, the Recovery Plan for the Hawaiian Monk Seal (NMFS 2007) identifies male aggression as a threat to the species, and every option has to be explored to reduce the threat.

Available information confirms that increasing the rate of female pup survival is essential to achieving population recovery, given the reproductive potential that the female contributes to the species. Males are generally less essential to ensuring population viability, and when males injure or harm female pups, removal of the male from the population is more easily tolerated. In these extreme cases, there may be no other available option; but the decision to lethally remove an animal is only made after careful evaluation of the situation and after exhausting all other available options (*e.g.* translocation to an alternate site as long as other seals would not be endangered, removal to permanent captivity, or administration of medicine to alter aggressive behavior). If seals are euthanized, the methods used must be in accordance with the American Veterinary Medical Association's guidelines on euthanasia (AVMA 2013) and in a humane manner that involves the least possible degree of pain and suffering possible to the animal involved (50 CFR 216.3).

BEH 02 How does NMFS know that behavior modification or chemical alteration of aggressive male behavior will work? Why can't NMFS just move seals instead of injecting them with chemicals? What happens if seals that are not aggressive are given hormones? NMFS has stated they want to keep wild seals wild but injecting chemicals does not uphold this statement.

Response: NMFS does not and cannot know whether behavioral modification or chemical treatment of aggressive males will have the desired effect until these methods are tried. Promising methods, especially those that have been successful in other species, will be tried in an experimental fashion (*e.g.*, on captive seals) and the results interpreted to refine methods (Section 2.5). Any techniques that have risks will be employed cautiously until they are proven safe.

Aggressive males may still be moved (translocated), brought into captivity, or euthanized to mitigate injury and mortality to other seals. All of these methods have some disadvantages. For example, translocation can be expensive, slow, and logistically complicated. Further, there is often no good location to bring an aggressive male where he will not pose a threat to other seals.

As described in Section 2.5, it is desirable to develop an alternative tool for mitigating male aggression that is effective, humane, feasible, affordable, and reversible. Gonadotropin-releasing hormone (GnRH)-inhibiting drugs have been used to successfully suppress aggressive behavior in other species, and NMFS believes it is worthwhile to explore their efficacy in monk seals. NMFS would not give GnRH-inhibiting drugs to seals unless there is compelling evidence that the seal has been involved in aggressive behavior that is a threat to adult females or young animals of either sex.

Aggressive males are identified based on field observations that document an individual male's involvement in multiple aggressive interactions. NMFS only intervenes with aggressive males when their behavior is extreme and a strong threat to other seals. While NMFS acknowledges that use of chemical remedies is not generally desirable, the alternative methods (translocation, captivity, lethal removal) are all arguably more extreme than successful chemical treatment would be. The latter would allow seals to remain living wild in their native habitat without presenting a persistent threat to other seals' survival.

BEH 03 The behavior modification program will be important for the future of Hawaiian monk seals in the MHI independent of the two-stage translocation program. The population of Hawaiian monk seals is naturally increasing in the MHI, therefore interactions between humans and seals are also increasing. Given this, NMFS should reevaluate the lack of behavior modification under Alternative 2 which would likely result in a negative impact on the human environment.

Response: NMFS agrees that behavioral management of monk seals in the MHI will be important as the population continues to naturally increase. The Final PEIS evaluates the potential impacts of both Alternatives 1 and 2 on the social and economic environment (Section 4.9), taking into account the naturally increasing monk seal population in the MHI, and the lack of a behavioral management program in those two alternatives. The discussion of impacts of Alternatives 1 and 2 stresses that numerous activities to promote monk seal recovery would not be accomplished under these alternatives, including reducing unmanageable human-seal interactions.

BEH 04 Behavior modification talks about keeping wild seals wild. Bringing seals to the MHI is not keeping wild seals wild, it's intermingling them.

Response: NMFS recognizes that it is generally desirable to avoid habituating wild animals, including monk seals, to human presence. Of the nearly 200 monk seals currently in the MHI, there are only a few that have displayed behaviors that we would consider "socialized" or "conditioned" to humans. NMFS acknowledges that some seals may also have an impact on local fishermen. For this reason, behavior modification is proposed under Alternatives 3 and 4 to help minimize potential interactions between seals and humans.

As a percentage of the whole MHI population, most seals in the MHI behave like other wild seals in the NWHI and tolerate humans at a reasonable distance, but do not seek out human interaction. Moreover, under Alternative 3 (Preferred), NMFS will not be bringing weaned pups from the NWHI and releasing them in the MHI (see response to Alt 03).

PEIS Section 5.4 describes the plans for developing a detailed behavioral management program, and as described in Chapter 5.6, NMFS will continue to work with its state partners and the volunteer response programs to monitor seals and intervene if seals begin displaying potentially problematic behavior.

BEH 05 There must be a better alternative than chemical alteration of seals. Please do not chemically manipulate young male seals.

Response: See responses to BEH 1 and BEH 2. NMFS acknowledges that chemical alteration of aggressive behavior is not ideal, and is not the first option for dealing with aggressive male seals. Aggressive interactions between adult male seals and smaller seals are normal (in a variety of species, not just monk seals), and often leads to scratches and relatively minor bite wounds. However, adult male aggression is of particular concern when the perpetrator displays an aberrant focus on young animals, with frequent, repeated, and severely aggressive behavior that threatens the young animals' life. The extreme aggression that has been documented is highly unusual behavior amongst monk seals in Hawaii and cannot be well explained, but previous experience shows that the impact of such aggression on smaller seals can be considerable and life threatening.

The Recovery Plan for the Hawaiian Monk Seal (NMFS 2007) directs NMFS to mitigate male aggression, and NMFS has been encouraged to explore non-lethal options. In cases where a male seal is extremely aggressive and causing injuries and death of young seals, if medication can be shown to safely alter extreme aggressive behavior, that option would be considered a viable, temporary alternative to euthanizing the seal.

BEH 06 Comments in support of conducting research on effective physical or chemical deterrents and other behavior changing techniques. Specific suggestions on techniques that could be used for behavior modification such as air horns.

Response: NMFS anticipates that the behavior modification protocols will include a suite of techniques that are adapted to each unique situation, implemented according to specific guidelines. In identifying what techniques may be suitable, NMFS has, and will continue to, avail itself of the published literature in this field and to consult with experts in aversive conditioning and behavior modification as applied to other captive and wild populations. Sections 2.6 and 5.4 of the PEIS provide additional information on behavior modification and aversive conditioning.

BEH 07 Behavior modification seems unlikely unless seals are placed in captivity.

Response: See response to BEH 02. The outcome of behavior modification research is not certain, but there is a need to have tools to respond to seals exhibiting undesirable behaviors that will allow them to remain in the wild population. Limited behavior modification techniques used on Hawaiian monk seals thus far have been successful and behavior modification has also been used successfully on other species including black bears (Mazur 2010). In some cases, seals may be placed in temporary captivity (e.g., to test taste aversion methods), but the majority of behavioral modification techniques would need to be used on seals in the wild to be effective. In addition, seals already in permanent captivity could be used to test behavioral modification techniques.

BEH 08 Comments opposed to behavior modification of seals - instead, behavior modification should focus on humans.

Response: NMFS recognizes that some undesirable seal behaviors and human-seal interactions are a consequence of seals that have received food, social interaction, or other rewards from people. In those cases, some modifications in human behaviors are also necessary to ensure that the undesirable interactions are eliminated. To this end, NMFS will continue to work with partners and community groups to develop public outreach to inform ocean users of how to avoid conditioning seals to human interaction. However, not all undesirable seal behaviors develop because humans are providing rewards or deliberately engaging with seals - in some cases the interactions are initiated by the seals. Regardless of the origin of the undesirable behavior, some behavior modification or other intervention is often necessary to extinguish the behavior and maintain the seal in the population.

BEH 09 Intensive efforts of the NMFS Monk Seal Response Team volunteers to "protect" nursing mothers has effectively modified their behavior by interfering with birthing and rearing seals.

Response: The NMFS proposed actions involving "behavior management" or "behavioral modification" in this PEIS all refer to actions that would directly involve "take," or direct interaction with Hawaiian monk seals to modify the seals' behaviors. The efforts to put up signs and educate the public by the Marine Mammal Response Network members do not fall into this category and are covered by the NMFS Marine Mammal Health and Stranding Response Program, separate from the action alternatives in this PEIS. Members put up signs to notify beachgoers that a seal is resting or nursing a pup, and to provide education and information about monk seals to visitors and residents. These efforts often prevent seals from being disturbed and scared into the water (either intentionally or unintentionally) by humans or domestic animals, and help keep humans safe by providing a recommended distance to stay back from the seals. We considered the impact of the proposed action together with other monk seal conservation activities, including volunteer outreach, in the cumulative impact analysis of the Final PEIS.

NMFS is unaware of any evidence that actions taken by members of the Marine Mammal Response Network to protect nursing mothers has an adverse effect on seal behavior or affects a seal's choice of beach haul-out location in the future. NMFS places signs and, in some cases, temporary fencing, in order to protect seal pups and mothers through weaning, a critical stage in pup survival.

BIO Hawaiian Monk Seal Biology

BIO 01 NMFS says Hawaiian monk seals don't stay in one area to feed but I see seals with the same tag on them in one area all the time, pounding the same area every week.

Response: It is true that certain seals tend to rest on land at particular sites that they return to frequently. However, studies of at-sea movements of seals in the MHI using Global Positioning System (GPS)- and satellite-linked transmitters, show that over time periods of weeks or months, seals tend to use foraging habitats spread all around an island and even often make trips between islands. While seals certainly do revisit the same foraging areas over time, it would not likely be a good strategy for them to continuously feed in the exact same area. Knowledge about how all kinds of animals, including seals, forage suggests that they feed in a prey area until their success falls to a certain level, and then they move on to another area. Despite the above, it is understandable how one could get the impression that seals are using the same area over and over. Because seals tend to come to rest on the same beaches, they traverse the waters near shore to get to and from their resting spots. However, when we examine the individual seal's behavior on a longer time scale, their typical use of wider foraging grounds is evident.

BIO 02 ***People must remember that NMFS is proposing to translocate pups that are much smaller and eat maybe 30 to 50 percent less than adult seals. So the amount of fish the pups could eat is far less than adults. Also, seals forage on other species in addition to those sought by fishermen.***

Response: NMFS agrees with these statements and covered these topics in Sections 3.3.1.5, 4.8.5.1 and 4.9.1 of the Draft PEIS. As stated in Draft PEIS Section 4.9.1, a juvenile Hawaiian monk seal may weigh approximately 250 pounds while an adult seal may reach up to 600 pounds. Thus, the amount of fish a juvenile seal is expected to eat is much less than an adult. Despite their size, given the wide variety of fish consumed by monk seals, the likelihood that seal predation on fish could cause a long-term decline in fish populations is unlikely. Hawaiian monk seals are known to prey on a wide variety of fishes, cephalopods (e.g., octopus), and crustaceans (e.g., crabs), some of which are not generally eaten by people. Hawaiian monk seals are also known to forage over a wide range of areas, both in terms of depth and variety of habitats, many of which are not used by fishermen.

Sections 4.9.1 thru 4.9.3 in the Final PEIS (Environmental Consequences of the Alternatives on commercial, subsistence and recreational fisheries, respectively), have been revised to reflect a re-evaluation of potential impacts of the alternatives on fisheries. This re-evaluation takes into consideration public comments, and additional information and analysis. Consistent with the Draft PEIS, the re-evaluation concluded that all PEIS alternatives would have negligible effects on fisheries. Nevertheless, for reasons described in the response to Alt 03, the Preferred Alternative (Alternative 3) in the Final PEIS does not include translocation of weaned pups from the NWHI for release in the MHI.

BIO 03 ***Please address gender balance of seals in the PEIS. NMFS talks about translocating female pups but does not mention whether or if there tend to be more males born than females. Sometimes sex ratios of species change when under stress.***

Response: Sex ratios at birth in a given year at a given site can be predominantly male or female; however, the average sex ratio of pups over time and across subpopulations is close to 50:50. At several places in Appendix E (summarized in Table E-1), NMFS addresses the possibility that translocating female pups could lead to male-biased sex ratios at the source subpopulation. In summary, temporarily translocated weaned female pups will be returned to natal or nearby sites prior to sexual maturity. Presumably they will have experienced higher survival than (non-translocated) males, and therefore the two-stage translocation should ultimately result in some female bias for affected cohorts. Alternately, if in fact the translocated females fare poorer than their male counterparts or cannot be repatriated for any reason, weaned pup translocations would be suspended as described in the decision framework. This could result in male bias for a few affected cohorts, but this would be a small portion of the total population.

BIO 04 The PEIS does not discuss how many of the seals that have been translocated to the MHI already are surviving. What will be the measure of success; how many seals?

Response: The only seals that have been translocated to the MHI from the NWHI were 21 adult males brought to the MHI from Laysan Island in 1994 (see Section 3.3.1.7). These seals exhibited high survival rates, which is normal for adult seals (Baker et al. 2011). However, the expected survival rates of temporarily translocated weaned pups and subadults (Alternatives 3 and 4) may be different than that of the previously translocated adults because younger animals naturally have lower survival rates compared to adults. For a review of NMFS' history of translocations, including moving seals of different ages a variety of distances, see Baker et al. (2011).

Metrics for assessing the success of translocations are described in Section 4.8.1.16 and Appendix E. They involve a variety of comparisons of abundance, survival, and population status. While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS (see response to ALT 03). The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking weaned pups from the NWHI and releasing them in the MHI. However, a variety of translocation actions could occur under the Preferred Alternative, including two-stage translocation *within* the NWHI, *within* the MHI, or from the MHI to the NWHI.

Any translocation program would continue only if successful, with any increase in numbers of translocated seals carefully managed. We would consider two-stage translocation to be successful if:

- Survival of young seals moved temporarily to a host subpopulation is better than survival of comparable seals in the subpopulation from which they came;
- Survival of seals returned to their birth subpopulation is better than the survival of comparable seals in the same subpopulation that were not translocated; and
- NMFS is able to capture and return all surviving translocated seals.

BIO 05 NMFS has stated that predation and disease are major factors for seals declining in the NWHI. What is to stop predation and disease from affecting seals in the MHI? Is the impact of fisheries interactions in the MHI less of a threat than food limitation and predation in the NWHI?

Response: Galapagos shark predation is a major source of mortality to pups only at French Frigate Shoals, contributing to the decline of that subpopulation (Section 3.3.1.7). Tiger sharks are known to prey on monk seals, but NMFS stated in Section 3.3.1.7 that the exact amount or extent of mortality due to tiger shark predation is not known because the predation event usually occurs away from shore. It is possible that predation could affect seals in the MHI to a greater degree sometime in the future; however, this is unlikely because large shark population density is much lower in the MHI due to fishing pressure, compared to the NWHI (Friedlander and DeMartini 2002). NMFS has not stated that infectious disease (as opposed to emaciation and starvation due to food limitation) is a major factor contributing to the decline in the NWHI. Rather, NMFS is concerned about the potential effects of future disease outbreaks.

Section 2.5 of the PEIS states: "Current information suggests infectious disease is not limiting recovery of the Hawaiian monk seal. However, the species is rare, has very low genetic diversity, and may have been buffered from exposure to many mammalian diseases due to its isolation in the Hawaiian Archipelago for millions of years. Together, these factors raise great concern that outbreaks of diseases to which monk seals have not been previously exposed could have devastating impacts." Disease outbreaks could occur anywhere in the monk seal's range, but may be more of a risk in the MHI where there is greater exposure to potential disease carriers (i.e., vectors)(Section 5.3 of the PEIS). Concern about disease is the motivation for ongoing disease monitoring research (Section 2.5 of the PEIS), the proposed vaccination plan (Appendix D of the PEIS), and the proposed health screening and quarantine protocols to accompany translocation (Appendix F of the PEIS).

The impact of fisheries interactions is thought to be less of a threat in the MHI than food limitation and predation (from Galapagos sharks at French Frigate Shoals only) in the NWHI. Despite fishery interactions ongoing in the MHI, the seal population is growing robustly, whereas the NWHI populations are mostly declining. Because these threats are dynamic and their relative importance could change in the future, an active research and population monitoring program is essential to detect, diagnose, and, if feasible, mitigate significant threats to recovery.

BIO 06 Hawaiian monk seals grub along the bottom of the ocean like pigs when they eat. This destroys microbes and coral and affects what you call "rubbish" fish that actually keep the reef healthy. This action is going to endanger fish populations in the MHI.

Response: While monk seals do feed on the sea floor, there is no evidence that their foraging behavior negatively impacts corals, microbes, reef health, or reef fish populations. In fact, by many measures, NWHI coral reef ecosystems, where the vast majority of monk seals have long persisted, tend to be much healthier with more robust reef fish populations compared to the MHI where there are relatively few seals.

BIO 07 I don't know why monk seals are called "Hawaiian" monk seals. There is no historic evidence of monk seals or cultural reference to them. Who can validate whether they are native or not? Monk seals exist in the MHI because they were transplanted here in the 1990s by researchers.

Response: Hawaiian monk seals are named so because they are endemic to the Hawaiian Islands Archipelago, and found nowhere else on earth. As described in Appendices K and M, there are historic and cultural records of Hawaiian monk seals across the NWHI and MHI from many sources including Hawaiian- and English-language newspapers (1800-1900s), ships' logs (e.g. King Kamehameha IV saw several seals on Nihoa in 1857), naturalist logs (e.g. seal killed in Hilo in 1900), and oral traditions and place names. NMFS did translocate 21 male seals from Laysan Island to the MHI in the 1990's because of problems at Laysan with aggression toward female and juvenile seals. Seals already existed in the MHI at that time. Regardless, the translocation of males alone could not have established a breeding population in the MHI, as females were not translocated with the males.

BIO 08 Hawaiian monk seals are endemic to Hawai'i and there is no doubt they are the most kupuna mammals here in the islands. Monk seals are here in the MHI naturally.

Response: NMFS agrees that based on all of the historical, biological, and physical evidence described in Appendices K and M monk seals are endemic to the entire Hawaiian Archipelago (Section 3.3.1.1 and Appendices K and M). Please also see response to BIO 07.

BIO 09 If monk seals are naturally increasing in the MHI, why mess that up by translocating them? Leave monk seals where they originated in the pristine sanctuary of the NWHI where there is more fish, they will not interact with humans, and can survive better.

Response: As explained in the response to comment ALT 03, NMFS has selected Alternative 3 as the Preferred Alternative in the Final PEIS. Alternative 3 does not allow for translocation of weaned pups from the NWHI for release in the MHI. Yet, it is worth noting that in Appendix E of the Draft PEIS, NMFS explained the rationale for two-stage translocation, which under Alternative 4 could involve moving some seals temporarily to the MHI from the NWHI. Under Alternative 4, two-stage translocations between the NWHI and MHI would not be expected to either increase or decrease the natural growth of the MHI seals. Translocated seals would have resided in the MHI for a few years, then been returned to their natal areas before they reached reproductive age, thus having no net effect on the number of seals living in the MHI permanently.

With regard to the comment that seals can survive better in the NWHI, information presented in Appendix E and Section 3.3.1.3 of the Draft PEIS demonstrates that in fact monk seals in the NWHI typically have lower survival rates compared to the MHI.

BIO 10 As stated, in the last 10 years, monk seals have declined 40 percent. The 10 years before that, everything was fine so what happened in these last 10 years? This should be evaluated.

Response: NMFS would like to clarify that the overall abundance in the NWHI has declined on average for several decades (PEIS Section 3.3.1.3). To assess "current" rates of change in the overall population, NMFS uses the most recent 10 years of data. However, that does not mean that the decline only began 10 years ago. Known threats and mortality sources are described in Section 3.3.1.7 of the PEIS.

BIO 11 Given the behavioral plasticity and opportunistic foraging strategies of Hawaiian monk seals, it is unlikely that local adaptations would hinder long-term foraging ability or survival at donor or nursery locations.

Response: NMFS agrees with this statement and this is supported by the success of past translocation efforts (Baker et al. 2011). However, in the modeling used to help evaluate the benefits from two-stage translocation (Appendix E), NMFS incorporated one-year survival "decrements" or penalties to account for any temporary threats or adjustments that might accompany release into an unfamiliar environment.

BIO 12 Is inbreeding a concern with such a small population of Hawaiian monk seals?

Response: As explained in the Draft PEIS Section 3.3.1.3: "Hawaiian monk seals exhibit extremely low genetic diversity according to a variety of measures (Schultz et al. 2008). This is probably due in part to a population bottleneck associated with overexploitation in the 19th Century, but genetic diversity appears to have been low even prior to that time (Schultz et al. 2008). There is little indication of contemporary inbreeding, and Hawaiian monk seal subpopulations have exhibited robust growth at various times despite their low genetic diversity. Further, although the species is distributed in a metapopulation, there is no evidence of genetic population structure. That is, the species is comprised of a single, panmictic (unstructured) population (or "stock") (Schultz et al. 2011)." In summary, while inbreeding may be a problem for some animal populations of this small size, data indicate that inbreeding is not a problem for the Hawaiian monk seal population.

BIO 13 Additional research on the MHI population is needed to determine factors that contribute to the observed success. For example, dietary factors, milk analysis, female pre-delivery weights, nutrient profiles, etc. should be evaluated.

Response: NMFS intends to continue conducting research to better understand and detect changes in factors that contribute to success and failure of monk seals throughout their range. This work is summarized in Section 2.5 and includes measurements of body condition, foraging behavior, and diet studies. However, some of the techniques proposed in this comment (milk analysis, pre-delivery weights) would involve handling and disturbance of pregnant or nursing females, which NMFS currently does not deem prudent, due to the risks to the female seals.

BIO 14 The 2006 NMFS stock assessment report stated that 34 monk seals have died during rehabilitation efforts or other research. This needs to be taken into consideration.

Response: NMFS has considered risks associated with past, current and future research and enhancement efforts. This is a major focus of PEIS Section 4.8.1. With regard to past mortalities, PEIS Section 3.3.1.7 states: "From 1982 to 1994, 23 seals died during rehabilitation efforts. Most of these involved seals brought into captivity for rehabilitation when they were already in exceedingly poor health. Thus, some portion of these seals would have certainly also died if they had not been brought into captivity. Additionally, two other seals have died in captivity, two adult males died when captured for translocation to mitigate male aggression, one was euthanized (an aggressive male known to cause mortality), four died during captive research and four died during field research." The PEIS specifies the number of seals that may be accidentally killed, euthanized (very ill or aggressive male seals), or brought into permanent captivity (aggressive males) associated with research and enhancement actions. The effect of these losses on the population status was evaluated for each alternative using computer modeling (Sections 4.8.1.17 – 4.8.1.20).

BIO 15 If you bring seals to the MHI, what's going to stop the sharks here from coming in and eating seals? People are very concerned about this. I have seen more sharks in the MHI than ever before. The PEIS needs to address the issue of sharks.

Response: A concern that monk seals in an area may attract sharks and create a human safety risk is understandable, at least partly because we know that some monk seals are eaten by sharks. However, there is currently no evidence or expert opinion indicating that more monk seals in the MHI will lead to more shark attacks on humans. When shark predation is usually cited as a threat to Hawaiian monk seals, it refers to unusual predation on pre-weaned pups at French Frigate Shoals by Galapagos sharks (Gobush and Farry 2012), not "normal" low levels of predation on the population at large. Other well-known examples of shark predation on seals occur where seals seasonally aggregate in dense colonies (for example, in South Africa and parts of California), but those situations are very different than the dispersed, low density distribution of monk seals in the MHI.

According to the *International* Shark *Attack File*, there have been a total of 116 documented unprovoked shark attacks on people in Hawaiʻi from 1828-2012, and 9 of these were fatal. The most recent fatal attacks in Hawaiʻi were in 2004 and 2013**.** Over the past 20 years, there has been an average of 3 to 4 attacks per year in the MHI, with no upward trend in the number of attacks, while the MHI monk seal population has increased substantially over the same time period. There were 10 attacks reported in the MHI in 2012, and 13 attacks reported from January through December 2013. Shark experts in Hawaii have not attributed this recent apparent spike in attack numbers to the presence of monk seals and maintain that it may "simply reflect natural variability and arise purely through chance" (Meyer and Holland, *Honolulu Star Advertiser,* Op-Ed, December 23, 2012). As of September 2013, DLNR and other researchers were starting research studies aimed at understanding shark movement around Hawaii and the apparent increase in attacks during 2012 and 2013 around Maui in particular.

In summary, while the number of monk seals in the MHI has increased due to natural population growth over the past several years, the number of **shark** attacks has not increased over that same time period in a manner that would suggest a direct correlation. This comment appears to be related primarily to translocating weaned pups from the NWHI for release in the MHI. Under the preferred alternative (Alternative 3) selected in the final PEIS, such translocations of pups from the NWHI to the MHI will not occur.

BIO 16 People need to understand that the issue of sharks attacking seals is unique to French Frigate Shoals and was the result of aggressive male seals trampling monk seal pups. The dead and injured pups were what attracted the sharks.

Response: As noted in Section 3.3.1.7, Galapagos shark predation on monk seal pups is only a concern at French Frigate Shoals. It is possible that the behavior was initially learned by Galapagos sharks due to the presence of pups killed by aggressive males in the 1990s. That hypothesis has been considered by NMFS but is difficult if not impossible to prove or disprove. Regardless, the shark predation behavior has continued at French Frigate Shoals long after male aggression ceased to be a significant factor. It is worth noting that some unknown level of tiger shark predation on monk seals of all ages occurs throughout their range.

BIO 17 Hawaiian monk seals have survived for over 16 million years so this concept that they are going extinct based on computer modeling is ludicrous when data show the species is doing fine. The population has actually been stable for five years.

Response: NMFS agrees that Hawaiian monk seals have existed for millions of years. However, many island species throughout the world have been documented to decline and become extinct following human colonization, which occurred in Hawaiʻi some 1500-1600 years ago. NMFS has not concluded that monk seals are certain to become extinct; rather, NMFS has concluded that the species is at risk of extinction and requires the protections of the ESA in order to recover. Computer population models are a mechanism for synthesizing all the relevant available information about populations (abundance, age of individuals, sex ratio, survival rates, birth rates, migration, etc.). Seal counts and population estimates have also revealed that overall abundance in the NWHI is declining and has not been stable for the past five years (Section 3.3.1.3).

CEF Cumulative Effects

CEF 01 The PEIS must address the cumulative effects of critical habitat designation, the changes to the Hawaiian Islands Humpback Whale National Marine Sanctuary, spinner dolphin protection measures, monk seal rehabilitation centers, and the programmatic recovery actions on the Hawaiian Islands and its people. The current evaluation is subjective, misleading, and too narrow.

Response: NMFS has addressed the potential cumulative effects of actions including designating monk seal critical habitat, modifications to the Hawaiian Islands Humpback Whale National Marine Sanctuary, spinner dolphin protection measures, monk seal rehabilitation centers, and others (as presented in PEIS Table 4.5-2 and described for specific resources throughout Chapter 4 of the PEIS). Please refer to the Response to CUL 01-10.

CEF 02 Overdevelopment, pollution, nuclear byproducts, land-based activities, and other wastes are part of the reason why seals are declining. NMFS should clean up the environment where monk seals might live. These factors need to be considered in the PEIS. NMFS needs to clean up all the garbage around the Islands.

Response: NMFS acknowledges that ecosystem dynamics are complex and we do not know all of the effects human actions (e.g., development, pollution, and fishing) may be having on the Hawaiian marine ecosystem. However, our population monitoring clearly identifies most causes of mortality in the population and thus far, we do not have clear evidence that the issues raised in this comment are directly contributing to the current population decline. Cumulative effects of past, present, and reasonably foreseeable future actions (RFFAs) on Hawaiian monk seals have been considered, were listed in the Draft PEIS Table 4.5-2 and are described in more detail in Section 4.8.1.21. NMFS has updated the cumulative effects assessment including a review of the actions currently considered along with other past, present, and reasonably foreseeable monk seal conservation activities in the Final PEIS. Necessary changes to the list of past, present, or RFFAs have been made such that a robust cumulative effects assessment was conducted.

CEF 03 Military activities should be evaluated as part of the cumulative effects analysis.

Response: Military activities have been included in the cumulative effects assessment where warranted and as described in Table 4.5-2 and sections throughout Chapter 4 of the Draft PEIS for specific resources. NMFS updated the cumulative effects assessment including a review of the actions currently considered for analysis in the Final PEIS. Necessary changes to the list of past, present, or RFFAs have been made such that a robust cumulative effects assessment was conducted.

CEF 04 The PEIS fails to address climate change, earthquakes, or tsunamis. The debris from the March 11, 2011 earthquake in Japan is likely to hit the NWHI this winter and will cover the beaches with toxic, potentially radioactive debris.

Response: NMFS has considered the potential cumulative effects of actions including climate change, tsunamis, and earthquakes as listed in Table 4.5-2 of the Draft PEIS. At the time the Draft PEIS was being prepared, little was known regarding the debris from the tsunami in Japan in March 2011. However, since publication of the Draft PEIS, additional information is now available on debris from the tsunami in Japan; this information has been included in the cumulative effects assessment in the Final PEIS.

CUL Cultural

CUL 01 NMFS should first coordinate with the kupuna and other Native Hawaiians of these islands to improve the recovery plans in order to avoid unjust harm to the monk seals you are trying to save.

Response: NMFS considers coordinating with Native Hawaiians on Hawaiian monk seal recovery a high priority. To address this priority NMFS has funded (when possible) a statewide Hawaiian cultural liaison and Hawaiian practitioner network coordinator, and community liaisons on Kaua‘i, O‘ahu, Moloka‘i, and Maui (PEIS Section 1.9.4). NMFS has also facilitated the participation of Hawaiian cultural practitioners in Hawaiian monk seal research and enhancement activities in the NWHI. As a result of these and other efforts, Native Hawaiians, including kupuna and cultural practitioners, have become increasingly engaged in the Hawaiian monk seal recovery program, and NMFS intends to continue to support this engagement to the maximum extent possible. Please also see Sections 5.5 and 5.6 of the PEIS for more information relevant to this comment.

CUL 02 NMFS needs to consider cultural practices as well as just historic and cultural properties. NMFS must address how the proposed actions will affect the Hawaiian people and their cultural practices. The PEIS fails to consider Native Hawaiian rights and cultural practices or impacts to traditional ocean users, the fishing community, and targeted socio-

economic populations as required under NEPA and Section 106 of the NHPA. A cultural impact assessment has not been prepared.

Response: NMFS has considered public comments and conducted additional analyses to assess potential impacts to cultural resources, traditional cultural practices, and traditional cultural properties. The results of this additional consideration and analysis are presented in Section 4.9.4 of the Final PEIS (additional information found in Appendices L and M). Potential impacts to the fishing community have also been further analyzed and the results are presented in Sections 4.9.1 – 4.9.3 of the Final PEIS. Regarding NHPA Section 106, NMFS determined that the proposed Federal agency actions to recover the Hawaiian monk seal had the potential to affect listed or eligible historic properties. Section 106 consultation was therefore initiated with the appropriate parties, including the State Historic Preservation Office (SHPO), Native Hawaiian Organizations, representatives of local governments, and the public. The NHPA Section 106 consultation was completed in compliance with the NHPA and NMFS made a determination of no historic properties affected (see Appendix A, Agency Correspondence). NMFS received no response from SHPO regarding the determination. NMFS made available to the public a separate document (Appendix L) describing the results of the Section 106 consultation process. Please also see the response to CUL 01.

CUL 03 What cultural protocols does NMFS have in place if a monk seal strands or entangles itself? How has NMFS consulted with cultural practitioners to gain their insights about traditional values and stewardship for finite resources?

Response: In the MHI, such stranding responses are covered by the Marine Mammal Health and Stranding Response Program, which is covered by a separate EIS and permit. Stranding response in the MHI is not the subject of this PEIS. As a standard procedure, NMFS engages practitioners to conduct cultural protocols before, during, and after responses to monk seals, including responses to strandings and entanglements. The practitioners are generally associated with the ahupuaʽa in which the response occurs, or have been previously identified to have cultural ties to the location or the seal being responded to. The protocols conducted are generally determined by each practitioner, depending on the variables of each response. Also please see response to CUL 01.

CUL 04 What happens when a Hawaiian monk seal gets into a fishpond? What does NMFS do and how is this covered in the PEIS? How is the pond going to be affected? How is the seal going to be affected?

Response: Monk seals that get into enclosed fishponds with functioning walls and makaha (gates) would generally be considered by NMFS to be "out of habitat" (a type of stranding) and NMFS will work with the fishpond owner or responsible party to remove the seal as safely and quickly as possible with a goal of minimal or no impact to the fishpond. The Final PEIS contains additional analysis of potential fishpond impacts (Section 4.9.4) and additional fishpond impact mitigation measures (Section 5.5).

CUL 05 The island that will be most affected by this action is Moloka'i and it should receive something in return so that the island can exercise Ho'okipa, traditional in Hawai'i for a stranger that comes and needs to be fed.

Response: NMFS recognizes that the number of monk seals using the shores and waters surrounding Moloka`i has increased over the past several years. NMFS has worked with some members of the Moloka`i community regarding Hawaiian monk seal recovery, and has provided a grant to a Moloka`i–based organization for community liaison work. NMFS looks forward to continuing and strengthening coordination and collaboration with various Moloka`i residents, including fishermen, Hawaiian practitioners, educators and students. As described in Appendices K and M of the Final PEIS, Hawaiian monk seals are native to the MHI as well as the NWHI.

CUL 06 As a Native Hawaiian community, we will not support any federal intrusion or give up any access, gathering, coastal, cultural or fishing rights. Expansion of Hawaiian monk seal critical habitat will affect our family and food resources. The proposed action infringes on our Native Hawaiian rights and culture protected under State law. We depend on the ocean's resources to survive and have for thousands of years.

Response: NMFS recognizes that there are concerns over the recent actions taken by the agency to revise critical habitat for Hawaiian monk seals. The revision to critical habitat is a federal action separate from this PEIS on monk seal research and enhancement activities and had a separate comment period that ended on January 6, 2012. Additional information on monk seal critical habitat can be found at: http://www.fpir.noaa.gov/PRD/prd_critical_habitat.html. Please also see Section 1.9.1 of the PEIS for more information on critical habitat.

Regarding the actions proposed in this PEIS on research and enhancement, based on all the analysis and research conducted by NMFS thus far, none of the actions proposed in the PEIS would cause any loss of access, gathering, coastal, cultural, or fishing rights. NMFS recognizes the value of Hawai`i's marine resources for subsistence and other purposes, and will continue to work with our government and non-government partners to ensure Hawaiian monk seal recovery actions do not adversely impact these resources or access to these resources.

CUL 07 Native Hawaiians are the endangered species, not monk seals. Hawaiian people are more important and we keep getting more and more restrictions on what we can do. Any time a foreign environmental concept is introduced, it destroys our culture. The Hawaiian monk seal expansion program will limit access to subsistence resources families rely on and curtail fishing in Hawaiian communities.

Response: Please see the responses to CUL 01 and 06. Considering all research and analysis to date, this PEIS is not proposing any new restrictions on access as a result of implementation of the actions proposed in the PEIS.

CUL 08 We do not support Hawaiian monk seal expansion because monk seals have never been part of Hawaiian culture. Seals are not mentioned in Hawaiian history, there is no Hawaiian name for seals, and no evidence of seals in carvings, burials, hula, etc., etc.

Response: Although not prominent and pervasive in Hawaiian culture compared to other sea creatures, such as green sea turtles, NMFS staff and contractors have consulted with Native Hawaiian practitioners and determined that some Hawaiian families have traditional ties to monk seals and there are some traditional Hawaiian cultural references to Hawaiian monk seals. Like the scattered and inconsistently distributed monk seal population, references to monk seals in Hawaiian culture are scattered and specific to certain geographic locales within the MHI. There appear to be references to monk seals in traditional place names and stories, and seal remains were found in a midden on Hawai`i Island dating from 1450-1700 A.D. (pre-European contact). Additional discussion of the significance of Hawaiian monk seals in traditional Hawaiian culture is presented in Section 3.4.7.1 and in Appendices K and M. Also see response to BIO 07.

CUL 09 Hawaiian monk seals are in the Polynesian Triangle so these seals will affect all cultures and people in the Polynesian Triangle.

Response: NMFS will continue to hold community meetings and connect with Native Hawaiians. As described in Section 5.6, NMFS is committed to a dialogue with local communities so we can hear concerns, share ideas, and work together toward monk seal recovery.

CUL 10 The PEIS fails to consider environmental justice to Native Hawaiians. Mokumanamana and Nihoa are spiritually significant, traditional sites registered on the National Register of Historic Places. Impacts to these areas are not given adequate consideration in the PEIS.

Response: Environmental justice is discussed in Section 4.9.6. Nihoa Island and Mokumanamana (Necker Island) are part of Papahānaumokuākea Marine National Monument. As described in Section 5.5 of the Final PEIS, any activities associated with monk seal recovery actions undertaken within the NWHI must comply with Monument regulations and the terms and conditions of Presidential Proclamation 8031. Monument regulations state that “permittees [must] attend a cultural briefing on the significance of Monument resources to Native Hawaiians” and that there are “prohibitions against the disturbance of any cultural or historic property”. The “Monument permit program allows for a comprehensive review of proposed activities and will be administered to ensure compliance with Presidential Proclamation 8031, as well as other applicable Federal statutes (such as the NHPA) and state laws and regulations” (NOAA 2008b). Under the terms of the Monument permit, researchers and volunteers involved in Hawaiian monk seal recovery actions coordinate their activities with the Monument archaeologist and historic preservation specialists to insure that they do not adversely impact any of the Monument’s historic properties. All researchers landing on Nihoa or Mokumanana (Necker) are instructed to limit their activities to coastal areas. The only exceptions are camping in designated camping areas and traveling between coastal areas. Monk seal researchers may place remote cameras near beach and rocky areas where seals congregate. The purpose of these cameras (Section 2.5) is to obtain monk seal data without the need for human presence. The installation and maintenance of any such remote cameras on Nihoa or Mokumanamana would be conducted in strict compliance with Monument permitting conditions.

DIS Diseases

DIS 01 If there is concern about Hawaiian monk seals getting exposed to disease, how is bringing seals to the MHI where there are pollutants, ships, humans, etc., minimizing risk of disease and keeping wild seals wild?

Response: As noted in PEIS Section 2.5, "Current information suggests infectious disease is not limiting recovery of the Hawaiian monk seal. However, the species is rare, has very low genetic diversity and may have been buffered from exposure to many mammalian diseases due to its isolation in the Hawaiian Archipelago for millions of years. Together, these factors raise great concern that outbreaks of diseases to which monk seals have not been previously exposed could have devastating impacts." There is no evidence that infectious disease is currently impacting the monk seal population, but NMFS is concerned about the potential for future outbreaks. Seals already occur throughout the Hawaiian Islands and are exposed to whatever disease threats are present in the islands now or will emerge in the future. Seals also move between the NWHI and MHI of their own accord.

While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking weaned pups from the NWHI and releasing them in the MHI (See Alt03). However, disease risk was not one of the reasons for the change in the Preferred Alternative. NMFS believes that the disease screening protocols described in Appendix F would have minimized any extra risk of disease associated with translocation to the MHI. These protocols will still apply to translocation actions included in the Preferred Alternative, including translocations *within* the NWHI, *within* the MHI or from the MHI to the NWHI. (See also response to comment BIO 05). Notwithstanding the translocation programs, NMFS included enhanced disease monitoring and mitigation in Alternatives 3 and 4 precisely because of the concern about potential disease outbreaks. This includes development of a vaccination plan (PEIS Appendix D).

In response to the comment that seals should be kept wild, the MHI are currently within the monk seal's natural habitat, and only a small proportion of seals in the MHI become habituated to humans. Although no weaned pups will be translocated from the NWHI for release in the MHI under the Preferred Alternative, human-seal interactions are likely to continue involving the already naturally growing seal population in the MHI. For that reason, NMFS plans to implement new Behavior Modification protocols as described in Sections 2.5 and 5.4 of the PEIS.

DIS 02 NMFS has explained that monk seals move around from island to island on their own. Seals will pick up diseases as they move around and this will end up in our food chain because the monk seals will spread disease to humans and other animals in the MHI.

Response: Seals do move around from island to island throughout their range. There is no indication that monk seals carry diseases that are not already in the ecosystems in which they live. The concern is the opposite - that monk seals may become exposed to diseases that are not typical marine mammal diseases (see PEIS Section 3.3.1.7) through contact with other wild or domesticated species, or human secretions. For example, *Toxoplasma gondii*, a parasite that can cause the disease toxoplasmosis, can infect both seals and humans, but only sexually reproduces in cats. Overall, the minute risk of spreading disease to humans and other animals in the MHI already exists regardless of the alternatives presented in this PEIS, as the MHI monk seal population is naturally growing and moves freely among the islands.

DIS 03 There is not enough information about the effects of disease vaccines and de-worming medicines on Hawaiian monk seals to understand all the risks involved.

Response: NMFS is currently conducting deworming research described in the PEIS (Section 2.5) on wild seals under Permit No. 10137, which has accompanying NEPA analyses on the use of various deworming drugs and their effects on monk seals and the environment. We propose to continue deworming research under the Preferred Alternative to collect sufficient data to determine the efficacy of treatments in the wild prior to implementing a deworming enhancement program. Results of preliminary deworming studies on monk seals have been published (Gobush 2011) and are summarized in Section 4.8.1.11 of the PEIS. Also, current and future permits would contain mitigation measures such as requiring researchers to halt studies if adverse effects are observed, and to demonstrate that the deworming drugs are safe, effective, and will not adversely impact non-target species prior to conducting deworming as an enhancement activity (PEIS Section 4.7.3.2).

Appendix D of the Final PEIS includes information on previous use of vaccinations in Hawaiian monk seals and other phocids. Vaccinations for West Nile Virus (WNV) have been used for over five years on 8 captive Hawaiian monk seals as part of the normal husbandry and medical care those seals receive, with no adverse effects observed. The WNV vaccine is considered safe for use in wild monk seals as discussed in Appendix D. Two facilities are currently permitted to test the proposed canine distemper virus (CDV) vaccination on captive Hawaiian monk seals, and one captive Hawaiian monk seal has been vaccinated to date with no adverse effects observed. Additional research on use of the CDV vaccination will be done on more captive Hawaiian monk seals. The PEIS proposes such additional vaccination research before these tools would be safely applied to the benefit of the monk seal in the wild.

DIS 04 Any vaccination protocol must be used with extreme caution to minimize the possibility of adverse events in a population that is already endangered. Please test vaccines on captive animals before using them on the wild population.

Response: This is precisely the approach that NMFS has taken to date and proposes to continue in the future (PEIS Appendix D). See response to DIS 03.

DIS 05 Since vaccines may not always be effective for treating disease, NMFS should make sure there is a backup plan to treat and handle affected animals in order to minimize mortality.

Response: NMFS uses very detailed protocols to minimize risk of injury and mortality when handling monk seals, both in the wild and in captivity. Many of these procedures require the involvement of a veterinarian, and in some cases, animals are taken into captivity for additional treatment or rehabilitation. In addition, as described in Appendix D of the PEIS, NMFS will first assess the safety and efficacy of vaccines before they are used on the broader monk seal population to minimize potential negative effects.

DIS 06 If a virus mutates and spreads into Hawaiian monk seals, how is NMFS going to vaccinate animals if there is no vaccine available?

Response: NMFS is proposing to use vaccines already developed for other species to provide immunization against the same or similar viruses (e.g. *morbillivirus* and West Nile Virus, see Appendix D). Sometimes a vaccine developed for a particular pathogen can confer immunity against a related but not identical virus. If a new virus emerges in monk seals against which no existing vaccine is effective, then NMFS will not be able to provide a vaccine to protect seals. However, NMFS has developed protocols for addressing an Unusual Mortality Event (UME). The UME plan is designed to enable rapid mobilization and response for any emergent mortality risk, whether from disease or other causes. The UME protocols are not evaluated in this PEIS, as they are addressed under separate permits and NEPA analysis for the national Marine Mammal Health and Stranding Response Program.

DIS 07 The use of vaccines in Hawaiian monk seals is valuable. High priority should be given to testing a vaccine for morbillivirus on captive animals to identify potential effects of the vaccine. NMFS should also modify the criterion for triggering morbillivirus vaccination on wild seals to include the detection of canine distemper in any species outside of quarantine in the MHI.

Response: Since the completion of the Draft PEIS, NMFS and partners have updated the vaccination plan with somewhat more sensitive triggers in the Final PEIS. For instance, any confirmed case of canine distemper in a dog or any other species outside quarantine in Hawai'i would trigger vaccination of wild seals. A confirmed case of morbillivirus in a cetacean in the MHI would trigger testing of seals for antibodies but not necessarily vaccination of wild seals. NMFS conferred with the respondent and other specialists when developing revised triggers in the Final PEIS.

DIS 08 Vaccines should not be tested on Hawaiian monk seals. They have not been shown to be safe. Many vaccines are produced in China these days.

Response: As described in Appendix D of the PEIS, some testing of West Nile Virus vaccine and canine distemper virus vaccine have already been tested in captive monk seals and shown to be safe thus far. NMFS plans to move forward cautiously with more captive (and then wild) seal testing for safety and achievement of the desired antibody response.

DIS 09 Translocation is problematic because there is a chance you will be introducing diseases to the NWHI.

Response: NMFS acknowledges that there is some risk of disease transmission associated with translocation of seals between any two subpopulations. That is why NMFS has established strict health and disease screening protocols any time seals are moved among subpopulations

(Appendix F). In addition, these protocols allow for a quarantine period for seals being moved from the MHI to the NWHI, recognizing the potentially greater disease transmission risk associated with moves in that direction. As explained in the Draft PEIS, Appendix F: "When transporting seals from the MHI to the NWHI, a period of quarantine may be necessary to reduce the likelihood of transferring a disease between the two regions. Quarantine holding will be done at a facility, on board a ship or in shore pens depending on the situation and facilities availability. The quarantine period should be long enough for the analysis of biomedical samples or longer than the prepatent period for the demonstration of clinical signs for the diseases of greatest concern. Two weeks is the generally accepted period and this period could include the transport period." Note that toxoplasmosis is an infectious disease threat to seals in the MHI. This disease cannot be transmitted from seal to seal, but is transmitted to seals by oocysts shed by domestic cats in the MHI. Thus, although seals are at risk for the disease in the MHI, they cannot transmit toxoplasmosis to seals in the NWHI.

DIS 10 Hawaiian monk seals may not show symptoms of disease (asymptomatic) and therefore spread disease to other vulnerable animals. It seems prudent to use a prophylactic approach rather than an outbreak response approach to treating diseases. It is not clear in the PEIS which approach is preferred by NMFS. This should be illustrated more clearly in the Final PEIS.

Response: NMFS acknowledges that it has not taken a position regarding whether a prophylactic or outbreak response approach to vaccination is preferred. A comprehensive prophylactic vaccination program may be advantageous, but such an effort can be both costly and risky. Disease risks to monk seals may be better characterized through vaccination research, even in early stages of the program. The costs of administering vaccines to all seals would be substantial and whether it is warranted will depend upon the probability and magnitude of a disease outbreak as well as the estimated protection afforded by vaccination. One other consideration is that by vaccinating seals prophylactically and eliciting an antibody response, the ability to detect exposure to disease versus vaccination is lost. Thus, there would be a loss of disease monitoring potential in a vaccinated population. Despite the above considerations, NMFS considers prophylactic vaccination to be a viable approach and will consider its relative merits as research and response actions accrue. A revised vaccination plan is included in the Final PEIS (Appendix D).

DIS 11 NMFS should describe how translocation health screenings are part of a larger framework for disease monitoring throughout the Hawaiian Archipelago. It is not clear how NMFS will implement a population-wide disease monitoring program. In addition, the PEIS should provide more information on how long the vaccination or de-worming trials would last.

Response: The population-wide disease monitoring program elements are described in Section 2.5 and include opportunistic sample collection, analysis of carcasses, and opportunistic sample collection from live animals for health status. Translocation health screenings information will augment these efforts, and the samples will be analyzed, archived, and logged in the same system as the overall disease monitoring program.

NMFS has determined that disease monitoring should normally be done opportunistically whenever a seal is captured and sedated for other reasons (e.g., telemetry studies, hook removal, etc.). That is, unless some specific seal health concern arises (e.g., illness or injury), NMFS rarely captures and samples seals simply for health assessment. This is based on 1) the constraints involved in choosing seals for safe handling (e.g., finding a safe location, no pregnant or molting seals, etc.); 2) analysis of samples collected in the past during dedicated disease monitoring effort; and 3) recommendations from an external review of the Hawaiian monk seal health and disease program.

NMFS did not state how long vaccination and deworming trials would last. This will depend upon a number of factors, including funding, the results of the trials to date, and the availability of new drugs, routes of administration, or vaccines.

DIS 12 The Draft PEIS should provide more explanation on the criteria used to determine whether a seal is healthy or unhealthy. These criteria will determine the effectiveness of disease monitoring and how disease risk will be determined for each location.

Response: Determining whether a seal is healthy or unhealthy depends on numerous variables (e.g., morphology, blood chemistry, disease exposure, behavior, growth, presentation of possible disease symptoms, and other factors) and are highly context dependent (e.g., presence of other threats). Standardized health forms and biomedical sampling (included in Appendix F) are used to determine the health of an animal, and judgments are typically made on a case-by-case basis with the assistance of veterinarian consultation. Standardized criteria are used to assess whether an Unusual Mortality Event (UME) is occurring, as addressed above in DIS 06.

DIS 13 To make the translocation program consistent, and to increase validity of any survival outcomes, NMFS should apply deworming treatment to both MHI-born seals and seals that may be translocated in order to compare both groups and assess the performance of the translocation program.

Response: If deworming is proven to be an effective way to improve the condition and survival of young seals, it may be applied anywhere in the monk seals' range and in conjunction with other activities (PEIS Appendix I). That includes potential treatment of seals translocated anywhere for any purpose within the strictures of NMFS' research and enhancement permit. NMFS acknowledges that if deworming notably affects survival and it isn't applied to both treatment and control groups in translocations, then it could affect NMFS' assessment of the translocation program performance. The commenter specifies that deworming should be applied to both MHI-born seals and any translocated to the MHI. NMFS has selected Alternative 3 as the Preferred Alternative in the Final PEIS (please see response to ALT 03), under which there would be no translocations of weaned pups from the NWHI to the MHI. Regardless, the commenter's point could be applicable to any translocation scenario where survival of translocated seals would be compared to another group (i.e., whether the translocation was to or from the MHI or within the NWHI).

In any case, NMFS agrees that it will be important to design these studies in such a way that multiple factors can be accounted for (in this case deworming and translocation effects). Two-stage translocation remains an action available under the Preferred Alternative 3 so long as it does not involve moving seals born in the NWHI to be released in the MHI. The first stage of 2-stage translocation is expected to involve recently weaned pups. Seals at this age have typically not been feeding independently and have not acquired parasites, thus deworming would rarely if ever be conducted during the first stage of the translocation. The NMFS deworming permissions to date specify that seals would only be treated at least 120 days post-weaning. However, seals being returned to their natal areas at age 2-3 years may be treated for parasites prior to release. If that is deemed warranted and feasible, NMFS may treat a separate group of similarly-aged seals at the release site to help separate de-worming from translocation effects. It is not yet clear whether this could be accomplished. NMFS is currently conducting research to determine whether deworming can be effectively accomplished in the field with minimal disturbance or stress to wild seals. Captive seals (such as those being translocated), may be more readily treatable for parasites because they are under more controlled veterinary care for at least several days.

ECO Ecosystems

ECO 01 NMFS must consider that moving seals around is manipulating the ecosystem just as is removing top predators. We don't understand the ecosystem effects of either of these things. There may be unintended consequences of moving 60 female pups that we don't understand.

Response: NMFS expects that any effective predator manipulation program would require a rather large-scale effort involving large numbers of predators (many orders of magnitude more than the potential number of seals that could be translocated). In contrast, NMFS stands by its analysis (PEIS Section 4.8) that the proposed level of translocation of young seals under any of the Alternatives would have negligible or minor adverse effects on other species in the ecosystem. Note that under the Preferred Alternative in the Final PEIS (Alternative 3), weaned pups would not be translocated from the NWHI to the MHI, but two-stage translocation could be conducted *within* the NWHI, *within* the MHI, or *from the* MHI to the NWHI. While a total of 200 weaned pups could be translocated over a 10-year period, only a maximum of 60 of these could be at any host site at any given time as each seal will be returned when it reaches 2 or 3 years of age. Nevertheless, unintended consequences are possible, and that is why NMFS has proposed a gradual cautious approach for implementation (PEIS Section 5.2) and continuous monitoring to detect problems (PEIS Appendix E).

ECO 02 Hawaiian monk seals have lived in the NWHI for hundreds or thousands of years so what has changed with the ecosystem? Has NMFS really looked at what has changed in the NWHI ecosystem that has created all these problems? We are not going to save the seals if we don't understand what is wrong with their habitat. NMFS needs to fix the problem in the NWHI first.

Response: The dynamics of marine ecosystems extending over hundreds of thousands of square kilometers are extremely complex. NMFS and other divisions within NOAA conduct a great deal of research evaluating the NWHI ecosystem beyond monk seals. This will continue to be an active area of research as noted in Table 2.12-1, including continuing demographic and ecosystem modeling, using remote sensing technology to collect elevation and bathymetry data for the NWHI, and conducting oceanographic studies to determine effects of oceanographic variability on prey abundance availability and foraging success. Many habitat and ecosystem issues thought to affect monk seals are described in Section 3.3.1.7. See also ECO 5 and BIO 10.

ECO 03 Competition between Hawaiian monk seals and predators for the same food resources will destroy the ecosystem and all species will be negatively impacted. Bringing seals to the MHI will dramatically impact the ecosystem.

Response: NMFS disagrees. Hawaiian monk seals have been an integral part of the Hawaiian marine ecosystem for many millions of years. More than 900 seals live and forage in the NWHI, and the reefs there tend to be much healthier with more robust reef fish populations compared to the MHI, so that NMFS does not believe the natural increase in the MHI monk seal population will have any negative impact on the ecosystem. Nevertheless, note that the Preferred Alternative in the Final PEIS (Alternative 3) does not allow for weaned pups to be translocated from the NWHI and released in the MHI (please see the response to ALT 03). Please also see the response to ECO 01 and BIO 06.

ECO 04 The PEIS should include a discussion about ecosystem-based management measures to improve conditions to enhance juvenile survival. Ecosystem-based management may be necessary to conserve seals and maintain the biodiversity of the atoll and island ecosystem.

Response: This PEIS supports the goals of the recovery program for the Hawaiian monk seal, and is required by the ESA and MMPA (Section 1.0 of the PEIS). This is a focused single-species goal although arguably achieving this goal could have ecosystem benefits. Thus, ecosystem-based management in the Hawaiian Archipelago is not one of the alternatives considered in this PEIS. NMFS considered the impact of the proposed action together with other monk seal conservation activities in the cumulative impact analysis of the Final PEIS. (See also responses to ALT 09 and ALT 10).

ECO 05 Ecosystem-based management might involve numerous individuals and groups, and require many years to evaluate options, identify solutions, and gain approval. Nonetheless, failing to begin such discussions now could result in resource managers being ill-prepared in the future when measures must be taken and are most needed. In order to save one species, we must look at the entire ecosystem.

Response: NMFS does not disagree with these statements and in fact is eager to continue and expand discussion of these topics. Once specific monk seal recovery actions have been sufficiently developed, NMFS may pursue permits and associated NEPA processes to be able to implement them. However, these ecosystem-based approaches are not sufficiently developed to be included in the PEIS for reasons, such as the uncertainty regarding important ecological processes, food-web dynamics, etc., explained in Section 2.11.1. (See also responses to ALT 09 and ALT 10).

ECO 06 Prior to adopting the translocation program, NMFS must consider the ecosystem changes that may result in areas where seals proliferate. Will there be a depletion of marine life in those areas? Will there be enough food resources available for monk seals and humans?

Response: Note that under the Preferred Alternative in the Final PEIS (Alternative 3), seals may not be translocated from the NWHI to the MHI, but two-stage translocation could be conducted *within* the NWHI, *within* the MHI, or *from the* MHI to the NWHI. As described in Appendix E, NMFS would only translocate a small number of seals at any given time to another subpopulation. While a total of 200 weaned pups could be translocated over a 10-year period in the first stage of two-stage translocation, only a maximum of 60 of these could be at the host site at any given time as they will be returned when they reach 2 or 3 years of age. Further, NMFS has stated that it would implement the translocation program (under either Alternative 3 or 4) gradually initially and monitor for any unintended consequences. This would constitute a small proportion of the already existing seal population at a host site. NMFS has explained how it will monitor various seal population variables to ensure that any undesired effects that should result will be detected. If such problems are found, the translocation plan would be adjusted accordingly. NMFS does not believe this small number of seals will deplete marine life (See also responses to ECO 03). These issues are described in Appendix E of the PEIS.

ECO 07 The ecosystem is connected and each species is important. The ecosystem will become unbalanced if monk seals go extinct.

Response: NMFS agrees that monk seals are an integral part of the Hawaiian ecosystem. Aiding in the monk seals' survival and recovery is the fundamental purpose of the Recovery Program supported by this PEIS (Section 1.0).

ECO 08 Historical human disturbance in the NWHI such as military activity, guano mining, and seal hunting has thrown the ecosystem of the NWHI off balance.

Response: There have likely been many human-caused and natural disturbances in the NWHI over last few hundred years and the respondent has certainly identified several of them. The level of human use and disturbance now occurring in the NWHI is relatively low as compared to historical times, but there are undoubtedly many residual effects from decades of intensive use, manipulation, and, in some cases, extraction.

FISH Fisheries/ Fishermen

FISH 01 Monk seals are going to compete with fishermen, which will cause considerable negative impacts to commercial, subsistence, and recreational fisheries in the MHI. NMFS's target is 500 monk seals in the MHI. We depend on fishing to feed our family and this will affect our way of life. Humans are the top of the food chain and should be first. These impacts will affect islanders well into the future. What is NMFS going to do about that? NMFS is protecting seals but who is protecting us?

Response: Under the Recovery Plan for Hawaiian Monk Seals, 500 seals in the MHI is part of the criteria identified for potentially reclassifying the monk seal from "endangered" to "threatened" status under the ESA. NMFS recognizes the importance of fishing to the lives of many Hawaii residents. Alternatives 3 (the Preferred Alternative in the Final PEIS) and 4 include important mitigation measures (described in PEIS Sections 2.5 and 5.4 – 5.6), including a seal behavior modification program and various measures to engage stakeholders, including fishermen. These mitigation measures are designed to address many concerns regarding adverse impacts caused by monk seals interacting with fishermen and other ocean users.

The Draft PEIS analysis concluded that any adverse impacts on fisheries associated with the proposed alternatives would be negligible. NMFS revised sections of the PEIS related to fisheries impacts (PEIS Sections 4.9.1 - 4.9.3), considering comments received regarding the Draft PEIS and further analysis conducted by NMFS (Sprague et al. 2013). The updated analysis in the Final PEIS confirmed the conclusions from the Draft that impacts of all alternatives on fisheries would be negligible. Moreover, the Preferred Alternative of the Final PEIS does not include moving weaned pups from the NWHI for release in the MHI. It is also important to note that no new restrictions or regulations on fishing, access, gathering, or other resource use activities are expected to occur as a direct result of implementing the proposed action.

FISH 02 NMFS must evaluate the impacts of the proposed action on recreational fisheries close to shore, not commercial fisheries in the outer islands. The PEIS only compares fish consumption by juvenile seals to commercial catch in the NWHI, which is not right.

Response: NMFS revised sections of the PEIS related to fisheries impacts (PEIS Sections 4.9.1 - 4.9.3), considering comments received regarding the Draft PEIS and further analysis conducted by NMFS (Sprague et al. 2013), which specifically focuses on nearshore fishery resources in the MHI and includes data from reported commercial and recreational fishery landings in the MHI. The updated analysis in the Final PEIS confirmed the conclusions from the Draft that impacts of all alternatives on fisheries would be negligible. Moreover, the Preferred Alternative of the Final PEIS does not include moving weaned pups born in the NWHI for release in the MHI.

FISH 03 The number of Hawaiian monk seals that will be in the MHI is not going to have a notable effect on fish that might be sought after by commercial, recreational, or subsistence fishermen. In fact, seals have much more to fear from people. Fishermen should share fish resources with seals or move to other fishing areas if monk seals are present.

Response: Please note that under the Preferred Alternative in the Final PEIS (Alternative 3), weaned pups may not be translocated from the NWHI to the MHI. NMFS believes that monk seals and fishermen can co-exist in the MHI with minimal adverse interaction and has provided grant funds to the State of Hawaii, DLNR under Section 6 of the ESA, in part to support DLNR's work to minimize adverse fishery interactions with monk seals. NMFS has also partnered with DLNR in disseminating guidelines for fishermen that are intended to prevent and mitigate fishery-seal interactions. These guidelines may be viewed at the following URL: http://www.fpir.noaa.gov/Library/PRD/Hawaiian%20monk%20seal/HMS-fishing_guidelines-FINAL-PUBLIC.pdf

FISH 04 When a monk seal gets into our fishpond, who is going to pay for our fish? We spend a lot of money on fish for our fishpond but all NMFS talks about is saving the seal. NMFS should consider setting up a compensation program for fishermen to alleviate the

financial burden of monk seal interactions. This may soften some of the negative feelings fishermen have toward seals.

Response: The Final PEIS considers potential impacts on fishponds in Section 4.9.4 and presents a related mitigation measures in Sections 5.4 – 5.6. NMFS must operate within authorized appropriations and currently has no authority or plans to set up a compensation fund for fishpond incursions. As noted in the response to comment CUL 04, monk seals that get into enclosed fishponds with functioning walls and *makaha* (gates) would generally be considered by NMFS to be "out of habitat" (a type of stranding) and NMFS will work with the fishpond owner or responsible party to remove the seal as safely and quickly as possible with a goal of minimal or no impact to the fishpond.

FISH 05 There are already too many Hawaiian monk seals. Monk seals are going to eat all the fish. Comments calculating the amount of fish consumed by Hawaiian monk seals based on their average weight. Based on calculations stated in comments, a single monk seal eats from 50 to 100 pounds of fish per day. Currently there are 150 seals eating up to 2,737,000 pounds of food per year. If NMFS brings 60 more seals to the MHI, that will equal 210 seals. This many seals could eat up to 6,387,500 pounds of fish per year. The amount of fish monk seals are going to eat is going to have an effect on commercial, subsistence, and recreational fishing. How can the PEIS state there would be no impact?

Response: The calculations presented in the comment appear to be based on inaccurate overestimates of daily consumption by Hawaiian monk seals. For example, a recent NMFS analysis found that monk seals likely eat, on average, around 15 lb. of prey per day, perhaps less (Sprague et al. 2013). Furthermore, much of the fish consumed by monk seals are not targeted by fishers in the MHI (Sprague et al. 2013). NMFS revised sections of the Final PEIS related to fisheries impacts (PEIS Sections 4.9.1 - 4.9.3), considering comments received regarding the Draft PEIS and the further analysis conducted by NMFS (Sprague et al. 2013). The updated analysis in the Final PEIS confirmed the conclusions from the Draft that impacts of all alternatives on fisheries would be negligible. Moreover, the Preferred Alternative of the Final PEIS does not include moving seals from the NWHI for release in the MHI.

FISH 06 Fishermen in Hawai'i are already under pressure given recent closures and restrictions. This proposed action will again increase pressure on Hawaiian fishermen. Fishermen are having a hard time dealing with monk seals interacting with fishing gear. Please keep the fishermen in mind when moving forward on this action.

Response: NMFS will continue and enhance its collaboration with Hawai'i's fishing community to the maximum extent possible. NMFS has provided a grant to DLNR to help support such collaboration with fishermen. Part of DLNR's grant project includes development and testing of a system to report Hawaiian monk seal interactions with fishing gear. NMFS appreciates fishermen who report interactions, as this provides information useful in developing and implementing the fishery interaction mitigation program discussed in Section 2.5 of the PEIS. It is important to note that no new restrictions or regulations on fishing or other resource use activities are expected to occur as a direct result of implementing the proposed action, because no such restrictions or regulations are proposed in any of these Alternatives.

Please also see the response to comment FISH 01 for more information relevant to this comment.

FISH 07 The Hawaiian monk seals are increasing in the MHI and our lobster population is declining. Is there a correlation?

Response: NMFS is not currently aware of a correlation nor a causative link between lobster and monk seal trends. Please also see the response to comment FISH 01 for more information relevant to this comment.

FISH 08 Is NMFS going to put Hawaiian monk seals in fishing grounds? Fishermen have very substantial concerns about this and it needs to be adequately addressed in the PEIS.

Response: In the Final PEIS, the Preferred Alternative is Alternative 3, under which weaned pups may not be translocated from the NWHI to the MHI, but translocations could be conducted *within* the NWHI, *within* the MHI, or *from the* MHI to the NWHI. As described in Section 5.2 and Appendix E of the PEIS, several criteria will be considered in determining the locations to which seals would be translocated. One of these criteria will be the likelihood of fishery interactions, and with all other criteria being equal, areas where fishing activity is known to be heavy would rank lower for translocation purposes than areas where fishing activity is relatively light. Section 5.6 of the Final PEIS describes how NMFS plans to engage fishermen and local community leaders as part of the process to determine appropriate translocation release sites. Please also see the response to comment FISH 01 for more information relevant to this comment.

FISH 09 There is a lot of confusion about the types of fish that Hawaiian monk seals eat. I've been told that monk seals eat fish that are six to eight inches long. They are not eating the large fish in the holes. Monk seals often eat fish further from shore than where fishermen fish.

Response: As described in Section 3.3.5 of the PEIS, the fish families most frequently consumed by seals in the MHI are *Balistidae* (triggerfish), *Acanthuridae* (surgeonfish), *Muraenidae* (moray eels), *Serranidae* (groupers, basslets etc.), *Holocentridae* (squirrelfish), *Labridae* (wrasses), *Scaridae* (parrotfish), *Ostraciidae* (boxfish), *Monacanthidae* (filefish), *Scorpaenidae* (scorpionfish), and *Congridae* (eels). There are numerous other families consumed but at a very low frequency. Cephalopods (octopus and squid) occur less frequently in the monk seal diet than fish; the most important species are day octopus, night octopus, and a squid species. The size of prey in the diet varies, but based on footage collected by seal-mounted video cameras, most of the prey were small (3-4 inches on average). However, there are occasionally exceptions when a large fish or octopus was captured and brought to the surface for eating.

There is also a large amount of variability in foraging strategies employed by individual monk seals. Tracking studies of over 30 seals in the MHI show that seals begin searching the bottom for food immediately after leaving the beach. Some seals stay within a mile of shore while others will travel out 30 miles or more to feed. Most foraging occurs in water less than 200 feet deep but some seals dive over 1,500 feet to find their food. All monk seals feed along extensive tracks of coastline and ocean, not just one single location, thus distributing their foraging effort and making it unlikely that seals will dramatically impact any one place.

FISH 10 Fishery-monk seal interactions should be monitored more closely by government given the rate of incidental mortality that occurs in the near-shore fisheries. NMFS should work closely with the State to reduce fishery-related interactions.

Response: NMFS agrees with this comment. Please also see the response to comment FISH 01 for more information relevant to this comment.

FISH 11 Commercial fisheries impacts result from interactions with Hawaiian monk seals in terms of increased fuel cost and trip length to compensate for depredation events rather than changes in MHI commercial catch data as presented in the PEIS.

Response: NMFS revised sections of the PEIS related to fisheries impacts (PEIS Sections 4.9.1 - 4.9.3), considering comments received regarding the Draft PEIS and further analysis conducted by NMFS (Sprague et al. 2013). The updated analysis in the Final PEIS confirmed the conclusions from the Draft that impacts of all alternatives on fisheries would be negligible. Nevertheless, Alternatives 3 (the Preferred Alternative in the Final PEIS) and 4 include important mitigation measures (described in PEIS Sections 2.5 and 5.4), including a seal behavior modification program and a fisheries interactions mitigation program. These mitigation measures are designed to address many concerns regarding adverse impacts caused by monk seals interacting with fishermen and other ocean users. Please also see response to comments FISH 01, FISH 06, FISH 08, and FISH 09.

FISH 12 NMFS's conclusion that the potential impact of Hawaiian monk seals on commercial fisheries would likely constitute only 0.6% to 1.6% of annual commercial catch. However, monk seal prey typically do not include pelagic species. Thus, the annual consumption of prey species by monk seals should instead be compared with non-pelagic commercial fisheries landings, which would have been approximately 4.8% of the total commercial catch for 2009.

Response: NMFS has revised sections of the PEIS related to fisheries impacts (Sections 4.9.1 - 4.9.3) considering this comment and other comments received regarding the Draft PEIS as well as further analysis conducted by NMFS. Sprague et al. (2013) have made revised and very conservative estimates of monk seal consumption of fish prey specifically in nearshore areas (excluding pelagic catch) and compared this to estimated consumption by other apex predators (i.e., sharks and jacks) as well as nearshore fishery landings. The conclusion from the Draft PEIS that all alternatives would have negligible impacts on fisheries did not change with the revised Final PEIS analysis. While this was focused on nearshore resources, it remains important to note the lack of impact monk seals have on the very important pelagic fisheries, which make up ~95% and ~82% of the landed weight by commercial and recreational fisheries, respectively. In assessing impacts it is important to document areas where there will be no competition or conflict as well as those areas where such potential exists. Please refer to FISH 09 for a description of the partial overlap of fish consumed by monk seals and targeted by fishers.

FISH 13 ***The bottomfish fishery in Hawai'i has been under strict management since 2007 and the fact that Hawaiian monk seals are foraging generalists that may compete with the fisheries creates reasonable concern in the fishing community. NMFS should continue to engage the fishing community to alleviate these concerns.***

Response: NMFS agrees with this comment and will engage the fishing community to the maximum possible extent. Please also see responses to comment FISH 01, FISH 08, and FISH 09.

FISH 14 ***The amount of fish a monk seal could consume pales in comparison to the amount of fish caught each year by people in Hawai'i. It is difficult to evaluate the potential effects of a larger monk seal population on recreational fisheries given there is little federal or state oversight of this industry. Thus, NMFS should continue to work with the recreational and commercial fishing sectors to obtain better data on fishery landings as well as continue to pursue studies on monk seal foraging habits.***

Response: NMFS agrees with this comment, and intends to continue the work referred to in the comment to the maximum extent possible. NMFS will continue to work with DLNR to get the best possible data on recreational and commercial landings to best manage potential interactions with Hawaiian monk seals. Please also see the recent NMFS publication by Sprague et al. (2013).

FISH 15 ***Hawaiian monk seals impact fishermen by damaging fishing gear which results in lost income. Comments describing interactions with Hawaiian monk seals while fishing including accounts of monk seals eating fish off of gear.***

Response: NMFS recognizes that interactions do occur. Reporting fisheries interactions is a requirement for commercial fishers (see 50 CFR 229.6) and is important for monk seal recovery as well as for fisheries impact mitigation purposes. Timely reports of interactions help NMFS work with fishermen and effectively manage seals to minimize interactions and potentially reduce damage to gear. NMFS has produced a set of guidelines to help reduce these interactions and also maintains a toll-free hotline to report the interactions and other marine mammal incidents. The seal behavior modification program and stakeholder engagement activities, described in Section 5.4 – 5.6, are designed to help reduce the frequency and impact of seal-fisheries interactions. NMFS revised its analysis regarding fisheries impacts considering this and other comments received and present this analysis in the Final PEIS (Sections 4.9.1-4.9.3). Also please see the response to FISH 06.

FISH 16 ***Seals are migrating naturally to the MHI because they are starving in the NWHI. They are reproducing on their own in the MHI. The reason they are starving in the NWHI is because of humans overfishing species like lobsters, not because of seals eating them all. Overfishing needs to be stopped and monk seals should not take the blame for how much fish are in ocean.***

Response: A small number of seals have been documented moving between the NWHI and the MHI; however, the growth of the MHI seal population (Section 3.3.1.3) cannot be explained by the low level of migration observed from the NWHI. Instead the MHI population is growing due to high survival and reproduction of the local MHI population. The lobster fishery in the NWHI has been closed since 2000, and whether the fishery affected monk seals is unresolved

(Section 3.3.1.7). The bottomfish fishery closed in 2009 (Section 3.3.1.7), so there is no commercial fishing occurring in the NWHI.

GEN General

GEN 01 Comments expressing general support for the proposed action. Hawaiian monk seals should receive the most protection possible, particularly for juvenile seals. Comments in support of saving Hawaiian monk seals from extinction.

Response: NMFS acknowledges the recommendation to implement Alternative 4, which was the Preferred Alternative in the Draft PEIS. In accordance with the mandate of the ESA, NMFS is committed to using necessary and appropriate measures to ensure the survival and recovery of the Hawaiian monk seal population. While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking weaned pups from the NWHI and releasing them in the MHI. Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation. NMFS also intends to conduct other important seal research and enhancement activities and to engage the public in an effort to address concerns raised during the Draft PEIS public comment process, especially concerns related to the two-stage translocation process. It is our goal to ensure that all future management and recovery efforts are as successful as possible by staying engaged with, and responsive to, Hawaii’s communities. See response to ALT 03.

GEN 02 Comments expressing general opposition for the proposed action. The proposed action is too risky and will not be good for the communities that would be affected in the MHI or the Hawaiian monk seals. Comments expressing general public safety concerns about seals in the MHI.

Response: NMFS disagrees that the proposed actions would be risky for monk seals or people. Several measures are currently in place, and additional measures would be added to monitor and mitigate any possible public safety risks that might arise from implementation of any of the proposed actions. These measures include seal behavior modification actions and stakeholder engagement activities as discussed in Sections 2.4 and 5.4 – 5.6 of the PEIS. Moreover, under the Preferred Alternative (Alternative 3) in the Final PEIS, no seals will be moved from the NWHI and released in the MHI.

GEN 03 Hawaiian monk seals do not belong in the MHI. Comments expressing general support for protecting monk seals as long as they remain in the NWHI.

Response: See response for BIO 07. The best available evidence indicates that Hawaiian monk seals have inhabited the Hawaiian Islands Archipelago for several million years. The

Hawaiian Islands are a continuous archipelago from Hawaiʻi Island to Kure Atoll, and wild animals do not recognize the invisible line that humans have drawn between the NWHI and MHI. NMFS understands that many people have concerns about interactions between Hawaiian monk seals and humans in the MHI. However, monk seals are protected throughout their range under MMPA and ESA, and NMFS must use necessary and appropriate means to provide for the conservation of the species throughout this range. As explained in Section 5.6, NMFS is committed to working with communities in Hawaiʻi to discuss issues, quantify interactions, identify seals of potential concern, and work toward solutions for humans and seals to coexist safely in Hawaiʻi.

GEN 04 NMFS should let nature take its course and not intervene by trying to protect Hawaiian monk seals. Every time NMFS tries to manage nature, it gets messed up. Permits should be revoked due to scientific misconduct.

Response: NMFS intends to continue to implement actions that promote Hawaiian monk seal recovery as required by and authorized under the ESA and MMPA. Scientific studies show that NMFS Hawaiian monk seal research handling has had no negative impact on the species and only very rarely on the individual seals handled (Baker and Johanos 2002). Recovery actions over the past several decades have saved many seals from injury and death due to entanglement, hookings, shark predation, aggressive males, etc. The NMFS PIFSC has no violations of their current permit (No. 10137) and takes a conservative approach to conducting new activities. NMFS maintains high scientific standards and complies with stringent scientific review and oversight protocols, and requests that any allegation of scientific misconduct be accompanied by supporting information.

GEN 05 NMFS must limit human intervention to only what is necessary to promote survival of Hawaiian monk seals so that survival does not become impeded.

Response: NMFS shares the concerns about limiting human intervention with Hawaiian monk seals to only what is necessary to promote survival. As described in PEIS Sections 1.5.2 and 1.5.3, NMFS activities that require interaction with monk seals in Hawaiʻi (such as moving seals away from harmful situations) are all permitted by the NMFS Office of Protected Resources under the ESA and MMPA. NMFS research and enhancement activities also adhere to the Animal Welfare Act standards and requirements (see Section 1.5.10). All NMFS activities are stringently reviewed during the permitting process and are reviewed at regular intervals to ensure that activities are continuing to benefit, and not harm, the monk seal population.

GEN 06 State of Hawaiʻi buy-in with this proposed action is essential for the success of the Hawaiian monk seal program. Some type of legislation may be necessary to mitigate some of the effects that might occur.

Response: NMFS values its partnership with the Hawaiʻi state government and will continue to coordinate and collaborate with DLNR and other state agency partners to the maximum extent possible. NMFS has provided grant funds to DLNR under Section 6 of the ESA, in part to support DLNR's work on Hawaiian monk seal recovery. NMFS is not aware of any new legislation necessary for successful implementation of the actions proposed in the PEIS.

GEN 07 The USEPA has rated the Draft PEIS on Hawaiian Monk Seal Recovery Actions as Lack of Objections (LO).

Response: NMFS acknowledges the USEPA has not identified any potential environmental impacts requiring substantive changes to the proposal. We will continue to coordinate with USEPA as required by NEPA and other laws and regulations.

GEN 08 Hawai'i has so many unique species that are becoming endangered, including Hawaiian monk seals. Monk seals represent how poorly humans have taken care of our environment and the challenge we face to reverse this trend.

Response: NMFS agrees that some human activities in the past, especially in the NWHI, contributed to the current endangered status of Hawaiian monk seal. NMFS recognizes the challenge we face in promoting Hawaiian monk seal recovery, and we believe the actions proposed in the PEIS represent the best way to address this challenge.

GEN 09 Some of the proposed actions seem to address the "symptoms" of monk seal decline and a more retroactive approach that is expensive rather than effective long-term recovery.

Response: NMFS has carefully considered actions that hold promise to support Hawaiian monk seal recovery and has determined that the actions proposed in the PEIS are most likely to result in the most effective and positive outcome for Hawaiian monk seal recovery. Please also refer to Section 2.11 in the PEIS for more discussion related to this comment.

GEN 10 As long as the monk seals don't prohibit our fishing and beach use, I support the proposed action.

Response: No new rules or regulations are proposed in the PEIS including any new or additional prohibitions on fishing or beach use resulting from implementation of the actions proposed in the PEIS.

GEN 11 An example of where something like this was very successful is the Gulf of Mexico. A lot of research has been done where fishermen used sea turtle "excluder" devices to keep endangered sea turtles away from their nets. This prevented costly damage to shrimp trawler nets and protected the endangered turtles.

Response: NMFS will continue to look for and consider solutions to fishery interactions and other Hawaiian monk seal recovery issues within Hawai'i and throughout the world. We frequently confer with our American and international colleagues to make sure we are aware of conservation measures that may be applicable for Hawaiian monk seal recovery.

GEN 12 Where is the projected negative impact study on this plan? Where are the documents that describe how monk seals will negatively affect our island?

Response: Section 4.0 of the PEIS describes adverse and beneficial impacts (including some minor adverse impacts) that are anticipated to be associated with the proposed alternatives. Please see the Executive Summary as well as Section 4.8 for descriptions of biological impacts and Section 4.9 for descriptions of social (including cultural) and economic impacts. In summary, among the biological resources, all effects on sea turtles, cetaceans, and fish species were found to be *negligible* for all alternatives. Likewise, among socio-economic resources, all effects on fishing (commercial, subsistence, and recreational), environmental justice, and military resources were determined to be *negligible* for all alternatives. After considering substantive comments received regarding the Draft PEIS and further analysis, NMFS revised the description of cultural impacts and impacts on fisheries in the Final PEIS.

GEN 13 NMFS should determine the cost of translocating seals and include costs in the decision-making process. A cost-benefit analysis should be provided in the PEIS for each alternative.

Response: NMFS does, and will continue to, consider costs among several factors in its decision-making processes related to actions it undertakes to promote Hawaiian monk seal recovery. While NEPA does not require explicit discussion of direct costs of implementing proposed actions in a PEIS, the actions proposed in this PEIS do consider feasibility of implementation, including cost. Alternatives were primarily selected however, because of their potential to provide the greatest benefit to Hawaiian monk seal recovery. NMFS is required to undertake activities within authorized appropriations, and routinely makes decisions concerning the allocation of limited financial resources to competing conservation programs.

GEN 14 If NMFS moves seals to the MHI, they will be killed and eaten.

Response: See response to GEN 03 and BEH 04. It is against federal law to kill or harm a Hawaiian monk seal without proper authorization under the ESA and MMPA. Violations of the MMPA and ESA can be charged either civilly or criminally, with criminal fines under the ESA of up to $50,000 or imprisonment for up to one year, or both. NMFS recognizes that some monk seals have been intentionally killed already and that may continue to occur regardless of the fact that under the Preferred Alternative in the Final PEIS (Alternative 3), no weaned pups will be translocated from the NWHI and released in the MHI. NMFS will continue to address this type of issue through education, outreach, and enforcement activities.

INA Inadequate Information to Assess Effects/Unclear Information

INA 01 The PEIS should include an assessment of the carrying capacity in the NWHI and the effects of climate change to gain a better understanding of the state of the ecosystem.

Response: NMFS provided a discussion of carrying capacity in Section 3.3.1.6 of the Draft PEIS, explaining the concept and the difficulty associated with its determination. There is considerable uncertainty about the underlying factors driving the decline, and the role of climate change remains uncertain. While it would be beneficial to have a more complete understanding of the role of climate change in altering the NWHI ecosystem, NMFS does not believe that beneficial recovery actions can or should be deferred while we pursue that understanding. Waiting until NMFS has a significantly better understanding of climate change effects is not compatible with the needs of monk seals (and therefore with the Purpose and Need of this action).

Refer to Section 3.3.1.7 of the PEIS for a discussion of the current understanding about the role of climate change, including apparent effects of varying oceanographic productivity on monk seal survival and body condition, and potential effects of sea-level rise on terrestrial habitat for monk seals.

INA 02 The PEIS should include an evaluation of whether the numbers of monk seals is realistic for the NWHI where the land is disappearing. The analysis of the proposed alternative is not quantitative.

Response: NMFS published the first study on the potential effects of sea level rise on NWHI terrestrial habitat and biota (described in PEIS Section 3.3.1.7). Recently, the USGS published a more complete analysis of land elevations and projected sea level rise impacts in the NWHI (Reynolds et al. 2012, available at http://pubs.usgs.gov/of/2012/1182/). The future of sea level rise and the potential for mitigating habitat loss remains uncertain. NMFS considers this an important issue and is committed to preserving the NWHI as important habitat for monk seals in the foreseeable future.

INA 03 NMFS does not know enough about the impacts of moving 10 to 20 seals a year to the MHI or about removing predators such as jacks (ulua) from the NWHI to move forward on this action.

Response: NMFS conducted an impact assessment of the proposed 2-stage temporary translocation in the Draft PEIS, and updated fishery impacts analysis for the Final PEIS. While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 (Preferred) does not include any two-stage translocation option that would involve taking seals born in the NWHI and releasing them in the MHI.

Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation.

Nevertheless, please note that the updated fishery impacts analysis in the final PEIS (Sections 4.9.1-4.9.3) concluded (consistent with the Draft PEIS) that impacts on fisheries from all Alternatives would be negligible. Regarding the removal of jacks (ulua) and other Hawaiian monk seal competitors in the NWHI, NMFS agrees that the impacts of this type of activity remain uncertain. Please also see the response to ALT 09.

INA 04 The PEIS does not take anything into account except the translocation program. The statements that there are negligible impacts on ocean users are just not true. A complete review of the entire monk seal recovery program is needed.

Response: The PEIS evaluates all aspects of NMFS' monk seal research and enhancement program. This encompasses not just the proposed translocation action, but also all other research and enhancement actions, whether ongoing or new. Please refer to Chapter 4 of the PEIS for this information.

INA 05 The PEIS does not explain what sampling monk seals for genetic analysis means or includes.

Response: In Section 2.5 of the Draft PEIS NMFS described the three sources for genetic sampling of Hawaiian monk seals. 1) Shed molt (skin) samples, 2) tissue collected from dead seals and 3) small flipper skin punches which are a byproduct of flipper tagging.

INA 06 The PEIS does not include any kind of pictorial display or description of what having 500 monk seals in the MHI will look like. How many seals will be in what areas of the islands and what impact will they have?

Response: Seal abundance in the MHI is increasing naturally. Under the Preferred Alternative (Alternative 3) in the Final PEIS, no weaned pups would be translocated from the NWHI and released in the MHI. The expanding naturally occurring population and the movements of individual seals in various habitats makes it difficult to depict precisely how monk seals would be distributed if the population reaches 500 seals.

INA 07 The PEIS is not based on evidence. The whole idea of translocation is based on computer modeling; it's not even based on real data. The science presented in the PEIS is inadequate.

Response: NMFS disagrees with this comment. The PEIS is based on years of scientific research. The translocation concept is not based on computer modeling; rather it is based on over 25 years of detailed demographic data, successful experience with translocation (including published results), and sound conservation science. The stochastic simulation model (described in Appendix J) is closely tied to the most recently available field research data. The model serves to integrate all of the relevant data in order to better predict, quantify, and compare the probable outcomes derived from various possible translocation scenarios. In this way, the model helps identify the most beneficial translocation scenarios based on everything we know about monk seal demographics and previous translocation experience.

INA 08 The PEIS needs to be more specific and describe where seals would be translocated. There is lack of information describing the science behind an increase in the number of translocations. Why does NMFS believe an increase in the number of translocations will support recovery? There is no explanation of what "additional permits above the number permitted" means in the alternatives.

Response: The exact locations where seals would be translocated have not been decided; however, the process by which those decisions would be made is described in Appendix E and

Section 5.2 of the PEIS. The scientific process by which the number of seals to translocate will be decided is also described in Appendix E.

Although Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking seals born in the NWHI and releasing them in the MHI. However, a variety of translocation actions could occur under the Preferred Alternative, including two-stage translocation *within* the NWHI, *within* the MHI, or from the MHI to the NWHI. The maximum numbers that could be translocated under each alternative are presented in Appendix I and the Executive Summary of the Final PEIS.

When specific locations are chosen for translocation, NMFS will evaluate the potential effects of moving seals to chosen sites as part of the permitting process. Site-specific activities will be evaluated against the analyses presented herein for future NEPA compliance and the appropriate level of NEPA review will be completed accordingly as described in Section 1.6 and Chapter 5 of the Final PEIS.

The respondent may be referring to wording in the Alternative Proposed Table 2.10-1, which mentions additional takes over the status quo in some alternatives. These are explicitly enumerated in Appendix I. Also, scientific research permits are valid for up to 5 years, and the PEIS is intended to cover a 10-year period. Thus, more than one permit will be required over the duration of the PEIS.

INA 09 The establishment of feeding stations as described in the PEIS raises concerns and needs further explanation in the Final PEIS. It is not clear whether feeding stations will require human involvement or be self-sufficient. Feeding stations may draw in other animals besides Hawaiian monk seals. The PEIS states that this approach has not been tried to date with monk seals yet later states that it was tried successfully in the 1990s making it unclear whether feeding stations have been tested or not.

Response: NMFS agrees that "feeding stations" was inadequate wording and have explained this concept more thoroughly in the Final PEIS (Section 2.5). In short, the draft PEIS discussed a proposal to provide supplemental feeding of seals after release back to the wild in the NWHI following captive care. Trained technicians would perform the feeding after the seals have been conditioned to take food in this way during their captivity. This temporary process would help the seal meet its subsistence requirements while it transitions to self-sufficiency on a natural diet. NMFS has previously fed seals in head start or captive care programs in shore pens in the NWHI using reef fish or frozen herring in the past, so feeding fish to seals in the remote NWHI has been accomplished before. The proposal in the PEIS differs in that the seals may not be held in pens for feedings. As with any of the recovery actions, this strategy will be approached with caution and the implementation of supplemental feeding will be designed to quantitatively determine effectiveness.

INA 10 There are no impact criteria presented in the PEIS for recreation and tourism. The terms "negligible" and "moderate" are far too subjective for this analysis.

Response: Impact criteria for recreation and tourism and descriptions of what is meant by "negligible" and "moderate" are included in Sections 4.4.3 and 4.9.5 of the Final PEIS."

INA 11 The Draft PEIS does not provide enough detail on how long the de-worming or vaccination trials would last. NMFS should address food limitation first before beginning other initiatives such as de-worming and translocations.

Response: NMFS did not state how long vaccination (Appendix D) and deworming trials (Section 2.5) would last. This will depend upon a number of factors, including funding, the results of trials, and the availability of new drugs, routes of administration, or vaccines. NMFS does not agree that it should solve food limitation before developing other tools to aid recovery. The monk seal is in crises and NMFS believes it should pursue all promising tools for recovering the species without deferring action pending additional long-term investigations. NMFS will continue to investigate the nature and underlying causes of food limitation affecting juvenile survival. The common objective of many recovery actions evaluated in the PEIS is to preserve or enhance the number of reproductive-aged females so that the population maintains its capacity to respond once natural foraging conditions become more favorable to growth.

INA 12 Impacts to piscivorous wildlife species, global climate change, sea level rise, tourism, or the military are not adequately considered in the PEIS. Information about the marine ecosystem and food web is not available for the MHI or NWHI.

Response: The following sections of the PEIS address each of the topics mentioned in the comment: 1) Section 4.8.5 (Fish); Section 4.8.6 (Birds); Section 4.9.5 (Recreation and Tourism); and Section 4.9.7 (Military Activities). The potential effects of climate change and the issue of sea level rise are addressed as part of the cumulative effects analysis for each resource evaluated in the PEIS as listed in Table 4.5-2 Reasonably Foreseeable Future Actions Within the Project Area. NMFS also notes that Sections 4.9.1 – 4.9.3 regarding potential impacts to commercial, subsistence, and recreational fisheries, have been revised in the Final PEIS.

INT Human-Seal Interactions

INT 01 NMFS wants to minimize human-seal interactions but you are exposing yourselves to seals during research. What's the difference? Is human disturbance due to research contributing to population decline? Research should be closely monitored to ensure there are no deleterious effects.

Response: NMFS has historically been, and remains, extremely sensitive to the potential for adverse effects of research on seals. NMFS keeps careful records of all research- and enhancement-related disturbances and handling of monk seals, and monitors for deleterious effects. All research and enhancement activities are conducted in a precautionary manner to minimize the potential for negative effects. NMFS has published peer-reviewed scientific articles evaluating the effects of research and has not found negative effects, with the exception of a very small number of unintended seal deaths over the long history of the research program. The protocols and their conservative nature are described throughout Section 2.5 of the PEIS.

NMFS also recognizes that, despite past performance, there is some risk of harm or death to seals associated with research and enhancement activities. That is why NMFS is applying for a permit that includes a limited number of unintentional mortalities (PEIS Appendix I), the potential impacts of which are analyzed in PEIS Chapter 4. Research and enhancement activities do involve some risk to the individual animals, but this small level of risk is acceptable in relation to the expected conservation benefits to the species. In contrast, most non-research and non-enhancement interactions between humans and seals entail risks of harm to both the seals and the people, and achieve no benefit to the seals.

INT 02 Increasing the number of Hawaiian monk seals in the MHI will increase the number of human-seal interactions. It seems the existing mitigation measures used to manage human-monk seal interactions are insufficient. Seals do nothing for us but cause problems such as closing roads and beaches. Seals are also at more risk for injury where there are more interactions.

Response: See response to BEH 03. NMFS acknowledges that people have concerns about interactions between humans and Hawaiian monk seals. The Hawaiian monk seal population in the MHI is naturally increasing due to high survival rates of pups that are born here. While seals may still experience harmful interactions or injuries, survival is still high relative to most sites in the NWHI.

Note that while Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI. Therefore, any increase in the number of seals in the MHI will be attributable to natural growth of the population. NMFS acknowledges that Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation.

Given the natural population increase in the MHI, NMFS agrees that the currently permitted options may be insufficient to manage the expected corresponding increase in seal-human interactions. To address this need, NMFS has proposed a behavioral management program in PEIS Chapter 2 (included in Alternatives 3 and 4). NMFS believes that humans and seals can safely coexist and share the beaches and ocean around the Hawaiian Islands.

As described in Section 5.6 of the PEIS, NMFS acknowledges that it will need the cooperation and involvement of the community in Hawaiʻi to learn about interactions and work with communities to develop solutions. See response to SOC 06 regarding closure of roads and beaches.

INT 03 ***If a monk seal is on a beach and becomes aggressive with small children that are there, am I going to risk getting fined for intervening or am I supposed to watch a child get injured or possibly die in front of my eyes?***

Response: NMFS acknowledges that people have concerns about monk seals and human safety. NMFS would like to emphasize that seals and people generally coexist peacefully in the waters and beaches around Hawaiʻi. However, in some situations, people may be concerned for their safety, or the safety of others, around a seal displaying aggressive behaviors (or defensive, in the case of mothers and pups). Monk seals are protected by both the Endangered Species Act and the Marine Mammal Protection Act, and both statutes have provisions that ensure that actions that are taken in self-defense or in defense of others are not subject to prosecution (see PEIS Sections 1.5.2 and 1.5.3).

NMFS would like to stress that in any case where it is made aware (through input from the public or other sources) that a seal is engaging in behaviors that cause risk to either humans or the seal, it would investigate and, if necessary, apply appropriate mitigation (behavior modification, removal, or other action as appropriate). Input from the public is vitally important for these protocols to be effective and implemented in a safe, timely manner. Also refer to the response to INT 04 below.

INT 04 ***NMFS should know that if people are threatened by a monk seal, they are going to kill the seal. There is no safety among seals and seals are harming people. Monk seals are aggressive and they are going to bite. What is your accountability if someone gets injured?***

Response: All scientific evidence, field observations, and public reports to date indicate that public safety risks associated with Hawaiian monk seals in the wild are extremely low. Monk seals are not aggressive by nature and only exhibit aggressive behavior toward humans when they feel threatened or when they have been previously fed by humans or otherwise interacted with, and have thereby been conditioned or "trained" to seek out human interaction. As discussed in the PEIS (Section 3.4.9) only a very small number of such interactions have occurred in the MHI over the past 20 years. NMFS has, and will continue to conduct outreach and education activities that help prevent human-seal interactions and minimize the risk of injury when they occur. The seal behavior modification program (described in Sections 2.5 and 5.4 of the PEIS) included in Alternatives 3 and 4 of the PEIS is designed in part to further address this concern. If the public follows the viewing guidelines and ESA/MMPA regulations, the risk of injury from a seal is negligible to non-existent. Please also refer to the response to INT 03.

INT 05 ***Given the high number of human-seal interactions and the unsustainable number of monk seal mortalities in recent years, NMFS should dedicate more attention to this issue in the Final PEIS. Additional community outreach and education to address interactions should be highlighted in more detail and recommendations for reducing interactions should be included. Alterations in human behavior are mentioned in Section 5.4 as an effective measure for preventing socialization of seals. NMFS should provide greater attention to this in the Final PEIS.***

Response: NMFS has presented information regarding human-seal interaction in Section 3.4.9 of the Draft PEIS. Section 3.4.9 of the Final PEIS reflects significant new human-seal incidents that have occurred between the release of the Draft PEIS and the completion of the Final PEIS.

Sections 5.4 and 5.6 present information regarding community education and outreach to address human-seal interactions. NMFS agrees that recommendations and guidelines for reducing interactions are important to disseminate to the public and additional education and outreach efforts in this regard are currently high priorities for NMFS. Since publication of the Draft PEIS, NMFS developed a public service announcement on human behavior around monk seals. This video and guidelines for human behavior are available on the NMFS web site

http://www.fpir.noaa.gov/PRD/prd_good_neighbors.html and are an important component of ongoing outreach efforts. The focus of this PEIS, however, is on research and enhancement activities directed on Hawaiian monk seals.

INT 06 ***Comments describing interactions with Hawaiian monk seals.***

Response: NMFS recognizes that, as with many other wildlife species around the world, there are interactions in the MHI where seals and humans overlap in their use of resources. NMFS appreciates the public sharing this information and encourages continued dialogue to help us better manage seals in the MHI in the future. Section 5.4 of the PEIS describes the plan for the development of a behavior modification program to help minimize seal-human interactions.

INT 07 ***When Hawaiian monk seals hear a boat engine, they begin following the boat. Older seals already in the MHI are going to teach the pups to interact with the fishermen. These seals are going to end up relying on handouts for food.***

Response: Scientific evidence to date does not support the idea that monk seals "teach" other monk seals. Monk seals are typically solitary animals, living and foraging mostly by themselves. Even mother seals and pups do not spend a significant amount of time together (only about 39 days during nursing) and weaning occurs rather abruptly when the mother seal leaves her pup and swims offshore to feed (Kenyon and Rice 1959; Wirtz 1968; Johnson and Johnson 1984).

Nevertheless, NMFS agrees that interactions with fisheries, including interactions with fishing boats, represent a serious recovery issue. For this reason, NMFS has proposed, under Alternatives 3 and 4, seal behavior modification programs intended to address this issue. Seal behavior modification programs are described in Sections 2.5 and 5.4. Please also see the response to comments FISH 01, FISH 06 and FISH 08 for more relevant information.

INT 08 We need to help Hawaiian monk seals by ending human-seal interaction as it contributes to population decline. Chronic disturbance may cause seals to abandon haul-out sites important for maturation.

Response: One of the recovery actions specified in the Recovery Plan for the Hawaiian Monk Seal (NMFS 2007) is to "reduce the likelihood and impact of human disturbance". As explained in PEIS Section 5.6.2, the Marine Mammal Response Network supports the Hawaiian Monk Seal Recovery Program by responding to monk seal haul-outs to protect seals from disturbance and alert the public that a seal is resting on the beach. Response network activities that do not involve direct interaction with monk seals are not included in the alternatives considered in the PEIS because they have been authorized under a separate permit, but are analyzed in the cumulative impact analysis of the Final PEIS As described in Section 5.6.2, the Marine Mammal Health and Stranding Response Network was analyzed in a separate NEPA evaluation which was published in 2009. Section 5.4 of this Final PEIS describes the plan for the development of a behavior modification program to help minimize seal-human interactions. NMFS considers the impact of the proposed action together with other monk seal conservation activities, including volunteer outreach, in the cumulative impact analysis of the Final PEIS. Also see response to BEH 09.

INT 09 More human-monk seal interactions are only going to lead to more prosecutions of Hawaiians and fishermen.

Response: Please see response to comment REG 05.

MGT Management

MGT 01 I support Hawaiian monk seal recovery but I do not support NMFS's role in the recovery. NMFS should not be the lead agency on this project. A joint task force should be developed which should include true Hawaiian practitioners, community members, and ocean users so NMFS would not be making decisions in a vacuum.

Response: The leadership role and responsibility of NMFS in Hawaiian monk seal recovery is specified in federal law (ESA and MMPA). NMFS agrees, however, that close coordination and collaboration with other government and non-government partners and stakeholders is essential for successful Hawaiian monk seal recovery. Public involvement and solicitation of public comments is incorporated in many aspects of the NMFS recovery program, including during the process of applying for federal permits and PMNM permits for various recovery activities. The Hawaiian Monk Seal Recovery Team also includes members of the Hawaiian community and ocean users. Plans for NMFS to engage Hawaiian practitioners and other community members are discussed in Section 5.6 of the PEIS.

MGT 02 Community-based resource management has been very successful in Hawai'i and now is an opportunity to train people to address your concerns with Hawaiian monk seals. NMFS could learn from the experts who know the coastline and oceans better than anyone.

Response: NMFS agrees. NMFS places a high priority on the uses of community-based resource management strategies for the purposes of Hawaiian monk seal recovery. Section 5.6 of the PEIS presents various ways in which NMFS will engage local communities, including community members who have special knowledge and expertise relevant to Hawaiian monk seal recovery.

MGT 03 Moloka'i needs protection from commercial fishermen and others that come from off-island to take or use our resources. People of Moloka'i should have some say in whether or not people can fish here.

Response: The purpose of this PEIS is to analyze the recovery actions proposed for Hawaiian monk seals, and the PEIS does not address general issues concerning public access to fishing resources.

MGT 04 NMFS must coordinate with other departments in the federal and state government and communicate better to successfully manage resources and work with the community.

Response: NMFS places a high priority on coordination with other federal and state government agencies. NMFS intends to continue to coordinate and collaborate closely with our government partners, including NMFS's Office of National Marine Sanctuaries and the State of Hawai`i, DLNR. Please also see the response to comment ALT 20. Although NMFS is the agency with the mandate and responsibility to recovery Hawaiian monk seals, NMFS recognizes that successful recovery of the species will depend on coordination with federal and state partner agencies. PEIS Section 1.8 describes the involvement of other agencies involved in the PEIS. USFWS and Hawai'i DLNR were invited to be cooperating agencies in the PEIS process, but both declined the invitation. Section 5.6 of the PEIS describes NMFS' plans to coordinate with stakeholders and communities. NMFS always strives to improve coordination with partners and continued communication to successfully manage our shared resources around the Hawaiian Islands.

MGT 05 The PEIS should address the need for supplemental funding to support the preferred alternative, the likelihood this funding will be secured, and the extent to which a lack of funding could limit critical research and recovery activities.

Response: Please see the response to comment GEN 13.

MGT 06 Will the State of Hawai'i have sufficient resources to be able to enforce these new management measures to protect seals?

Response: No new rules or regulations are included in the actions proposed in the PEIS. NMFS has provided grants to the State of Hawai'i DLNR, under a cooperative agreement and joint enforcement agreement, in part to support Hawaiian monk seal recovery and enforcement of Hawaiian monk seal protections specified in the ESA and MMPA.

MGT 07 Federal budget constraints must be considered for this project. Why implement a program that will fail unless it receives a large amount of federal funding?

Response: NMFS will only implement actions for which it is allocated adequate funding. Please also see comment GEN 13 for information relevant to this comment.

MGT 08 Is it normal or natural to cordon off sections of beach around a monk seal? It may be safer for the seal or for humans but is it natural?

Response: See response to BEH 09. NMFS believes that Hawaiian monk seals and humans can safely coexist and share the beaches and ocean, in part, because this is already occurring in several places around Hawai`i. NMFS is committed to Hawaiian monk seal recovery, as well as human safety, and believes that the response network program that helps to notify and educate beachgoers about Hawaiian monk seals supports this mission. When NMFS cordons off sections of beach around a monk seal, it is to allow the seal the ability to exhibit its natural behaviors (*e.g*., resting, nursing) without being harassed by humans, and for public safety. NMFS will continue to use an adaptive management approach in providing protection to monk seals and guidance to the public along Hawaiʻi's beaches and shorelines. Cordoned off areas, or seal protection zones (SPZs), are erected and managed by NMFS and government partners on a case-by-case basis depending on specific criteria and guidelines that consider the location, the individual seal(s), levels of human use, etc. NMFS policy calls for the use of SPZs only when certain criteria are met. The harassment of monk seals by humans is illegal for a reason – human actions that alter the behavior of endangered species can harm the animals' ability to survive.

MGT 09 There is a wonderful opportunity to educate the public through the Hawaiian Monk Seal Response Team. It would be helpful if the Response Team was given some sort of badge of authority, a shirt or jacket with the NMFS logo, or a flag or sign that we could place in the sand explaining that we are volunteers for NMFS.

Response: The Marine Mammal Response Network is a NMFS program not part of the action alternatives analyzed in this PEIS. However, it is standard policy for trained volunteers who have completed a certain number of hours and regularly respond to monk seal haul-outs to wear a shirt identifying them as a member of the NMFS-approved Response Network. Volunteers are invaluable to NMFS' Hawaiian monk seal recovery efforts, helping to inform and educate beachgoers about the seals with which we share our beaches and ocean, and by doing so, helping to keep humans and monk seals safe. Shirts or jackets are provided to response volunteers to identify them as trained and authorized response network members, but this does not confer any authority or permission to "take" or approach more closely to monk seals than the general public. However, the identification helps direct beachgoers to a vetted source of information, and helps the recommendations of the volunteer regarding safe viewing to carry more weight. If trained volunteers need shirts, they should coordinate with their respective Island Response Coordinator.

MGT 10 It is critical that NMFS work with the State Legislature on the objectives of this program.

Response: NMFS provided an informational briefing regarding the PEIS and the proposed re-designation of Hawaiian monk seal critical habitat to members of the Hawaiʻi State Legislature on November 18, 2011. NMFS will continue to provide relevant information and seek the views of the Hawai`i State government regarding Hawaiian monk seal recovery.

MGT 11 How will the public know what NMFS's progress on this proposed action will be? What if these actions fail - how far will NMFS go to intervene? At what point will the program be deemed successful?

Response: Please see the response to BIO 04. NMFS will provide updates on the progress of the Hawaiian monk seal recovery program, including progress on implementing the actions proposed in the PEIS via the NMFS PIRO website, news media advisories, public presentations, community meetings and other methods of community engagement, many of which are described in Section 5.6 of the PEIS. Regarding how far NMFS will go to intervene, NMFS will only implement actions that have been carefully assessed in the PEIS or otherwise subjected to review and analysis as specified in NEPA and all other applicable laws and regulations, such as the ESA and MMPA. Regarding how the success of the program will be measured, several evaluation criteria are specified in the PEIS (please see Sections 5.2 - 5.4, and Appendix E of the PEIS), and additional criteria will be specified in the required ESA-MMPA permit, which NMFS must obtain prior to implementing the actions proposed in the PEIS.

PUB Public Coordination

PUB 01 Public outreach to further explain more about the monk seal's decline will help the public understand the uniqueness of the situation and build support for the project. Community support is essential for this project to be successful. The project is progressing too fast.

Response: NMFS agrees that community support is essential for the recovery of the Hawaiian monk seal to be successful. NMFS began outreach efforts for the PEIS in October 2010 with the beginning of the public scoping period (details can be found in PEIS Appendix B). After the scoping period, while NMFS was incorporating the public comments and preparing the Draft PEIS, NMFS held numerous "talk story sessions" and information sharing sessions with government partners, stakeholders, and community members on all populated islands (except Niihau) to provide information and answer questions regarding the need for, and potential impacts of, the proposed actions. Although NMFS staff learned a great deal from these meetings, they were held to have informal discussions with stakeholders and were not documented for the record as part of the official NEPA public process. NMFS's goal is to ensure that all future management and recovery efforts are as successful as possible by staying engaged with, and responsive to, Hawaii's communities. Section 5.6 of the Final PEIS describes the range of NMFS planned or ongoing activities to coordinate with stakeholders and communities. Please also see the response to PUB 03.

PUB 02 ***NMFS should coordinate with the community to select release sites and provide continued outreach to make sure people understand the status of the project. Continued public outreach on a regular basis is necessary for this project to be successful.***

Response: Section 5.2 of the PEIS and Appendix E describe the monitoring plan for the two-stage translocation process and how NMFS has developed a decision framework to support decision-making and assessment at each stage of the process. NMFS emphasizes that recipient sites would be carefully chosen with public input. The details of the decision framework are covered in depth in Appendix E. Note that while Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking seals from the NWHI and releasing them in the MHI. However, translocations may occur within the MHI under Alternative 3, and community input would be considered when conducting those translocations.

Section 5.6 of the Final PEIS describes the range of NMFS' planned or ongoing activities to coordinate with stakeholders and communities. Also, as described in Section 1.6 and Chapter 5 of the Final PEIS, site-specific activities will be evaluated against the analyses presented herein for future NEPA compliance and the appropriate level of NEPA review will be completed accordingly.

PUB 03 ***In the past, NMFS has done a terrible job at communicating with community members and practitioners, despite promises made at town hall meetings and public hearings. NMFS has never led a well-coordinated outreach effort. It fails to be seen how NMFS can successfully communicate the status of activities with the monk seal recovery program. The public outreach on the PEIS and critical habitat for monk seals has been very disappointing.***

Response: NMFS is committed to continually improving outreach efforts. The NEPA process is an information disclosure and gathering process to include the public in the decision-making of federal agencies. NMFS began this process with the scoping period in October-November 2010.

Although not documented for the record as part of the official NEPA process, NMFS held numerous informational meetings with government partners, stakeholders, and members of the community to discuss the proposed actions. NMFS held 20 meetings with federal, state, and county government agency staff (e.g. DLNR, HIHWNMS, County Parks & Rec, WESPAC, OHA), 17 meetings with nearly 200 stakeholders (e.g. tour operators, fishermen, coastal property managers, Aha Kiole), 14 town hall meetings on 6 islands to answer questions, and 6 meetings with over 140 response volunteers.

Once the draft PEIS was released in August 2011, NMFS held 6 formal public hearings on 5 islands to receive public comments. In an effort to do this, even after the official public comment period for the PEIS closed, NMFS conducted a televised briefing for two committees of the state House of Representatives, and has sent a letter with an update about the PEIS and critical habitat processes (along with background information) to every state legislator, mayor, and county council member. NMFS will continue its efforts to involve and engage the community and appreciates suggestions for how to better accomplish this. Section 5.6 of the Final PEIS describes the range of NMFS planned or ongoing activities to coordinate with stakeholders and communities.

PUB 04 Has NMFS met with local and state government officials? What outreach efforts have been done as part of this PEIS? It is not clear what level of public scoping took place.

Response: See response to MGT 04, PUB 01, and PUB 03 for information regarding public scoping and coordination with government officials. A detailed description of the public scoping process can be found in Appendix B of the Draft PEIS.

PUB 05 Better use of the media is needed to effectively reach our communities. Propose notification in newspapers should be published on this project. The meetings seem to have come up quickly. I have not seen any banners or heard radio announcements about public hearings. It is critical that NMFS connect with communities and does not appear sneaky.

Response: NMFS acknowledges that announcements and notification about upcoming public meetings are important. During the scoping period starting in October 2010, NMFS published paid public notices in 7 newspapers on 5 islands. Notices were published 14 days in advance of each public scoping meeting, and again 7 days prior to the meeting date. Public Service Announcements (PSAs) were also sent to 7 television and radio stations, but airing of those announcements is at the discretion of the station. The same procedure was followed for the comment period following publication of the Draft PEIS. Announcements of the meetings were also sent out on different email mailing lists and listserves for several different organizations and community groups.

Finally, a press release was issued when the draft PEIS was released and several print articles were published in local newspapers (*e.g.,* the *Honolulu Star-Advertiser*, *Moloka'i Dispatch, Honolulu Weekly,* and *The Garden Island*), as well as print stories picked up by the national press and television stories on local news stations. NMFS will continue its efforts to communicate with communities and improve notification of important issues.

PUB 06 When will the public be able to view comments and testimony and what has been done to address our concerns?

Response: As described in the beginning of this Comment Analysis Report, this report provides a summary of the public comments received on the Draft PEIS during the comment period and NMFS' responses to those comments as required by NEPA. Where changes were made in the Final PEIS, NMFS has specifically noted such in the responses to comments included in this report.

PUB 07 NMFS should produce an informative video about the monk seal's decline and the proposed recovery actions. This video could be shown at film festivals, ball park movie nights, and on airplanes for tourists coming to visit Hawai'i.

Response: NMFS agrees that outreach is a very important strategy for Hawaiian monk seal recovery and that films, in particular, provide a visually engaging medium for conveying information to the public. NMFS has co-produced a video presenting information relevant to the proposed seal behavior modification activity and other impact mitigation measures related to human-seal interactions. This video can be viewed at: http://www.fpir.noaa.gov/PRD/prd_good_neighbors.html. NMFS acknowledges this comment and will take it into consideration when planning outreach projects in the future.

PUB 08 People are financially stretched right now and feel threatened by this project. The more fishermen and kupuna NMFS can coordinate with to promote the proposed actions, the more successful it will be.

Response: See response to PUB 03. NMFS recognizes that coordination with the community is an essential component of Hawaiian monk seal recovery. NMFS is committed to working with the fishermen, *kupuna*, and communities that are directly affected by monk seals to work toward productive solutions for coexistence. Section 5.6 of the Final PEIS describes the range of NMFS planned or ongoing activities to coordinate with stakeholders and communities.

PUB 09 Why can't we provide comments on critical habitat during this public comment period?

Response: As discussed in Section 1.9.1 of the PEIS, revising monk seal critical habitat is a separate federal action with a different process. The PEIS and critical habitat processes are similar because each action relates to the recovery of Hawaiian monk seals and requires public engagement. However, these actions are subject to differences in administrative process, because these actions are guided by different provisions of the ESA.

The revision of critical habitat was prompted by a petition, which under section 4 of the ESA compels an agency response based on the best available information. If a revision is warranted, NMFS may identify critical habitat in areas occupied by the species (i.e. within the range) and/or in areas not currently occupied by the species but necessary for survival and recovery. Once designated, federal agencies must consult with NMFS or USFWS, as appropriate, to ensure that any action that they fund, permit, or carry out will not destroy or adversely modify critical habitat. Existing monk seal critical habitat is described as part of the environmental baseline (Chapter 3) and the proposed revision is evaluated as part of the cumulative effects assessment in Chapter 4.

This PEIS looks at the effects from the federal government funding, permitting, and carrying out research and enhancement activities on the species itself, the Hawaiian monk seal. There are different requirements for the two processes. Activities carried out on monk seals are also regulated by the MMPA, AWA, and other laws described in PEIS Section 1.5. In addition, an ESA consultation must be done to make sure that the federal actions carried out on monk seals, as described in the PEIS, will not jeopardize the existence of monk seals or destroy or adversely modify monk seal critical habitat.

Please visit this website for more information on critical habitat: http://www.fpir.noaa.gov/PRD/prd_critical_habitat.html

PUB 10 Why didn't NMFS have a public meeting in Hana about this project?

Response: NMFS held an informational community meeting in Hana on July 21, 2011 to discuss the PEIS and proposed redesignation of Hawaiian monk seal critical habitat, although this meeting was not documented for the record as part of the official NEPA or critical habitat designation process. NMFS held the formal public hearing for the draft PEIS in Kihei to reach a larger portion of the Maui community. In total, NMFS held a total of two informational town hall style meetings (in Hana andKihei) and one public hearing (in Kihei) on Maui. NMFS held a total of 14 informational, town hall-style meetings on 6 islands (not documented for the record as part of the NEPA process) and 6 NEPA public hearings across the state. See Response to PUB 03.

PUB 11 Despite all the public opposition that continues to be expressed at these meetings and in comments, it still seems as if they are being ignored. It seems like this is already a done deal.

Response: NMFS is aware of opposition among members of the public to various current and proposed Hawaiian monk seal recovery activities. NMFS has and will seriously consider all substantive public comments in the development, assessment, and implementation of the Hawaiian monk seal recovery program. Public support for an endangered species recovery program, such as the Hawaiian monk seal recovery program, is desirable for recovery purposes, and significant efforts have been and will be taken by NMFS to effectively address legitimate concerns.

While NMFS acknowledges opposition among some members of the public, NMFS has also received numerous supportive public comments regarding the actions proposed in the PEIS and regarding the Hawaiian monk seal recovery program in general. Decisions regarding implementation of any recovery action proposed in the PEIS will be based on the strength of the recommendation and on which alternative meets the purpose and need identified and which best contributes to the recovery of the monk seal.

REG Regulatory

REG 01 Please explain when the Section 106 consultation process will be initiated and subsequently completed in accordance with the National Historic Preservation Act. We cannot concur with a determination of no effect on cultural and historic properties as stated in the PEIS. Additional documentation on the effects on cultural and historic properties is needed.

Response: In fulfilling its responsibilities under Section 106 of the NHPA NMFS undertook a compliance process (See Appendix L) which included consultation with Native Hawaiian Organizations (NHO) and individuals that attach traditional religious and cultural significance to eligible or listed historic properties that have the potential to be affected by the undertaking associated with monk seal recovery as outlined in this PEIS. The intent of the consultation was to identify historic properties potentially affected by the undertaking and to seek ways to avoid, minimize, or mitigate any adverse effects on those properties.

NMFS held eleven community meetings were held on six islands between October 29 and December 13, 2013. The announcement for these meetings was sent out via the monk seal listserv, and to everyone on the PEIS email contact list. The meeting announcement, along with an invitation to consult, was also sent to DLNR PIO, HIHWNMS, PMNM, OHA, WESTPAC, SHPD, and to a list of NHOs, including Association of Hawaiian Civic Clubs, Island Burial Councils, and Hui Malama I Na Kupuna O Hawai'i Nei. Notices ran in major newspapers around the state.

The NHPA Section 106 consultation was completed in compliance with the NHPA and a determination of no historic properties affected was made. On November 14, 2013 NMFS made available to the public, via its website, a separate document (Appendix L) describing the results of the Section 106 consultation process. This document was sent to the Hawaii State Historic Preservation Officer (SHPO) on November 12, 2013 (see Appendix A). NMFS received no response from SHPO regarding the determination. The document describing the NHPA 106 process was also sent to all consulting parties on November 19, 2013 (see Appendix A).

REG 02 This PEIS is not in compliance with federal and State of Hawai'i laws such as the Coastal Zone Management Act or Hawai'i Environmental Protection Act (HEPA). Specifically, a cultural impact assessment has not been prepared.

Response: NMFS will continue to comply with all applicable laws, including the CZMA. Section 5.6 of the PEIS provides an overview of the coordination and consultation NMFS has conducted and will continue to conduct related to the Hawaiian monk seal recovery program. An assessment of potential cultural impacts is presented in Section 4.9 of the Final PEIS and additional information can be found in Appendix M, which presents detailed cultural impact assessment.

REG 03 This PEIS must comply with the Admissions Act and explain how the proposed action will benefit Native Hawaiians and the general public. NMFS has a mandate to work with Native Hawaiians and protect Native Hawaiian access.

Response: The activities proposed under the PEIS are fully compliant with and authorized by federal law. Both MMPA and ESA authorize NMFS employees, in the performance of official duties, to undertake activities that take or harass protected species and marine mammals under certain circumstances that will aid in the conservation of those species, including research and enhancement.

NEPA requires NMFS to consider the impact of the proposed activity on communities and cultural resources, which appears in sections 3.4.6 and 4.9.4 of the PEIS. In addition, NMFS has revised the cultural impact assessment section of the PEIS (Section 4.9) and presents further cultural impact assessment in Appendix M. NMFS has completed the NHPA compliance process for the actions proposed in Alternative 3, the Preferred Alternative (see Appendix L).

NMFS also intends to engage Native Hawaiians and other key stakeholders via the measures described in Sections 5.5 and 5.6 in the PEIS. Refer to REG 01 and CUL 02 for more information on NEPA and the NHPA processes.

REG 04 State law already protects monk seals so there is no need for federal law enforcement to overlap with state enforcement. Designation of the MHI as critical habitat is not necessary to assist law enforcement in protecting monk seals.

Response: No new federal regulation is proposed in this PEIS. Federal and State law enforcement agencies (such as NOAA Office of Law Enforcement and State of Hawaiʻi DLNR Division of Conservation and Resources Enforcement) routinely coordinate on law enforcement related to Hawaiian monk seals, pursuant to a joint enforcement agreement under the ESA. Refer to Response to PUB 09 regarding critical habitat designation.

REG 05 Having more seals in the MHI is going to lead to more prosecutions of fishermen, Hawaiians, and residents. People are going to be fined, incarcerated, or get injured by seals.

Response: NMFS recognizes the importance of fishing to many Hawaiʻi residents, and does not agree that more seals in the MHI would likely result in more prosecution of fishermen, Hawaiians, or other residents. The evidence to date indicates that while the Hawaiian monk seal population has increased substantially in the MHI over the past several years, no substantial increase in prosecutions has occurred.

NMFS has worked, and will continue to work, with fishermen, fishing clubs, and others in the fishing community to promote co-existence among Hawaiian monk seals, fishermen, and fisheries. NMFS has developed guidelines (available via the NMFS PIRO web site: http://www.fpir.noaa.gov/Library/PRD/Hawaiian%20monk%20seal/HMS-fishing_guidelines-FINAL-PUBLIC.pdf), in consultation with DLNR, that are intended to prevent or minimize monk seal interactions with fishing gear and thereby reduce the chances of possible ESA or MMPA violations.

REG 06 If monk seals die in fishing nets, is that going to lead to a ban on fishing? If seals wind up dead on the beach with ulua hooks in their throats, is NMFS going to ban ulua fishing? Will there be more restrictions on fishing grounds? What will be the impact on beach goers?

Response: NMFS recognizes the importance of fishing to many Hawaiʻi residents and is not proposing any new ban or restriction on any type of fishing in this PEIS. Please see response to comment REG 05.

REG 07 Hawaiʻi does not need any more rulemaking or critical habitat expansions.

Response: No new federal law or rule is proposed in this PEIS. Federal agencies are required to comply with NEPA and analyze the effects of their proposed actions on the environment. In this case, NMFS is applying for a new permit (not a proposed regulation or rule) for research and enhancement that involves the take of Hawaiian monk seals under the ESA and MMPA. Thus, the PEIS is the environmental analysis of the proposed activities in the permit application that is required by NEPA. Please also see the response to comment PUB 09 regarding critical habitat.

REG 08 When a seal beaches itself, the area around it is closed. If you increase the number of seals in the MHI, every time a seal beaches itself the beach is going to be closed. This will affect families who want to spend time at the beach.

Response: Please see responses to MGT 9, SOC 6, SOC 7, and SOC 08.

REG 09 The Endangered Species Act precludes NMFS from choosing Alternative 2. The only reason Alternative 2 is part of the PEIS is because NEPA requires it.

Response: NMFS does not agree with this comment. The ESA requires federal agencies to develop and implement recovery plans for the conservation and survival of the species. To that end, NMFS prepared a recovery plan that contains measurable criteria for achieving recovery goals. Nothing in the ESA requires that NMFS implement any particular alternative that has been analyzed in this EIS. However, we believe implementation of the Preferred Alternative is most consistent with the objectives outlined in the recovery plan.

REG 10 NMFS's voluntary guidelines for fishermen only serve as mitigating factors in an investigation or enforcement action for an unintended species interaction.

Response: Please see response to comment REG 05.

REG 11 Under Hawai'i Statutes it is a Class C felony to "take" a monk seal. I do not recall any exemption for "take" due to permits.

Response: The activities proposed under the PEIS are fully compliant with and authorized by federal law. Under the Section 104 of the MMPA and Section 10 of the ESA, there are exceptions to the moratoria and prohibitions on taking marine mammals and threatened and endangered species. These exceptions include permits for scientific research and enhancement, and other activities. NMFS employees have federal permits under the MMPA and ESA authorizing them to harass or otherwise take protected species for scientific research and enhancement purposes. The State of Hawaii also issues special exemption permits allow persons or organizations to conduct certain activities that would normally be prohibited.

REG 12 Under Field Manual 2710, NMFS must follow the laws of the land and as a Hawaiian national, I do not give consent for this project.

Response: The activities proposed under the PEIS are fully compliant with and authorized by federal law. Both MMPA and ESA authorize NMFS employees, in the performance of official duties, to undertake activities that take or harass protected species and marine mammals under certain circumstances, including research and enhancement.

REG 13 NMFS can renew their permits any time they want so it doesn't matter what we say in our comments about this program. They are going to do what they want.

Response: This comment is not accurate. In order to obtain an ESA-MMPA permit to do research and enhancement activities on an endangered marine mammal, researchers must go through a rigorous process with each application that is submitted. This process typically takes a year to complete. This includes submitting a detailed application justifying and describing the proposed activities, having the application subject to public and expert review, and completing the necessary consultations and environmental analyses. NMFS must take into consideration substantive comments received on a permit application that are relevant to the ESA and MMPA permitting requirements, which are summarized in this document and Section 2.6.3.

The ESA-MMPA permit process is subject to additional requirements, as shown in Section 1.5, which lists all the federal laws that researchers must abide by in order to work with monk seals. Some laws require additional permits to carry out this work and others require consultations (*e.g.*, the ESA) and environmental review (*e.g.*, NEPA).

The permit cannot be issued until the PEIS Record of Decision and ESA consultation are complete. As described in Section 4.7.1, scientific research and enhancement permits may be issued for a maximum of five years from the date of issuance. The five-year period may be extended by a minor amendment up to 12 months, but such extension by a minor amendment may not authorize an increase in the number of animals taken, or changes to the geographic locations or species. Any major change to a permit requires the same process as applying for a new permit, including the 30-day public comment period and any necessary consultations and environmental analyses.

SOC Socioeconomic Effects of Hawaiian Monk Seal Research and Enhancement

SOC 01 The economic assessment is incomplete and incorrect. The PEIS summary of potential impacts lists a beneficial impact of the proposed project for tourism. Not everyone views seals in the MHI as positive. The fishing community does not view seals as positive. Having more seals in the MHI is going to hurt the economy.

Response: An assessment of potential economic impacts is presented in Section 4.9 of the Draft PEIS. The assessment of impacts on recreation and tourism (PEIS Section 4.9.5) and fisheries (PEIS Sections 4.9.1 - 4.9.3) associated with Alternatives 3 and 4 include consideration of important mitigation measures, including a seal behavior modification program and a fisheries interactions mitigation program. These mitigation measures are expected to address many concerns regarding adverse impacts caused by monk seals interacting with humans.

NEPA requires that impacts be assessed based on the best available information related to actual impacts. Negative views or perceptions regarding Hawaiian monk seals or the proposed alternatives would not necessarily lead NMFS to predict adverse impacts unless these views or perceptions would likely manifest as actual adverse impacts on the resources being assessed. A recent public survey conducted throughout Hawaiʻi did not find a widespread or majority negative view of Hawaiian monk seals among fishermen surveyed. Nevertheless, NMFS has revised sections of the PEIS related to fisheries impacts (Sections 4.9.1 – 4.9.3).

The public survey report is available at the following URL: http://www.fpir.noaa.gov/Library/PRD/Hawaiian%20monk%20seal/MonkSeal_SurveyResults_Final.pdf.

SOC 02 ***This project is the epitome of environmental injustice yet the PEIS states that there is a negligible impact on environmental justice. Not considering cultural impacts is environmental injustice. The potential to remove fish and poi is not a negligible impact.***

Response: Most of the proposed actions in this PEIS involve direct intervention with seals in the NWHI (e.g. vaccinations, monitoring, tagging, deworming). None of these actions is expected to affect cultural resources in the MHI. Please note that while Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking seals from the NWHI and releasing them in the MHI. Nevertheless, NMFS understands that there are interactions between some seals and humans in the MHI, and that some people feel that their ability to catch fish is being impacted by monk seals. However, the PEIS analyzes the impact of the various alternatives on the environmental baseline that includes the monk seals already in the MHI (PEIS Section 4.9).

For the purposes of a NEPA analysis, the term "environmental justice" refers to the requirement that federal agencies evaluate whether a proposed action would have a disproportionally high adverse impact on low income populations, minority populations or Indian tribes (CEQ (1997a). NMFS analyzed potential effects of the proposed action on resources such as fisheries, cultural resources and historic properties. Based on the best available information, NMFS determined that the anticipated environmental effects that could potentially raise environmental justice concerns (as defined above) would be negligible and not likely to be disproportionately borne by native Hawaiians, other minority populations, and/or low-income populations. Nor would any of these effects appreciably exceed effects to the general population. For more description of the analysis and summary of effects, please see sections 4.9.4, 4.9.6 and 3.4.6 of the Final PEIS. Please also refer to REG 01 to address NEPA and the National Historic Preservation Act. Most of the proposed actions in this PEIS involve direct intervention with seals in the NWHI (e.g. vaccinations, monitoring, tagging, deworming). None of these actions are expected to affect cultural resources in the MHI.

Regarding the last statement of the comment, Hawaiian monk seals are carnivores so while they eat fish and invertebrates in the ocean, they do not eat taro (grown inland in freshwater), poi (dish made from cooked taro), limu, or other plants or algae. Updated information about monk seal consumption and the potential overlap with fisheries are provided in Final PEIS Sections 4.9.1 through 4.9.3. In addition to the specific actions covered in the PEIS, NMFS is committed to working with communities in the MHI to assess the current impacts of monk seals already in the MHI and work to manage impacts as the resident monk seal population continues to naturally increase.

SOC 03 ***The economy in Hawai'i is not doing well. Many tourists say the highlight of their trip in Hawai'i is to see a monk seal. More tourists means more jobs in hotels and restaurants. Saving monk seals will help the environment and tourism.***

Response: Please see the response to SOC 01. Many people visit Hawai'i to enjoy the unique experiences and unique natural resources, including viewing Hawaiian monk seals, that make

Hawaiʻi special and unlike anywhere else in the world. Like many of Hawaiʻi's other endemic species, Hawaiian monk seals can be found nowhere else in the world and visitors often find it to be a memorable experience when they share the beach or ocean with an endangered seal during their visit. NMFS' analysis in the PEIS concluded that under Alternatives 3 and 4, the increase in the monk seal population (compared to Alternatives 1 or 2) would improve viewing opportunities, and thus have an impact on the experience of tourists visiting Hawaiʻi (Section 4.9.5.2 of the PEIS).

SOC 04 Given how badly our economy is doing right now, there are better ways to spend federal funding than to support this project.

Response: Annual federal funding allocated for Hawaiian monk seal recovery activities has yet to reach the level specified in the Hawaiian Monk Seal Recovery Plan. Nevertheless, NMFS appreciates the current overall fiscal climate in which our Hawaiian monk seal recovery program functions and will continue to pursue the best value with any and all allocated funds in compliance with all federal acquisition rules and regulations. In any event, NMFS is required by ESA and MMPA, within existing appropriations, to undertake those measures that are necessary to restore the monk seal population to a viable, self-sustaining level.

SOC 05 This project is not going to improve our quality of life in Hawaiʻi

Response: For purposes of this PEIS, NMFS is required to discuss the environmental impacts of the federal action that are reasonably expected to occur and to inform the public of reasonable alternatives which would avoid or minimize adverse impacts. NEPA is a procedural statute, which does not mandate particular results. The ESA recognizes that certain species of fish, wildlife, and plants in the United States have gone extinct because of economic growth and development without adequate concern for conservation. Other species such as the Hawaiian monk seal are in danger of extinction, and these animals are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people.

Hawaiian monk seals are the only seal in the world that live in a tropical coral reef ecosystem. Hawaiian monk seals are endemic to Hawaiʻi, meaning they are only found in Hawaiʻi and nowhere else in the world. Peer reviewed publications (Kittinger et al. 2012, Watson et al. 2011) have documented reports of monk seals sighted in the MHI going back to the 1800's, and archaeological remains of monk seals dating to AD 1400 - 1700 were found on the Island of Hawaiʻi.

Although not as prominent in Native Hawaiian culture as other sea creatures, like sea turtles, recent research reveals that some Hawaiian families have traditional ties to monk seals and there are some historical Hawaiian cultural references to monk seals. This is presented in Appendices K and M of the PEIS. The protection and recovery of monk seals is important to the history and culture in Hawaiʻi and to the ecosystem in the Hawaiian Islands. The loss of this species would represent the loss of a unique animal that is found nowhere else on earth.

SOC 06 The entire community and our natural resources are all going to be affected by this proposed action including fish, monk seals, fishermen, ocean users, residents, and Native Hawaiians. Monk seals are going to take over our beaches and oceans.

Response: Please see responses to INT 02, FISH01, and SOC 07. NMFS recognizes that there are concerns about the impact that Hawaiian monk seals may have on the MHI ecosystem and human uses of the ocean. This is an understandable concern, given that many introduced species have indeed become problematic invasive species in Hawaiʻi. However, monk seals are not alien species and the biology of slow-growing, native, tropical marine mammals (like the Hawaiian monk seal) is very different than the biology of Hawaiʻi's invasive alien species (e.g. fish, plants, and land mammals).

The Hawaiian monk seal is a long-lived species that reproduces slowly. Therefore, the population could not "explode" like alien species have in Hawaiʻi, or even grow to populations comparable to other seals or sea lions in other locations, like California sea lions on the mainland west coast. The current population in the MHI stands at about 200 individuals, and even by the year 2030, it is estimated there will still likely be less than ~700 seals in the MHI.

In their interaction with the marine environment, Hawaiian monk seals are a natural part of Hawaiʻi's coral reef ecosystems and have been so for several million years. Monk seals are generalist feeders, meaning they eat many different prey species, so their impact on any one species in the ocean is very small.

SOC 07 Recreation and tourism are going to be negatively affected by having more monk seals in the MHI. Right now, if a seal is on the beach, it is fenced off and people have to stay 150 feet away from the seal. If there are 350 seals in Hawaiʻi, that equals 52,500 feet of beach space that could be fenced off and cannot be used. If beaches are closed, the economy will be damaged.

Response: Please see responses to BEH 09, MGT 08, and SOC 03. The Hawaiian monk seal population is small, declining, and in danger of becoming extinct; therefore, the seals are protected by the ESA, MMPA, and other laws. These protections make it illegal for humans to disturb, harass, harm, or kill monk seals (or attempt to do so). In some cases, this means that people are asked to give seals a reasonable amount of space to rest, forage, or tend their pups, and to keep people safe. NMFS and the State of Hawaiʻi do not close entire beaches or areas of the ocean in the MHI because of monk seals. Signs, cones, and ropes on beaches are not a legal barrier that closes the beach. Rather, the signs notify beachgoers that there is a seal on the beach and that it is illegal to disturb the animal.

Federal guidelines suggest staying at least 150 feet away to avoid potentially violating the ESA or MMPA by disturbing the seal. In the MHI, most Hawaiian monk seals do not react strongly to human presence at a reasonable distance on the beaches they share, unless there is direct disturbance (*e.g.*, loud noises or yelling, approaching very closely, or attempting to touch the seal). As a result, the Marine Mammal Response Network members very rarely erect a "seal protection zone," or SPZ, a full 150 ft. away from the seal in each direction.

For "regular" haul-outs of seals coming onshore to rest, volunteers are asked to create a temporary SPZ of the minimum size necessary to prevent disturbance of the seal, allowing humans to have the maximum area possible for beach use and transit through the area. On extremely busy beaches, the area of the SPZ for the seal is often made even smaller to account for human use of the beach. Given the over 750 miles of coastline in the State of Hawaiʻi, and the fact that only a small number of the total seals are ever on shore simultaneously (usually each for a relatively short time), the presence of monk seals will not prevent humans from using the beaches.

SOC 08 How will the proposed action affect ocean and beach access? Will ocean users be pushed out of areas?

Response: See responses to SOC 06 and SOC 07.

SOC 09 The PEIS concludes that impacts on ocean users are negligible which is incorrect. NMFS must not be taking into account the translocation program to come to this conclusion.

Response: The assessment of impacts on ocean users engaged in recreation and tourism (Section 4.9.5) and fisheries (Sections 4.9.1 - 4.9.3) associated with Alternatives 3 and 4 in the Draft PEIS did include consideration of the proposed 2-stage translocation as well as other types of translocation. These assessments also included consideration of important mitigation measures, including a seal behavioral management program and a fishery interactions mitigation program. These mitigation measures are designed to address many concerns regarding adverse impacts caused by monk seals interacting with ocean users.

Moreover, NMFS revised sections of the PEIS related to fisheries impacts (Sections 4.9.1 -4.9.3) considering comments received regarding the Draft PEIS and further analysis conducted by NMFS.

Finally, please note that while Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking weaned pups from the NWHI and releasing them in the MHI.

SOC 10 The people of Hana depend on the land and the ocean to survive.

Response: NMFS recognizes the strong relationships many Hana (Maui) residents have with the land and the ocean. NMFS also appreciates the support many Hana residents have provided in monitoring and responding to Hawaiian monk seals, including the seal pup known as "Koki," in and around Hana. The Draft PEIS predicted that implementation of the proposed actions would cause only negligible impacts on commercial and non-commercial use of land and ocean resources. Nevertheless, NMFS revised sections of the PEIS related to fisheries impacts (Sections 4.9.1 -4.9.3) considering comments received regarding the Draft PEIS and further analysis conducted by NMFS. The revised analysis also found that the alternatives in the PEIS would have negligible impact on fishery resources.

Finally, please note that while Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking weaned pups from the NWHI and releasing them in the MHI.

TRAN Translocation

TRAN 01 Comments expressing general support for the translocation program. The PEIS Appendix E provides a well-considered adaptive management approach to translocation. NMFS should move forward with this program as quickly as possible. This action is the most promising for slowing the decline.

Response: NMFS agrees with the comment that the translocation program is a promising alternative for slowing the decline of the monk seal population. While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking seals born in the NWHI and releasing them in the MHI.

Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation.

NMFS would also conduct other important seal research and enhancement activities under Alternative 3 and engage the public in an effort to address concerns raised during the Draft PEIS public comment process, especially concerns related to human-seal interactions. See also response to ALT 03.

TRAN 02 Comments opposing all translocations or translocating monk seals to the MHI. Translocating seals should only occur within the NWHI.

Response: Please see response to TRAN 06.

TRAN 03 The PEIS does not adequately address the impacts of more seals in the MHI and focuses too much on translocation as the preferred method for recovery. There is much public opposition to translocating seals to the MHI and this is cause for concern. At a minimum, the number of female pups should be limited to no more than six over the next five years.

Response: While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking seals from the NWHI and releasing them in the MHI.

Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation. NMFS would also conduct other important seal research and enhancement activities under Alternative 3 and engage the public in an effort to address concerns raised during the Draft PEIS public comment process, especially concerns related to human-seal interactions.

It is our goal to ensure that all future management and recovery efforts are as successful as possible by staying engaged with, and responsive to, Hawaii's communities. Based in part on input during the comment period, additional analysis of potential effects on fish and fishing resources are included in the final PEIS (Sections 4.9.1-4.9.3), though the analysis still concluded that all PEIS alternatives would have negligible impacts on fisheries. NMFS would also point out that two-stage translocation is one of many potential tools proposed for aiding recovery in the PEIS. These actions are described in the alternatives (Chapter 2). While NMFS hopes that two-stage translocation (as constrained under Alternative 3, the Preferred Alternative) will prove an effective tool, it will be conducted along with numerous other recovery actions.

TRAN 04 Translocating seals within the NWHI is faulty because we are only moving seals around in an environment that is not suitable for survival.

Response: Based on survival rates prevalent in most of the NWHI a few years ago, NMFS would have largely agreed with this comment. However, in 2009 and 2010, even when survival was generally poor in the six main NWHI subpopulations, successful translocations from French Frigate Shoals to Nihoa Island were conducted and the translocated seals fared better than those pups that remained at French Frigate Shoals.

In the past few years, there are indications that juvenile survival rates at some NWHI sites have improved, suggesting that there may be merit in conducting translocations within the NWHI.

NMFS's approach is based on recognition that conditions for survival are highly variable and a specific action that may be without merit currently could be very helpful a few years in the future. The ability to take advantage of this variability and adapt the translocation program to prevailing conditions is a cornerstone of the two-stage translocation proposal (PEIS Appendix E). A variety of translocation actions could occur under the Final PEIS Preferred Alternative, including two-stage translocation *within* the NWHI, *within* the MHI, or from the MHI to the NWHI.

TRAN 05 NMFS states that the fish down alternative is not feasible due to logistics and cost but those would be the same issues associated with translocation. Translocation should be a last resort not a first choice.

Response: NMFS did not state that a fish down alternative was not feasible due to logistics or cost. In Section 2.11.1, the Draft PEIS states "There is currently a lack of sufficient information on NWHI food web dynamics to reliably predict whether predator reduction would be an effective method for improving juvenile monk seal survival without unintended consequences.

Potential undesirable changes in predator-prey dynamics could be caused by fishing and therefore a more complete understanding of the system's trophic dynamics is required prior to undertaking any predator reduction experiment, whether locally or system wide. Therefore, given the available information, this alternative is not practical or feasible and will not be carried forward for analysis."

TRAN 06 Why does NMFS want to translocate monk seals to the MHI where they will be exposed to more threats such as interaction with humans, disease, and competition with fishermen? Seals should be translocated to the NWHI where they won't be killed by fishermen.

Response: While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking seals born in the NWHI and releasing them in the MHI.

Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation. NMFS would also conduct other important seal research and enhancement activities under Alternative 3 and engage the public in an effort to address concerns raised during the Draft PEIS public comment process, especially concerns related to human-seal interactions.

It should be noted that under the Preferred Alternative, a variety of translocation actions could occur, including two-stage translocation *within* the NWHI, *within* the MHI, or from the MHI to the NWHI. Appendix E of the PEIS presents the decision framework that will be used to determine the best option available given prevailing biological conditions and the constraints of the Preferred Alternative and the associated NMFS permit. Please also see response to ALT 03.

To help address the concerns mentioned in this comment regarding threats to seals in the MHI, NMFS has proposed actions such as behavioral modification (PEIS Sections 2.5 and 5.4) as well as outreach and education programs and other ongoing activities (PEIS Section 2.12 and 5.6). These actions are intended to help minimize negative interactions between seals and humans. Please also see response to BEH 04, BIO 07, BIO 05, GEN 14, and INT 02.

TRAN 07 How does NMFS plan to move the animals and what precautions are you going to take with handling? NMFS should carefully examine the procedures used to handling seals if it appears this could lead to mortalities.

Response: As described in Section 2.5 of the PEIS, NMFS has developed extremely conservative protocols for seal handling that are designed to achieve the research or enhancement objectives, while minimizing disturbance to other seals in the area, and the risk of harm to the seal and the human handlers. These protocols have been developed over a long and successful history of safely handling seals with very low risk to the animals involved (Baker and Johanos 2002).

TRAN 08 The abduction of monk seals from their neighborhood is cruel. These are sentient beings.

Response: Research studies indicate that Hawaiian monk seals that are translocated to areas of lower seal mortality fare better than do seals that are not translocated (Baker *et al* 2011). In most cases, beneficial results are observed, such as better survival, when compared to similar seals that are not translocated. Translocation would be conducted only to provide seals with better chances for survival so that they may mature and contribute to the recovery of the species.

TRAN 09 How does NMFS know that a monk seal is going to stay in the same place that it is moved? If you move them back to the NWHI, they are just going to come back to the MHI. What assurances can you make that all seals translocated will be recaptured?

Response: Please note that while Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI. However, a variety of translocation actions could occur under the Preferred Alternative, including two-stage translocation *within* the NWHI, *within* the MHI, or from the MHI to the NWHI.

A recent study published by NMFS (Baker *et al* 2011) reviewed almost 250 translocations of Hawaiian monk seals that were conducted for various reasons over several decades. The paper reports that translocated seals, especially the younger ones, tend to stay in the region where they are released. Past experience indicates that such a long-distance return (from the NWHI to MHI) is unlikely. Recently weaned pups tended to stay at the same beach area where they were released for weeks to months and then began moving around more. Adult males tended to leave their release sites very quickly, but did not return to where they originated. For example, 21 adult males were taken from Laysan Island to the MHI in 1994, and none returned to Laysan Island. Only one returned, temporarily to the NWHI (to Nihoa Island) and then came back to the MHI. NMFS expects that seals translocated in future actions under the Final PEIS Preferred Alternative, will behave similarly to those translocated in the past and will plan details of future translocations in part on this extensive history. However, if the seals behave differently than expected, NMFS will alter the translocation program accordingly.

Recapturing individual seals can indeed be difficult and this remains an important consideration regardless of the fact that under Alternative 3 (Preferred), no seals born in the NWHI will be translocated from the NWHI and released in the MHI. There are a number of considerations that make NMFS confident recaptures can be achieved. First, the number of seals that will need to be recaptured will be fewer than the number initially translocated because there will be some natural mortality in the intervening years. Second, NMFS has a population monitoring program that provides sighting information on tagged animals. Seals often show patterns in which they haul out at favorite beaches, and this will guide searching effort when it is time for recapture. Third, though it can require persistence, NMFS has a long history of successfully finding and recapturing target animals for various purposes. Still, it is possible that a seal may not be found when it is scheduled to be recaptured. If so, that seal will simply remain on the search list and will be caught and translocated at the next opportunity.

TRAN 10 NMFS should consult with outside experts (i.e., captive facilities, Marine Mammal Commission, and Monk Seal Recovery Team) on the translocation program and review the progress of the program after a suitable period of time. It does not seem advisable at this stage to set strict criteria for terminating the program as the agency will likely need flexibility.

Response: NMFS has and will continue to consult with these and other outside experts as the translocation program is conducted. The decision framework described in Appendix E of the PEIS identifies a variety of adjustment and course changes that would be informed by new demographic information and evaluation of the translocations conducted to date. NMFS is sensitive to the possibility that setbacks and failures may occur unexpectedly and that terminating any enhancement effort too early is a risk. It is particularly important to gauge the effectiveness of the project based on results from multiple years rather than on observations from a single year, whether good or bad. The permit for this work would include a cap on the number of mortalities that could occur during translocations; as long as these mortalities were not reached, the translocations could proceed even in the event of some loss of seals.

TRAN 11 It is difficult to determine whether a soft release (when an animal is held at a release site to help it acclimate) or hard release (released immediately upon arrival) will be more successful. Thus, it will be important to tag animals before they are released at a site in order to track their movements. Depth recorders on translocated animals could also help with foraging studies.

Response: As described in Section 5.2 and Appendix F, all translocated seals will be tagged with plastic flipper tags and some will also be instrumented with tracking devices and dive recorders. These measures will greatly assist in evaluating the success of the program. The proportion of translocated seals that will be instrumented will be partially determined by available funding, but some prioritization is likely so that seals of particular interest (*e.g.*, release location, body condition, or other factors) can be tracked.

TRAN 12 NMFS should consider moving seals born in the MHI to the NWHI within the first year of the program to determine whether this phase of the program is successful and allowing managers to adjust the approach as necessary. This may also avoid a net change in the number of seals in the MHI, thus alleviating public concerns.

Response: While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI. Nevertheless, a variety of translocation actions could occur under the Preferred Alternative, including two-stage translocation *within* the NWHI, *within* the MHI, or from the MHI to the NWHI.

Appendices E and I of the PEIS provide for the experimental movement of up to six juvenile seals annually (separate from the two-stage translocation program) in order to obtain some early information about the likely success and magnitude of survival decrements associated with the second stage of two-stage translocation. In addition, if seals in the MHI develop unmanageable behavior and persistently interact with people, they may be candidates for translocation to the NWHI. This would resolve their interactions with people and also inform NMFS about the success of translocations from the MHI to NWHI. Experimental translocations of seals could be conducted at any time, but will not necessarily precede translocations of weaned pups as described in Alternative 3 (Preferred).

TRAN 13 Weaned pups should only be translocated to communities that support this program; otherwise, they will not survive.

Response: While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI.

Alternative 4 would be infeasible at this time. NWHI pups, if brought to the MHI, could become involved in fishery and other human interactions, just as has occurred among some seals born in the MHI. Capacity and techniques for monitoring translocated seals, and intervening to prevent and mitigate such interactions, must be further developed before this action can be conducted without risking failure as measured both in terms of seal survival and public attitudes toward monk seal conservation. NMFS would also conduct other important seal research and enhancement activities under Alternative 3 and engage the public in an effort to address concerns raised during the Draft PEIS public comment process, especially concerns related to human-seal interactions.

It is our goal to ensure that all future management and recovery efforts are as successful as possible by staying engaged with, and responsive to, Hawaii's communities. See PUB 02, PUB 03, and PUB 08. NMFS agrees that community support is essential recovery activities recovery actions to succeed.

TRAN 14 The decision-framework for translocation presented in Appendix E of the PEIS should include community consultations and socioeconomic factors as part of decision-making.

Response: While Alternative 4 was Preferred in the Draft PEIS, Alternative 3 has been selected as the Preferred Alternative in the Final PEIS. The distinction between these two Alternatives is that Alternative 3 does not include any two-stage translocation option that would involve taking weaned pups born in the NWHI and releasing them in the MHI. Because of this change, this respondent's specific concerns may be reduced. Nevertheless, a variety of translocation actions could still occur under Alternative 3 (Preferred), including, for example, translocation of seals within the MHI to alleviate risks to seals and to mitigate human-seal interactions. NMFS will continue to engage local communities when conducting such actions (see Chapter 5).

TRAN 15 ***In the description of translocation activities listed in Table 2.10, Alternative 3 indicates that seals age three or older that are native to the MHI may be moved to the NWHI in order to evaluate their survival rates. This differs from the description of activities under Alternative 4, which implies NMFS would move seals age three or older from the MHI to NWHI only if seals were originally from the NWHI and were now returning to their natal site. Table 2.10-1 appears to be inconsistent with the rest of the PEIS, and may give the reader a false impression of translocation plans under each alternative. If Table 2.10-1 is correct, then it is not clear why NMFS would be willing under Alternative 3 to take the risk of moving native MHI seals to the NWHI, where survival rates are much lower, but would not be willing to do this at the same time they are taking weaned pups down from the NWHI to the MHI during the first phase of translocation under Alternative 4. A diagram presenting the various scenarios of translocation would be extremely helpful.***

Response: In Table 2.10, the translocation box for Alternative 4 states that it would include everything in Alternative 3 *plus* the additional items listed. Therefore, the translocation of seals to evaluate their survival (from MHI to NWHI) could be conducted under either Alternative 3 or 4. Further, this action is listed under both alternatives in Appendix I. (Also refer to the response to comment TRAN 12)

TRAN 16 ***It is unclear under Alternative 3 if animals evaluated for survival would be "problem animals" translocated from the MHI to the NWHI***

Response: NMFS interprets this comment to pertain to the 6 seals per year that may be translocated to experimentally evaluate survival under Alternative 3 and 4 (Appendix I of the PEIS). These could be "problem" seals, but need not be. (Also refer to the response to comment TRAN 12).

TRAN 17 ***It is unclear how sites will be evaluated for their viability as nursery sites and which criteria will be used. Decisions should not just be based on survival but pup body condition, parasite loads, and other indications for successful foraging.***

Response: NMFS believes that recent survival of seals at potential recipient sites provides the best "bottom line" indicator of how favorable that site may be for weaned pups. Survival (or mortality) is a process that integrates multiple factors such as foraging opportunities, health status, etc. In practice, any outstanding factors that might influence the success or failure of the project, and which are not fully addressed in the stipulated criteria, will be considered.

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APPENDIX C – DRUGS CURRENTLY USED OR PROPOSED TO BE USED DURING HAWAIIAN MONK SEAL RESEARCH AND ENHANCEMENT ACTIVITIES

The following table lists the drugs currently used or proposed to be used in Hawaiian monk seals, possible adverse effects including any observed in Hawaiian monk seals, and the pharmacokinetics of each drug (i.e., known information on how the body affects the drug, including how the drug is absorbed, distributed, the rate of action and duration of effect, chemical changes in the body, and effects and routes of excretion of metabolites). Information in the table is from Plumb (2008) or other references if noted. More detailed information on each drug can be found in Plumb (2008).

In addition to the drugs in the table below, supportive fluids such as electrolytes, dextrose, and sodium bicarbonate may be administered at the discretion of the attending veterinarian in response to adverse reactions to capture, handling, and drug administrations. Over the next 10 years, new drugs may become available or other drugs may be prescribed for use in Hawaiian monk seals by the attending veterinarian. Information on such new drugs would be provided by PIFSC to the OPR Permits Division and may be incorporated into the protocols if indicated by the attending veterinarian. Possible adverse effects of any new drugs would be weighed against the benefits of using the drugs for each case. Also, if any of the drugs listed in Table C-1 or any new drugs are used and severe adverse effects are reported in Hawaiian monk seals, the drugs would be discontinued or dosages modified per recommendation by the attending veterinarian.

Table C-1 Information On Drugs Proposed For Use in Hawaiian Monk Seals During Research and Enhancement Activities

Drug Name	Dosage/Route of Administration	Use in Hawaiian monk seals	Possible Adverse Effects	Pharmacokinetics
Atropine Sulfate	0.02 -0.2 mg/kg IM, IV, SC (CRC Handbook)	To treat bradycardia (slowed heart rate) or cardiac arrest; may be used as a pre-anesthetic to reduce respiratory secretions and block vagal mediated dive reflex.	Generally dose related; mild effects in healthy patients; severe effects with high or toxic doses include gastrointestinal (constipation, vomiting), central nervous system (CNS). Benzodiazepines may potentiate adverse effects (Veterinary Drug Handbook, 4th Ed., Plumb) Used on numerous occasions in Hawaiian monk seals with no adverse reactions reported (NMFS unpubl. data). Used extensively in other pinnipeds during anesthesia with no observed side effects (Haulena and Heath 2001)	Well absorbed with peak effects on heart rate within 3-4 minutes; metabolized in liver and 30-50% of dose excreted unchanged in urine. Half-life (the time required for the concentration of the drug to reach half of its original value) in humans is 2-3 hours.
Ceftiofur crystalline free acid	6.6 mg/kg IM (Meegan et al. 2010)	Long-acting cephalosporin antibiotic for prophylactic treatment of injuries and treatment of infections.	Usually not serious and low occurrence; mild transient pain and possibility of abscess at injection site; diarrhea; hypersensitivity reactions include rash, fever, or anaphylaxis. Used in Hawaiian monk seals with no adverse effects (Permit No. 10137-07, NMFS, unpub. data). No adverse reactions reported after use in	Half-life in cattle is 8-12 hours with peak levels after 30-45 minutes of intramuscular (IM) injection. A study at The Marine Mammal Center (Sausalito, CA) on 10 California sea lions resulted in maximum plasma concentrations at 24 hours post-IM injection; plasma drug levels

Drug Name	Dosage/Route of Administration	Use in Hawaiian monk seals	Possible Adverse Effects	Pharmacokinetics
			humpback whales, California sea lions, northern elephant seals, and harbor seals (Gulland pers. comm.).	at lower levels would likely be maintained for 5-8 days post-injection (Meegan et al. 2010).
Dexamethasone	0.2 - 1 mg/kg (CRC Handbook)	A glucocorticoid used for treatment of shock; may be used to treat adrenal insufficiency, inflammation, and other maladies.	Usually associated with long-term administration and manifested as clinical signs of hyperadrenocorticism; can retard growth in young animals; when given short-term, unlikely to cause significant harmful effects, even in massive doses. Few instances of use in Hawaiian monk seals with no adverse reactions reported (NMFS unpubl. data).	Half-life in dogs is 2-5 hours; biologic activity can persist for $\geq$ 48 hours.
Diazepam	0.1-0.25 mg/kg IV	A benzodiazepine used as a sedative (anxiolytic, muscle relaxant, hypnotic) for capture events; may be used as an appetite stimulant or anti-convulsant.	Dogs may exhibit CNS excitement; in horses may cause muscle weakness and ataxia; in cats may cause irritability, depression, aberrant demeanor. Routinely used sedative in Hawaiian monk seals with no adverse reactions reported (NMFS unpubl. data).	Highly lipid soluble and widely distributed throughout the body; readily crosses blood-brain barrier and is highly bound to plasma proteins; metabolized in liver to active metabolites nordiazepam, temazepam, and oxazepam, which are eliminated primarily in urine.
Doxapram HCL	2-5 mg/kg IV (CRC Handbook) Administered at 5 ml (pups/juveniles) and 10 ml	A CNS/respiratory stimulant used to treat respiratory arrest; may also be administered during/after anesthesia.	Hypertension, arrhythmias, seizures, and hyperventilation, which are most probable with repeated or high doses. Increases myocardial oxygen demand and reduces cerebral blood flow. Few instances of use in Hawaiian	After intravenous (IV) injection, onset of effect in humans and animals within 2 minutes; in dogs, rapidly metabolized and excreted as metabolites in urine within 24-48 hours after administration. Serum half-life

Drug Name	Dosage/Route of Administration	Use in Hawaiian monk seals	Possible Adverse Effects	Pharmacokinetics
	(subadults/adults)		monk seals with no adverse reactions recorded (NMFS unpubl. data).	in dogs is 2.5-3.2 hours and in humans is 20-50 hours.
Emodepside + Praziquantel	0.11 to 0.19 ml/kg	Topical antiparasitic (nematocide + cetocide) used to treat intestinal roundworms and tapeworms.	Most common side effects in cats include skin and gastrointestinal reactions. Used in captive and wild Hawaiian monk seals with no adverse reactions recorded (NMFS unpublished data).	In cats: rapidly absorbed through skin and into systemic circulation after dermal administration; serum concentrations detectable for praziquantel after 1 hour (peak at 6 hours) and for emodepside after 2 hours (peak at 2 days); detectable for up to 28 days following administration.
Epinephrine	0.05-0.2 mg/kg IV, IM, SC, pericardial, intratracheal	Treatment for cardiac arrest with resuscitation; may also be used to treat anaphylaxis.	Anxiety, tremors, excitability, vomiting, hypertension (with overdose), arrhythmias, high levels of uric acid in blood, and lactic acidosis (with prolonged use or overdosage). Few instances of use in Hawaiian monk seals with no adverse reactions reported (NMFS unpubl. data).	Well absorbed following IM or subcutaneous (SC) injection; onset of action following SC injection is 5-10 minutes; immediate action following IV injection; does not cross blood-brain barrier; actions end by uptake into sympathetic nerve endings; metabolism in liver and other tissues to inactive metabolites.
Fenbendazole	11mg/kg twice (CRC Handbook)	An antiparasitic agent for treating intestinal roundworms.	Generally no adverse effects at normal doses; hypersensitivity secondary to antigen release by dying parasites may occur, especially with high doses; vomiting reported infrequently in dogs and cats ; well tolerated at doses up to 100x recommended.	Marginally absorbed after oral administration; metabolized to active compound oxfendazole and sulfone; in sheep, cattle, and pigs, 44-50% of a dose is excreted unchanged in feces, and <1% in urine.

Drug Name	Dosage/Route of Administration	Use in Hawaiian monk seals	Possible Adverse Effects	Pharmacokinetics
			Used in research field trial in Hawaiian monk seals and in captive care; no adverse effects reported from use but difficult to administer orally in field setting (NMFS Permit No. 10137 Hawaiian Monk Seal Deworming Project: Year One Summary).	
Flumazenil	0.05-0.1 mg/kg Flumazenil would be administered IV at a dosage of 2.5 ml (pups/juveniles) and 5.0 ml (subadults/adults), repeated if necessary	A benzodiazepine antagonist used to reverse effects of sedative overdose (diazepam or midazolam).	In humans, injection site reactions, vomiting, cutaneous vasodilatation, vertigo, ataxia, and blurred vision; deaths have been associated with its use in humans having serious underlying diseases; large IV overdoses have rarely caused symptoms in otherwise healthy humans. Used in Hawaiian monk seals with no adverse reactions reported; trials with captive monk seals proved effective in reversing effects of midazolam (NMFS unpubl. data).	Administered with rapid IV injection with therapeutic effects within 1-2 minutes; rapidly distributed and metabolized in liver; half-life in humans is approximately 1 hour.
Furosemide	2-5 mg/kg (CRC Handbook)	A diuretic used to treat congestive heart failure or pulmonary edema.	May induce fluid and electrolyte imbalances; reported to cause hearing loss in cats and dogs given high IV doses; other effects include gastrointestinal problems, anemia, weakness, restlessness. Few instances of use in Hawaiian	In dogs, the elimination half-life is approximately 1-1.5 hours; in humans, the diuretic effect takes place within 5 minutes and peak effects 30 minutes after IV injection.

Drug Name	Dosage/Route of Administration	Use in Hawaiian monk seals	Possible Adverse Effects	Pharmacokinetics
			monk seals with no adverse reactions reported (NMFS unpubl. data).	
Ivermectin	200 microgram/kg	An antiparasitic agent for treating intestinal roundworms; used as a heartworm preventative in captive monk seals.	Species-specific adverse effects generally from dying microfilaria or other larva, for example, swelling and itching in horses, shock-like reactions in dogs, and paralysis and staggering in cattle; may cause neurologic toxicity in mice and rats with doses slightly more than prescribed; may cause death, lethargy, or anorexia in birds. Used in captive care of Hawaiian monk seals to treat intestinal worms and used routinely on permanently captive monk seals with no adverse reactions reported (NMFS unpubl. data; Annual Report for Permit No. 455-1760).	Oral doses absorbed up to 95%; greater bioavailability after SC administration but more rapidly absorbed after oral administration; well distributed to most tissues except in cerebrospinal fluid thus reducing its toxicity; metabolized in liver and primarily excreted in feces; less than 5% is excreted in urine; elimination half-life for dogs is 2 days.
Lidocaine HCL	1-3 ml 2 % topically	A local anesthetic used to reduce pain from skin incisions such as blubber biopsies.	At usual doses, serious adverse reactions are rare; most common are dose-related and rare, including CNS reactions, transient nausea and vomiting, and cardiac effects. Routinely used in Hawaiian monk seals during biopsy sampling with no adverse reactions reported (NMFS unpubl. data).	Lidocaine has a high affinity for fat and adipose tissue and is bound to plasma proteins; rapidly metabolized in liver to active metabolites; less than 10% of an injected dose is excreted unchanged in urine.
Midazolam	0.1-0.15 mg/kg IV, IM	An injectable benzodiazepine	Few adverse effects have been reported in humans including effects	Rapidly and nearly completely absorbed after IM injection;

Drug Name	Dosage/Route of Administration	Use in Hawaiian monk seals	Possible Adverse Effects	Pharmacokinetics
		used as a sedative for capture events or as a preanesthetic.	on respiratory and cardiac rates and blood pressure; other effects reported in humans include pain on injection, local irritation, headache, nausea, vomiting, and hiccups. Possibility of respiratory depression is principal concern in veterinary patients. Used in wild and captive Hawaiian monk seals with no adverse reactions reported; trials with captive monk seals indicated midazolam safe and effective (NMFS unpubl. data; Annual report for Permit No. 455-1760).	highly protein-bound and rapidly crosses the blood-brain barrier; metabolized in liver; elimination half-life in dogs averages 77 minutes and in humans is approximately 2 hours.
Praziquantel	10 mg/kg (CRC Handbook)	An anticestodal antiparasitic used to treat intestinal tape worms.	In dogs, oral dosing can cause anorexia, vomiting, lethargy, or diarrhea but incidence is less than 5%; greater incidences from injectable in dogs including pain at injection site, vomiting, drowsiness, and staggering gate. Used in research field trial (oral and IM) and in captive care (oral) of Hawaiian monk seals; no adverse effects reported from oral use in captive care; difficult to administer orally in field setting; swellings resulted from IM injections in field use (NMFS unpubl. data; Gobush et al. 2011).	Rapidly and nearly completely absorbed after oral administration; peak serum levels in dogs between 30-120 minutes; distributed throughout the body, crossing intestinal wall and blood-brain barrier into CNS; metabolized in liver and excreted primarily in urine; elimination half-life in dogs is 3 hours.

Drug Name	Dosage/Route of Administration	Use in Hawaiian monk seals	Possible Adverse Effects	Pharmacokinetics
Prednisolone sodium succinate	1 mg/kg	A glucocorticoid used for treatment of shock; may be used to treat adrenal insufficiency and other maladies.	Usually associated with long-term administration and manifested as clinical signs of hyperadrenocorticism; can retard growth in young animals; when given short-term, unlikely to cause significant harmful effects, even in massive doses. Few instances of use in Hawaiian monk seals with no adverse reactions reported (NMFS unpubl. data).	Biologic half-life is 12-36 hours.
Sodium pentobarbital	1 ml/10 lbs. into extradural vein	Humane euthanasia by attending veterinarian of moribund seals, or as a last resort to remove aggressive male seals.	Barbiturates depress the CNS in descending order starting with the cerebral cortex and loss of consciousness progressing to anesthesia; with overdose, deep anesthesia progresses to apnea due to depression of the respiratory center, followed by cardiac arrest (AVMA 2013). Used to effectively euthanize one aggressive adult male in 1991.	Onset of action within 1 minute after IV administration. Distributes rapidly to all body tissues with highest concentrations in brain and liver.

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APPENDIX D – HAWAIIAN MONK SEAL VACCINATION RESEARCH AND RESPONSE PLAN

Vaccination – Objectives and Justification

Current information suggests infectious disease is not limiting recovery of the Hawaiian monk seal. However, the species is rare, has very low genetic diversity and may have been buffered from exposure to many mammalian diseases due to its isolation in the Hawaiian Archipelago for millions of years. Together, these factors raise great concern that outbreaks of diseases to which monk seals have not been previously exposed could have devastating impacts.

Proactive efforts to mitigate the potential or eventual negative effects of infectious disease on monk seals include vaccination studies to determine the safety and efficacy of vaccines against specific pathogens considered most likely to spread to monk seals (e.g., morbillivirus and West Nile Virus). Captive studies would include both monk seals and surrogate species, and potentially free-ranging Hawaiian monk seals. If such research indicates that the vaccines are safe and effective, they may be administered preventatively or in response to an outbreak, to wild or rehabilitating seals.

Epidemic diseases (referred to as epizootics when occurring in animals rather than humans) are diseases that occur at a time or place that they do not usually occur, or with a greater frequency than expected in a certain period. Severe epidemics may reduce host population density to such an extent that stochastic events or previously unimportant ecological factors may further reduce the host population size (Harwood and Hall 1990). For example, canine distemper dramatically reduced black-footed ferret (*Mustela nigripes*) populations in Wyoming, bringing them to extinction in the wild (Thorne and Williams 1988); and, avian malaria reduced native Hawaiian honeycreeper (*Hemignathus parvus*) populations to such small numbers that many were finally eliminated by predation or habitat loss (Warner 1968).

Infectious diseases, especially those that are newly introduced to naïve populations of animals, can cause mass illness and mortality. The best means of preventing the spread of infectious disease among animals are vaccinations. Vaccines are available for two viruses that have been identified as high risks to Hawaiian monk seals: morbillivirus and West Nile virus. Background surveys conducted on Hawaiian monk seals support that they remain naïve to both viruses. These two viruses are the current focus of vaccination research and response planning for Hawaiian monk seals.

Morbilliviruses—These viruses, specifically phocine distemper virus (PDV) and canine distemper virus (CDV), have caused mass die offs of phocids. During 1988, approximately 18,000 (70% of the population) harbor seals (*Phoca vitulina*) in Europe died from PDV infection (Heide-Jørgensen *et al*. 1992). A second outbreak of PDV occurred in the North Sea in 2002, which killed over 20,000 harbor seals (Jensen *et al*. 2002). Outbreaks of canine distemper (CDV) killed 5-10,000 Baikal seals (*Pusa sibirica*) in 1987-1988 (Grachev *et al*. 1989), 10,000 Caspian seals

(P. caspica) in 2000 (Kennedy *et al*. 2000) and may have been responsible for the deaths of 2,500 crabeater seals (*Lobodon carcinophagus*) in the Antarctic in 1955 (Laws and Taylor 1957). While a morbillivirus was isolated from Mediterranean monk seals (*Monachus monachus*) that died during an epidemic, its importance relative to biotoxins in causing mortality remains controversial (Hernandez *et al*. 1998). While the susceptibility of Hawaiian monk seals to morbilliviruses is unknown, due to the devastating effects these viruses can have on phocids, there is a need to better understand and prepare for such an event in Hawaii.

West Nile Virus—This virus caused the death of a captive monk seal at SeaWorld San Antonio, Texas, and has caused mortality in captive harbor seals in the mainland U.S. To date this virus has not been identified in wild marine mammals, although it is present along the eastern seaboard and southern California. This mosquito-borne virus is currently not present within Hawaii, and the State has rigorous surveillance and response plans for this virus due to its public health importance. Although neither single cases of disease nor epidemics of West Nile Virus have been reported in wild marine mammals to date, the death of a monk seal in Texas from this infection indicates monk seals are susceptible. Thus, the possibility of extensive mortality in monk seals exists if the virus were to be introduced to Hawaii, warranting a response plan to such a scenario.

Available vaccines—Vaccines currently used for prevention of viral diseases in domestic animals can be divided into three types:

- Vaccines based on a dead inactivated virus;
- Vaccines using live attenuated viruses; and
- Vaccines consisting of recombinant viruses.

Vaccines using a dead virus are considered the safest because the virus cannot replicate in the host or cause disease; however, this lack of replication often means that the immune response generated following vaccination is short-lived and may not be protective. Live vaccines typically generate the most effective immune response. When used in species other than the one for which the vaccine was developed, live vaccines present the risk of the virus replicating in the host and either causing disease in the vaccinated animal, or being shed in secretions and becoming infective to contact animals. One vaccine proposed for use under this permit is an inactivated West Nile virus vaccine (Innovator, Fort Dodge) that has been used regularly to date on Hawaiian monk seals in captivity in San Antonio, Texas, with no adverse reactions observed (Workshop to Evaluate the Potential for Use of Morbillivirus Vaccination in Hawaiian Monk Seals, Final Report 2005).

Recombinant virus vaccines use a vector virus that does not typically infect the target host but expresses antigens from the pathogen of interest to stimulate an immune response against it. A recombinant vaccine to CDV (monovalent recombinant canary pox vector expressing canine distemper virus antigens, Purevax, Merial) licensed for use in ferrets in the U.S., is now used extensively in zoological collections (Bronson et al. 2007) and is proposed for use in research and enhancement activities under this permit. It is the only distemper vaccine recommended by the American Association of Zoological Veterinarians for use in non-domestic carnivores including mustelids (http://www.aazv.org). It is approved generically for animal use in the State of Hawaii. Safety and efficacy trials with this CDV vaccine have been conducted on four captive harbor seals and on one captive Hawaiian monk seal. These preliminary studies demonstrated that the vaccine is safe, and antibodies to canary pox were detected after a second (booster) dose. This vaccine has also proven to be a safe and effective prophylactic treatment for captive southern sea otters (*Enhydra lutra nereis*) (Jessup et al. 2009).

Research and Enhancement—Vaccination

Vaccination Methods: Up to 1,100 monk seals (essentially the entire species) could be vaccinated if the need were to arise and safe, effective vaccines were available to meet that need. The following describes the proposed approach to vaccine studies and vaccination.

Vaccine research

To prepare for and respond to an epidemic caused by morbilliviruses or West Nile virus, the following research is proposed.

Surveillance for morbillivirus and West Nile infections—To enable detection of novel viral infections in the Hawaiian monk seal population, there is a need to routinely and actively monitor for infections. Monitoring wild monk seals for these viruses may include tests for antibodies against the virus in blood (e.g., enzyme linked immunosorbent assays), tests for actual virus in blood, feces, or nasal swabs (e.g., polymerase catalyzed reaction assays), and syndrome-based surveillance. Sample and data collection for these tests would be covered by health assessment studies described in the Final PEIS.

Assess the safety and efficacy of the recombinant CDV vaccine—Currently, one captive Hawaiian monk seal has been vaccinated against morbillivirus. Vaccination of additional Hawaiian monk seals would better elucidate their ability to mount a proper immune response, the number of vaccines (including boosters) needed to generate this response, and the duration of immunity against morbilliviruses. Vaccination of additional captive Hawaiian monk seals will be pursued with partners under separate permits, including the Waikiki Aquarium and Sea World San Antonio, which have both applied to conduct this research under their own permits. Authorization to conduct vaccine research on monk seals in other facilities that do not have permits to conduct the research are being sought by NMFS.

Post-Vaccination Antibody Response (PVAR) Methods for Permanently Captive Monk Seals

Captive seals can serve as a model to establish vaccine antibody response for Canine distemper virus (CDV) and West Nile virus (WNV). For CDV, the use of Purevax (Meriel) would be used (a monovalent recombinant canary pox). Recombinant vaccines pose less risk than use of a live virus. The WNV vaccine is a product made by Fort Dodge of inactivated WNV. As an inactivated virus, it cannot be shed and therefore does not require a closed system. In addition, the recombinant canary pox has been tested in harbor seals at Sea World (by Pam Yochem) and no virus shedding was detected (Dr. Frances Gulland, personal communication).

To assess the effectiveness of the vaccines, serum antibody samples must be taken throughout the year. It is proposed to collect serum on days 0, 28, 42 and 365 to monitor antibody formation. Day 0 serum collection will occur prior to vaccination to provide baseline values for each animal. Vaccination for both CDV and WNV will occur after the serum is collected. Along with serum samples, duplicate nasal swabs will be obtained. A follow up vaccine will be given on day 14, but no blood sample will be taken at this time. Each vaccine is given subcutaneously in a 1 ml dose, administered twice, fourteen days apart. To minimize restraint and handling time of the seals, the serum collections on days 0 and 365 may also serve as annual blood sampling for the seals regular health monitoring. Additional handling and sedation will occur on days 28 and 42 post-vaccination to obtain the serum and nasal swabs only.

For both routine health monitoring and the PVAR study, blood samples will be obtained through the use of chemical sedation if deemed necessary by the attending veterinarian and light physical restraint. Sedation would be achieved with either diazepam (0.2 mg/kg IV) or midazolam (0.2 mg/kg IM) and blood collected from the extradural sinus or interdigital webbing vein. Flumazenil will be kept on hand for emergency use to reverse diazepam or midazolam sedation if necessary. However, it will not be used routinely as the half-life is less than that of the sedative drugs. Blood samples and nasal swabs will be obtained. At some facilities, seals may be trained for voluntary blood sampling. In addition, vaccination of future monk seals brought into temporary captive care (under the MMHSRP permit) may be conducted during the research phase.

Outbreak response for seals in the wild

Vaccination of monk seals may occur either in response to an outbreak or prophylactically in the absence of disease in Hawaii. Once a minimum of five captive seals has been vaccinated with no adverse effects identified, a prophylactic vaccine trial should be developed in the MHI. However, until this trial has been performed, a response plan is needed in case of disease events that could significantly increase the risk of morbillivirus disease in monk seals, due to their critically endangered status. A series of different disease parameters in Hawaiian monk seals, other marine mammals and domestic animals have been identified that could trigger a vaccination response in Hawaiian monk seals.

HMSRP proposes to vaccinate in response to disease outbreaks as diagnosed by a series of triggers described below. If the risk of morbillivirus or West Nile virus epidemics to monk seals changes from the current situation, this approach may be modified.

Morbillivirus

Triggers

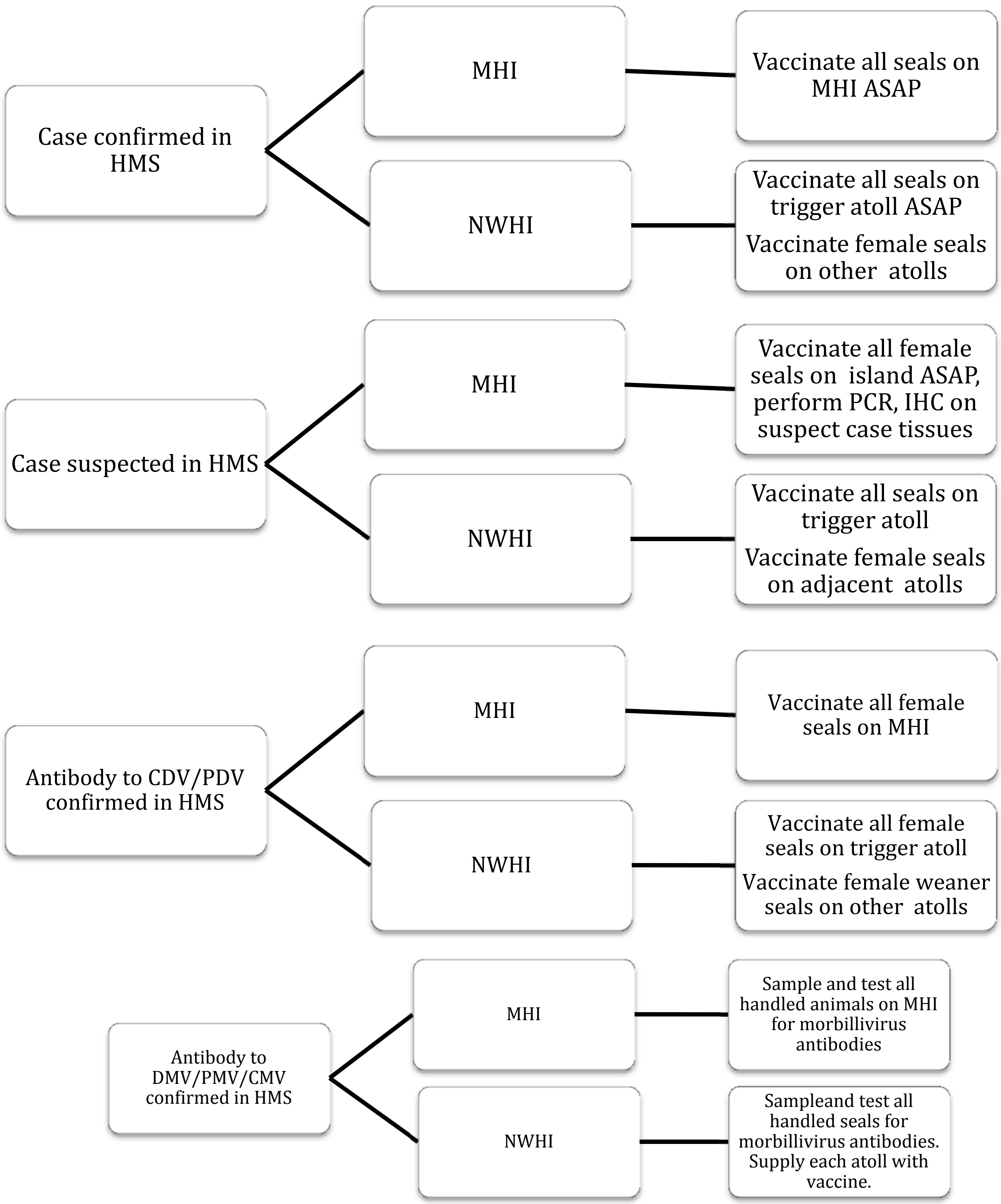
A *confirmed* case is an animal with pneumonia, or encephalitis, or lymphadenitis, or dermatitis, with morbillivirus detected in tissues by PCR or immunohistochemistry, and its identity confirmed by nucleic acid sequencing.

A *suspect* case is an animal with severe pneumonia or encephalitis associated with syncitial cells and inclusion bodies detected on histology, with either a positive PCR or immunohistochemistry result. Detection of antibody occurs when serum neutralization test results are greater than 1:16.

Responses to each disease parameter are summarized in the decision tree below. Each response is made by weighing the advantages and disadvantages, and recognizing that a second trigger occurring during a response may increase the level of response. Detection of antibody implies that exposure is occurring, but lack of disease would imply seals have developed resistance to the exposure. Thus vaccination response would be at a lower level than that to a detected case.

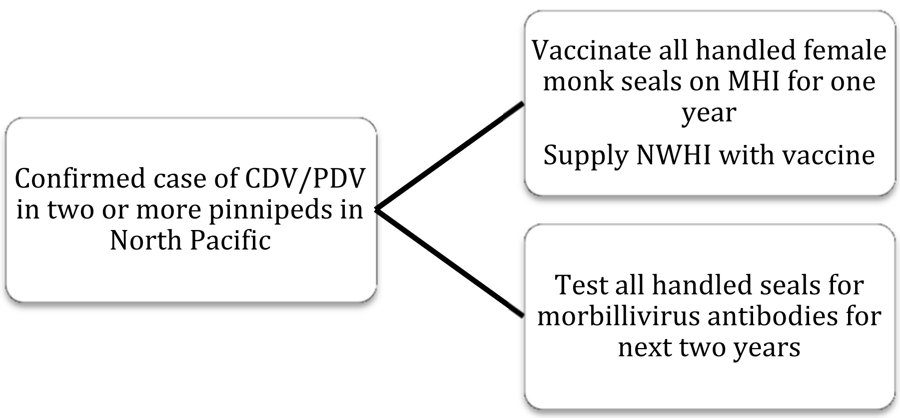
All vaccination responses would be maintained for one year. During response, surveillance for morbillivirus infection through necropsy of dead animals and serology of handled live animals will be prioritized by NMFS. Following vaccination, all vaccinated animals would be blood sampled and tested for morbillivirus antibodies within one year of vaccination unless pregnant.

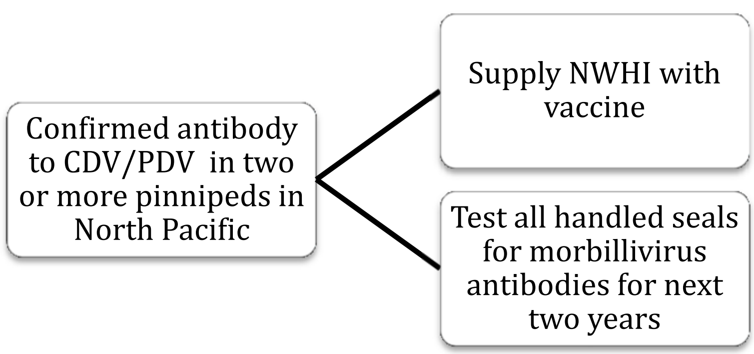
Triggers in Hawaiian Monk Seals

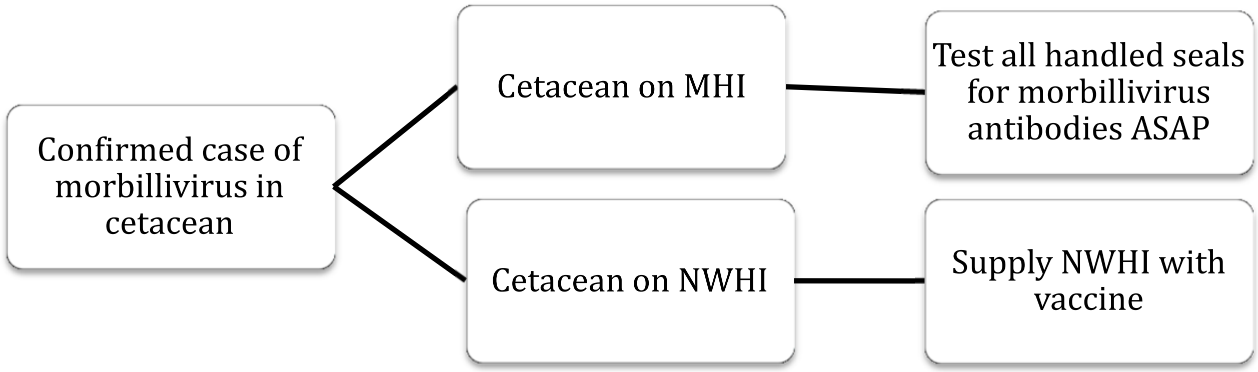


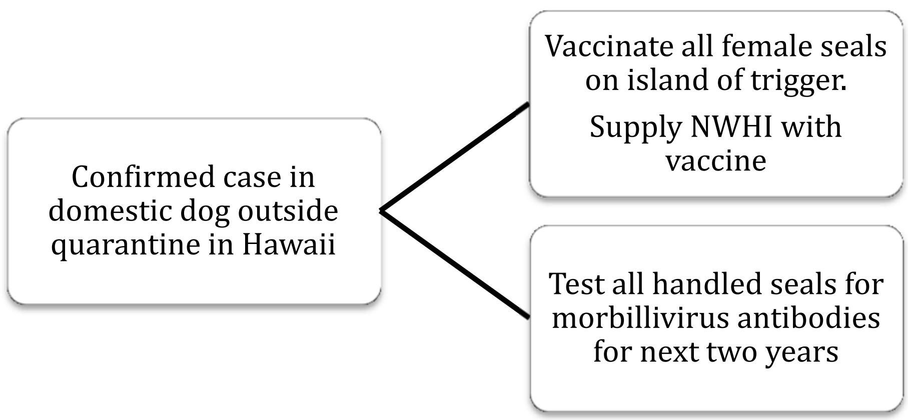
Triggers in Other Mammals

Morbillivirus associated disease in seals to date worldwide is believed to have resulted from transmission of virus from other seal species and domestic dogs (Grachev et al 1989, Jensen et al. 2002). Thus diseases in these species are considered risk factors for monk seals. Morbillivirus disease has not been reported to date in pinnipeds of the North Pacific, nor in mammals on the Hawaiian Islands, despite its prevalence in seals in Europe and the Atlantic (see above), and in domestic dogs in the continental United States. If morbillivirus disease was detected in pinnipeds in the North Pacific, the risk of Hawaiian monk seal exposure to morbillivirus infections would be heightened due to occasional movement of pinnipeds from other regions of the North Pacific to Hawaii. A small number of northern elephant seals have been documented in Hawaii and in 2012 a female northern fur seal landed on Oahu. Movement of other pinnipeds to Hawaii occurs unpredictably, and vaccination takes time to perform and achieve protective immunity. Thus, triggers that suggest pinniped morbillivirus disease could reach Hawaii at random times have been identified to trigger vaccination. Triggers that could occur in mammals other than pinnipeds have also been identified.









Results of the response to the first trigger event will be used to refine responses to subsequent trigger events. In particular, records will be taken on:

- Time between trigger and administration of first and second dose of vaccine;
- Number of seals vaccinated;
- Time required to vaccinate all or most animals on island;
- Age distribution of vaccinated animals; and
- Resightings of vaccinated animals
- Any indication of adverse reaction to vaccination.

West Nile Virus

The epidemiology of West Nile Virus differs significantly from that of morbilliviruses, as it is a vector borne zoonotic virus rather than a directly spread animal pathogen. This virus caused the death of a captive monk seal at SeaWorld San Antonio, Texas, and has caused mortality in captive harbor seals in the mainland U.S. To date this virus has not been identified in wild marine mammals, although it is present along the eastern seaboard and southern California. As this mosquito-borne virus is currently not present within Hawaii, the State has rigorous surveillance and response plans for controlling this virus due to its public health importance. Although neither single cases of disease nor epidemics of West Nile Virus have been reported in wild marine mammals to date, the death of a monk seal in Texas from this infection indicates monk seals are susceptible. Thus, the possibility of extensive mortality in monk seals exists if the virus were to be introduced to Hawaii, warranting a response plan to such a scenario

Trigger

A case of West Nile virus in the Hawaiian Archipelago in humans or wildlife, with activation of the State emergency response for West Nile virus control could trigger implementation of West Nile virus vaccinations in wild Hawaiian monk seals.

Response

As vaccination of Hawaiian monk seals to WNV has occurred with proven safety for over 5 years in 8 captive monk seals in Texas, the risk of vaccination against WNV is minimal, apart from risks associated with approach and injection.

In response to a detected case of WNV in any species in Hawaii, all accessible seals on the MHI would be vaccinated with West Nile virus vaccine (Innovator, Fort Dodge), starting with the island on which the case was identified. Vaccine would be transported to each NWHI and used if the outbreak is not controlled in the MHI within 2 months.

<u>Potential prophylactic vaccination</u>

The best way to protect Hawaiian monk seals against these viral infections is to vaccinate prior to population-wide exposures. This is especially true if multiple doses of vaccines are required to gain immunity against infections, or if immunity responses take weeks to months to develop. Conversely, vaccines that mount short-term responses against infections or have higher risks of side effects may best be delivered only in the face of population-wide exposures. Based upon the information gained from research and any outbreak response, it will be determined whether prophylactic or solely response-driven vaccinations against morbillivirus and West nile virus are needed.

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APPENDIX E—TWO-STAGE TRANSLOCATION: A PROPOSAL FOR ENHANCEMENT OF THE ENDANGERED HAWAIIAN MONK SEAL[1]

Context and Scope

The National Marine Fisheries Service (NMFS) is proposing a novel strategy for boosting juvenile Hawaiian monk seal survival. The proposal involves temporarily translocating weaned female pups from subpopulations with relatively low juvenile survival to alternate sites where juvenile survival is much higher, then returning them several years later. The objective is to reduce early mortality of these individuals, which is exceptionally high in the first two years of life and is thought to be the primary factor limiting population recovery. The proposed translocations would ideally preserve sufficient reproductive potential within monk seal subpopulations maintaining the capability for more rapid growth should conditions currently constraining survival eventually relax. Given recent trends for this species (4% annual decline in abundance), this logic is admittedly optimistic, but some improvement in natural survival will surely be required if the species is to avoid extinction.

Recent survival rates suggest the most favorable option (purely in terms of demography) would involve temporarily moving seals from the remote Northwestern Hawaiian Islands (NWHI) to the main Hawaiian Islands (MHI), an initiative that involves some controversy related to socio-economic issues (See Final PEIS Appendix B).

As described below, the proposed translocation program is but one of several actions, currently underway or proposed, to conserve the Hawaiian monk seal. All of these actions have been, or will soon be, subject to scrutiny for NEPA clearance, MMPA/ESA permitting, IACUC approval, and Recovery Team and Marine Mammal Commission review. Most of these activities have a long history of positive application to monk seals or demonstrated precedent in other wildlife management or conservation programs.

In contrast, the proposed translocation program is novel in many respects and deserves special consideration. Social and economic concerns associated with translocations will be thoroughly analyzed and addressed during the PEIS and permitting processes. However, the PIFSC further commissioned a special Society for Conservation Biology (SCB) review of the science of its proposed translocation strategy. The PIFSC recognizes that the proposed two-stage translocation program has unique features in terms of its design, execution and underlying scientific principles when compared to 'traditional' translocation or reintroduction programs. As such, the SCB review was intended to evaluate the scientific support for the proposed strategy. While recognizing that the translocation program would

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[1] An earlier version of this document was prepared for a Society for Conservation Biology (SCB) blue ribbon panel review of the science supporting two-stage translocation. Some of the comments and suggestions arising from the SCB review (completed 7 February 2011) have been incorporated into the current version of this document. Other suggestions, such as providing a wider range of metrics for evaluating two-stage translocation benefits, were incorporated directly into Chapter 4 of the Final PEIS.

occur as one element of a more comprehensive research and enhancement program, the scope of that review was relatively narrowly focused on translocation science.

Background

Distribution and Population Status

The Hawaiian monk seal ranges throughout the entire Hawaiian Archipelago with rare occurrences recorded at Johnston Atoll, approximately 800 km south of Hawaii (Figure 1). The species is structured in a metapopulation consisting of eight NWHI subpopulations, which together comprise roughly 85% of total abundance; the remainder is distributed amongst the MHI. The monk seal subpopulations display varying degrees of demographic independence but are linked through regional environmental correlation as well as migration (Baker *et al.* 2007, Baker and Thompson 2007, Schultz *et al.,* 2010). A proxy for movement rates among subpopulations (the proportion of tagged seals seen at other than their natal site during their lifetime) ranges from 4% to 18% depending upon the site (Schultz *et al.,* 2010). Effective migration has apparently been sufficient to preclude any discernable genetic population structure, such that the species is comprised of a single panmictic population (Schultz *et al.* 2009, Schultz *et al.,* 2010).

Total Hawaiian monk seal abundance is approximately 1,100 individuals with subpopulations ranging from roughly 50 to 200 seals each. The overall population abundance is falling by an estimated 4% per year. The six most-studied subpopulations in the NWHI (French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll and Kure Atoll) are currently declining with estimated intrinsic rates of increase (λ) ranging from 0.89 to 0.96 (Baker *et al.* 2011*a*). Necker and Nihoa Islands appear to be stable or increasing, however the demographics at these two sites are relatively poorly characterized due to their difficult access and historically relatively small contribution to total abundance. In contrast, the MHI population is increasing with an estimated λ of 1.07.

Poor post-weaning juvenile survival is the primary driver of the population decline in the NWHI and, conversely, favorable survival in the MHI contributes to that region's robust growth. Recent survival to age curves (l_x) demonstrate the divergent survival regimes operating between the NWHI and MHI (Figure 2). Chronic poor juvenile survival for time periods ranging from 10-20 years in the NWHI have resulted in degraded age structures exhibiting an over-representation of newborns and older seals, with few juveniles and young adults.

Age-specific fecundity (m_x) has been rather well characterized for three NWHI subpopulations (Harting *et al.* 2007, Figure 3). The curves vary among these sites and tend to be somewhat lower than for other pinnipeds. There is some evidence that MHI seals enjoy earlier maturation and higher reproductive rates, at least among the younger adults (Baker *et al.* 2011*a*). Nevertheless, survival rates are the primary factor determining population status and trends at present.

Causes of population decline

The 2007 Recovery Plan for the Hawaiian Monk Seal (NMFS 2007) identified three “crucial” threats to the species:

- **Food limitation,** the primary cause of low juvenile survival.
- **Entanglement** in marine debris, which affects all ages and sexes, but disproportionately involves juvenile seals.
- **Shark predation,** particularly Galapagos shark predation on pups at French Frigate Shoals.

Another set of second tier “serious” threats include infectious disease, terrestrial habitat loss in the NWHI (especially due to sea level rise), intra-specific male aggression, and human interactions especially in the MHI (disturbance, fishery interactions, etc.).

While certain of these threats can have important sporadic or localized impacts (*e.g.*, male aggression) or have *potential* for widespread, devastating impacts (epidemic disease), it is generally agreed that the primary cause of the current decline is food limitation leading to unsustainably high levels of juvenile mortality (Antonelis *et al.* 2006, Baker 2008). Insufficient availability of prey for young seals may be mediated through poor or variable overall system productivity, competition with other top predators (Baker *et al.* 2007, Polovina 2008, Baker and Johanos 2004, Parrish *et al.* 2008), or both. In any case, because the diagnosis indicates a deficiency in the ecosystem that is leading to the demise of young monk seals, there are no simple or certain remedies. Thus, a set of novel tools, including a new translocation approach, is being proposed. Below we describe past, ongoing and future planned interventions to provide some context for the translocation proposal that is the focus of this review.

Past and current demographic research and monitoring

Due to steep declines in abundance following surveys in the late 1950s, the Hawaiian monk seal was listed as endangered under the United States Endangered Species Act (ESA) in 1976. Efforts to monitor the species and foster its recovery began in the early 1980s, led by the NMFS as prescribed by the ESA. Monk seal population assessment has focused on determining abundance, age and sex structures, survival rates, reproductive rates, and causes of injury and mortality. The Hawaiian monk seal thus has the distinction of being the subject of a long-term and thorough demographic study on a par with that undertaken for any large, free-ranging mammal in the world. Relying on the rich data set accumulated from over two decades of research, a suite of demographic parameter estimates has been updated annually for six NWHI subpopulations, with less data available from Necker and Nihoa Islands, and more recently, data from the MHI. Summarized demographic data are typically available for review within a few months after annual field seasons have ended. Further, robust investigations of foraging behavior and monk seal health and disease are ongoing. This rich, two-decade plus research data set is essential for evaluating past recovery efforts and designing future measures. A primary focus of the research program has naturally been to discover and, when possible, mitigate natural and anthropogenic threats to the species.

Future proposed interventions

Despite many past efforts and those ongoing, the monk seal's status continues to erode. These efforts have no doubt slowed the species' decline, but it is broadly agreed that more must be done to save the species from further deterioration and ultimately, extinction. Because the primary driver of decline is low juvenile survival, successful interventions must be directed toward the early life stages: pups and juveniles. However, due to the condition of age structures and vital rates in the NWHI as described above, the number of pups available for intervention is projected to rapidly decline (Figure 4). This realization heightens the sense of urgency to begin interventions before the opportunity to effect meaningful improvement expires.

Many past and current efforts will be continued into the foreseeable future as these measures have clear and direct benefits. These include, but are not limited to, disentangling seals caught in marine debris, removing fishing hooks from seals, large-scale removal of potentially entangling marine debris from beaches and reefs, and mitigating Galapagos shark predation and intra-specific male aggression when needed. Some translocations, already authorized, will continue. For example, within-atoll translocation of weaned pups from high shark predation islets to historically safer islets at French Frigate Shoals is a successful tool for mitigating post-weaning Galapagos shark predation. In the MHI, pups that wean in high human-use areas isolated from other seals may also be translocated to more favorable sites when deemed beneficial. Finally, translocation of adult males is one option authorized for mitigating male seal aggression.

The robust Hawaiian monk seal research effort will continue and expand in the future. This program is focused on four broad areas: population monitoring, foraging ecology, health studies and survival enhancement research. The full details of the research program are beyond the scope of this document, but it is important to recognize that each element of research inquiry is integrated into the goal of species' conservation. Investigations serve to identify threats, characterize underlying factors that influence survival and reproduction, design interventions, and evaluate the success of conservation measures.

Coupled with the research program is an expanding management effort, primarily focused on the MHI. The management program, led by the NMFS Pacific Islands Regional Office entails stranding response, public outreach and education, and legal/regulatory issues.

Another anticipated expansion is in the area of captive care of monk seals. In collaboration with the Marine Mammal Center in Sausalito, NMFS is pursuing expanded capacity for captive care facilities. Care would be provided to seals brought into temporary captivity under the authority of the NMFS Marine Mammal Health and Stranding Response Program. Captive care efforts would be limited to animals deemed in need of medical intervention.

In addition to the foregoing measures, a set of new research and enhancement tools is under consideration to promote recovery of the Hawaiian monk seal. These include:

- Two-stage translocation
- De-worming
- Vaccination research
- Behavioral modification

The proposed two-stage translocation program is the subject of this paper and SCB review, however the other three initiatives will be described briefly.

De-worming is currently being investigated as a means for improving free-ranging juvenile seal survival by temporarily reducing gastrointestinal parasite burden. If this approach is determined to be feasible and effective, it may be used as an enhancement tool.

Vaccination research is meant to address potential disease (*e.g.*, morbillivirus and West Nile Virus) outbreaks that could devastate Hawaiian monk seals. If the safety and efficacy of specific vaccines are established, then these could be used either prophylactically or as a response tool to contain an outbreak.

Behavioral modification research addresses a range of measures primarily intended to prevent or mitigate human-seal interactions. Occasionally seals become socialized to humans in the MHI and because of the dangerous nature of their interactions with people, these seals have typically been translocated from the MHI or brought into permanent captivity. Seals also interact with fishers, sometimes to the detriment of the former (hooking, entanglement, shooting) and the latter (loss of catch, damaged gear). Tools to prevent or alter such behavior will be in greater demand as the MHI monk seal population continues to grow. As the tools and protocols for effective behavior modification are refined, they will become an integral component of monk seal management in the MHI.

Two-stage Translocation

Basic concepts

According to the "IUCN Guidelines for Reintroduction", translocation is defined as *"deliberate and mediated movement of wild individuals or populations from one part of their range to another"* (IUCN 1998). Translocation has proven to be one of several useful tools in the Hawaiian monk seal conservation effort (Baker *et al.* 2011*b*). The NMFS is proposing a novel approach to further apply translocation to enhance the Hawaiian monk seal population. Translocating individuals would have one or more of the following objectives:

1) Increase individual fitness (especially survival).
2) Improve the species status (*e.g.*, abundance, population reproductive value).
3) Maintain meta-population structure for long-term resiliency.

The fundamental concept underlying application of translocation is to address mismatches between local environmental conditions and distribution of seals among subpopulations. For example, some pups wean at subpopulations where they experience high mortality, apparently largely due to insufficient prey resources. Thus, many of these neonates perish, whereas, because of spatial variability among sites, they might have survived elsewhere. This would be tolerable under different conditions. That is, if the monk seal population were large and if mean environmental conditions were more favorable (although still punctuated with periods of unfavorable conditions), the meta-population might achieve a sort of dynamic stability across the entire range. The current situation, however, is not sustainable because the number of monk seals is perilously low and steadily declining. Further, adverse conditions have largely prevailed for a decade or more, and natural dispersal occurs at far too slow a rate to effect a more optimal distribution.

Translocation, then, is a tool that could mitigate population decline by accelerating dispersal of young animals from areas of low survival (referred to as "donor" or "natal" sites) to areas of higher survival (referred to as "recipient" or "nursery" sites). This approach could achieve objectives 1 and 2 above. Nonetheless, if translocations are conducted at an appropriate scale for a sufficient number of years, some potentially negative consequences must be addressed. For example, donor populations may become unacceptably depleted or exhibit skewed sex ratios (as only females will be selected for translocation). Moreover, moving too many seals to recipient sites might result in overcrowding and adversely impact vital rates. For these reasons, some translocation measures will also be taken to achieve objective 3 above.

The proposed two-stage translocation approach is illustrated by the following. The NMFS Pacific Islands Fisheries Science Center (PIFSC) currently holds a permit to translocate weaned pups among NWHI subpopulations to improve their probability of survival. Unfortunately, all the primary NWHI subpopulations are experiencing relatively low juvenile survival (Figure 2) such that the potential efficacy of translocation amongst those subpopulations is uncertain. However, present conditions are favorable in the MHI, suggesting that the greatest positive effects of translocation could be achieved by moving weaned pups from the NWHI to the MHI. While juvenile survival in the NWHI is low, those seals that reach adulthood enjoy survival rates comparable to those in the MHI (Baker and Thompson 2007; Baker *et al.* 2011*b*). Thus, given recent survival rates, the most effective scenario would likely involve moving weaned female pups from NWHI subpopulations to the MHI in order to increase the proportion surviving (first stage of translocation). Subsequently, animals that have achieved adult survival rate levels (*i.e.*, age 2 or 3 yr and older, following Baker and Thompson 2007 and Baker *et al.* 2011*a*) would be returned from the MHI to their natal NWHI subpopulations (second stage translocations). The latter action will serve to rebalance population distribution to avoid excessive depletion of donor subpopulations, ensure the MHI does not become over-populated, and prevent problems associated with male-biased sex ratios at donor sites. Further, should environmental conditions become more favorable in the future, this return translocation would serve to fortify subpopulation age structures, positioning them to exploit improved conditions and achieve positive growth. Without the second stage of the translocation process, donor subpopulations would likely become sufficiently depleted from prolonged low recruitment that population growth would be very slow, even in newly favorable environmental conditions.

It must be emphasized that while the preceding translocation scenario (*i.e.*, NWHI to MHI and return) is suggested by current conditions, future conditions may well dictate other approaches. For example, when juvenile survival is sufficiently high at any NWHI subpopulation, these NWHI subpopulations might be considered for receipt of translocated weaned pups. Likewise, if MHI conditions deteriorate significantly in the future, moving weaned pups from the MHI to the NWHI might be beneficial. Thus, it is critical to underscore that while the underlying translocation strategy is consistent, the particulars will necessarily be adaptive in accordance with prevailing monk seal demographics and environmental conditions. Furthermore, the realized success of translocations is uncertain. Because of the dynamic state of the system and the uncertainty of outcomes, the translocation program would be guided by a complex and adaptive decision framework.

Genetic considerations

Strong genetic population structure can imply local adaptation across a species' range. When planning translocations in such a context, the risk of diluting local adaptation is of critical importance. In contrast, the Hawaiian monk seal's lack of population structure coupled with observed levels of natural movement amongst subpopulations indicate that translocations may be conducted without fear of genetic consequences (Schultz *et al.* 2010).

Decision framework

A host of complex and interacting issues arise from three fundamental features of the proposed translocation program:

1) The program will, by design, occur over a span of several years.
2) Environmental and, perhaps in smaller subpopulations, demographic stochasticity lead to variable and unpredictable monk seal survival rates over time and space.
3) This is a novel recovery strategy the outcomes of which are uncertain, and there is potential for unintended (including undesirable) outcomes.

The remainder of this document focuses on the design, execution, and evaluation of two-stage translocation supported by a decision framework and simulation modeling. The decision framework and modeling reflect an attempt to consider all relevant inputs to inform actions and foresee and minimize the risks of undesirable translocation outcomes.

The critical importance of the accumulated monk seal demographic database and the continued stream of annual monitoring data cannot be over-emphasized. Existing survival and age/sex structure information will be the primary basis for determining when to conduct translocations and between which subpopulations. Continued monitoring of both translocated and non-translocated individuals will provide the basis for project evaluation, informing the subsequent steps and reducing uncertainties of simulations.

The skeleton of the decision framework is depicted in two flow charts, one for each stage of translocation (Figure 5). A narrative follows, which travels through each step in the flow charts. Next, explicit risks of undesirable outcomes are described and components of the decision framework that mitigate those risks are presented.

Translocation of weaned female pups (Figure 5a)

The flow charts in Figure 5 are color-coded to help illustrate the decision-making process. Green boxes represent decision points or actions that progress toward translocation, whereas orange boxes indicate circumstances where translocations are suspended. Yellow boxes represent information inputs that influence decisions. Lastly, red numbers serve as references for orienting the following narrative with the chart.

Step 1 (in Figure 5a) is to evaluate whether there is a "substantial and consistent" difference in juvenile survival between at least two subpopulations. This indeed is the primary motivator for the entire translocation scheme. The two elements of this evaluation, "substantial" and "consistent" require further explication.

The magnitude of the difference in survival suggests a maximum expected benefit that could be conferred by translocation. For example, if survival for a given age class at two hypothetical subpopulations were 0.30 at site *a* and 0.70 at site *b*, then at best we could anticipate a 0.40 (0.70-0.30) improvement in the survival of seals moved from site *a* to *b*. The greater the survival differential, the more compelling the case is for translocation. However, establishing a concrete threshold for when translocation is worth doing is problematic, because we have insufficient experience with this intervention approach to reliably anticipate outcomes. Nevertheless, we require some guidelines to begin with, which will be refined as experience accumulates. The earliest age when translocations might occur is at weaning, and monk seals tend to achieve adult survival rates at approximately age 3 yr. Thus, an appropriate period for comparing survival amongst subpopulations is from weaning to age 3 yr. Initially, we will examine survival for this period among subpopulations but not hold to thresholds, which would be arbitrary if established *a priori*. While it could be argued that any improvement in survival is valuable, no matter how small, potential decrements to survival associated with translocation (see simulation modeling section) might subtract from the expected benefits of being placed in a more favorable environment. For initial trials the survival differential will be sufficiently large to allow the potential for considerable survival decrements to translocated seals without the action causing harm (*i.e.*, improvements should exceed decrements).

The concept that differential survival should be consistent before translocation is warranted arises from the observation that juvenile monk seal survival rates are notoriously variable among sites and from year to year. Previous analysis has shown that there is only weak autocorrelation in first year survival between years, such that poor survival in one year does not provide much predictive power about the next cohort's survival prospects (Baker and Littnan 2008). Not only do survival rates fluctuate, but estimates have associated error, in part because the cohort size at individual sites can be very low. In order to avoid having our translocation decisions constantly chasing last year's rates, we propose evaluating survival differential using the most recent available three years at each site. As with the magnitude threshold, this approach will be refined as information on outcomes is collected.

Thus, in Step 1, using the stochastic simulation model described in subsequent sections, we evaluate whether there is a sufficient differential in survival from weaning to age 3 yr measured over the past three years among subpopulations. If not, then continued monitoring of vital rates (**Step 2**) is prescribed. If yes, then we proceed to **Step 3**.

At **Step 3**, we ask whether the project has been ongoing for at least 2 years. If not, there are not yet any candidates for the return translocations, so we proceed directly to **Step 6**. However, if the project has been conducted for at least 2 years, we evaluate **Step 4**, whether return translocations of 2+ yr-old seals previously moved as weanlings are occurring as planned. Examples of conditions which might result in failure to return seals as planned would be an emerging concern about a pathogen affecting either subpopulation, unanticipated logistical problems or other factors as described below. If seals are not being returned as planned, then weaned pup translocations are suspended (**Step 5**) until whatever is impeding return translocations is resolved. This decision is intended to both avoid overloading a recipient site with immigrants and preventing over-depletion and sex ratio imbalance at donor sites that are not being replenished.

At **Step 6**, the donor and recipient subpopulations are determined. This will typically be a simple matter of selecting the two sites with the lowest and highest survival, respectively. However, there may be cases where more than one site has similarly low or high survival, such that weaned pups could be drawn from or delivered to more than one site. As in Step 1, simulation modeling will be conducted to evaluate expected benefits associated with selecting various combinations of donor and recipient sites. If weaned pups have been translocated to the proposed recipient site in recent years, the survival performance of the former translocatees will inform this decision.

Step 7 is a critical juncture where the number of seals to be translocated is determined. This decision is influenced by numerous factors indicated by the yellow boxes. The *smallest* number indicated by any of these factors should be the *maximum* number considered for translocation. For example, the "number of weaned female pups in healthy condition" at the prospective donor site sets a clear upper bound on the potential number available for translocation. Likewise, logistical constraints (ship deck space, ship availability, funding, etc.) might also limit the number that can be translocated. Further, the number deemed prudent to translocate in any one year may be influenced by societal factors (especially in the MHI). Regardless, when the program is new, it will be prudent to start small with approximately 5 weaned pups, gradually increasing to at most 10 per year in the first several years. Finally, the capacity for the prospective recipient sites(s) to absorb a cadre of additional weaned pups must be considered. This will largely be assessed by evaluating trends in juvenile survival. For example, first year survival post-weaning appears to be sensitive to worsening conditions. Thus, if a trend towards deteriorating survival is observed, this would suggest translocating fewer numbers of new pups. Lastly, social factors (public attitudes) may indicate that receiving sites within the MHI can absorb fewer additional seals than might be concluded on biological grounds alone.

Once the target number is determined, seals will be captured at their natal sites (**Step 8**) and screened for a variety of health parameters including indications of infectious disease (**Step 9**). Health screening protocols evolve with techniques and perceived potential for specific diseases. However, PIFSC has established protocols for health screening translocated weaned pups, which are periodically reviewed and which have been applied as recently as 2009. Seals which do not pass the health screen will either remain at liberty at the natal site or will be brought into captive care if deemed in need of medical attention (**Step 10**). Those that pass the health screen will be transported to their destination, released, and closely monitored (initially with telemetry) (**Step 11**). Past experience has shown that direct release of weaned pups in appropriate habitat (*i.e.*, at sites where other pups have previously been weaned and survived) is a successful strategy (Baker *et al.* 2011*b*).

Translocation of seals age 2 yr and older (Figure 5b)

The second stage of the proposed translocation involves repatriation of seals, previously translocated as weaned pups, which have achieved adult survival rates (2 or 3+ yr-olds). The precise age when young seals achieve adult survival rates is not fixed and may depend on factors such as their body condition at weaning and environmental conditions where they spend their first few years of life. The optimal age for returning seals is therefore not known, but will be informed by experience as the translocation program is conducted. Thus, some previously translocated seals may be returned at age 2 yr, but all would be slated for return by the time they reach age 3 yr. Figure 5b depicts the flow chart for the return translocation, with color-coding and notation conforming to that in Figure 5a.

Step 1 is reached when translocations have occurred two years or more previously, so that there are potential translocatees available for repatriation. At **Step 2**, we assess whether the survival prospects for 2-yr-olds, 3-yr-olds and adults in the seals' natal region are roughly as high or higher than in the current location. The reasoning here is that while juvenile survival varies greatly among subpopulations, adult rates tend to be more similar and less variable. For example, although juvenile survival is currently much lower in the NWHI than in the MHI (Figure 2), adult survival in the NWHI is comparable or just slightly lower than that in the MHI (Baker *et al.* 2011*a*). Thus, the two-stage translocation effectively protects subjects from the high mortality they would have otherwise experienced as juveniles in their natal regions, and returns them at an age when they will likely experience relatively high survival. The two translocations, then, confer a net benefit on translocatees even if they experience slightly lower survival as adults when repatriated in their natal regions. The expected magnitude of this net benefit will be assessed using simulation modeling as described in subsequent sections.

Alternatively, if adult survival at the natal region is considerably lower, then return translocations would be suspended (**Step 3**) and additional weaned pup translocations from the donor population in question would also cease (see Figure 5a, **Step 5**). It is conceivable that in rare cases other factors might provide a compelling incentive for translocating 2+ yr old seals even if adult survival at the natal site is sub-optimal. For example, addressing an imbalanced sex ratio or some other deficit might influence the disposition of these young female seals. If adult survival at the natal region remains comparable to, or higher than, the current location, we proceed down the path to return previous translocatees to their natal region (**Step 4**). The number of age 2+ yr-olds to potentially return is simply determined as the number of surviving previously translocated weaned pups (**Step 5**). Based upon the body condition of individual seals and taking into account survival of any seals previously translocated at age 2 yr and prevailing survival rates at the natal area, some 2-yr-olds may be returned. Again, all seals age 3 yr and older would be slated for return.

The next important decision is to confirm that returning seals to the site of origin is indeed appropriate and prudent at the present time (**Step 6**). This deliberation is influenced by multiple factors (yellow boxes). For example, if seals have been returned in previous years, the survival performance of those earlier returnees will be considered before additional seals are repatriated. More broadly, the capacity of the natal region to absorb returnees will be assessed as indicated by survival rates of all ages at the site, as well as current abundance relative to historical levels. Disease risk is another consideration. If a known disease is present at the natal subpopulation, but is absent from the seals' current location, then it would not be appropriate to expose returnees and thus risk their survival. If it is deemed inadvisable to return seals to the preferred (natal) location, then an alternate nearby location may be chosen, so long as that location is deemed prudent according to the above criteria. Finally, male-biased sex ratios have led to male aggression-related mortality in the past, and interventions to adjust sex ratio have successfully lowered this threat (Johanos *et al.* 2010). Thus, there may be cases where returning seals to a site, not necessarily their birth location, could be used to ameliorate male-biased sex ratios. If no appropriate release location is identified, then return translocations of 2+ yr-olds will be suspended (**Step 3**).

Once the release location(s) have been confirmed, the subject seals will be brought into captivity (**Step 7**, *in situ* pens/cages in the NWHI; permanent captive facilities in the MHI). At this point, the seals will be health screened as described above and also held in quarantine for a prescribed period; likely approximately two weeks, depending upon veterinary protocols to be developed (**Step 8**). The primary purpose of quarantine is to confirm absence of active disease and minimize the chance of transmitting a disease into a return site where that disease may be absent. The quarantine period may be shortened when moving animals between subpopulations where disease surveillance indicates that the prevalence of exposure to a suite of pathogens is equivalent. Quarantine is expected to be most important when moving seals from the MHI to the NWHI, as some diseases may occur in the former region but not the latter because of the presence of feral and domesticated animals in the MHI.

Seals which fail to pass the health screen or quarantine will be released at the capture site or brought into captive care if appropriate (**Step 9**). Otherwise, they will be transported, released and closely monitored (initially with telemetry) (**Step 10**).

Minimizing risk of undesirable outcomes

A variety of risks are inherent in any intervention in wild populations, including the proposed two-stage translocation. Risk minimization will be achieved through program design, intensive monitoring and evaluation, and the adaptive decision framework described above. Below, we address how the risk of an extensive list of conceivable potential ill effects will be minimized.

Table E-1. Risks and concerns that may affect the outcome and evaluation of two-stage translocations in Hawaiian monk seals.

Issue	Risk or Concern	Mitigating Factors
Condition of weaned pups (*e.g.*, axillary girth), is positively related to survival prospects.	Selection of weaned pups for translocation may not be representative (i.e only viable, healthy pups will be selected), so that project evaluation may be difficult.	Small, but otherwise healthy pups will not be excluded from translocation. Only non-viable, emaciated or wounded animals will be avoided. Post-hoc analysis will control for condition of both translocated and non-translocated pups.
Depletion of donor subpopulations.	If weaned pups are continuously taken from a site, abundance may fall to an unacceptably low level, with the potential that: i) Seals no longer play a "functional" role in the system. ii) Competitors may occupy the monk seal niche and inhibit population re-establishment. iii) "Empty" environment could be a wasted opportunity for growth if intra-specific competition is low.	Depletion should only be short-term and moderate because 2+ yr-olds will be returned to the donor population. This, in fact, should increase rather than deplete the donor population after return translocations commence. Moreover, should intra-specific competition lessen at the donor site, juvenile survival should consequently increase. This will reduce the survival differential between sites and automatically regulate further weaned pup translocations.
Development of male-biased sex ratios	Removal of female pups will eventually manifest in male-biased sex ratios, leading to increased male aggression toward adult females and juveniles.	Weaned female pups will be returned to natal sites prior to sexual maturity. Presumably they will have enjoyed higher survival than (non-translocated) males. Ultimately, the two-stage translocation should result in some female bias for effected cohorts. If in fact the translocated females fare poorer than their male counterparts or cannot be repatriated for any reason, weaned pup translocations would be suspended as described in the decision framework. This could result in male bias for a few affected cohorts, but this would be a small portion of the total population.
Capacity of recipient site to absorb immigrants.	Overshooting carrying capacity could lead to a crash of the recipient population.	Recipient site demographics will be closely monitored, especially for declining juvenile survival. If this is observed, the differential survival between donor and recipient sites decreases, so that translocations slow or cease, thus correcting the problem.

Translocated seal survival	Weaned pups taken from their natal sites may not fare as well as natives at the recipient site. Returned 2+ yr-old returnees may not survive as well as those who have survived from birth at their natal site.	Past experience (Baker *et al.* 2011*b*) has shown that recently weaned pups are amenable to translocation and have survival rates indistinguishable from pups born at release sites. Sites where pups have been weaned and survived will be selected as release locations for weaned translocation pups. Experience translocating juvenile seals is limited. Repatriates to their natal regions may have both disadvantages and advantages relative those that have grown up there. Two or three-year-old seals may experience greater effect of capture stress than has been the case with weaned pups. Returnees may be disadvantaged by having to learn to forage in a new area, which may have less prey availability than where they grew up. However, because returnees spent their first 2 or 3 years in more favorable habitat, their body condition should be better than non-translocated seals in their natal region, thus providing a survival advantage. In both cases (weaned pups and returnees), survival will be monitored and translocation plans appropriately adapted as described in the decision framework.
Infectious disease	Translocating seals may result in spreading disease faster than would occur naturally.	Health screening of all translocated seals, coupled with appropriate quarantine of returnees will minimize risk of transporting infectious agents. Moreover, disease surveillance will be ongoing throughout the species range to detect emerging disease outbreaks. At present, there does not appear to be strong differences in exposure throughout the range, perhaps with the exception of some diseases (leptospirosis, toxoplasmosis) more prevalent in the MHI than the NWHI.

Simulations to evaluate benefits from two-stage translocations

Model Design

The monk seal stochastic simulation model was used to compare and evaluate the expected outcomes from a representative set of translocation scenarios. Details of the model structure and mechanics are provided in Harting (2002) and only the fundamental features are described here.[2] At its core, the model is a mechanistic, stochastic, metapopulation model with provisions for handling uncertainties in input parameters and modeled processes. The model is heavily data driven, capitalizing on the demographic and life history data collected over more than two decades in the NWHI and, more recently, the incipient demographic data set for the MHI. Necker and Nihoa Islands (NWHI) are relatively data poor and have historically comprised a small portion of total abundance, and are therefore not included in simulations. The model provides multiple options for simulating natural perturbations (survival catastrophes, birth catastrophes, shark predation, and aggressive male interactions) and management interventions (captive rearing/release, translocations, shark removals, and other). It produces a diverse array of outputs suitable for evaluating simulation outcomes including abundance, realized growth rate, multiple demographic descriptors, and assorted metrics specific to whatever intervention scenario was executed. The primary output is site-specific, with summary diagnostics for the entire system and the two main regions (NWHI and MHI).

For the purposes of this analysis, certain model components were disabled, including the option for density dependent adjustment of demographic rates. While that feature of the model is certainly important when performing long-term projections, the precise manner in which density dependence operates on the monk seal population is unknown and its influence can overwhelm and obscure the effects of all other factors included in the simulation scenario.

For the NWHI, age-specific survival rates used for model input were derived from fitting the Siler survivorship curve to observed rates from the most recent three data years. Separate curves were fit for each of the 6 sites. For the simulations, parameter uncertainty was handled by random sampling Siler parameters from the variance/covariance matrix from the parameter fitting. Age-specific reproductive rates were estimated from pooling pupping data from 1990 to the present using methods described in Harting *et al*. (2007). As with survival rates, parameter uncertainty was handled by randomly sampling a unique set of correlated parameters from the fitted distributions. In the model, survival and reproduction are determined stochastically for each individual in the population by binomial sampling (testing a uniform random number in the range [0,1] against the age-specific survival rate). Migration is also determined stochastically for each individual according to the fitted movement rate for each age class. Each simulation was initialized with the most recent starting age/sex distribution for each NWHI site.

As compared to the NWHI, data from which to estimate vital rates and population composition are much more limited for the MHI. A detailed description of the methods used to fit both survival and reproductive rates for the MHI are provided in Baker *et al.* (2011*a*). Where data were lacking (*e.g.*, reproductive rates of older MHI females), some inference and extrapolation was necessary based on patterns observed in the NWHI. Uncertainty in parameter estimates was handled in the same manner as for the NWHI, with unique parameters drawn from their fitted distributions at the start of each simulation.

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[2] Additional details about the simulation model are also provided in Appendix J of this PEIS

Translocation Scenarios

As described in the decision framework section of this document, the specific translocation scenario to be undertaken in a given year will be determined according to the most recent data available for each subpopulation. Results from preceding translocation efforts, logistics to accomplish the translocation and other considerations will also enter into the decision-making calculus. In a given year, the optimal translocation scenario might involve any combination of single or multiple donor and nursery sites. Further, the number of seals collected and translocated to each site will vary. It is not our intent to present and evaluate the full complement of translocation scenarios that might be undertaken, but rather to present a small set of representative scenarios that illustrate the salient aspects of this intervention strategy and highlight some of the variables and uncertainties that influence the expected outcome. In practice, prior to initiating an action, additional simulations and ancillary analyses will be undertaken to inform NMFS about the relative benefits that might accrue from various translocation scenarios in a given year.

We present results from nine scenarios. These include one "baseline" scenario that involves no translocation and which serves as the basis of comparison for the other scenarios. This scenario is indicative of what would be expected if current vital rates remain applicable for the duration of the 10-year model projection, and no major perturbations or interventions alter the population trajectory.

The remaining simulations are divided into two sets of four simulations each: one set of cross-region translocations (from French Frigate Shoals (FFS) to MHI), and another set of within-NWHI translocations (FFS to Laysan Island (LAY)). These sites were selected primarily based on the current survival differential of the species' main breeding sites as estimated from the most recent (2010) data. Considering only the NWHI, FFS has consistently had the poorest juvenile survival of any site (l_3 = 0.137), while LAY currently has had much better juvenile survival rates (l_3 = 0.331), although, as with other NWHI sites, LAY has historically demonstrated considerable inter-annual variability (Figure 2). In contrast to all NWHI sites, the MHI has demonstrated the best juvenile survival of any breeding site (l_3 = 0.641).

For all scenarios, we simulated the collection of 10 female pups annually for 5 years at FFS and subsequent release at the nursery site (MHI or LAY). Although the model allows for mortality while in transport, for these simulations there was no deduction for captive mortality and the number of seals released was the same as the number collected. This is consistent with the very low levels of translocation mortality reported by Baker et al. (2011*b*). In actual translocations to the MHI, the specific island and release site will be chosen on the basis of past suitability for native pup survival as well as other (social) considerations. However, for purposes of estimating demographic rates, there is no distinction among sites in the MHI and hence the MHI release site was treated generically for the translocation simulations.

Once released, the translocated pups are presumed to merge with the native-born seals, but the model has provisions for a first-year survival decrement of translocatees as compared to the native born seals at the release site. The concept underlying this survival decrement is based primarily on data supporting a positive relationship between weaning girth and first year survival, although the shape of that relationship varies over time and space (Baker 2008). Weaned pups in the MHI exhibit higher survival than in the NWHI and also MHI pups wean in far better condition on average than in the NWHI. Therefore, if we were to translocate NWHI weaned pups to the MHI, we would not necessarily expect them to enjoy the average survival rate of native pups, but rather the survival rate of *similarly-sized* pups in the MHI, as predicted by the fitted relationship between size (girth) and survival in the MHI. The average girth of 70 weaned pups born at FFS during 2007-2009 was 103.7 cm. Pups in the MHI with this girth would have an expected survival rate of 0.69. The overall survival rate of pups born in the MHI is 0.77, so that the expected decrement for FFS pups translocated to the MHI would be 0.69/0.77 = 0.90. This value was used for the survival decrement in certain translocation scenarios. To encompass the full range of possibilities, additional scenarios were run using no survival decrement for the first year after release at the nursery site. In a review of a variety of past translocation experiences, Baker *et al.* (2011*b*), found that translocated weaned pups enjoyed survival rates indistinguishable from native born seals in the same area.

For all simulation years subsequent to the first year after release, translocated seals shared the same survival rate as native-born seals with survival determined stochastically as described above. However, the model maintains separate "accounting" for the translocated seals so that the number of seals stochastically surviving to each age is tracked.

The model provides the option to return seals to their natal site at a specified age. For all of the simulated translocations described herein, seals were returned at age 3 yr. While some seals may in fact be returned at age 2 yr, for illustration purposes it is helpful to simulate returns at a single age. Additionally, for assessing the largest effects of two-stage translocation, it is informative to simulate the case in which all seals would be returned at age 3 yr. This scenario has the greatest lasting effect on the natal population and the greatest transient effect on the nursery population abundance. At this stage of the simulations, another survival decrement can be optionally applied to represent differential success relative to non-translocated seals left on site. As with the previous nursery site survival decrement, the return decrement applies only to the first year after release. The appropriate magnitude for this decrement is uncertain, but multiple factors might act to steer this adjustment in opposing directions. Returning seals will initially be unfamiliar with the new environment and it might take some time for them to orient to prime foraging and haulout areas. The available prey may also differ between the two areas. Returning seals may have less experience with sharks and competitors, especially if they grew up in the MHI. Finally, because there has been little experience translocating seals of this age, there may be some increased mortality due to stress of captivity. In contrast to the preceding negative considerations, and in accordance with the intent of the translocation to place seals in a more favorable environment, returning seals may be larger and healthier than seals that developed on site. This factor would positively affect survival of these seals.

Due to uncertainty regarding the relative roles that each of these factors might play in the survival prospects of returning seals, the simulations allowed for two different return decrements: no decrement (*i.e.*, same survival as native born seals), and a 29% decrement (multiplier of 0.71) relative to native seals. The latter decrement was derived from observations of the survival of seals collected at FFS for captive care treatment and later released at Kure Atoll or Midway Atoll. While those seals had a survival rate of 71% as compared to native seals, that reduction may be more severe than is expected in the current case. The captive care seals had no foraging experience prior to release, and were age 1 yr (rather than age 3 yr) when released. Nonetheless, we believe that the two values we used (100% and 71% of native survival) are reasonable estimates to bracket the range of plausible decrements that could be expected.

Combining the two values for each of the two survival decrements, and allowing for the two different geographic scenarios (FFS to MHI, and FFS to LAY), gives a total of 8 translocation scenarios plus the single baseline (no translocation) scenario (Table 2).

Table 2. Simulation scenarios to evaluate expected outcomes from two-stage monk seal translocations. All scenarios involved 10 seals translocated per year for 5 consecutive years, with all survivors returned to their natal site at age 3 yr. Populations were initialized at current age/sex status and projected forward 10 years.

Survival multipliers 1st year after release*		**Locations (natal site to nursery site)**	
Nursery (recipient) site	**Natal (source) site**	**FFS to MHI**	**FFS to LAY**
1.0	1.0	Scenario 1a	Scenario 2a
0.90	1.0	Scenario 1b	Scenario 2b
1.0	0.71	Scenario 1c	Scenario 2c
0.90	0.71	Scenario 1d	Scenario 2d

* Values in each cell are multiplied by operative rate for like age-class seals at the release site to provide an adjusted survival rate applicable to the treated seals.

Metrics for evaluation

It is important that a proper metric, or set of metrics, be identified to evaluate the outcomes from the translocation simulations. In the long term, critical metrics include total population abundance, metapopulation structure and extinction risk. These measures clearly depend on a wide range of factors (many of which are represented in the model along with their associated uncertainties), which collectively account for the substantial variability in outcomes characteristic of long-range projections. Although conducting long-range projections, and perhaps full population viability analysis (PVA), is vitally important in the strategic design of monk seal recovery, it is not our intent to undertake such an analysis here. Rather, we are primarily interested in near-term projections and metrics that are most useful for revealing the influence of the proposed translocations, and which minimize the confounding influence of other factors (density dependence, environmental stochasticity, etc.) that might mask the directs effects of the translocations.

Among the obvious metrics for assessing results from the simulations is raw population abundance or realized growth rate from the first to final years of the simulations. While these values are certainly informative, we believe that they can be misleading because they fail to address one of the salient limitations in the NWHI subpopulations, that of a depauperate age structure. As described in the background section, the protracted period of low juvenile survival has led to an ageing breeding population and dwindling cohort sizes. Barring a natural improvement in juvenile survival, or an intervention that addresses the same, that pattern is expected to continue for the foreseeable future. Within that context, it is appropriate that the simulations be evaluated according to some metric associated with population age structure. *Reproductive value* (v_x), and the related *population reproductive value* (V_{pop}), provide informative measures for this purpose. Age-specific reproductive value (Eqn. 1) reflects the probable future reproductive output of an individual female now of age x in terms of newborn equivalents. This value is given by:

$$v_x = \frac{\lambda^x}{l_x} \sum_{i=x}^{\max} \frac{\phi_i}{\lambda^i} \qquad (1)$$

where λ is the intrinsic growth rate, l_x is the survivorship to age x, and ϕ_x is the age-specific net maternity function ($l_x m_x$).

Reproductive value is a particularly useful descriptor for comparing the relative demographic contributions expected from individuals of different ages. It incorporates information on both the likelihood of survival to each reproductive age, as well as the expected reproductive output of an individual of age *x* and all future ages. It is less useful for comparing across lifetables (that is, among different populations) since it is scaled in terms of newborns for the unique lifetable applicable to that particular site. For monk seal populations, v_x attains a maximum at around age 5-7, but varies in maximum value from over 7 newborn equivalents (FFS) to under 3 newborn equivalents (MHI) (Figure 6). The difference between these two sites is largely attributable to the fact that at FFS, newborn pups stand a poor chance of reaching the age of reproductive maturity, whereas the prospects for pups born at the MHI are relatively high.

Whereas v_x is a property of the lifetable and does not reference the current population state, *population reproductive value* (V_{pop}) extends the concept by incorporating information on the current population size and age/sex composition. This parameter is the sum of the age-specific reproductive values for all of the females currently in the population:

$$V_{pop} = \sum_{x=0}^{\max} v_x n_x \qquad (2)$$

where v_x is the age-specific reproductive value of an individual of age *x*, and n_x is the number of individuals of age *x* currently in the population. One can think of V_{pop} as analogous to the quantity of potential energy stored in the population, which is likely to translate into future pup production. This metric is particularly *apropos* for our purposes because we do not believe that any single intervention, including translocations, will be capable of effecting a major improvement in total population abundance. We do believe, however, that by targeting our interventions on age-structure adjustments, we can fortify the population so that it is capable of a rapid response should environmental conditions more conducive to population growth eventually arise.

Using these two demographic measures as our primary metrics, what we hope to achieve through translocation is to increase the number of females in those age classes having the highest v_x. In aggregate, those additional females will act to increase V_{pop}. This concept is best illustrated graphically (Figure 7). Here we see the resulting age structure from a hypothetical translocation scenario, as compared to the baseline, no-translocation projection. The increase in number of females aged 5-9 yr corresponds to the age classes with the highest v_x at FFS (dotted line and right y-axis). By taking those seals to a more favorable nursery site, they will effectively circumvent the intense survival bottleneck affecting non-translocated seals left on-site.

Simulation Results

Effects of the translocations at the nursery site

Because the translocated seals were returned to their natal site at age 3 yr for the simulations, the effects of the translocations at the nursery site were ephemeral (Figure 8a). As expected, final abundance at the nursery site was the same with or without the translocations, but the mean population trajectory was elevated while the project was underway (years 1-8) as compared to the baseline trajectory. This observation holds true for all 8 translocation scenarios. This pattern of no net effect is based on the assumption that the addition of a small number of seals at the nursery site (maximum of 30 at any time, age pup through age 2) will not result in density-dependent reductions in survival at the nursery site. Further, the imported seals were “removed” prior to attaining reproductive maturity and therefore produced no pups at the nursery site. Because the translocations elicited no net change at the nursery site, the remainder of this review will focus on effects at the natal site.

Effects of the translocations at the natal site

For all scenarios, the natal population (FFS) was initialized at the current (2010) population size of 194 seals. The mean abundance declined under all simulation scenarios, including both the baseline (Bsl) and all translocation scenarios. In the no-translocation scenario (Bsl Figure 9), the abundance dropped to 93 seals at the end of the 10-year projection (52% decline). The projected decline is largely driven by loss of senescent seals and a declining cohort size from fewer breeding females. Although the benefits derived from translocations were not sufficient to fully compensate for the population decline forecast for this site, the final abundance with translocation ranged from 96 to 112 seals, depending on which site was used as the nursery (MHI or LAY) and which set of survival decrements was applied. The highest abundance (112 seals) was achieved when the seals were taken to the MHI and no survival decrements were applied.

When viewed in terms of their effects on *population reproductive value* (V_{pop}), returns from the simulated translocations were more impressive. However, as with final abundance, none of the translocations were sufficient to offset the expected decline from all other factors (Figure 10). Initially (year 1) the FFS population has V_{pop} of approximately 360 newborns (this value varies each simulation due to random age assignments of seals having unknown ages, such as those first identified as adults). Under the no-translocation scenario (Bsl), the V_{pop} is expected to decline to less than 165 newborn equivalents. In contrast, under the various translocation scenarios, V_{pop} ranged from 181 to 263 newborn equivalents. As with final abundance, the greatest returns were achieved through the MHI translocation scenarios (T1a to T1d in Figures 9-11), but even the least favorable translocation scenario (T2d; LAY with both survival decrements) produced a 10% improvement in V_{pop} as compared to the baseline scenario.

Yet another way to view the returns from the translocations is by inspecting the proportional change in V_{pop} from year 1 to year 10 of the scenarios (Figure 11). With no intervention, in 10 years the FFS subpopulation is expected to have only about 45% of the reproductive potential of the initial population. Under the most favorable translocation scenario (T1a), approximately 73% of V_{pop} is preserved, with the remaining translocation scenarios yielding between 50% and 70%.

Interpretation of Simulation Results

It is evident from the simulations that FFS is likely to undergo a significant decline in both abundance and reproductive capacity with or without focused intervention. The best that can be achieved through translocation is to moderate the decline and reinforce the population so that it has enough resilience to capitalize on improved conditions should they occur, and to initiate a slow natural recovery which might be bolstered by additional interventions. The simulations described above are all focused on a single subpopulation, FFS, which currently has the poorest juvenile survival and lowest intrinsic growth rate of any breeding site. The general pattern described for FFS, along with the expected benefits from translocation, are applicable to all of the NWHI subpopulations. The magnitude of the benefit conferred through translocation will vary according to the current status of the subpopulation and the survival differential between whichever natal and nursery site are selected for treatment, as based on the decision framework presented above.

The specifics of the 8 simulation scenarios we described were chosen to illustrate the range of benefit that might be realized from two-stage translocation. Although the specifics of these scenarios were hypothetical, it is worth considering which among them we believe to be the most realistic. For the FFS to MHI translocations (T1a – T1d in Figures 9-11), there is a reasonable expectation that the first survival decrement (0.90 multiplier for the first year after release) will apply due to the smaller size and inferior condition of FFS pups relative to MHI pups. The post-return decrement is less certain; it is likely that the 0.71 survival multiplier is overly severe, as it was based on a set of captive care seals released at age 1 yr and having no prior foraging experience. These observations lead us to conclude that the actual benefit from translocation to the MHI would be intermediate between scenarios T1b and T1d.

We can apply the same logic to the LAY translocations (T2a to T2d in Figures 9-11). First, the initial decrement is likely to be less than the 0.90 multiplier because seals born at FFS and LAY are more similar in size and condition than are seals born at FFS and MHI (as used to calculate the 0.90 decrement). Therefore the actual multiplier is expected to be less severe than that prescribed by the 0.90 value used for the MHI. Similarly, because the seals will be returned to habitat that is similar to that in which they developed (*e.g.,* in terms of predators and competitors), the returning decrement could arguably be less severe than that for seals transferred from the MHI to FFS. It is reasonable to expect that *some* decrement will be incurred as the seals orient to the new area, so that the correct value for the second multiplier will lie between 0.71 and 1.0 but probably on the higher end of that range. This logic leads us to conclude that the most realistic scenario is a composite of scenarios T2a, T2b and T2c.

There is another very important consideration with regard to the FFS to LAY translocations and which may be applicable to any within-NWHI translocation scenario. In contrast to the MHI, each of the NWHI subpopulations is currently declining. Consequently, it is questionable whether any of these sites could accommodate additional seals without causing further depression in survival rates. Further, substantial inter-annual variability in vital rates in the NWHI may make it difficult to identify which combination of sites might reliably produce a positive outcome in a given year. This same variability could also make it difficult to discern whether any downturn in demographic performance was related to translocation efforts or attributable to normal stochastic variation. There are, however, clear advantages to within-NWHI translocations. Confining the interventions to the NWHI circumvents potential problems with human-seal interactions and public resistance to importing, even if only temporarily, additional seals. Disease and quarantine concerns might also be less intense in the context of exclusively within-NWHI translocations.

Addressing uncertainty in post-return decrements to survival

The simulated benefits of two-stage translocations are strongly influenced by the magnitude of decrements applied to survival of translocated seals after each translocation stage. The decrement values used for the simulations were extrapolated from the best available data and are a reasonable expected range based on existing information. There has been considerable experience translocating weaned pups (Baker et al., 2011*b*) and much analysis of the relationship between weaning girth and survival (Baker 2008), so that the expected range of survival decrements applied to translocated weaned pups is well supported. However, there is much greater uncertainty associated with the decrement applied to 3-yr-old seals returned to their natal subpopulations. Given this uncertainty, it is informative to consider how large a survival penalty translocated seals could incur before their survival matched, or was inferior to, that of non-translocated seals at the natal site. This threshold decrement value can be estimated from observed survival rates for seals at the natal and nursery sites (Table 3).

Table 3. Age-specific survival rates for recent years at FFS, LAY and MHI. The rates in the first column represent survival from weaning to Age 1.

	Weaning to 1 yr	1 yr to 2 yr	2 yr to 3 yr	3 yr to 4 yr
FFS	0.359	0.567	0.941	0.895
LAY	0.681	0.537	0.917	0.938
MHI	0.841	0.859	0.910	0.891

In the above simulations, FFS served as the donor site and MHI or LAY served as the nursery sites. Seals were returned seals to their natal site at age 3 yr, at which point a survival decrement was applied for the first year after return (from age 3 to 4 yr). Therefore the value of greatest interest for evaluating translocation is survivorship from weaning to age 4, designated as l_4* (the asterisk serves to distinguishes this parameter from the customary l_4 which measures survival from birth to age 4), which is the product of the age-specific survival rates in Table 3):

$$l_4^* = p_0 * p_1 * p_2 * p_3 \qquad (3)$$

where p_0 is the survival rate from weaning to age 1 and p_1-p_3 s are age-specific survival rates for the respective ages. Substituting the survival rates for ages 0-3 yr at FFS (Table 3) into Equation 3 gives $l_4^* = 0.171$. Accordingly the objective of the translocations is to improve on that rate such that the translocated seals do better than those "control" seals left at the natal site.

The operative survival schedule for the translocated seals is a composite of the survival rates for ages 0-2 yr at the nursery site, and age 3 yr at the return site. Additionally, we have incorporated two survival decrements that apply, respectively, to age 0 yr (weaning, when the seals are first released at the nursery site) and age 3 yr (after they are returned). The operative survival schedule for the translocated seals is then:

$$l_4^* = (p_0 * d_1) * p_1 * p_2 * (p_3 * d_2) \qquad (4)$$

where p_0, p_1, and p_2 are the survival rates for weaning through 2 yr at the nursery site; p_3 is the survival of age 3 yr seals at the return site; d_1 is the survival decrement for pups during the first year after release, and d_2 is the survival decrement at the return site for the first year after release.

The most severe d_1 survival decrement used for the simulations was 0.90, derived from examining the survival of MHI pups of comparable girth to average FFS pups. However, because the difference in weaning girths among the NWHI subpopulations is far less than the difference between NWHI and MHI pups, a d_1 value of 0.90 may be overly severe for translocations between NWHI subpopulations. Yet, to determine survival decrement thresholds, we can conservatively set d_1 to a fixed constant = 0.90, leaving only decrement d_2 as an unknown:

$$0.171 = (p_0*0.90) * p_1 * p_2 * (p_3*d_2) \qquad (5)$$

where 0.171 is the aforementioned l_4* for FFS-born, non-translocated seals. This equation serves as the basis for calculating the threshold return decrement, d_2, that demarcates a net benefit from net harm associated with two-stage translocation.

For FFS to MHI translocations, substituting MHI survival rates for p_0 through p_2, and the FFS rate for p_3 in Equation 5 gives:

$$0.171 = (.841*0.90) * 0.859 * 0.910 * (0.895*d_2) \qquad (6)$$

Solving for d_2 gives a return decrement value of 0.324. This means that, given recent survival rates at FFS and MHI, seals translocated from FFS to MHI as pups and returned at age 3 yr would do better than non-translocated seals if their realized survival for the first year after return is at least 32% that of non-translocated seals.

For FFS to LAY translocations, *s*ubstituting LAY survival rates for p_0 through p_2, and the FFS rate for p_3 gives:

$$0.171 = (.681*0.90) * 0.537 * 0.917 * (0.895*d_2) \qquad \text{(Eq. 7)}$$

Solving for d_2 gives a return decrement value of 0.635. This means that, given recent survival rates at FFS and LAY, seals translocated from FFS to LAY as pups and returned at age 3 yr would do better than non-translocated seals if their realized survival for the first year after return is at least 63% that of non-translocated seals.

The preceding calculations of expected survival decrement thresholds are point estimates which do not account for high inter-annual variability which characterized monk seal survival, or the demographic stochasticity associated with small sample sizes (reflected in Fig. 9-11). Nonetheless, these estimates suggest that there is a sizable safety buffer for MHI translocations and a marginal safety buffer for within-NWHI translocations even if the lowest value used in the above simulations (0.71) was overly optimistic. The actual degradation in survival could be more severe than assumed and the translocated seals are still likely to perform better than seals left at their natal site.

The intent of two-stage translocation is not to merely "break even" but rather to confer enough benefits on the managed subpopulation to warrant the effort, expense and risk involved. Whether or not a particular translocation plan is advisable must still be determined according to the expected benefits (abundance, V_{pop}, and other metrics) likely to accrue from implementing that plan. However, the threshold values provide a valuable reference for maintaining a standard of "doing no harm" with the proposed program.

Under two-stage translocation, the earliest data about the actual return survival decrement would likely not be available until the fourth year of the project, when the survival of the first group of 3-yr-old seals returned to their natal sites would be evaluated. Some information could be available in the third year if some 2-yr-olds are returned. Relevant information could, however, be collected by initiating some limited experimental translocation of juvenile seals. The experiment may first involve moving a small number of seals (at least age 2 yr) among areas of the NWHI where foraging conditions or success are thought to be comparable. This would help evaluate the potential combined effects of translocation on this age-class, without the confounding influence of a marked change in habitat quality. Subsequently, older juveniles might then be moved from an area with relatively low competition and predator densities (e.g., the MHI at present) to areas with greater competition and higher predator densities (NWHI). This would provide information about how older juveniles respond to being released in unfamiliar environments with more challenging conditions relative to where they grew up.

Conclusion

The two-stage translocation strategy described and analyzed above is but one tool in a suite of interventions now planned or proposed to promote monk seal conservation. Unfortunately, none of these interventions, whether undertaken singly or in concert, are sufficient to fully compensate for the projected decline in the species. Although we know of no direct precedents for two-stage translocation, and there are many unknowns that accompany its implementation, we think that this approach will be indispensable to the overall recovery effort.

Two-stage translocation is a novel strategy that should produce not merely an ephemeral boost in abundance, but, more importantly, will preserve essential reproductive potential within the population. This intervention will be flexible and adaptable, with the specific form it assumes each year informed by the most recent data on demographic performance at each site. This flexibility will allow demographic issues throughout the system to be addressed, whereas some prior interventions have focused on specific mortality factors at individual sites. Those interventions are vitally important to the welfare of specific subpopulations, but they lack the scope to insulate the population from further system level decline and perhaps extinction.

The decision framework represents how the translocation program is expected to be conducted. Similarly, the simulations provide the best assessment of the returns that could be achieved through translocation. Once the program is underway, both the model inputs and details of the decision framework will be iteratively refined to reflect new observations from incoming data. Accordingly, we intend to embark on this project with the utmost caution, initially as a small-scale experiment to refine the protocols, evaluate the early results, and modify and scale up the program as appropriate.

The need to identify beneficial interventions does not end with translocation, as the NMFS will continue to identify other creative strategies to arrest the population decline. But such a solution has proven elusive, and given the current trends, it would be imprudent to defer decisive action while the quest for that ultimate remedy goes forward. It is our hope that the need for translocations, along with the need for all other intrusive measures, will eventually yield to natural processes, as the trajectory of the monk seal population begins its ascent to a sustained and full recovery. In the interim, it is incumbent on NMFS to take the steps necessary to ensure that the population is not indifferent to any improvement in natural conditions, but retains the capacity to respond accordingly.

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Figure 1. The Hawaiian Archipelago and Johnston Atoll

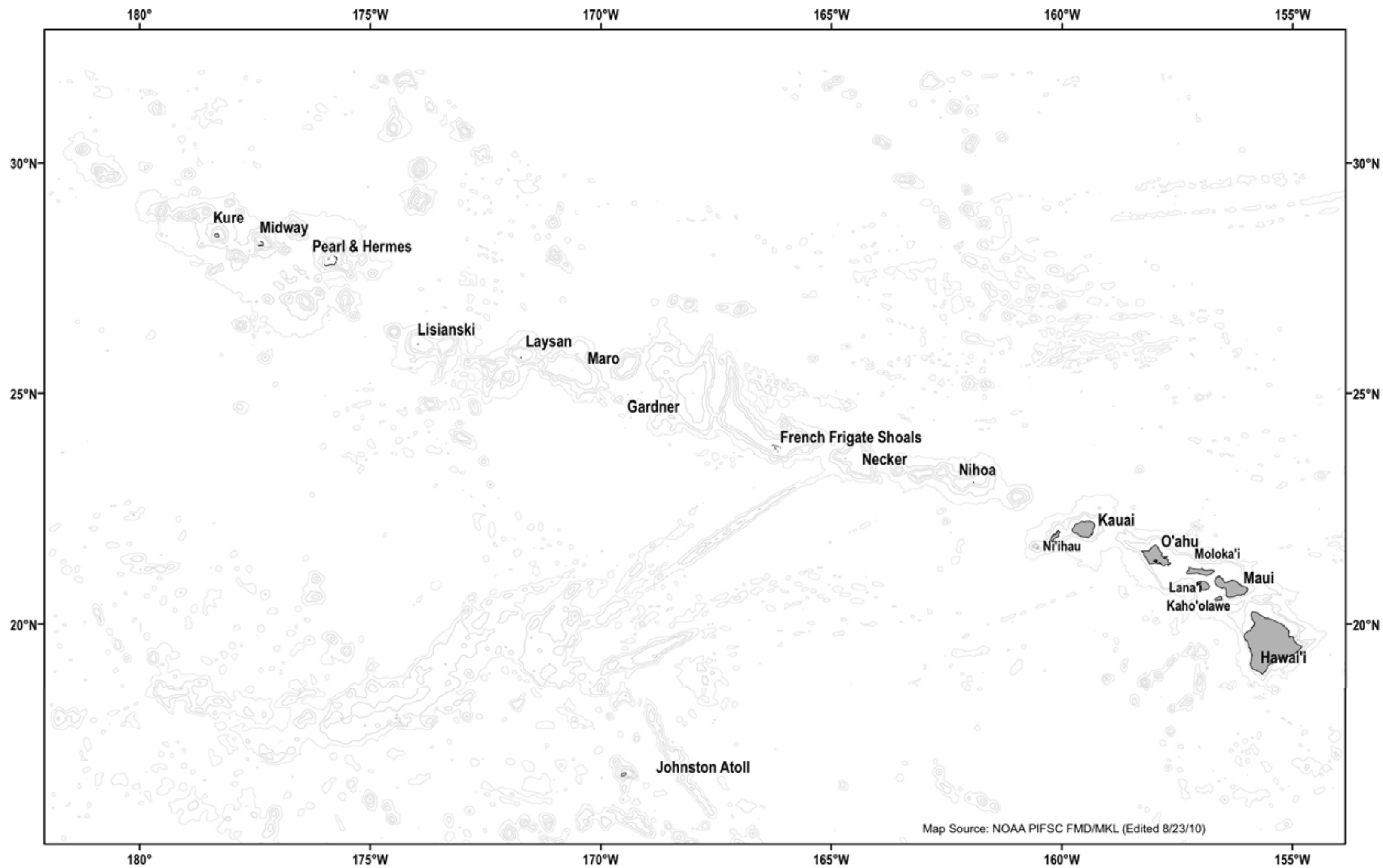


Figure 2. Cumulative survival probability curves (l_x) for the six Northwestern Hawaiian Islands subpopulations (solid lines), based upon recent (2006-2008) rates, and all available data in the main Hawaiian Islands (dashed lines). From Baker *et al.* (2011*a*).

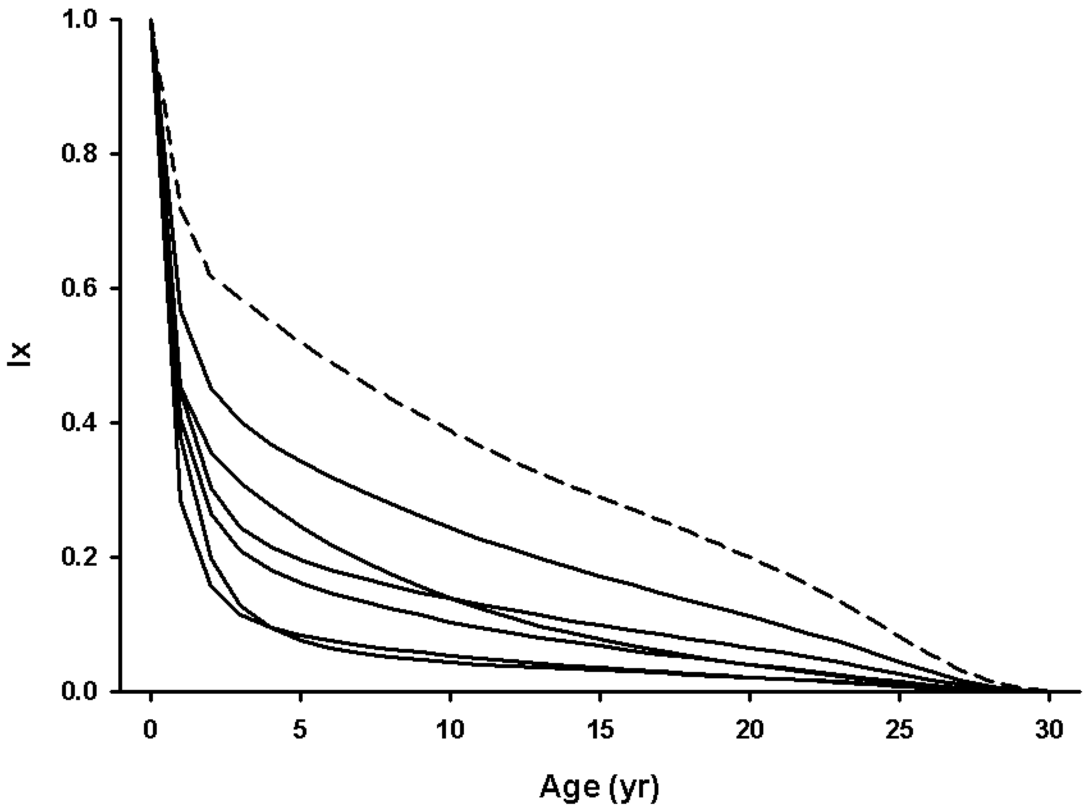


Figure 3. Fitted age-specific reproductive curves for three subpopulations of Hawaiian monk seals (LAY= Laysan Island, FFS=French Frigate Shoals, LIS=Lisianski Island).

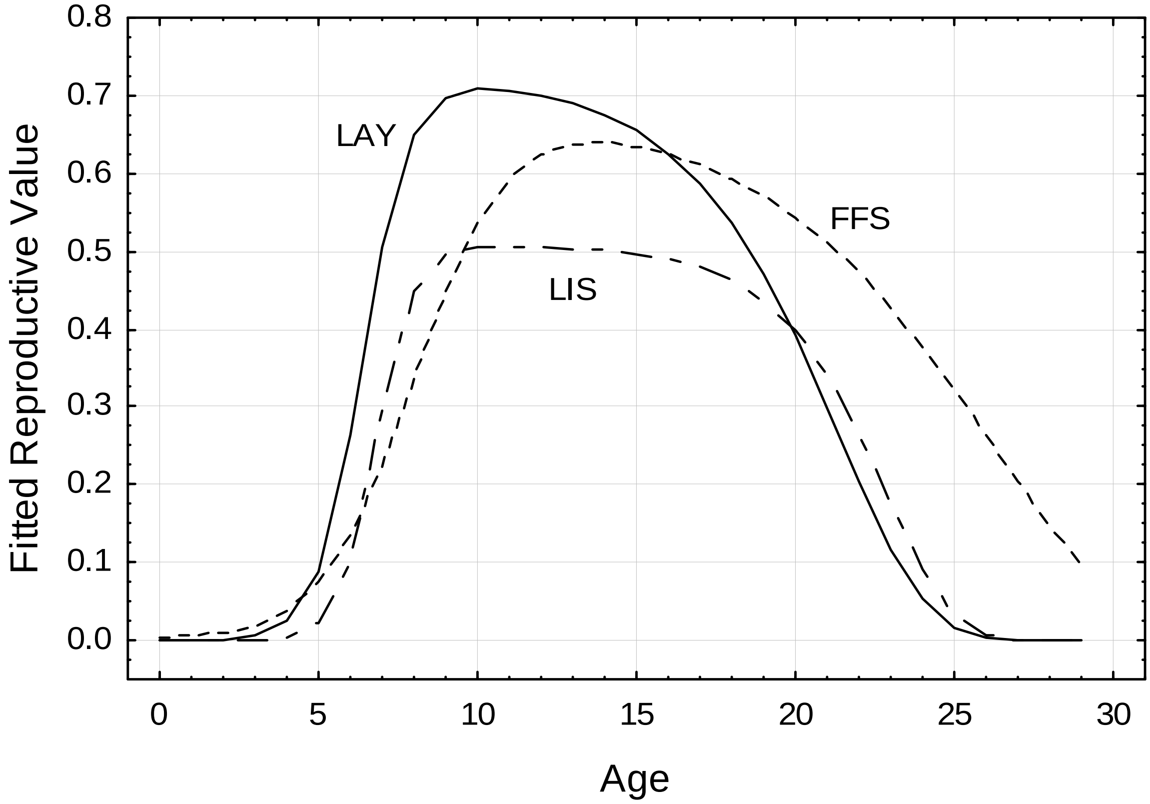


Figure 4. Simulation model projection of future Hawaiian monk seal pup production at six NWHI subpopulations pooled. Values are mean number of pups born in each simulation year in a 20-year projection.

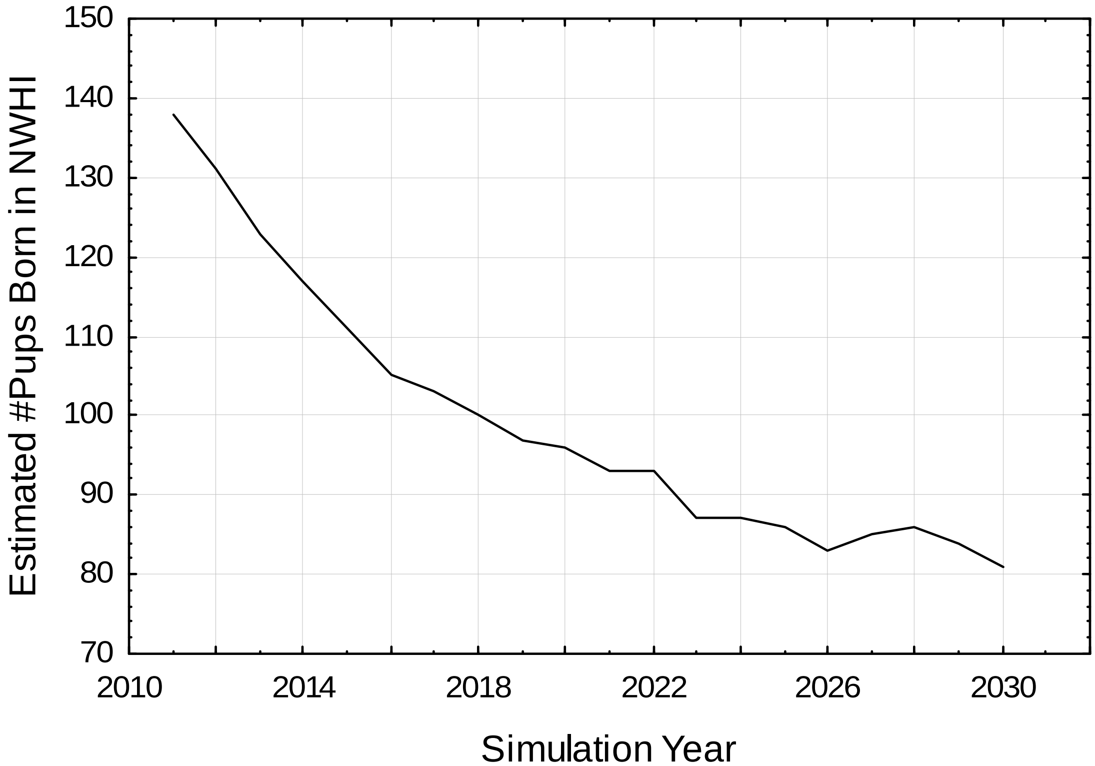


Figure 5a. Flow chart depicting decision framework for translocation of weaned Hawaiian monk seal pups.

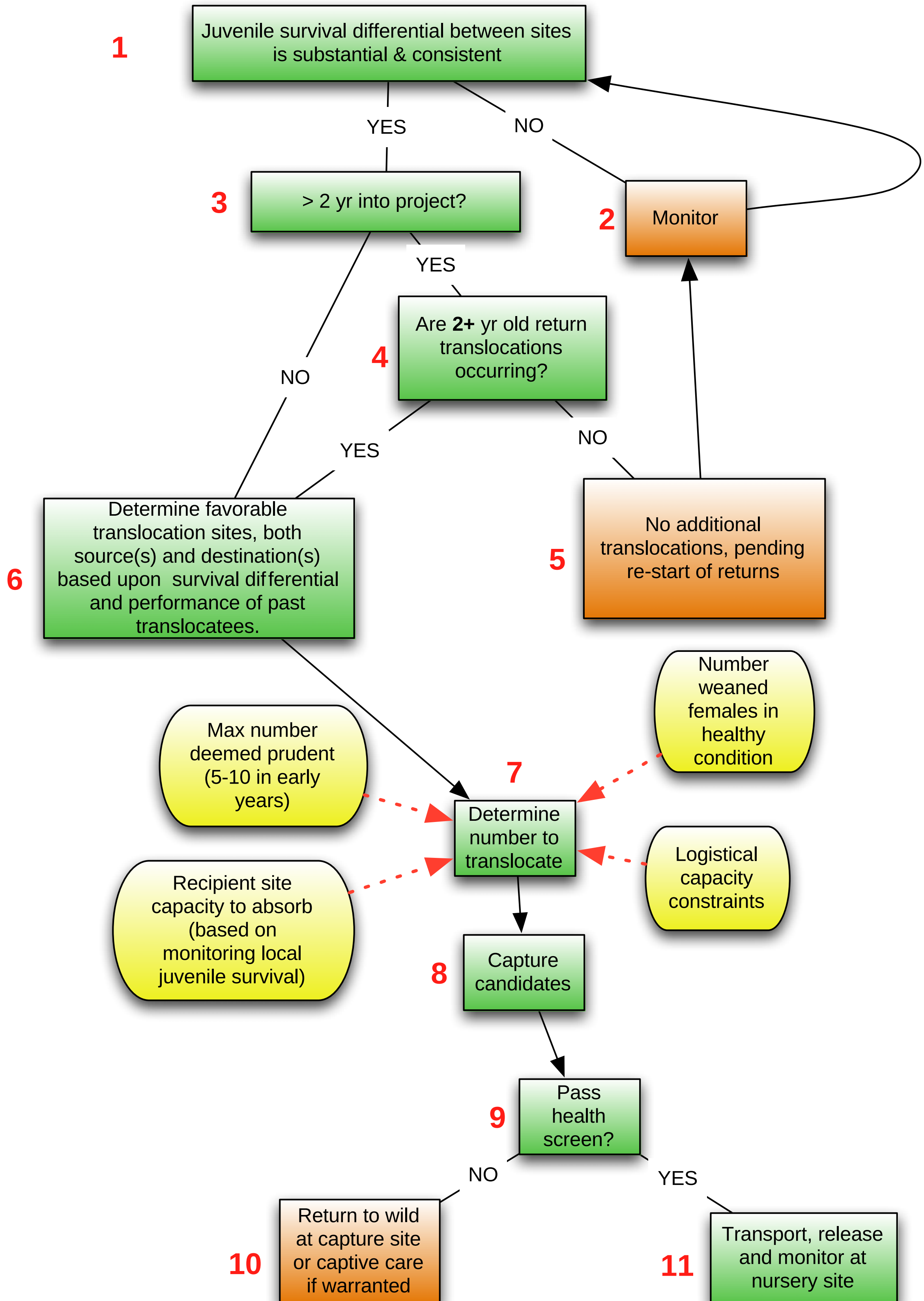


Figure 5b. Flow chart depicting decision framework for translocation of 2+ yr-old Hawaiian monk seals.

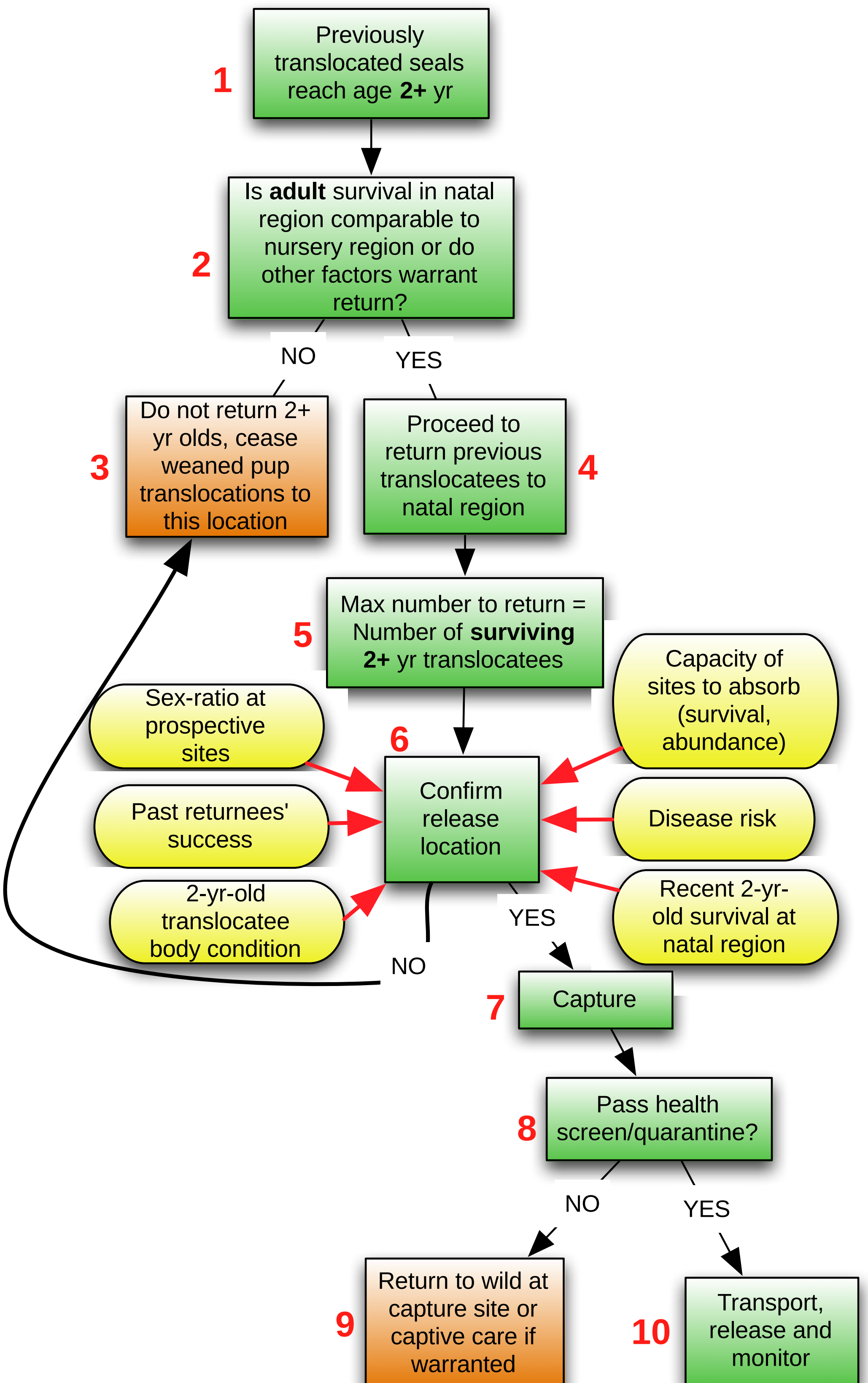


Figure 6. Contrasting age-specific reproductive value curves for French Frigate Shoals and main Hawaiian Islands MHI monk seals.

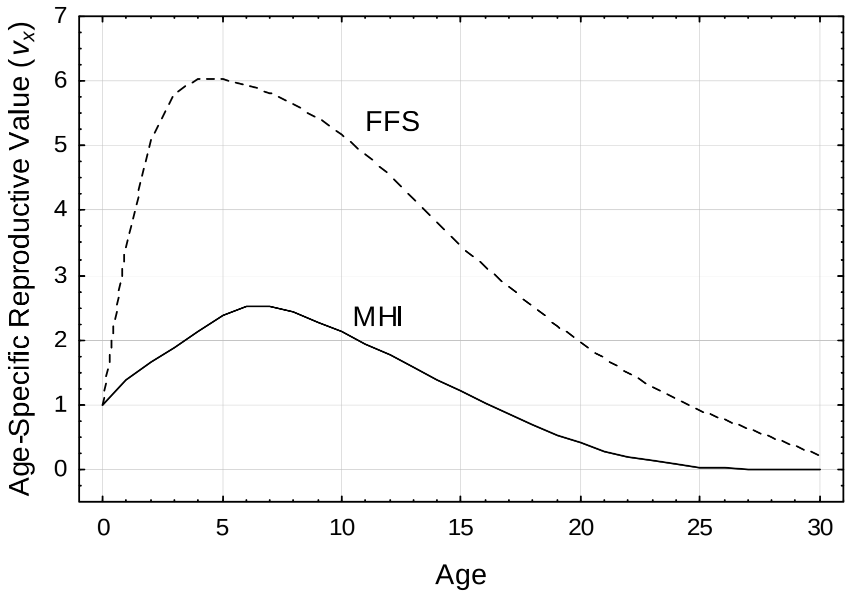


Figure 7. Age structure modification at natal site associated with a representative two-stage translocation. In this hypothetical scenario, translocated seals grow up at a nursery site and are returned to the natal site at age 3, with this treatment repeated for 5 consecutive years.

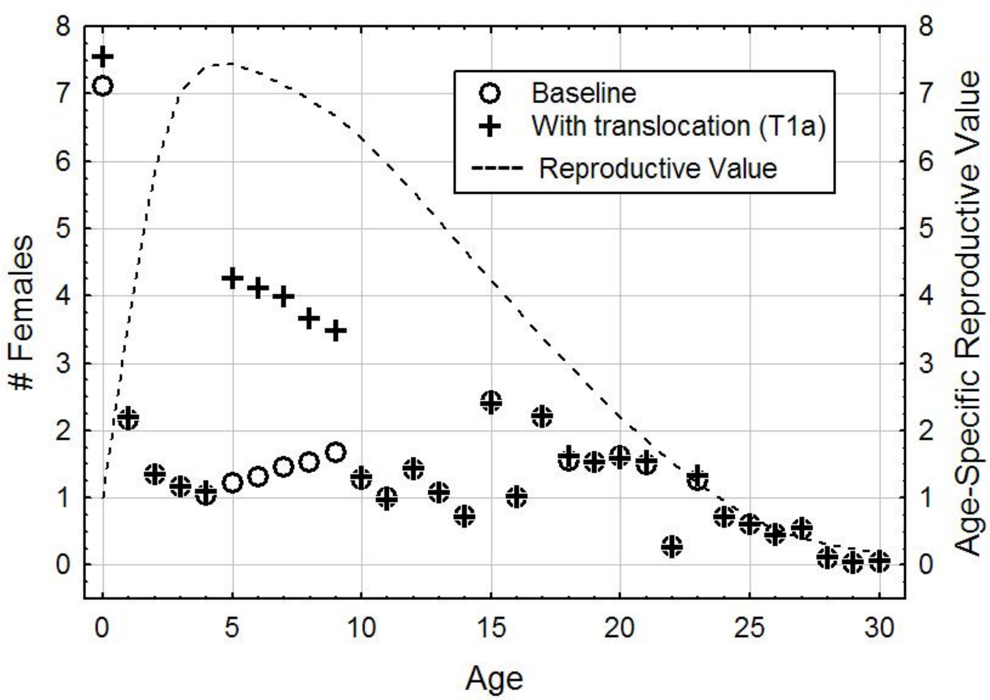
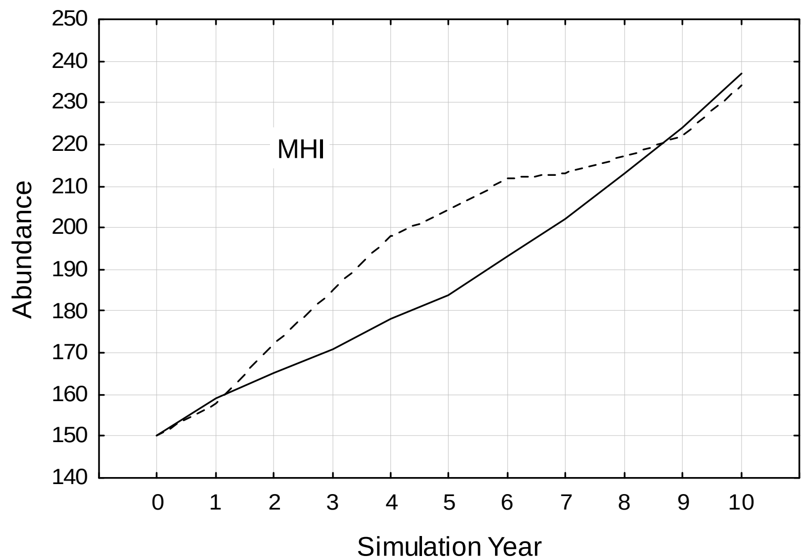


Figure 8. Simulation trajectories at the nursery (MHI) and natal (FFS) sites for a representative translocation scenario. Lines represent mean abundance at each time step, with translocation (dotted line) and without translocation (solid line). The salient difference at the nursery site is an ephemeral elevation in mean abundance during the years the project is underway.

8a. Nursery site (MHI)



8b. Natal site (FFS)

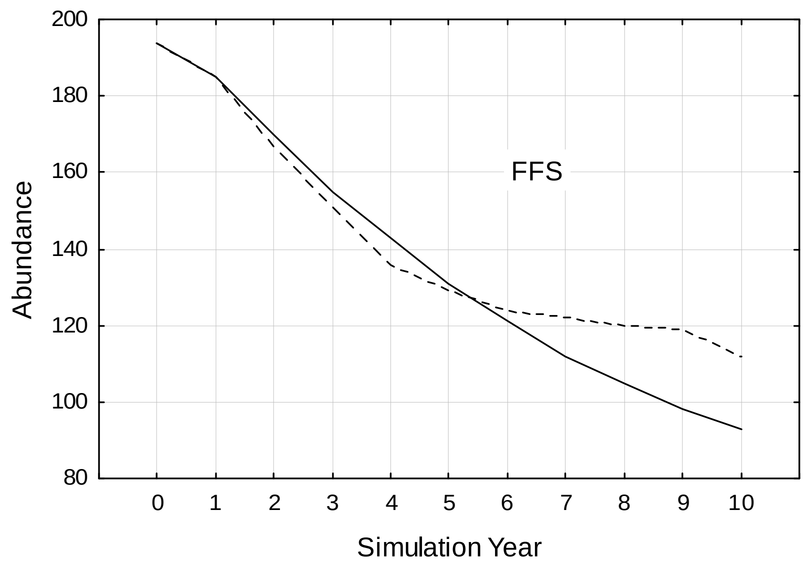


Figure 9. Mean abundance (with 5% and 95% tails) at the natal site (FFS) for the baseline (Bsl) and 8 translocation scenarios. Scenarios differ in the nursery location and survival decrements as described in Table 2.

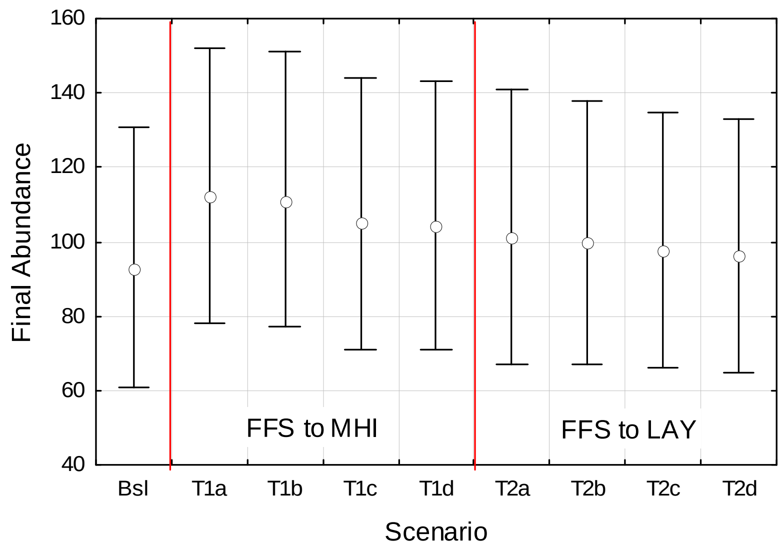


Figure 10. Population reproductive value (V_{pop} with 5% and 95% tails) at the natal site (FFS) for the baseline (Bsl) and 8 translocation scenarios. Scenarios differ in the nursery location and survival decrements as described in Table 2.

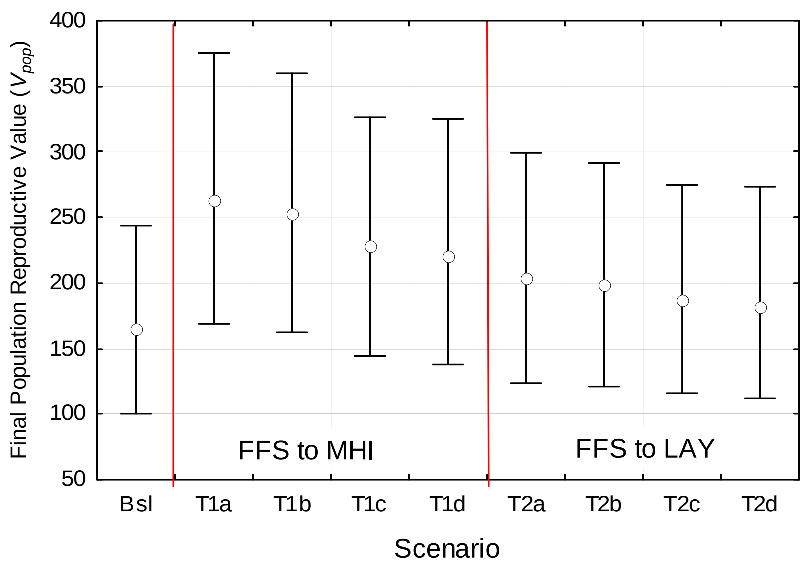
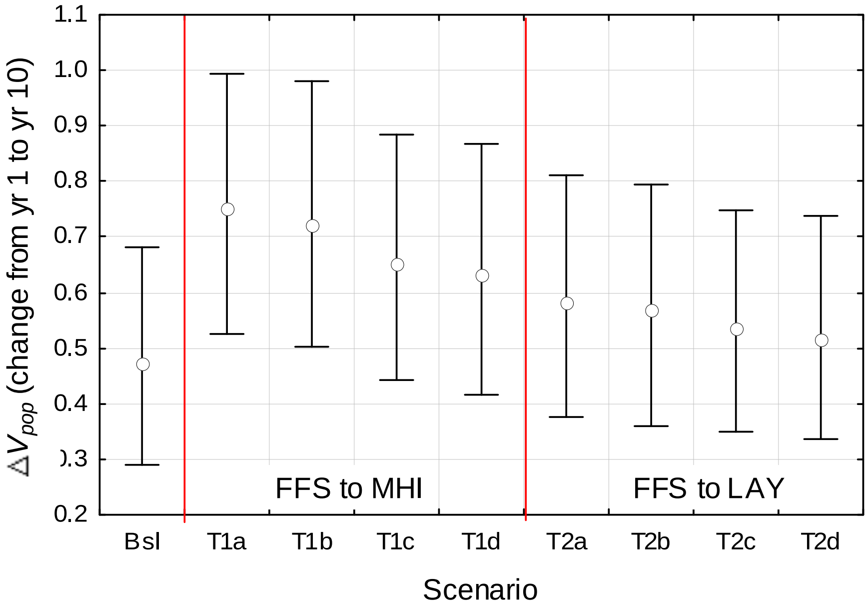


Figure 11. Change in Population Reproductive Value (ΔV_{pop}) at FFS from year 1 to year 10 of baseline and translocation simulation scenarios. Scenarios differ in the nursery location and survival decrements as described in Table 2.



APPENDIX F—HEALTH SCREENING AND QUARANTINE PROTOCOLS FOR HAWAIIAN MONK SEAL TRANSLOCATION BETWEEN SUBPOPULATIONS

These protocols support NMFS' translocation actions. These protocols are intended for any seal translocations between subpopulations (e.g., two-stage translocations or experimental juvenile translocations), as opposed to rapid and short distance translocations (within atolls or within the main Hawaiian Islands, MHI). Separate protocols are included for translocating different age classes of seals and are applicable to any locations in the Hawaiian Archipelago.

These protocols are subject to refinement and change based on experience that will accrue during the next decade, veterinary consultation, emergence of new testing procedures, disease risks, etc. Protocols will be reviewed annually and updated as required to refine protocols and improve implementation.

Weaned Pup Translocations

Steps involved in weaned pup translocations include:

1) Selection and capture of seals, health screening, and attachment of tracking instruments.
2) Recapture and transport to vessel/aircraft.
3) Transport to destination site.
4) Release of seals at new location.
5) Post-release monitoring.

Transport Vessels: A variety of transportation modes will be used including large vessels (NOAA ships, other chartered vessels), airplanes, helicopters, automobiles, and other as appropriate depending on location and available resources.

Specific Protocols:

1) *Selection and capture of seals, health screening and attachment of tracking instruments.* Any weaned pup at the designated source site will be considered a candidate for selection, as long as it exhibits no apparent signs of disease, injury or any other factors that may compromise survival. Relatively recently (i.e., less than a month previous) weaned pups may be favored for selection as they are more likely to remain at the release location longer than those that have weaned earlier (Baker et al. in review). Seals will undergo health screening and a subset will be instrumented with a tracking device approximately 1-4 days prior to transport. Seals will be captured using standard practices (by hand or using a hoop net). Blood may be collected without sedation or seals will be sedated.

Seals will be evaluated using the current standard health screen. This may be modified as deemed necessary due to specific disease concerns in source and recipient subpopulations, up to date testing procedures and veterinary consultation. Current practice includes:

Blood Analysis

1) Field analysis:

a. WBC count – Unoppette system

b. RBC count – Unoppette system
c. WBC differentials, platelets – Microscope and archive extra unstained smear
d. Hematocrit/ PCV – Microhematocrit centrifuge
e. Hemoglobin
f. Serum chemistry (Na, K, Cl, BUN, Creat, Ca) – I-Stat kit
g. Glucose – Glucometer and test strips
h. BUN - Azostix

2) Lab analysis (frozen 0.5-1.0 mL aliquots of serum, stored in liquid nitrogen dewar in the field)
a. Serum chemistry – send to IDEXX
b. Tier 1 testing, which currently includes: morbillivirus, seal herpes 1, Toxoplasma, and fecal culture.

3) Banked blood samples stored in liquid nitrogen dewar in the field
a. Remaining serum (or at least 4 aliquots)
b. Whole blood (Na heparin and EDTA)
c. EDTA plasma, buffy coat, and RBC
d. Na heparin plasma, buffy coat, and RBC
e. PAX gene blood RNA tube (for biotoxins)

Swab processing:
1) In the field place all swabs in the liquid nitrogen dewar after collection
2) Lab analysis
a. 1 nasal and 1 rectal swab in Avian Influenza transport media (frozen) – send to National Wildlife Health Center in Madison
b. 2 dry swabs from the eyes, nares, mouth, genital orifice, rectum and any external wounds
c. 1 swab of any abnormal tissue in viral transport media (if deemed appropriate)

Blubber Biopsies:
Put in liquid nitrogen dewar in the field
1) 1 for toxicology (Teflon container)
2) 1 for fatty acid analysis (cyrovial)

Other Sampling:
1) Any other sampling deemed necessary by the PI or attending veterinarian.

External Exam
1) Physical Exam
a) Assessment for external wounds
b) Auscultation of lungs, heart

c) Examine eyes, nose, ears etc. (damage, disease, moisture)

2) Morphometrics
   a. Girth
   b. Length
   c. Weight

Samples not analyzed in the field will be stored, shipped, and analyzed as described in the current monk seal permit.

If, based on veterinarian's physical exam and immediately available test results, seals do not show any signs of injury or illness, some may be instrumented with appropriate telemetry equipment to monitor them after release. This device will assist post-release monitoring until the opportunity to visually survey the seals arises.

If seals do show physical signs of injury or illness, the attending veterinarian will determine whether to sedate for full biomedical sampling or to treat the injury or illness. These animals will be covered under the health assessment portion of the PIFSC research and enhancement permit, or under the MMHSRP permit depending on the treatments required.

After this handling, seals will either be released and allowed to freely range until capture for transport or will be held in a shore pen (approximately 1-4 days). Allowing seals to freely move will minimize any stress seals may experience being held in a captive shore pen. Holding in shore pens allows for better assessment of animals health and reduces effort of relocating seals within the atoll. The decision to use pens or allow seals to free-range prior to transport will depend on conditions at the field site, results of physical examination and transport logistics. If seals are allowed to range freely, prior to the second capture the seals will be visually assessed for any outward signs of injury or illness. If the attending veterinarian determines the animal to be unhealthy, either after physical examination and/or evaluation of blood sample, then the animal will not be translocated.

2) Recapture and transport to vessel/aircraft.

Weaned pups will be captured using standard techniques for the transport of weaners. If transport involves a small boat shuttle to a larger ship, animals will be restrained in a stretcher net by two trained seal biologists and placed on the deck inside the small boat. Seals will then be transported directly to the vessel. Water will be available onboard to cool the seal when needed. The number of seals that may be transported at one time in the small boat will be dependent the specific boat's capacity.

There should be adequate area that no seals are piled on top of each other and that there is a reasonable amount of space for researchers to operate to cool and move seals as necessary.

Seals will be taken onto the vessel by lifting the entire small boat by crane up to the mid-ship low railing access on the port side of the vessel (or the safest method depending on the vessel being used). One biologist will remain with the seal during lifting. Seals will be hand lifted from the small boat onto the vessel and brought to their cages.

The distances between cages will be wide enough to allow biologists to move between, prevent spread of urine and feces between cages, and allow the free flow of air. The cages will be strapped to the deck to prevent sliding if rough seas develop. Seals will be placed on a blue tarp, removed from the stretcher net and lifted manually into the cages. Seals will be held separately. A saltwater hose is located near the cage and ice is available for cooling off seals in the heat of the day. Cage openings will be accessible to allow access to animals if medical care or treatment is needed in transit.

If transport is via automobile to aircraft, similar but more logistically simple procedures will apply. Seals will be captured in the same way. Unless it is not feasible, the seals will be transported in cages (again while being observed and with water for cooling available) in automobiles and likewise aboard aircraft.

3) Transportation to destination site

The transportation of seals between subpopulations could be done via boat, plane, car, or other reasonable mode of transportation. Multiple modes of transport can be used at any time. During all transports, the animals will be escorted by a veterinarian and sufficient staff to be able to respond to an emergency.

Transport via ship:

During transport the deck(s) holding the seals will be off limits to anyone except seal biologist monitoring the animals, the veterinarian and ships safety officers. No physical contact with seals will be made unless a problem arises in which a seal needs to be restrained for examination or treatment (see contingency plan below). If physical contact is made, protocols for handing seals in the wild will be followed as described in the permit application and as written in the Hawaiian monk seal Field Research Manual for safe handling of seals and minimizing risk of disease transmission (e.g., clean coveralls that have been soaked in bleach solution, wash hands, etc). Observers will look for a variety of threats, indications of stress or disease, and ways to mitigate both while observing the animal:

a) Entrapment/entanglement in cage
b) Abnormal discharge from body orifices
c) Abnormal respiration
d) Abnormal behavior
e) Modifying ambient temperatures to prevent overheating
f) Enforce security-preventing disturbance by people on ship
g) Monitor for ship equipment/supplies posing risk to seals.

Seals will be monitored 24 hrs a day while on the ship. Observers will watch for changes in external behavioral/health parameters. Initially upon be loaded onto the boat the seals will be closely observed for signs of acute stress (e.g. continued high respiration and heart rate, agitated behavior, shaking). Descriptive and medical observations will be collected for each individual seal. The following types of data will be recorded:

a) Observation form to be annotated at the end of each shift with significant findings; summary form to be completed by veterinarian daily.
b) Summary form to be completed at the end of each 2-hour shift
c) Eye exam form - only if eye issue is observed

Veterinary exam sheet will also be filled out by the attending vet prior to release.

4) Release of seals.

The protocols for releasing seals will be dependent on conditions at the selected release site(s).

General Considerations:

- Most releases will be on shore at a beach selected based on suite of criteria including, but not limited to:
  - site where pups have weaned and survived in past
  - ideally where conspecifics of similar age are present or frequent
  - if in MHI, then isolated from human contact
- Immediately after release seals will be monitored on shore for as long as logistically practicable.

If the site is a remote island or beach and landing by small boat is treacherous then this strategy will be considered (this will only be done in rare circumstances):

The vessel will approach the release site and attempt to get as close as possible to minimize distance traveled by small boats. Seals will be removed from their cages and placed on a blue tarp. They will be captured using a stretcher net and brought to the small boat, which will be held by the crane at the portside mid-ship low railing access (or other technique deemed safest and depending on vessel). Seals will be transported on the floor of the small boat and the boat will be lowered into the water for a near-shore release of seals.

The small boat will attempt to get within at least 100 m of shore but closer if conditions allow. This will mean the boat will be in shallow water with emergent land clearly visible for seals to navigate by. Two biologists will lift the seal over the rail of the safe boat, lowered to the surface of the water and one side of the stretcher net dropped allowing the seal to swim away. Safety lines will be tied to the boat side bar of the stretcher net and connected to the SAFE boat. This will keep the stretcher net from sinking and will cause the net to open releasing the seals if it should be dropped. An additional crewmember will be prepared with snorkel gear to help in the water if something needs to be done in the water.

If the site can be accessed by truck or other vehicle the following should be considered:

- Time of transport should be minimized so animals should be moved be transported during peak traffic times

- Animals will be escorted in the back of the truck by monk seal specialists to monitor the animals' health and welfare during transport
- Water will be available to cool the seal during transport
- A veterinarian and emergency gear will be available should an animal need assistance
- A back up/escort vehicle will be accompany the transport in case a vehicle should breakdown, so the animal(s) can continue to be moved

5) Post Release Monitoring

a. Remote Monitoring

Movement and diving behavior of seals instrumented with tracking devices data will be compared to data concurrently collected from native seals or to pre-existing data on seals of similar age to determine whether translocated seal behavior is within the normal observed range.

b. Resighting

Attempts to resight translocated seals will be made during regular population monitoring effort or intensified observation at the release subpopulation. The level of observation effort will vary largely depending upon the accessibility, logistics and cost of mounting surveys. Subsequently, haulout behavior and survival of translocated versus native seals of the same age will be compared.

Translocation of older seals

The following protocols pertain to the translocation of juvenile or sub-adultHawaiian monk seals (e.g., involved in the second stage of two-stage translocation). Similar protocols will be applied to translocation of aggressive adult male monk seals. Any seal older than 1 yr, which has been identified for translocation for any of the purposes proposed under the PEIS, may be subject to these protocols. Once identified for translocation, subjects will be considered further if they exhibit no apparent signs of disease, injury or any other factors that may compromise survival[1].

Steps involved in translocation of older seals may include some, but not necessarily all, of the following:

1) Selection and capture of seals for health screening and attachment of tracking instruments.
2) Quarantine
3) Transport
4) Release of seals at new location.
5) Post-release monitoring

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[1] Aggressive adult male selected for translocation to mitigate harm to other seals may nevertheless be selected even if compromised in some way.

Transport Vessels: Same as for weaned pups

Specific Protocols:

1) Selection and capture of seals for instrumentation and health and disease screening.

Procedures will be as described above for weaned pups with the following exceptions. Older seals will typically be captured with a stretcher or hoop net and transported in cages appropriate to their body size. Because older seals are far more mobile than weaned pups, they will usually be held in shore pens after initial capture until transport to the destination. As with weaned pups, seals which do not pass their health screen will not be translocated. If appropriate, they may be brought in for treatment under the MMHSRP or released on site if deemed appropriate by the attending veterinarian. Further, aggressive adult males deemed inappropriate for translocation may be brought into permanent captivity or euthanized according to the currently existing research and enhancement permit.

2) *Quarantine Period*
When transporting seals from the MHI to the NWHI, a period of quarantine may be necessary to reduce the likelihood of transferring a disease between the two regions. Quarantine holding will be done at a facility, on board a ship or in shore pens depending on the situation and facilities availability. The quarantine period should be long enough for the analysis of biomedical samples or longer than the prepatent period for the demonstration of clinical signs for the diseases of greatest concern. Two weeks is the generally accepted period and this period could include the transport period. Specific quarantine protocols are described in greater detail in a subsequent section.

3) Transportation to release site

Transportation of seals will follow the protocols established for weaned pups.

4) *Release of seals at new location.*

Release of seals will follow the protocols established for weaned pups.

5) Post Release Monitoring

Monitoring will be conducted as described for weaned pups.

Injury/Illness during transport:

If during transport a seal becomes sick or injured it will be cared for in transit by veterinary and husbandry staff, equipped with emergency drugs, antibiotics, intubation equipment, fluids for hydration, and IQF herring if tube feeding is necessary. The compromised seal(s) monitored 24 hours/day until it can be delivered to a captive care facility.

Captive care will be conducted using established protocols refined and developed with recent captive care activities for Hawaiian monk seals and other pinniped under the authority of the MMHSRP permit. Eventual release of the seal will be determined according to standards of the MMHSRP.

Detailed Hawaiian Monk Seal Quarantine Protocol

The following are quarantine protocols that will be followed during the captive holding of Hawaiian monk seals, for example during translocation quarantine periods. Quarantine will typically occur in a captive facility, but these protocols can be adapted for use in a shore pen situation if needed. In such cases, reference to "pools" or "tanks" would apply to separate shore pens.

To date, no infectious disease that can be spread horizontally between seals has been found to cause clinical disease in Hawaiian monk seals. The following protocol takes this into consideration and is designed to reduce the risk of transmission of disease from outside sources to seals under human care. These sources include domestic animals and terrestrial wildlife (both directly and indirectly via fomites). Because humans act as fomites and because habituation of temporarily held monk seals is of paramount concern, every effort should be made to minimize human contact with releasable seals.

I. QUARANTINE

A. QUARANTINE DEFINITION AND OBJECTIVES

1. Quarantine refers to "any isolation or restriction on travel or passage imposed to keep contagious diseases, insect pests, etc. from spreading."
2. Hawaiian monk seals held in captive care must be maintained under strict quarantine at all times. Quarantine measures between individual seals are at veterinary discretion based on health assessment findings.
3. All personnel involved in the feeding, handling, and care of these seals must be properly trained in quarantine procedures by an experienced staff. Quarantine procedures should always be clearly posted.

B. APPROVED DISINFECTING AGENTS

1. Dilute (10%) bleach, accelerated hydrogen peroxide or Nolvasan solution may be used. Practices differ slightly for each type of disinfecting agent and adherence to these practices is crucial to adequate quarantine.
2. The preferred agent is accelerated hydrogen peroxide (brand name: Accel) because it is less toxic than bleach and has a shorter contact time than bleach and Nolvasan.
3. CONTACT TIME is the most important aspect of disinfection. Each agent should be allowed to contact the surface that is being disinfected for the following minimum amounts of time:
    a. Bleach: 10 minutes
    b. Nolvasan: 10 minutes
    c. Accel: 5 minutes

4. When using bleach, either in footbaths or otherwise, it is imperative that organic matter (feces, dirt, etc.) be removed from the surface FIRST. Bleach will not adequately disinfect in the presence of such debris.

C. NMFS QUARANTINE POLICY

Quarantine from Outside Sources

1. All equipment used in the quarantine facility, including feeding, handling, clothing and medical supplies MUST be:
    a. Used exclusively for monk seals
    b. Properly sanitized after each use

2. **NO VISITORS** are allowed in monk seal quarantine area unless previous approval is granted by the permit holder (Charles Littnan) and the on-site supervisor. This approval is granted on a case-by-case basis.

3. Any person working with wild or domestic animals or visiting another animal care facility on the same day must shower and change clothes before and/or after entering the seal enclosures.

4. Gloves should be worn anytime a seal (or biological samples) will be handled. Thoroughly wash hands with soap after handling seals or biological samples.

5. **FOOTWEAR**:

    a. No street shoes are to be worn inside enclosures.

    b. Closed-toe footwear designated for "monk seal quarantine" should be kept at the lower entrance to each enclosure. This footwear should be used in the enclosures at all times and nowhere else. Breathable footwear (such as crocs) is permitted unless the wearer will be in standing water contaminated with biological matter (*i.e.,* feces). Rubber boots should be worn to completely protect the feet from biological matter in these instances, such as during tank cleaning.

    c. Footwear described above should be dipped in a footbath and scrubbed upon entry into and exit from the pool area. A footbath and long handled scrub brush should be kept at the bottom of the steps, inside the gate of each enclosure.

6. **PROTECTIVE CLOTHING:**

    a. Any person that will potentially come in direct contact with seals must wear clothing that is designated for monk seal quarantine use only. This clothing can include coveralls, tee shirts and shorts/pants.

    b. All quarantine clothing should be kept clean and remain at Ford Island in a designated area away from potential sources of contamination. It should never be worn when handling other species or animals outside of Ford Island.

    c. Clothing should also be changed before and after handling any sick individual seals.

    d. Protective clothing worn during procedures should be washed and disinfected at the end of each day.

7. Any new equipment or tools brought into the quarantine area must first be disinfected.

Seal Isolation

These measures should be followed if sick and healthy seals are housed at the same facility concurrently:

1. Use separate cleaning and feeding supplies, footwear and clothing exclusively for the sick seal unless instructed otherwise by the attending veterinarian.

2. Veterinary approval is required for any movements of seals between enclosures or when combining more than one seal in a tank.
3. If a seal requires isolation, follow the Potential Disease Outbreak Protocol.

II. OBSERVATIONS AND CONDUCT AROUND SEALS

A. OBSERVATIONS

1. In the morning and prior to each feed, conduct a thorough inspection of the seals and pens before proceeding with further activity. Following each feed or handling event, monitor the seals' behavior closely. Perform a final inspection before leaving for the day.
2. Throughout the day, use the cameras to observe each seal at least every 60 minutes. Observe and record the condition and activity level of the seal. Record the presence, color, consistency and amount of feces, urine, and spew (and the ID of the seal that produced it, if known). Look for any harmful debris in or around pens.
3. Note anything unusual in a seal's appearance (eye discharge or cloudiness, nasal discharge, bite wounds, etc.) and behavior (lethargic, unresponsive, stereotypic behaviors, etc.). Notify attending veterinarian and animal care manager immediately of any abnormal changes in a seal's health.
4. Succinctly record any observations on the Daily Observation Sheet, including the time and observer's initials. Frequently used acronyms: BAR = bright, alert, and responsive; QAR = quiet, alert, and responsive.

B. CONDUCT AROUND THE SEALS AT ALL TIMES

Every possible effort should be made to minimize the habituation of the seals by reducing human-seal interactions.

1. Do not enter enclosures unless absolutely necessary.
2. When in enclosures, **DO NOT MAKE PHYSICAL CONTACT WITH SEALS** unless necessary for procedures requiring handling. Minimize going into the enclosure and the amount of time you spend in the enclosure as much as possible.
3. Minimize talking and noise when working with or near the seals and the enclosure. Move slowly and avoid startling gestures.
4. Whenever possible, observers should remain as inconspicuous and unobtrusive as possible to observe seals' normal behaviors in captivity and minimize their stress in captivity.
5. Each person entering an enclosure with the seal should be carrying a herding board, which should within arms-reach at all times.
6. Outside of feeding sessions seals may display undesirable behaviors. Record these observations and follow these instructions:
   a. Approaching too closely or too rapidly
      → Use a herding board to keep the seal away
   b. Mouthing hoses, brooms, or boots
      → Discourage this by preventing opportunities for seals to bite at these objects
   c. Stereotypic behaviors (repetitive splashing, slapping at the walls of the enclosure, pattern swimming)
      → These are a sign of boredom and may be reduced by providing seals with approved environmental enrichment devices (EEDs). Objects such as marine debris that the seals may encounter once returned to their natural habitat should not be used as EEDs so that they do

not associate these objects with food or play. A good example of an EED is sinking a milk crate that has fish stuck in the holes or providing some of their daily caloric needs through "fishsicles."

III. CLEANING THE QUARANTINE AREA

A. DISHES

1. Wash all dishes used for feeding and handling with dish soap and water. Scrub the inside of all feeding tubes using a tube brush. Rinse thoroughly.
2. Place all dishes in a dish sanitizer. If a dish sanitizer is not available, the following steps should be followed after step 1, above:
    a. Soak or spray all equipment (bolus syringes, knives, tongs, cutting boards, etc.) with disinfectant according to section I.B. ("Approved Disinfecting Agents") above.
    b. Rinse all dishes thoroughly to remove the disinfectant.
    c. Allow all dishes to air-dry.
    d. Stomach tubes should be washed with soap and water, rinsed thoroughly, and then boiled for 10 minutes.
3. Bolus Syringe Care: after the syringes have been washed and dried as described above, lubricate the O-ring with mineral oil and put the syringes back together for safe storage. Be careful when handling the syringes as they are fragile and can crack easily.

B. DAILY CLEANING AND MAINTENANCE

Seal Enclosure Cleaning

1. Do not allow seals to mouth or bite brooms or hoses.
2. Never allow equipment to remain unattended in an occupied seal enclosure. Return all equipment to its storage area after use.
3. Always keep enclosure gates bolted.
4. When cleaning, take the opportunity to look for vomit, diarrhea and observe the feces for consistency and parasites. Always record observations form in the seal's chart and make special note of any unusual findings.
5. Every morning, inspect the entire pen enclosure for any scat, urine, fish parts, and wind-blown debris. If necessary, use a broom and fresh water hose to clean the seal enclosure. Thoroughly rinse all fish scales, blood, and debris from the decks, walls, and ledge of the enclosure and walkway with the fresh water hose after each feed. Special care should be taken to clean scales from doors, door handles, and bolts.
6. Before leaving in the evening, the deck and pool walls and floor should be hosed down and any spattered blood, scales, scat, or other debris should be scrubbed away.

Footbaths and Walkways

1. Rinse off the walkway and stairs leading to the seal enclosure at least once a day. Scrub the walkway with broom, disinfectant and water as needed.
2. Refill footbaths as needed depending on choice of disinfectant (usually once per 1-2 days for Accel). When using bleach, footbaths should be refilled anytime organic material is present.

3. If using bleach, add 1 cup bleach to 1 gallon of water and be sure to have a final water rinse before the pen entrance.

Fish House Cleaning

1. Freezers and refrigerators must remain clean and neat at all times. All feeders are responsible for maintaining freezer cleanliness on a daily basis. Keep freezers free of ice buildup as much as possible.
2. Wipe down all counter and table surfaces after each feeding. Be especially mindful of cleaning any fish scales and spattered blood from the all surfaces after each feeding.
3. Mop the food prep room floor after the morning feeding.
4. Empty the garbage daily.

C. WEEKLY CLEANING

Seals should be crated/kenneled and weighed once weekly using the forklift. Weekly cleaning can be done during this time. Use a net to scoop the seals out of the water and herding boards to direct them into the holding area. Be sure to keep the seals wet, shaded and monitor their behavior regularly.

Seal Enclosure

The monk seal pools should be drained and the pools, walls, ledges, doors, and stairways cleaned once a week using accelerated hydrogen peroxide disinfectant (preferred) and a large, soft-bristled brush.

1. Drain pool, empty all footbaths.
2. Spray and use disinfectant to scrub all surfaces (pools, walls, ledges, doors, stairways).
    a. If using bleach solution instead of hydrogen peroxide, all organic matter must be rinsed away first and be careful to direct the rinse water toward the drain holes at the corners of the enclosure, away from seals because (bleach is a skin and eye irritant).
3. Allow appropriate amount of contact time for the disinfectant used (see above).
4. Hose off all surfaces, then close drain and turn on the water inflow.
5. Refill footbaths and when pool is full, return seals to enclosure.
6. Thoroughly rinse and put away all cleaning equipment.
7. Record the seals' behavior, the duration spent in the holding area, and any other relevant information from the cleaning event (scat, spew, urine, etc.) on the observations form in each seal's chart.

D. QUARTERLY CLEANING

Every 3 months, and particularly before the rainy season or forecasted heavy rainfall, the shade structure should be rinsed (if removable, it should be removed and scrubbed) to remove dust and debris. Rinse water should not go into an enclosure if it is occupied by a seal – remove the seal as with weekly cleaning procedures. Clean enclosure per weekly cleaning instructions after cleaning the shade structure.

IV. WATER SAMPLING SEAL TANK

Sampling should occur on the same day and time each week at least a couple of days after the weekly enclosure cleaning. Collect one sample from each occupied pool and one from the inflow in addition to a temperature control sample collected from the pool. These samples are submitted to Hawaii Food & Water Testing Lab (HF&WTL) for total coliform testing.

1. Be as sterile as possible: wear gloves, do not open lid to bottle until immediately before collection, do not contaminate inside of lid or bottle, don't set the lid down, etc.
2. Collect the inflow sample by removing the lid and holding the bottle under the water inflow to fill it. Decant any excess water being careful not to touch the lip of the bottle or the lid.
3. Sample the pool (pool and temp control sample) 180^0 from the water inlet. With the lid still in place, submerge the bottle about 1 foot deep. Unscrew the lid underwater with the bottle positioned counter-current to fill the bottle. Replace the lid underwater. Remove the bottle from the water and decant the excess water being careful not to contaminate the bottle or lid.
4. Immediately place the samples in the small red cooler with blue ice (provided by HF&WTL) for transport to the lab. If transport is not immediate, place the samples in the refrigerator (sampling fridge, not fish storage fridge). Store sample bottles in the cooler and ice pack in freezer until next sampling.
5. Complete all the necessary paperwork and be sure to label each bottle (pool, inflow, temp control).
6. Results submitted on Tuesday are usually faxed to us, c/o Angie Kaufman, on Thursday or Friday. These counts should not exceed 1000 MF/100ml. If fecal coliform counts exceed 1000 MF/100ml, results are reported to Robert Dollar by phone; sampling must be repeated within 24 hours. Promptly notify the veterinary staff if counts are above 1000 MF/100ml.
7. Enter the date, time, coliform count, and any pertinent comments in the HMS Water Testing spreadsheet.

DIRECTIONS TO HF&WTL

2688 B Kilihau St.
Honolulu, HI 96819
Ph: 836-5558
Fax: 836-5509
contact: Wendy

Open Mon.-Friday, 8am-5pm
Located in Mapunapuna near the airport. Go east (towards the airport) on Nimitz Hwy & turn left on Kakoi St then right on Kilihau St (2688B Kilihau St.). It's the 3rd grey building on the left.

V. SEAL ILLNESS/EMERGENCY CARE

1. In case of an emergency or suspected illness, refer to the phone list and call the attending veterinarian or veterinary technician immediately to relate symptoms or circumstances of emergency or illness. Follow the emergency chain-of-command protocol.
2. A veterinarian or trained veterinary staff will perform any needed blood sampling.
3. A crash kit and emergency drugs will be kept at all facilities when seals are present. All other medical supplies for blood sampling, fluid and antibiotic administration, monk seal medications, and additional medical supplies are kept at the Vet Lab Ford Island.

EXAMPLE **Physical Examination Form**
Circle as appropriate

Body outline: Swelling, Wound, Change from previous day
If yes, describe: ____
Flippers: Normal use of all 4 flippers with full-range of motion, Favoring one flipper (describe), Lacerations, Swelling, Ulcers/sores, Signs of pain or discomfort
Discharges: Ears, Nares, Eyes, Umbilicus, Rectum, Vagina, Other
If yes, describe amount:______ mL, Color:___________,
Consistency:_______________
Feces: Describe amount:_______ mL, Color:___________,
Consistency:________________
Urine: Color:_____________
Eyes:

Right: Discharge: Clear tears, Crustiness around eyes, Purulent discharge Redness or congestion of conjunctiva, Swelling of conjunctiva, Prominence of third eyelid, Corneal opacity/ cloudiness, Corneal ulcer, Lacerations, Swelling of eyelids, Squinting or photosensitivity, Any obvious loss of vision

Left: Discharge: Clear tears, Crustiness around eyes, Purulent discharge Redness or congestion of conjunctiva, Swelling of conjunctiva, Prominence of third eyelid, Corneal opacity/ cloudiness, Corneal ulcer, Lacerations, Swelling of eyelids, Squinting or photosensitivity, Any obvious loss of vision

Mouth: Color of mucous membranes: Pink, Red, Pale pink/White
Teeth: Broken, Erupting. List site:____

Behavior: Alert, Bright, Lethargic, Depressed, Active, Inactive, Stereotypic behavior, Disorientation, Vocalizations, Other abnormal behavior for each individual seal, Any marked change from previous days
Describe:____

Other comments (environmental conditions, respiration rate, heart rate, etc.):
____
____
____
____
____
____

Animal ID: ___________ **Date:**______________ **Name of Observer:**____________________
Time:______________

Appendix G PMNM 2011-001 Permit and Other Papahānaumokuākea Best Management Practices

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PAPAHĀNAUMOKUĀKEA
Marine National Monument

DEC 2 3 2010

Mr. Tom Edgerton
Superintendent, Papahānaumokuākea Marine National Monument
Department of Interior
U.S. Fish and Wildlife Service

Administrator (TBD)
Division of Aquatic Resources
Department of Land and Natural Resources
State of Hawaii

Mr. Paul Conry
Administrator, Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii

Ms. T. ʻAulani Wilhelm
Superintendent, Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

ADDRESS:
Papahānaumokuākea Marine National Monument Office
6600 Kalanianaʻole Hwy, Suite 300
Honolulu, HI 96825

Dear Co-Trustee Representatives:

The National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (FWS), and the State of Hawaii (collectively, the Co-Trustees) have approved the issuance of permit number PMNM-2011-001 to conduct activities within Papahānaumokuākea Marine National Monument ("Monument") for conservation and management purposes. Activities are to be conducted in accordance with the permit application and all supporting materials submitted to the Monument, and the terms and conditions of permit number PMNM-2011-001 attached.

Your permit contains specific special conditions and reporting requirements. Please review them closely and fully comply with them while undertaking permitted activities.

If you have any questions about this permit please contact Ray Born at (808) 792-9488, Justin Rivera at (808) 397-2632, Lasha-Lynn Salbosa at (808) 397-2633 or Danielle Carter at (808) 397-2647. Thank you for your continued cooperation with NOAA, FWS, and the State of Hawaii.

William J. Aila Jr. Date
Interim Chairperson
Board of Land and Natural Resources
Department of Land and Natural Resources
State of Hawaii

Thomas R. Edgerton 12/23/10

Tom Edgerton Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of Interior
U.S. Fish and Wildlife Service

for 12-22-10

T. ‘Aulani Wilhelm Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

PAPAHĀNAUMOKUĀKEA
Marine National Monument

DEC 2 3 2010

CONSERVATION AND MANAGEMENT PERMIT

Papahānaumokuākea Marine National Monument Co-Trustee Representatives:	Permit Number: PMNM-2011-001
Mr. Tom Edgerton Superintendent, Papahānaumokuākea Marine National Monument Department of Interior U.S. Fish and Wildlife Service	Effective Date: January 1, 2011 Expiration Date: December 31, 2011

Administrator (TBD)
Division of Aquatic Resources
Department of Land and Natural Resources
State of Hawaii

Mr. Paul Conry
Administrator, Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii

Ms. T. ‘Aulani Wilhelm
Superintendent, Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

ADDRESS:
Papahānaumokuākea Marine National Monument Office
6600 Kalaniana‘ole Hwy, Suite 300
Honolulu, HI 96825

Project Title: Co-Trustee conservation and management activities in Papahānaumokuākea Marine National Monument

This permit is issued for activities in accordance with Proclamation 8031 ("Proclamation") establishing Papahānaumokuākea Marine National Monument ("Monument") under the Antiquities Act of 1906, 16 USC §§ 431-433 ("Antiquities Act") and implementing regulations (50 CFR Part 404). All activities must be conducted in accordance with the Proclamation and the regulations (attached). No activity prohibited by the Proclamation or 50 CFR Part 404 is allowed except as specified below. Chapter 13-60.5, Hawaii Administrative Rules remains in effect for activities in State waters.

Subject to the terms and conditions of this permit, the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (FWS), and the State of Hawaii (collectively, the Co-Trustees) hereby authorize the permittee listed above to conduct conservation and management activities within the Monument. All activities are to be conducted in accordance with this permit. The permit application is incorporated into this permit and made a part hereof; provided, however, that if there are any conflicts between the permit application and the terms and conditions of this permit, the terms and conditions of this permit shall be controlling.

PERMITTED ACTIVITY DESCRIPTION:

The following activities are authorized by this permit:

1. ENTRANCE
   Permittees, their designated agency staff and contractors necessary for the permitted activities, as well as residents of Midway Atoll, may enter the Monument. See Permitted Personnel List (attached).

   All personnel must be identified and information provided to the Monument permit coordinators prior to entry to the Monument. The permittees shall ensure that any person assigned to any conservation and management activities allowed under this permit is qualified to perform the assigned role and is limited to the scope of their position and respective project, and all other applicable policies, protocols, permits, and regulations.

   All activities must be consistent with existing State and federal laws. As such, management agencies will confirm compatibility and consistency prior to the conduct of individual activities under this permit.

   The MMB may monitor activities under the permit. Any member of the MMB may, for a period not to exceed 48 hours, verbally require temporary modification or cessation of activities identified in the permit if, in the opinion of the MMB member, such action is necessary to limit effects on Monument resources beyond the intended scope of the permit, to protect governmental equipment, or to ensure the safety of personnel. Such action will be followed as soon as possible by MMB emergency consideration of the temporary permit modification or temporary permit cessation. If the MMB concurs with the temporary action taken by the MMB member, the Co-Trustees may amend the permit with the necessary changes or withdraw it. A decision by the Co-Trustees to amend the permit or to allow the activity to continue unchanged will include the necessary findings that the activity and its effects satisfy Monument permit issuance criteria and do not risk the safety of governmental employees or damage to governmental equipment.

2. OPERATIONS
    a. Field station operations for resource conservation supported by on-site management.
    b. Facility maintenance activities for assets and facilities of the National Wildlife Refuge System and Kure Atoll and its agents necessary for meeting mission and purposes of the refuges, sanctuary, and Monument. Examples of activities to be undertaken include, but are not limited to:
        i. Maintenance and repair/replacement (e.g. carpentry, electrical, plumbing, welding, general construction) of facilities and their components;
        ii. Building and other facilities deconstruction and reconstruction;
        iii. Airport maintenance, including improvements such as runway lighting replacement and taxiway maintenance (including repaving and painting/marking);
        iv. Painting, including all preparation work such as scraping, washing, etc.; and
        v. Lead-based paint soil remediation, including removal of sand/soil from around many or all affected buildings and proper on-site containment of this material.
    c. Field camp supply and support activities, including but not limited to delivery and removal of supplies, people, waste, and/or assets necessary for operations.
    d. Operations and on-site review of activities, including but not limited to:
        i. Operations and on-site reviews by management and congressional personnel;
        ii. Agency site visits and meetings for management planning and programmatic assessments; and
        iii. On-site management and safety reviews to gauge implementation and effectiveness of Monument management programs.
    e. Operation, maintenance, and use of airfields and runways at Midway Atoll and Tern Island.
    f. Operation of vessels to provide access for conservation and management activities.
    g. Anchoring of authorized vessels on non-coral substrate only. Anchors must be lowered into place.
    h. Sustenance Fishing, as defined by 50 CFR Part 404.11 section (h); allowed only within Midway Atoll Special Management Area for on-island U.S. Fish and Wildlife Service (FWS) personnel and contractors.
    i. Activities involving personnel safety, fitness and health maintenance including, but not limited to:
        i. Jogging at Tern Island, French Frigate Shoals, and Midway Atoll; and

ii. Health and safety operations for personnel, volunteers, contractors, and visitors in the Monument including site safety reviews, adverse weather and emergency response procedures, safety protocols, and continuity of operations plans.

3. RESOURCE SURVEY AND MONITORING

Survey and monitoring of target species and habitats to evaluate status and trends for management purposes. The following activities in direct support of management, monitoring, and characterization may be conducted:

a. Placement, installation, and maintenance of scientific equipment, devices, markers, oceanographic instrument arrays, and remote viewing camera systems;
b. Non-lethal marking and tagging for monitoring purposes;
c. Visual, non invasive marking and tagging for monitoring purposes;
d. Collection of biological, chemical, climatological, or geological samples for: analysis in support of activities under approved management plans; restoration or recovery plans; base line inventory and monitoring of population trends; and habitat conservation and management;
e. Collection of biological voucher specimens that cannot be visually identified on the spot and/or may represent new geographic records or new species;
f. Physical surveys and collections for landfills, storage tanks, contamination, or other potentially hazardous artifacts associated with current and former occupation and use of the Northwestern Hawaiian Islands (NWHI); and
g. Habitat mapping activities for the production of accurate, high-resolution base maps where data collection methods may include optic, acoustic, and metal detector technologies, as well as land and dive operations for ground truthing.

4. NATURAL RESOURCE PROTECTION, RESTORATION AND REMEDIATION

Conduct management actions to promote conservation of Monument resources. This includes activities necessary to understand and carry out protection, restoration, and remediation of species and habitats, such as carrying out existing species recovery and restoration plans or accessing the Monument to conduct federally authorized activities under the Endangered Species Act (ESA).

Examples include, but are not limited to, Hawaiian Monk Seal Recovery Plan, the Laysan Island Ecosystem Restoration Plan (1998), the short-tailed albatross attraction project on Midway, the Laysan duck reintroduction project on Midway, the Nihoa Millerbird recovery project, *Verbesina* control, cattle egret control, rat control, and other non-native species control projects. Restoration, when and where appropriate, will be undertaken using the best available information about pre-disturbance conditions to establish goals. Activities may include:

a. Monk seal disentanglement and health response (including treatment and necropsy), translocation from areas of high risk to safer areas, reuniting nursing mothers and pups, and removal of aggressive males;
b. Population augmentation or reestablishment activities such as capture, translocation, reintroduction, and outplanting;

c. Invasive species controls by mechanical, chemical, and manual methods as needed; and
d. Investigation and monitoring of contamination in abiotic or biotic resources.

Removal of marine debris, trash, and other materials (land and ocean-based) that pose threats to Monument resources, including but not limited to derelict fishing gear. This may include:

a. Disentanglement of threatened and endangered species by authorized personnel, debris tracking via drifter buoys and Unmanned Aerial Vehicles, and monitoring of sites that have been cleared of debris for site recovery rates and effects of removal;
b. Location and removal of debris and hazardous materials. This may be through interagency agreements, such as the Department of Defense (DOD) Innovative Readiness Training (IRT), Formerly Used Defense Sites (FUDS), or the Base Realignment and Closure (BRAC) Programs. Efforts may include activities such as seafloor and island mapping, reconnaissance and removal of materials, and derelict vessel salvage and removal; and
c. Removal of sessile encrusting flora and fauna associated with marine debris.

Provide Emergency Response, Injury Assessment, Mitigation, Restoration, and Monitoring and Post-Response Management:

a. Activities as necessary for emergency response, injury assessment, mitigation, restoration, monitoring, and post-response management in coordination with appropriate federal and / or state resource agencies and as appropriate consistent with NOAA, USFWS, and State of Hawaii Damage Assessment and Restoration regulations, policies, and procedures (e.g., oil spills, ship groundings, damage assessments, monitoring alien species, monitoring coral bleaching events, collection of bleached coral or alien species); and
b. Activities in response to an unusual mortality event (including but not limited to threatened and endangered species, marine mammals, migratory birds), mass stranding, or other urgent species response.

5. CULTURAL AND HISTORICAL RESOURCE IDENTIFICATION AND PROTECTION

To identify, document, interpret, preserve, and protect the Monument's cultural and historic resources, the following activities may be conducted:

a. Collection of post-contact artifacts as needed subject to National Historic Preservation Act (NHPA) consultation when applicable;
b. Monitoring and surveying of historic sites;
c. Conservation of artifacts subject to NHPA consultation and appropriate approvals from other Federal agencies (e.g., U.S. Navy) when applicable;
d. Non-commercial filming and photographic activities for the purposes of further documenting and capturing the history of the NWHI;
e. Location of historic artifacts using passive side scan sonar, metal-detector, or (land-based) ground penetrating radar;

f. Returning seized Monument resources to their natural environment in coordination with appropriate federal and/or state resource agencies, including the Office of Hawaiian Affairs, as appropriate;
g. Maintenance, preservation, and perpetuation of Native Hawaiian cultural sites and practices per the National Historic Preservation Act, Native American Graves Protection and Repatriation Act, Archeological Resources Act, American Indian Religious Freedom Act and applicable sections of the Hawai'i State Constitution, Hawaii Revised Statutes and Hawaii Administrative Rules; and
h. Maintenance and preservation of historic sites on Midway Atoll.

6. OUTREACH AND EDUCATION

To cultivate an informed, involved constituency that supports and enhances conservation of the natural, cultural, and historic resources of the Monument, and to contribute to the Nation's science and cultural literacy, the following activities may be conducted:

a. Collection of information and experiences from the Monument to develop agency web pages, Navigating Change projects, Monument projects, etc;
b. Collection of debris and biological samples and specimens such as albatross boluses for education projects;
c. Conduct news media and VIP site visits to enhance public knowledge and understanding of Monument resources; and
d. Present environmental programs at Midway Atoll.

No further disturbance of the cultural or natural resources of the Monument is allowed.

PERMITTED ACTIVITY LOCATIONS:

Other than entrance into the Monument, the permitted activities listed above are allowed at the following locations:

The permittees may conduct conservation and management activities throughout Papahānaumokuākea Marine National Monument.

GENERAL TERMS AND CONDITIONS:

In accordance with the Proclamation and applicable regulations, the permitted activities listed above are subject to the following general terms and conditions:

1. The permittee must sign and date this permit on the appropriate line below. Once signed and dated, the permittee must provide a signed original copy to the Monument official identified below. The permit becomes valid on the date the last signature is obtained and shall remain valid until the expiration date on the permit.

   Permit Coordinator
   Papahānaumokuākea
   Marine National Monument
   6600 Kalaniana'ole Hwy. Suite 300
   Honolulu, HI 96825

2. This permit is neither transferable nor assignable and must be carried by the permittee while engaging in any activity authorized by this permit. All other persons entering the Monument under the authority of this permit must provide the name of the permittee or the permit number to any authorized enforcement or management personnel upon request.

3. This permit may only be modified by written amendment approved by the Co-Trustees. Modifications to this permit must be requested in the same manner as the original request was made. Any modifications requested by the permittee, such as adding or changing personnel to be covered by the permit or to change the activities that are allowed, must be made in writing.

4. This permit is subject to suspension, modification, non-renewal, or revocation for violation of the Proclamation, implementing regulations, or any term or condition of the permit. Any verbal notification of a violation from an authorized Monument representative may require immediate cessation of activities within the Monument. The issuance of a permit shall not constitute a vested or property right to receive additional or future permits. This permit may, in the sole discretion of the Co-Trustees, be renewed or reissued. However, there is no right to a renewal or re-issuance. Failure to fulfill permit requirements may affect consideration of future permit applications.

5. Permit terms and conditions shall be treated as severable from all other terms and conditions contained in this or any other ancillary permit. In the event that any provision of this permit is found or declared to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the remaining terms or conditions of this permit.

6. This permit does not relieve the permittee of responsibility to comply with all federal, state and local laws and regulations. Activities under this permit may be conducted only

after any other permits or authorizations necessary to conduct the activities have been obtained.

7. The permittee may be held liable for the actions of all persons entering the Monument under the authority of this permit.

8. All persons entering the Monument under the authority of this permit are considered under the supervision of the permittee and may be liable in addition to the permittee for any violation of this permit, the Proclamation and implementing regulations in conjunction with this permit. The permittee must ensure that all such persons have been fully informed of the permit terms and conditions prior to entry into the Monument. Each such person must provide written acknowledgment to the permittee, prior to entry into the Monument, that he/she has received a copy of the permit, agrees to abide by all applicable terms and conditions, and may be liable for violations of the permit. The permittee shall maintain all signed acknowledgments and submit them with the summary report described in General Condition #22.b. An acknowledgement form is attached.

9. Notification of entry into the Monument must be provided at least 72 hours, but no longer than one month, prior to the entry date. Any updates to the list of personnel must also be provided at least 72 hours before entering the Monument. Notification of departure from the Monument must be provided within 12 hours of leaving the Monument. Notification may be made via e-mail or telephone by contacting: E-mail: nwhi.notifications@noaa.gov; Telephone: 1-866-478-6944; or 1-808-395-6944. No other methods of notification will be considered valid.

10. The permittee and any person entering the Monument under the authority of this permit shall, before entering the Monument, attend a cultural briefing or view designated cultural informational materials on Papahānaumokuākea regarding the region's cultural significance and Native Hawaiians' spiritual and genealogical connection to the natural and cultural resources. Persons entering the Monument at Midway Atoll may satisfy this requirement upon arrival.

11. All vessels (including tenders and dive boats), engines and anchor lines shall be free of introduced species prior to entry into the Monument. To ensure this, all vessels, engines and anchor lines shall be inspected for potential introduced species prior to departing the last port before entering the Monument. No later than 24 hours prior to entry, the permittee shall provide the Monument Permit Coordinator with a report prepared by the individual conducting the inspection that: a) sets forth when and where the inspection occurred; b) identifies any introduced species observed, including where found; c) summarizes efforts to remove any species observed; and d) certifies the vessel as free of all introduced species. The Monument Permit Coordinator shall review the report and, based on the review, may delay the entry into the Monument until all concerns identified by the Monument Permit Coordinator have been addressed.

12. All hazardous materials, biohazards and sharps, must be pre-approved by the Co-Trustees. For purposes of this permit, "hazardous material" has the same meaning as the

definition found at 49 CFR §105.5 (U.S. Department of Transportation). All hazardous materials, biohazards and sharps must be stored, used, and disposed of according to applicable laws and Monument-approved protocols. The permittee or a designated individual entering the Monument under the authority of this permit must be properly trained in the use and disposal of all such materials proposed. Proof of appropriate training may be required by the Co-Trustees. No such material may be left in the Monument after the departure of the permittee unless it has been previously approved by Monument staff. Immediately after the project is complete the permittee must remove all such materials from the Monument. The permittee will be responsible for all costs associated with use, storage, transport, training, disposal, or HazMat response for these materials.

13. All equipment or supplies brought into the Monument, or structures of any kind built in the Monument by the permittee are the responsibility of the permittee. All materials that are brought to the Monument by the permittee must be removed by the permittee except as otherwise permitted. Any permanent structures, equipment, or supplies that require maintenance, are determined to be unserviceable, or are a safety hazard, must be immediately repaired or removed from the Monument by the permittee. No structures, equipment, or supplies may be left in the Monument following the completion of the project except as listed in the permit.

14. If Monument staff is present at the field site, the permittee must meet with them before beginning permitted activities. Even with a valid permit, authorized Monument staff may prohibit entry into any location(s) within the Monument as they may deem appropriate to conserve or manage resources, particularly in areas where cumulative impacts of permitted activities are concentrated.

15. In order to facilitate monitoring and compliance, any person entering the Monument under the authority of this permit, including assistants and ship's crew shall, upon request by authorized Monument enforcement personnel, promptly: a) allow access to and inspection of any vessel or facility used to carry out permit activities; b) produce for inspection any sample, record, or document related to permit activities, including data, logs, photos, and other documentation obtained under, or required by, this permit; and c) allow inspection on board the vessel or at the permittee's premises of all organisms, parts of organisms, and other samples collected under this permit.

16. It is prohibited to possess or consume alcohol in the Hawaiian Islands National Wildlife Refuge in accordance with the refuge policy. Any violations will result in immediate removal of the offender from the Monument at the individual's own cost. Offenders may not be readmitted to the Monument.

17. All persons entering the Monument under the authority of this permit are responsible for the cost of removing themselves from the Monument at the conclusion of the term of the permit or upon revocation or suspension of the permit. All such persons are also responsible for the cost of removing themselves from the Monument in the event of a

necessary medical evacuation, emergency evacuation, including weather, or for the cost of any necessary search and rescue operation.

18. Except as expressly required by applicable law, the Co-Trustees are not liable for any damages to equipment or injuries to the permittee and persons entering the Monument under the authority of this permit. The permittee and any person entering the Monument under the authority of this permit shall release, indemnify, and hold harmless the National Oceanic and Atmospheric Administration, the Department of Commerce, the U.S. Fish and Wildlife Service, the Department of the Interior, the United States Government, the State of Hawaii, and their respective employees and agents acting within the scope of their duties from and against any claims, demands, actions, liens, rights, subrogated or contribution interests, debts, liabilities, judgments, costs, and attorney's fees, arising out of, claimed on account of, or in any manner predicated upon the issuance of this permit or the entry into or habitation upon the Monument or as the result of any action of the permittee or persons participating in the activity authorized by this permit. In the event that a government employee, acting in his official capacity, is the permittee, or is entering the Monument under the authority of this permit, then he shall be subject to all applicable federal and State laws that pertain to claims by or against him predicated upon the issuance of this permit or entry into or habitation upon the Monument.

19. Monument managers or their designees may verbally require the permittee to modify or cease activities not identified in this permit if, in the opinion of the managers or designees, such action is necessary to limit disturbance to or protect Monument resources, to protect government equipment, or to ensure the safety of personnel. After providing such verbal instructions, the managers or designees will provide the permittee with a written modification, suspension or revocation to this permit at the earliest practicable opportunity. The failure to follow verbal instructions or modified permit terms, or to cease activities upon suspension or revocation of this permit, may constitute a violation of this permit, the Proclamation, the regulations, or other applicable law.

20. Disturbance of any cultural or historic property, including but not limited to Native Hawaiian cultural sites, burials, archaeological deposits, maritime heritage sites, and WWII structures and features, such as stone walls and mounds, stone uprights, bunkers, batteries, camp sites, hospitals, housing areas, and radio towers; or the disturbance or collection of any historic or cultural materials and artifacts, including but not limited to bottles, dishes, cartridges, hospital materials, carvings, human remains, or Native Hawaiian bone or stone implements, found within the Monument, including the sale or trade in such items, is prohibited.

21. All Monument resources within the jurisdiction of the State of Hawaii are held in trust under the Hawai'i State Constitution, Article XI, Sec. 1. The State of Hawaii and the Government of the United States reserve ownership or control, as the case may be, of Monument resources, both living and nonliving, that may be taken or derived from those found in the Monument.

22. The permittee must satisfy the following reporting requirements:

a. Within thirty (30) days after the expiration date of this permit, the permittee must submit a summary report of activities conducted under this permit. The report shall be submitted using the Monument permit report template, if applicable.

b. For permitted vessels, the permittee having authority over the vessel must maintain and submit a cruise log within thirty (30) days after the expiration date of this permit. The log shall include but is not limited to: description of cruise activities, geographic locations of those activities, anchoring locations, and small boat dive locations. The permittee shall also maintain a daily vessel discharge log, which must be submitted with the cruise log.

c. Annual Report. The comprehensive annual report is a summary of all activities undertaken, including but not limited to: dates of all arrivals and departures from islands and atolls within the Monument, names of all persons involved in permitted activities, details of all specimens collected, handled, etc., any other pertinent information, GPS locations of all samples collected, transects, etc., results of work to date, copy of all data collected, and a proposed schedule of publication or production of final work. The report shall include a concise summary or abstract for use in Monument reports. Two hard copies and one electronic copy (Microsoft Word preferred, but not required), must be submitted to the Co-Trustees. The annual report is due by the end of the second week of January of the calendar year that follows the year that the permit was in effect or before a new permit is issued, whichever comes first. Subsequent annual reports are required each year until all data collected under research permits are fully analyzed.

d. For activities on State lands or within State waters, the permittee must submit a monthly report on the specified form.

e. The permittee may debrief the Co-Trustees following the completion of all activities in the Monument covered under this permit. The permittee may schedule the debriefing upon submitting the annual report.

f. The permittee must submit two copies of any article, publication, or other product created as a result of the information gained or work completed under this permit, including materials generated at any time in the future following expiration of this permit.

g. Any publications and/or reports resulting from activities conducted under the authority of this permit must include the notation that the activity was conducted under permit number PMNM-2011-001. This requirement does not apply to publications or reports produced by the news media.

h. All required submissions (including plans, logs, reports, and publications) shall be provided to the Monument official at the address indicated in General Condition #1.

23. All data acquired or created in conjunction with this permit will be submitted with the summary report, and annual report. Photographic and video material is considered data. The permittee retains ownership of any data, (including but not limited to any photographic or video material), derivative analyses, or other work product, or other copyrightable works, but the Federal Government and the State of Hawai'i retain a lifetime, non-exclusive, worldwide, royalty-free license to use the same for government purposes, including copying and redissemination, and making derivative works. The permittee will receive acknowledgment as to its ownership of the data in all future use. This requirement does not apply to data acquired or created by the news media.

24. Because photographic or video material that is created for personal use (i.e., not specifically acquired or created in conjunction with this permit) could unintentionally collect data that is also valuable for management purposes, the Co-Trustees reserve the right to request copies of any such material and the permittee agrees to provide a copy of such material within a reasonable time. The Co-Trustees may use such material for management purposes.

25. Any question of interpretation of any term or condition of this permit will be resolved by the Co-Trustees.

SPECIAL TERMS AND CONDITIONS:

1. This permit is not to be used for nor does it authorize the sale of collected organisms. Under this permit, the authorized activities must be for noncommercial purposes not involving the use or sale of any organism, by-products, or materials collected within the Monument for obtaining patent or intellectual property rights.

2. The permittees may not convey, transfer, or distribute, in any fashion (including, but not limited to, selling, trading, giving, or loaning) any coral, live rock, or organism collected under this permit without the express written permission of the Co-Trustees.

3. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocols attached to this permit.

4. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.

5. Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or near-shore waters in the State Marine Refuge

6. No fishing is allowed in State Waters except as authorized under State law for subsistence, traditional, and customary practices by Native Hawaiians.

7. If there is any Hawaiian monk seal or any other protected species in the area when performing any permitted activity, the activity shall cease until the animal(s) depart the area, except as permitted for specific management of that species.

8. To ensure the protection of Monument resources, the permittee must conduct all activities in accordance with the following Monument Best Management Practices and guidelines, as attached:
    a. Protocol for Acquiring Avian Blood Samples
    b. Human Hazards to Seabirds Briefing
    c. Boat Operations and Diving Activities
    d. Protocol to Reduce Impact to Laysan Finch
    e. General Storage and Transport Protocols for Collected Samples
    f. Special Conditions and Rules for Moving Between Islands and Atolls and Packing for Field Camps
    g. Protocols Necessary for Conducting Trolling Research and Monitoring
    h. Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles
    i. Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment
    j. Precautions for Minimizing Human Impacts on Endangered Land Birds
    k. Special Conditions and Rules for Small Boat Operations at Tern Island

PMNM-2011-001
Co-Trustee Management Permit

9. All Permittees going to Midway will have shoes and luggage inspected for invasive species prior to departure or immediately upon arrival in Midway.

10. For all activities requiring landing on uninhabited islands an authorized staff escort trained for each particular uninhabited island will be included on the landing team.

11. Permittee is required to work in conjunction with the U.S. Fish and Wildlife Service regarding any arrangements at sites within the Hawaiian Islands and Midway Atoll National Wildlife Refuges, and with the State of Hawai'i Kure Atoll Seabird Sanctuary Manager at Kure Atoll. The Refuge Managers for the above locations listed in the Permitted Activity Locations section must be notified at least 72 hours and not more than 30 days prior to arrival. Upon departing, notification to the appropriate Refuge Manager is required. Contact information for notifications are listed below:
    a. French Frigate Shoals: Paula Hartzell, Tern Island Deputy Refuge Manager; email Paula_Hartzell@fws.gov, or telephone 808-792-9554.

    b. Midway Atoll: Acting Midway Refuge Manager, John Klavitter; email John_Klavitter@fws.gov, or telephone 808-954-4817.

    c. Laysan Island: Laysan Biotech, Cindy Rehkemper; email Cindy_Rehkemper@fws.gov and Laysanfws@stratosnet.com , or telephone 808-792-9487.

    d. Kure Atoll: State Seabird Sanctuary Manager, Cynthia Vanderlip; email kureatoll.dlnr@amosconnect.com.

Your signature below, as permittee, indicates that you accept and agree to comply with all terms and conditions of this permit. This permit becomes valid on the date when signed by the last Monument Official. Please note that the expiration date on this permit will not be extended by a delay in your signing below.

Thomas R. Edgerton 12/23/10

Mr. Tom Edgerton
Superintendent, Papahānaumokuākea Marine National Monument
Department of Interior
U.S. Fish and Wildlife Service

Date

Administrator (TBD)
Division of Aquatic Resources
Department of Land and Natural Resources
State of Hawaii

Date

Mr. Paul Conry
Administrator, Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii

Date

Ms. T. ʻAulani Wilhelm
Superintendent, Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

Date

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Mr. Tom Edgerton | Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of Interior
U.S. Fish and Wildlife Service

03JAN11

for Administrator (TBD) | Date
Division of Aquatic Resources
Department of Land and Natural Resources
State of Hawaii

Mr. Paul Conry | Date
Administrator, Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii

Ms. T. ʻAulani Wilhelm | Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

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Mr. Tom Edgerton — Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of Interior
U.S. Fish and Wildlife Service

Administrator (TBD) — Date
Division of Aquatic Resources
Department of Land and Natural Resources
State of Hawaii

Paul J Conry — 1/3/11

Mr. Paul Conry — Date
Administrator, Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii

Ms. T. ʻAulani Wilhelm — Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

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Mr. Tom Edgerton — Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of Interior
U.S. Fish and Wildlife Service

Administrator (TBD) — Date
Division of Aquatic Resources
Department of Land and Natural Resources
State of Hawaii

Mr. Paul Conry — Date
Administrator, Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii

for — 1-11-11

Ms. T. 'Aulani Wilhelm — Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

Attachments (15):

1. Papahānaumokuākea Marine National Monument Rules and Regulations
2. Maps of the Papahānaumokuākea Marine National Monument
3. Permit Acknowledgment Form
4. Permitted Personnel List
5. Protocol for Acquiring Avian Blood Samples
6. Human Hazards to Seabirds Briefing
7. Boat Operations and Diving Activities
8. Protocol to Reduce Impact to Laysan Finch
9. General Storage and Transport Protocols for Collected Samples
10. Special Conditions and Rules for Moving Between Islands and Atolls and Packing for Field Camps
11. Protocols Necessary for Conducting Trolling Research and Monitoring
12. Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles
13. Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment
14. Precautions for Minimizing Human Impacts on Endangered Land Birds
15. Special Conditions and Rules for Small Boat Operations at Tern Island

William J. Aila Jr.
Interim Chairperson
Board of Land and Natural Resources
Department of Land and Natural Resources
State of Hawaii

Thomas R. Edgerton 12/23/10

Tom Edgerton
Superintendent, Papahānaumokuākea Marine National Monument
Department of Interior
U.S. Fish and Wildlife Service

for 12-22-10

T. ʻAulani Wilhelm
Superintendent
National Oceanic and Atmospheric Administration
Papahānaumokuākea Marine National Monument

Appendix G
Part 2: Papahānaumokuākea Marine National Monument Special Conditions, Rules for Moving Between Islands and Atolls, and Packing For Field Camps

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The islands and atolls of the Papahanaumokuakea Marine National Monument (Monument) and the Hawaiian Islands National Wildlife Refuge are special places providing habitat for many rare, endemic plants and animals. Many of these species are formally listed as Endangered under the Endangered Species Act. Endemic plants and insects, and the predators they support, are especially vulnerable to the introduction of competing or consuming species. Such introductions may cause the extinction of island and reef endemics, or even the destruction of entire island or reef ecological communities. Notable local examples include: the introduction of rabbits to Laysan Island in 1902 which caused the extinction of numerous plant and insect species, and 3 endemic landbird species; the introduction of rats to many Pacific Islands causing the elimination of many burrowing seabird colonies; the introduction of the annual grass, sandbur, to Laysan Island where it has crowded out native bunch grass thus, eliminating nesting habitat for the Endangered Laysan finch; and, the introduction and proliferation of numerous ant species throughout the Pacific Islands to the widespread detriment of endemic plant and insect species.

Several of the islands within the Monument are especially pristine, and as a result are rich in rare and special plants and animals. Nihoa Island has at least 17 endemic and rare insect species, 5 Endangered plants and 2 Endangered birds. Necker Island has Endangered plants and 11 endemic insects. Laysan Island has Endangered plants, 9 endemic arthropods and the Endangered Laysan finch and Laysan duck. Other islands in the Monument such as Lisianski, and islets in Atolls such as Pearl and Hermes Reef and French Frigate Shoals provide homes for a variety of endemic and/or endangered species and require special protection from alien species.

Other Pacific Island such as Kure and the "high islands" (Oahu, Hawaii, Maui, Kauai, etc.) as well as, certain islands within Midway Atoll, Pearl and Hermes Reef and French Frigate Shoals have plants and/or animals that are of high risk for introduction to the relatively pristine islands discussed above. Of special concerns are snakes, rats, cats, dogs, ants and a variety of other insect and plant species. Harmful plant species of highest concern that we know of are *Verbesina encelioides, Cenchrus echinatus, and Setaria verticillata.*

The Co-trustees are responsible for the management and protection of the islands, reefs and wildlife of the Monument. No one is permitted to set foot within the Monument without the express permission of the Co-trustees through the permitting process. Because of the above concerns, the following restrictions on the movement of personnel and materials throughout the Monument exist.

The Following Conditions and Rules apply to the all islands within the Monument with the exception of those at French Frigate Shoals and Midway Atoll:

Definitions:

"**New**" means off the shelf and never used anywhere but the island in question.

"**Clothing**" is all apparel , shoes, socks, over and under garments.

"**Soft gear**" is all gear such as daypacks, fannypacks, packing foam or similar material, camera bags, camera/binocular straps, microphone covers, nets, holding or weighing bags, bedding, tents, luggage, or any fabric, fiber, paper or material capable of harboring seeds or insects.

1. Any personnel who will be landing boats, and staying within the boats, at any island should have clean clothes and shoes.

2. Any personnel going ashore at any island and moving inshore from the immediate area in which waves are breaking, or beyond the intertidal area, at the time of landing must have new footwear, new or island specific clothes and new or island specific soft gear. All must be frozen for at least 48 hours prior to landing.

3. Any personnel entering any vegetated area, regardless of how sparse the vegetation, must have new footwear, new clothes and new soft gear all frozen for at least 48 hours prior to landing.

4. To avoid transport of seeds from within small boats the following protocol should be followed. For islands with safe or sandy landing conditions, one should keep quarantine shoes/socks inside quarantine containers until the island is reached. One should go ashore bare foot, and then don the quarantine shoes. Non quarantine shoes should be removed in the small boat, put into a bucket or some kind of sealed container, and left enclosed in that container until the person departs the island. The sealed container, if clean on the outside, may go ashore, but should not be opened ashore. For landings which are rocky, rough, and relatively unsafe (such as Necker and Nihoa) for safety reasons, quarantine shoes should be donned when inside the small boats, but care should be taken to look for seeds and insects which may be in the small boat.

5. Soft gear may not be moved between islands. Hard gear must be thoroughly cleaned and frozen for at least 48 hours between islands.

6. During transit, clothing and gear coming off Kure, Midway, or any islet of French Frigate Shoals must be carefully sequestered to avoid contamination of gear bound for cleaner islands. Special care must be taken to avoid contaminating gear storage areas and quarters aboard transporting vessels with seeds or insects from these islands.

7. Regardless of origin or destination, inspect and clean all equipment, supplies, etc., just prior to any trip to the Monument. Carefully clean all clothing, footwear and softgear following use to minimize risk of cross contamination of materials between islands.

8. Pack supplies in plastic buckets with fitted lids or other sealable metal or plastic containers since they can be thoroughly cleaned inside and out. Cardboard is not permitted on islands. Cardboard boxes disintegrate in a short time and harbor seeds, animals, etc., which cannot be easily found or removed. Wood is not permitted unless sealed (painted or varnished) on all surfaces and frozen for 48 hours.

   Wooden boxes can also harbor insects and seeds and therefore are only allowed if well constructed (tight fitting seams are required). All wood must be treated, and inside and outside surfaces must be painted or varnished to provide a smooth, cleanable finish that seals all holes.

9. Freeze or tarp and fumigate then seal all equipment (clothes, books, tents, everything) just prior to departure. Food and cooking items need not be fumigated but should be cleaned and frozen, if freezable. Cameras, binoculars, radios, and other electronic equipment must be thoroughly cleaned, including internal inspection whenever possible, but do not need to be frozen or fumigated. Such equipment can only be packed in wooden crates if treated as in #2 above. Any containers must contain new, clean packing materials and be frozen or fumigated.

10. At present, Tern Island is the singular exception to the above rule, having less stringent rules due to the large number of previously established alien species. Careful inspection of all materials and containers is still required. However, it is acceptable to use wooden and cardboard containers for transporting supplies to Tem Island. Also, there is no requirement for freezing or fumigating items disembarked at Tem. Although requirements for Tem Island are more lax, the Refuge is still concerned about the possibilities of new introductions. Do not wear clothing to Tern Island that has been worn at Pearl and Hermes, Midway Atoll or Kure Atoll.

Additional Special Conditions for Travel to Nihoa and Necker (Mokumanamana) Islands: Nihoa and Necker are the most pristine locations in the Monument. Nihoa is home to the highest number of federally listed endangered species in the Monument. Many areas of these small rugged islands are inaccessible. Introduction of any alien species could have disastrous results in a very short time. It would be almost impossible to mount any kind of control or eradication program on these islands should an alien species become established. Because of these reasons, access to Nihoa and Necker are strictly limited, and rules governing entry are more stringent.

Access to Nihoa and Necker by permittees will only be allowed under the accompaniment and supervision of a U.S. Fish and Wildlife Service (USFWS) Representative. The representative, who shall be appointed by the U.S. Fish and Wildlife Service Monument Manager will work with permittees to assure careful compliance with all rules for inspection, handling and preparation of equipment. The USFWS Representative will have the authority to control and limit access to various parts of the island to protect animals, plants and archaeological sites, especially endangered species. The USFWS Representative will have the authority to disallow access to the island, or order an immediate departure from the island if conditions for working on the island are not met or are violated in some way.

All field equipment made out of fabric material or wood must be new, and never previously used in the Northwestern or main Hawaiian Islands. Equipment previously purchased or made for use on Nihoa and Necker that has been carefully sealed and stored while away from Nihoa and Necker, and not used elsewhere, may also be brought onto the island. Rules for freezing and/or fumigating are as described for other sites in the Monument (see above).

Clothing, footwear (shoes, slippers, socks, etc.), daypacks (soft gear) must be new, unused, or previously only used on Nihoa (or Necker) and carefully sealed and stored while off of the island. Hard gear such as camera, and equipment must be thoroughly cleaned and inspected.

<u>Additional Special Conditions for Travel Within Pearl and Hermes Atoll</u>: In recent years *Verbesina encelioides* has been introduced to Southeast Island within Pearl and Hermes Atoll. This noxious weed has taken over a large portion of the island. To prevent the further spread of this weed to the other islets within this atoll the following precaution must be taken:

1. Every person should have one set of quarantine gear and clothing for Southeast Island and one set of quarantine gear and clothing for all other islets in the atoll. For instance the same clothing, and if needed camping gear, may be used at north and seal kittery, but anything used at southeast needs to stay off all other islets in the atoll. Do not use the outer islet clothing and gear on Southeast Island.

2. Carefully inspect small boats and their associated equipment when traveling between islets at Pearl and Hermes Atoll. Since folks likely take one anchor ashore and put one anchor in the water there is potential for seed dispersal on anchor lines as well as from within the small boats. This needs to be watched very carefully.

<u>Additional Special Conditions for Food</u>: Fresh foods such as fruits, vegetables, leafy vegetables and tubers are not permitted on quarantine enforced islands (Necker, Nihoa, Laysan, Garner Pinnacles, Lisianski and Pearl and Hermes Reef). Concern is not only that certain species such as tomatoes could easily become established but that decomposing organic waste can also harbor microbes and insects and can act as an introduction vector. Soil can contain many seeds, eggs, larvae, etc., and cannot be transported to or between islands. All other food that can be safely frozen (this does not apply to food in cans or glass jars) must be packaged in air tight containers just as all other gear and frozen for 48 hours.

Appendix G
Part 3: Procedures for Minimizing Impacts to Endangered Laysan Finch

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The following avoidance and minimization measures will reduce the risk of harm to the Laysan finch:

- To reduce the risk of inadvertent drowning of Laysan finch at the campsite:
- Buckets will always be overturned so that they cannot collect rainwater.
- Laundry buckets must have lids while laundry is soaking.
- Water-filled buckets for dish washing (or for any other purpose) will always be attended.
- Tarps *(e.g.,* those covering propane, etc.) will be tucked in tightly so that they cannot collect rainwater.
- Garbage cans used for desalinization will have netting placed between the can and the lid. Care will be taken to make sure the lids close properly; faulty positioning of hoses can interfere with proper closure.
- To minimize accidental entanglement of Laysan finches at the campsite:
- Fabric with loose threads will be burned to minimize the risk of Laysan finch entanglement. Laysan finch feet can become entangled when fabric is hung out to dry.
- Loose threads will be cut off tents and tarps.
- Anything with small mesh *(e.g.,* bird nets) will be put away to avoid Laysan finch entanglement.
- minimize impacts to Laysan finch from general camp activities and maintenance:
- Camp supplies and water jugs will be aligned with ample space between rows so that finches will not get trapped. Storage jugs will always be capped.
- Burn barrels must be attended at all times when burning trash. When not burning, any vents or rust-eaten holes in the barrel or lid will be covered *(e.g.,* with rocks).
- For stability reasons, buckets will not be stacked more than two high. Personnel will watch for leaning buckets or water jugs and level the sand beneath leaning buckets if necessary.
- Tents will be zipped at all times (day and night) so that finches cannot enter.
- Laysan finches will not be fed or allowed access to human food. Laysan finch dependency on the camp could potentially result in adverse impacts to the finches when campsites are dismantled.
- On the islands of Pearl and Hermes, Laysan finches appear to be limited by nest sites, therefore, they nest in debris (driftwood, plastic pipes, baskets, etc.). Thus, the beaches will not be cleaned or debris disturbed as this may destroy a nest. In an effort to prevent nesting in undesirable locations, camp gear must be checked daily during the nesting season (spring and summer) for signs that finches are building nests on or under gear. If it is determined nest building has begun, the nest site should be modified to prevent nest completion.

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APPENDIX H – DISPOSITION OF MARINE MAMMAL PARTS/BIOLOGICAL SAMPLES

Following federal regulations (50 CFR 216.37 Marine mammal parts) governing the transfer of marine mammal parts taken or imported under permit is required in all research and enhancement permits that authorize sample collection. 50 CFR 216.37 specifies the following:

With respect to marine mammal parts acquired by take or import authorized under a permit:

(a) Marine mammal parts are transferrable if:

> (1) The person transferring the part receives no remuneration of any kind for the marine mammal part;
>
> (2) The person receiving the marine mammal part is:
>
> > (i) An employee of NMFS, the U.S. Fish and Wildlife Service, or any other governmental agency with conservation and management responsibilities, who receives the part in the course of their official duties;
> >
> > (ii) A holder of a special exception permit which authorizes the take, import, or other activity involving the possession of a marine mammal part of the same species as the subject part; or
> >
> > (iii) In the case of marine mammal parts from a species that is not depleted, endangered or threatened, a person who is authorized under section 112(c) of the MMPA and subpart C of this part to take or import marine mammals or marine mammal parts;
> >
> > (iv) Any other person specifically authorized by the Regional Director, consistent with the requirements of paragraphs (a)(1) and (a)(3) through (6) of this section.
>
> (3) The marine mammal part is transferred for the purpose of scientific research, maintenance in a properly curated, professionally accredited scientific collection, or education, provided that, for transfers for educational purposes, the recipient is a museum, educational institution or equivalent that will ensure that the part is available to the public as part of an educational program;

(4) A unique number assigned by the permit holder is marked on or affixed to the marine mammal part or container;

(5) The person receiving the marine mammal part agrees that, as a condition of receipt, subsequent transfers may only occur subject to the provisions of paragraph (a) of this section; and

(6) Within 30 days after the transfer, the person transferring the marine mammal part notifies the Regional Director of the transfer, including a description of the part, the person to whom the part was transferred, the purpose of the transfer, certification that the recipient has agreed to comply with the requirements of paragraph (a) of this section for subsequent transfers, and, if applicable, the recipient's permit number.

(b) Marine mammal parts may be loaned to another person for a purpose described in paragraph (a)(3) of this section and without the agreement and notification required under paragraphs (a)(5) and (6) of this section, if: (1) A record of the loan is maintained; and (2) The loan is for not more than one year. Loans for a period greater than 12 months, including loan extensions or renewals, require notification of the Regional Director under paragraph (a)(6).

(c) Unless other disposition is specified in the permit, a holder of a special exception permit may retain marine mammal parts not destroyed or otherwise disposed of during or after a scientific research or enhancement activity, if such marine mammal parts are: (1) Maintained as part of a properly curated, professionally accredited collection; or (2) Made available for purposes of scientific research or enhancement at the request of the Office Director.

(d) Marine mammal parts may be exported and subsequently reimported by a permit holder or subsequent authorized recipient, for the purpose of scientific research, maintenance in a properly curated, professionally accredited scientific collection, or education, provided that:

(1) The permit holder or other person receives no remuneration for the marine mammal part;

(2) A unique number assigned by the permit holder is marked on or affixed to the marine mammal specimen or container;

(3) The marine mammal part is exported or reimported in compliance with all applicable domestic and foreign laws;

(4) If exported or reimported for educational purposes, the recipient is a museum, educational institution, or equivalent that will ensure that the part is available to the public as part of an educational program; and

(5) Special reports are submitted within 30 days after both export and reimport as required by the Office Director under 216.38.

Appendix I, Table 1: Activities Proposed under the Alternative 1, Status Quo.

Table 1. Proposed annual takes of Hawaiian monk seals under the Status Quo Alternative. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles. Activities would occur under Permit No. 10137 through June 2014, and the same activities are proposed to be permitted beyond 2014 under this alternative.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
1. Monitoring	Any	Both	150	3	Disturbance from visual observation and photo-identification during ground monitoring and vessel and aerial surveys (including unmanned aerial and amphibious vehicles); and from installation and repair of remote video cameras	MHI	Annually at any time of year.
			50	1		Nihoa Is.	
			50	1		Necker Is.	
			250	5		French Frigate Shoals	
			10	1		Gardner Pinnacles	
			250	3		Laysan Is.	
			225	3		Lisianski Is.	
			200	3		Pearl and Hermes Reef	
			100	2		Midway Atoll	
			150	2		Kure Atoll	
			5	1		Johnston Atoll	
2a. Tagging	Any except nursing pups, lactating or obviously pregnant females.	Both	30	3	Restraint, tagging (flipper and PIT), collect flipper plugs, morphometrics (length and girth), whisker sampling (cut)	MHI	Annually at any time of year (predominantly during summer field camps).All of the animals may also be taken by Tasks 1 and 3.Weaned pups in the MHI may also have ultrasound performed concurrent with flipper tagging. At French Frigate Shoals, 35 weaned pups of either sex may have a sonic tag deployed on a third flipper tag (annually over three years).
			25	1		Nihoa Is.	
			15	1		Necker Is.	
			150	3		French Frigate Shoals	
			75	3		Laysan Is.	
			50	3		Lisianski Is.	
			50	3		Pearl and Hermes Reef	
			25	2		Midway Atoll	
			35	2		Kure Atoll	
			1	1		Johnston Atoll	
2b. Retagging	Any except nursing pups, lactating or obviously pregnant females.	Both	100	1	Restraint, retagging (flipper), flipper plugs, morphometrics, whisker sampling (cut)	Hawaiian Archipelago	Annually at any time of year. Seals may have been taken by monitoring (Task 1) and may have been tagged in previous years.

Table 1. Proposed annual takes of Hawaiian monk seals under the Status Quo Alternative. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles. Activities would occur under Permit No. 10137 through June 2014, and the same activities are proposed to be permitted beyond 2014 under this alternative.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
3. Marking	Any	Both	75	2	Temporary bleach marking	MHI	Annually at any time of year. All of the animals may also be taken by monitoring (Task 1) and tagging (Task 2).
			30	2		Nihoa Is.	
			30	2		Necker Is.	
			250	2		French Frigate Shoals	
			250	2		Laysan Is.	
			225	2		Lisianski Is.	
			200	2		Pearl and Hermes Reef	
			100	2		Midway Atoll	
			150	2		Kure Atoll	
			5	1		Johnston Atoll	
4. Health Screening and Foraging Studies	Any healthy seal excluding lactating females with pups and nursing pups	Both	70	2	Restraint, sedation, tagging, blood sampling, swabs, blubber biopsy, whisker sampling (cut without sedation or pull with sedation), weight, morphometrics, ultrasound, instrumentation	Hawaiian Archipelago	Annually any time of year. Sixty (60) healthy seals may be instrumented. Recaptures for instrument removal and sampling. All animals may have been taken by Tasks 1-3.
	Any unhealthy seal excluding lactating females with pups and nursing pups	Both	30	2	Restraint, sedation, tagging, blood sampling, swabs, blubber biopsy, whisker sampling (cut or pull), morphometrics, ultrasound, treatment (lance and cleanse abscesses), humane euthanasia or incidental mortality of 10 moribund animals	Hawaiian Archipelago	Annually at any time of year. Includes humane euthanasia of up to 10 moribund or severely injured seals at discretion of veterinarian authorized over a five-year period. All animals may have been taken by Tasks 1-3.

Table 1. Proposed annual takes of Hawaiian monk seals under the Status Quo Alternative. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles. Activities would occur under Permit No. 10137 through June 2014, and the same activities are proposed to be permitted beyond 2014 under this alternative.							
Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
5. Intestinal Parasite Treatment	Pups ≥ 120 days post-weaning and juveniles up to age 3	Both	200	4	Restraint, weight, morphometrics, ultrasound, fecal collection (voided feces, fecal loop, or digital extraction), whisker sampling (cut), anti-helmintic treatment	Hawaiian Archipelago	Annually, year-round; may be combined with other capture activities. Medical treatments authorized at discretion of consulting/attending veterinarian.
				8	Additional anti-helmintic treatments via topical application without capture and restraint		
6. Translocation	Nursing pup	Both	20	6	Capture, restraint, and relocation by hand to natural mother or prospective foster mother, whisker sampling (cut)	Hawaiian Archipelago, Johnston Atoll	Establishing/re-establishing maternal association. Annually at any time of year but predominantly during summer field camps. Most takes will occur in the NWHI (intra-island/atoll).
	Weaned Pup	Both	35	3	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, fecal, whisker sampling – cut or pull), and relocation from high risk areas via boat, ship, vehicle, or air craft	Hawaiian Archipelago, Johnston Atoll	Risk alleviation. Annually at any time of year. Most takes occur at French Frigate Shoals (intra-atoll) or within the Main Hawaiian Islands.

Table 1. Proposed annual takes of Hawaiian monk seals under the Status Quo Alternative. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles. Activities would occur under Permit No. 10137 through June 2014, and the same activities are proposed to be permitted beyond 2014 under this alternative.							
Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
	Weaned Pup	Both	6	3	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, fecal, whisker sampling – cut or pull), instrumentation, temporary holding, translocation from areas of low survival via boat and ship	NWHI	Seals may be translocated within the NWHI.
7. Adult Male Removal	Adult	Male	10	2	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, fecal, whisker sampling – cut or pull), instrumentation/trans-location, permanent captivity, or euthanasia	Hawaiian Archipelago; Johnston Atoll	Up to 10 males may be removed over a five year period. Euthanasia via IV sodium pentobarbital, captive penetrating bolt, or gunshot.
8. Disentangle	Any	Both	As warranted (likely not to exceed 25/year)	>1	Disentanglement and dehooking (with or without capture, sedation, and release); whisker sampling (cut or pull)	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year. All animals may have been taken by Tasks 1-3.
9. Conduct Necropsies	Any	Both	As warranted	1	Necropsy any seal found dead, that died during restraint, or that was euthanized. After necropsy, use seal tissue as bait for permitted shark removals to enhance seal survival.	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year.
10. Opportunistic Retrieval of samples	Any	Both	Unlimited samples	Unlimited samples	Collect parts (placentae, scats, spews, and molted fur/skin) from haul out areas	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year but predominantly during summer field camps.

Table 1. Proposed annual takes of Hawaiian monk seals under the Status Quo Alternative. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles. Activities would occur under Permit No. 10137 through June 2014, and the same activities are proposed to be permitted beyond 2014 under this alternative.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
11. Import and Export Parts	Any	Both	Unlimited import/ export	Unlimited samples	Export (and re-import) Hawaiian monk seal samples. Import (and re-export) Mediterranean monk seal specimens for research related to monk seal conservation	World-wide (including but not limited to Canada, the Netherlands, Scotland, Greece, Australia)	Annually at any time of year.
12. Incidental harassment of monk seals	Any	Both	200	2	Incidental harassment during any research and enhancement activity	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year. Total incidental harassment over all activities.
13. Unintentional Mortality	Any	Both	2	1	During any research or enhancement activity	Hawaiian Archipelago; Johnston Atoll	Four unintentional mortalities over a five-year period not to exceed 2 deaths in any one year.

Appendix I, Table 2: Activities Proposed under Alternative 3 – Limited Translocation (Preferred Alternative).

Table 2. Proposed annual takes of Hawaiian monk seals under Alternative 3 – Limited Translocation (Preferred Alternative). Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
1. Monitoring (Research)	Any	Both	250	5	Disturbance from visual observation and photo-identification during ground monitoring (including terrestrial/amphibious unmanned vehicles), vessel and aerial surveys (including unmanned aerial vehicles); and from installation and repair of remote video cameras	MHI	Annually at any time of year.
			100	3		Nihoa Is.	
			75	3		Necker Is.	
			250	5		French Frigate Shoals	
			10	1		Gardner Pinnacles	
			400	5		Laysan Is.	
			275	5		Lisianski Is.	
			400	5		Pearl and Hermes Reef	
			150	5		Midway Atoll	
			200	5		Kure Atoll	
			5	3		Johnston Atoll	
2.a Tagging (Research)	Any except most nursing pups, lactating or	Both	60	3	Restraint, tagging (flipper and PIT), collect flipper plugs, vibrissae, morphometrics (length and girth), ultrasound	MHI	Annually at any time of year (predominantly during summer field camps).
			25	3		Nihoa Is.	

Table 2. Proposed annual takes of Hawaiian monk seals under Alternative 3 – Limited Translocation (Preferred Alternative). Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
	obviously pregnant females.		15	3		Necker Is.	Seals may also be taken by Tasks 1 and 3. Seals may also have ultrasound performed concurrent with flipper tagging At French Frigate Shoals, 35 weaned pups of either sex may have a sonic tag deployed on a third flipper tag. Any remaining nursing pups at end of field season may be tagged.
			100	3		French Frigate Shoals	
			75	3		Laysan Is.	
			70	3		Lisianski Is.	
			70	3		Pearl and Hermes Reef	
			50	3		Midway Atoll	
			50	3		Kure Atoll	
			5	3		Johnston Atoll	
2.b Retagging (Research)	Any except most nursing pups, lactating or obviously pregnant females	Both	100	1	Restraint, retagging (flipper), flipper plugs, vibrissae, morphometrics	Hawaiian Archipelago	Annually at any time of year. Seals may have been taken by disturbance (Task 1) and may have been tagged in previous years.
3. Marking (Research)	Any	Both	150	3	Temporary bleach marking	MHI	Annually at any time of year. All of the animals may also be taken by disturbance (Task 1) and tagging (Task 2).
			60	3		Nihoa Is.	
			30	3		Necker Is.	
			250	3		French Frigate Shoals	
			250	3		Laysan Is.	

Table 2. Proposed annual takes of Hawaiian monk seals under Alternative 3 – Limited Translocation (Preferred Alternative). Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
			250	3		Lisianski Is.	
			250	3		Pearl and Hermes Reef	
			100	3		Midway Atoll	
			150	3		Kure Atoll	
			5	3		Johnston Atoll	
4.a Health Screening and Instrumenta-tion (Research)	Any healthy seal excluding lactating females with pups and nursing pups	Both	100	2	Restraint, sedation, tagging, sampling (blood, swabs, blubber biopsy, vibrissae), weight, morphometrics, ultrasound, instrumentation	Hawaiian Archipelago and Johnston Atoll	Annually any time of year. Sixty (60) healthy seals may be instrumented. Recaptures for instrument removal and sampling. All animals may have been taken by Tasks 1-3.
4.b Health Screening, Treatment, and Instrumentation (Research and Enhancement)	Any unhealthy seal excluding lactating females with pups and nursing pups	Both	30	2	Restraint, sedation, tagging, sampling (blood, swabs, blubber biopsy, vibrissae), bleach marking, treatment if needed (lance abscesses, administer long-acting antibiotic), weight, morphometrics, ultrasound, instrumentation, humane euthanasia or incidental mortality of 10 moribund animals	Hawaiian Archipelago and Johnston Atoll	Annually at any time of year. Includes humane euthanasia of up to 10 moribund or severely injured seals at discretion of veterinarian over a five-year period. All animals may have been taken by Tasks 1-3.

Table 2. Proposed annual takes of Hawaiian monk seals under Alternative 3 – Limited Translocation (Preferred Alternative). Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
4.c Health Screening, Treatment, and Instrumentation (Enhancement)	Any unhealthy seal excluding lactating females with pups and nursing pups	Both	As warranted (est. < 30)	As directed by vet	Restraint, treatment (lance abscesses, administer long-acting antibiotic), sedation, vibrissae, bleach marking, and instrumentation	Hawaiian Archipelago and Johnston Atoll	Annually at any time of year. All animals may have been taken by Tasks 1-3. May also occur during health screening of unhealthy seals.
5.a Intestinal Parasite Treatment (De-worming Research and Enhancement)	Pups $\geq$ 120 days post-weaning and juveniles up to age 3	Both	300	8	Restraint, weight, morphometrics, ultrasound, fecal collection (voided feces or fecal sample collected via fecal loop or digital extraction); up to 4 deworming treatments using oral or injectable drugs; up to 4 post-treatment monitoring takes at regular intervals (visual assessments and recapture for weight, morphometrics, and fecal sampling)	Hawaiian Archipelago and Johnston Atoll	Annually, year-round. Treatments may be combined with other activities requiring restraint and sedation Medical treatments authorized at discretion of consulting/attending veterinarian. If monthly treatment determined effective during research phase, capture/restraint for follow up sampling and morphometrics would be discontinued and only topical treatment would be administered.
				4	Restraint, weight, morphometrics, ultrasound, fecal collection (voided feces, fecal loop, or digital extraction), and topical anti-helmintic treatment		
				8	Additional topical anti-helmintic treatments via topical application without capture and restraint (up to 12 monthly treatments annually via topical anti-helmintic);		

Table 2. Proposed annual takes of Hawaiian monk seals under Alternative 3 – Limited Translocation (Preferred Alternative). Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
6.a Translocation to Save Abandoned Pups (Enhancement)	Nursing pup	Both	As warranted (est. < 20)	6	Capture, restraint, and relocation by hand to natural mother or prospective foster mother	Hawaiian Archipelago, Johnston Atoll	Establishing/re-establishing maternal association. Annually at any time of year but predominantly during summer field camps. Most takes will occur in the NWHI (intra-island/atoll).
6.b Translocation to Alleviate Risks (Enhancement)	All	Both	As warranted (est. < 60)	3	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation, temporary holding, and relocation from high risk areas via boat, ship, vehicle, or air craft	Hawaiian Archipelago, Johnston Atoll	Risk alleviation. Annually at any time of year. Translocations within or between any subpopulations in the species range allowed. Pups near weaning (e.g., within a few days of the mother leaving) and that are at high risk of mortality may be translocated. Seals may also be hazed away from dangerous locations.
6.c Two-Stage Translocation (Enhancement)	Weaned Pup	Both	20	3	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation, temporary holding, translocation from areas of low survival via boat, ship, vehicle, or aircraft	Hawaiian Archipelago, Johnston Atoll	Enhance survival: 1st stage of two-stage translocation. Annually at any time of year. Mostly females, but males when warranted. **Translocations within the NWHI or from the MHI to the NWHI, are allowed, *but not from the NWHI to MHI.*** Details to be determined through application of decision framework in Appendix A.
	Juvenile and Sub-adult	Both	30	3	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation, temporary holding, translocation via boat, ship, vehicle, or air craft	Hawaiian Archipelago, Johnston Atoll	Enhance survival: 2nd stage of two-stage translocation. Annually at any time of year. Mostly females, but males when warranted.

Table 2. Proposed annual takes of Hawaiian monk seals under Alternative 3 – Limited Translocation (Preferred Alternative). Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
					Surviving juveniles that had been translocated as weaned pups returned to their natal or other suitable site (includes seals from 1st stage of translocation that remained at recipient site until at least age 2 yr).		Translocations within or between any subpopulations in the species range allowed. *Note that seals originally born in the MHI and previously taken to the NWHI may be returned to the MHI.* Details to be determined through application of decision framework in Appendix A.
6.d Translocation for Research	Juvenile, sub-adult and adult	Both	6	3	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation, temporary holding, translocate between subpopulations	Hawaiian Archipelago, Johnston Atoll	Research to determine survival of translocated juveniles to inform two-stage translocation enhancement. Annually at any time of year. Translocations within or between any subpopulations in the species range allowed. Seals with unmanageable behavior in the MHI may be translocated to the NWHI as part of this study.
7.a Adult Male Removal (Enhancement)	Adult	Male	20	2	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation/translocation, permanent captivity, or euthanasia	Hawaiian Archipelago; Johnston Atoll	Up to 20 males may be removed annually, but only 10 lethal removals over a five-year period. Taste aversion testing may occur on adult male seals brought into captivity.
7.b Adult Male Hazing (Enhancement)	Adult	Male	As warranted (est. <10)	As warranted (est. <10)	Haze	Hawaiian Archipelago; Johnston Atoll	Aggressive males may be hazed away from conspecific victims in cases of immediate risk of injury or death or when specific males repeatedly attack conspecifics.

Table 2. Proposed annual takes of Hawaiian monk seals under Alternative 3 – Limited Translocation (Preferred Alternative). Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
8. Disentangle and Dehook (Enhancement)	Any	Both	As warranted (est. < 75)	As warranted	Disentanglement and dehooking (with or without capture, sedation, and release); collect vibrissae	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year. All animals may have been taken by Tasks 1-3.
9. Conduct Necropsies (Research)	Any	Both	As warranted	1	Necropsy any seal found dead, that died during restraint, or that was euthanized. After, use seal tissue as bait for permitted shark removals	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year.
10. Opportunistic Retrieval of Samples (Research)	Any	Both	1,100	Unlimited samples	Collect parts (placentae, scats, spews, and molted fur/skin) from haul out areas	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year but predominantly during summer field camps.
11. Import and Export Parts (Research)	Any	Both	Unlimited import/ export	Unlimited samples	Import/export/receive	World-wide (including but not limited to Canada, the Netherlands, Scotland, Greece, Australia)	Annually at any time of year. Export (and re-import) Hawaiian monk seal samples collected under the authority of this permit. Import (and re-export) Mediterranean monk seal specimens for research related to monk seal conservation.
12. Supplemental Feeding	Pup or Juvenile	Both	12	Unlimited	Supplemental feeding of post-rehabilitated seals	NWHI	Annually at any time of year seals may be fed at daily or longer intervals for up to one year.

Table 2. Proposed annual takes of Hawaiian monk seals under Alternative 3 – Limited Translocation (Preferred Alternative). Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
(Enhancement)							
13. Behavioral Modification (Research and Enhancement)	Any	Both	20	As warranted (est. <20)	Intentional harassment for behavior modification. Aversive conditioning and other methods including but not limited to: Capture restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation, translocation, temporary holding; hazing using visual, audible and tactile means; impeding movement with barriers, etc. Chemical taste aversion with lithium chloride in captivity only.	MHI	Annually at any time of year. Prevent seals from socializing with humans; alter behavior of seals socialized to humans or behaving in a manner dangerous to the seal or public safety. Seals may be brought into temporary captivity for taste aversion research. Experimental protocols to determine optimal methods.
14. Vaccinations (Research and Enhance-ment)	Any	Both	1,100	4	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), and administration of vaccine	Hawaiian Archipelago	Annually at any time of year.

Table 2. Proposed annual takes of Hawaiian monk seals under Alternative 3 – Limited Translocation (Preferred Alternative). Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
15. Incidental harassment of monk seals (Research and	Any	Both	400	3	Incidental harassment during any research and enhancement activity including opportunistic sample collection	Hawaiian Archipelago; Johnston Atoll	Total incidental harassment over all activities.
16.a Unintentional Mortality (Research)	Any	Both	2	1	During any research activity	Hawaiian Archipelago; Johnston Atoll	Four unintentional mortalities over a five-year period not to exceed two deaths in any one year.
16.b Unintentional Mortality (Enhancement)	Weaned pup	Both	2	1	During any enhancement activity	Hawaiian Archipelago; Johnston Atoll	Four unintentional mortalities over a five-year period not to exceed two deaths in any one year.
	Juvenile/ subadult	Both	4	1	During any enhancement activity	Hawaiian Archipelago; Johnston Atoll	Eight unintentional mortalities over a five-year period not to exceed four deaths in any one year.
	Adult	Male	2	1	During any enhancement activity	Hawaiian Archipelago; Johnston Atoll	Four unintentional mortalities over a five-year period not to exceed two deaths in any one year.

Appendix I, Table 3: Activities Proposed under Alternative 4 – Enhanced Implementation.

Table 3. Proposed annual takes of Hawaiian monk seals under Alternative 4 – Enhanced Implementation. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
1. Monitoring (Research)	Any	Both	250	5	Disturbance from visual observation and photo-identification during ground monitoring (including terrestrial/amphibious unmanned vehicles), vessel and aerial surveys (including unmanned aerial vehicles); and from installation and repair of remote video cameras	MHI	Annually at any time of year.
			100	3		Nihoa Is.	
			75	3		Necker Is.	
			250	5		French Frigate Shoals	
			10	1		Gardner Pinnacles	
			400	5		Laysan Is.	
			275	5		Lisianski Is.	
			400	5		Pearl and Hermes Reef	
			150	5		Midway Atoll	
			200	5		Kure Atoll	
			5	3		Johnston Atoll	
2.a Tagging (Research)	Any except most nursing pups,	Both	60	3	Restraint, tagging (flipper and PIT), collect flipper plugs, vibrissae, morphometrics (length and girth), ultrasound	MHI	Annually at any time of year (predominantly during summer field camps).
			25	3		Nihoa Is.	

Table 3. Proposed annual takes of Hawaiian monk seals under Alternative 4 – Enhanced Implementation. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
	lactating or obviously pregnant females.		15	3		Necker Is.	Seals may also be taken by Tasks 1 and 3. Seals may also have ultrasound performed concurrent with flipper tagging At French Frigate Shoals, 35 weaned pups of either sex may have a sonic tag deployed on a third flipper tag. Any remaining nursing pups at end of field season may be tagged.
			100	3		French Frigate Shoals	
			75	3		Laysan Is.	
			70	3		Lisianski Is.	
			70	3		Pearl and Hermes Reef	
			50	3		Midway Atoll	
			50	3		Kure Atoll	
			5	3		Johnston Atoll	
2.b Retagging (Research)	Any except most nursing pups, lactating or obviously pregnant females	Both	100	1	Restraint, retagging (flipper), flipper plugs, vibrissae, morphometrics	Hawaiian Archipelago	Annually at any time of year. Seals may have been taken by disturbance (Task 1) and may have been tagged in previous years.
3. Marking (Research)	Any	Both	150	3	Temporary bleach marking	MHI	Annually at any time of year. All of the animals may also be taken by disturbance (Task 1) and tagging (Task 2).
			60	3		Nihoa Is.	
			30	3		Necker Is.	
			250	3		French Frigate Shoals	

Table 3. Proposed annual takes of Hawaiian monk seals under Alternative 4 – Enhanced Implementation. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
			250	3		Laysan Is.	
			250	3		Lisianski Is.	
			250	3		Pearl and Hermes Reef	
			100	3		Midway Atoll	
			150	3		Kure Atoll	
			5	3		Johnston Atoll	
4.a Health Screening and Instrumentation (Research)	Any healthy seal excluding lactating females with pups and nursing pups	Both	100	2	Restraint, sedation, tagging, sampling (blood, swabs, blubber biopsy, vibrissae), weight, morphometrics, ultrasound, instrumentation	Hawaiian Archipelago and Johnston Atoll	Annually any time of year. Sixty (60) healthy seals may be instrumented. Recaptures for instrument removal and sampling. All animals may have been taken by Tasks 1-3.
4.b Health Screening, Treatment, and Instrumentation (Research and Enhancement)	Any unhealthy seal excluding lactating females with pups and nursing pups	Both	30	2	Restraint, sedation, tagging, sampling (blood, swabs, blubber biopsy, vibrissae), bleach marking, treatment if needed (lance abscesses, administer long-acting antibiotic), weight, morphometrics, ultrasound, instrumentation, humane euthanasia or incidental mortality of 10 moribund animals	Hawaiian Archipelago and Johnston Atoll	Annually at any time of year. Includes humane euthanasia of up to 10 moribund or severely injured seals at discretion of veterinarian over a five-year period. All animals may have been taken by Tasks 1-3.

Table 3. Proposed annual takes of Hawaiian monk seals under Alternative 4 – Enhanced Implementation. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
4.c Health Screening, Treatment, and Instrumentation (Enhancement)	Any unhealthy seal excluding lactating females with pups and nursing pups	Both	As warranted (est. < 30)	As directed by vet	Restraint, treatment (lance abscesses, administer long-acting antibiotic), sedation, vibrissae, bleach marking, and instrumentation	Hawaiian Archipelago and Johnston Atoll	Annually at any time of year. All animals may have been taken by Tasks 1-3. May also occur during health screening of unhealthy seals.
5.a Intestinal Parasite Treatment (De-worming Research and Enhance-ment)	Pups $\geq$ 120 days post-weaning and juveniles up to age 3	Both	300	8	Restraint, weight, morphometrics, ultrasound, fecal collection (voided feces or fecal sample collected via fecal loop or digital extraction); up to 4 deworming treatments using oral or injectable drugs; up to 4 post-treatment monitoring takes at regular intervals (visual assessments and recapture for weight, morphometrics, and fecal sampling)	Hawaiian Archipelago and Johnston Atoll	Annually, year-round. Treatments may be combined with other activities requiring restraint and sedation Medical treatments authorized at discretion of consulting/attending veterinarian. If monthly treatment determined effective during research phase, capture/restraint for follow up sampling and morphometrics would be discontinued and only topical treatment would be administered.
				4	Restraint, weight, morphometrics, ultrasound, fecal collection (voided feces, fecal loop, or digital extraction), and topical anti-helmintic treatment		
				8	Additional topical anti-helmintic treatments via topical application without capture and restraint (up to 12 monthly treatments annually via topical anti-helmintic);		

Table 3. Proposed annual takes of Hawaiian monk seals under Alternative 4 – Enhanced Implementation. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
6.a Translocation to Save Abandoned Pups (Enhancement)	Nursing pup	Both	As warranted (est. < 20)	6	Capture, restraint, and relocation by hand to natural mother or prospective foster mother	Hawaiian Archipelago, Johnston Atoll	Establishing/re-establishing maternal association. Annually at any time of year but predominantly during summer field camps. Most takes will occur in the NWHI (intra-island/atoll).
6.b Translocation to Alleviate Risks (Enhance-ment)	All	Both	As warranted (est. < 60)	3	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation, temporary holding, and relocation from high risk areas via boat, ship, vehicle, or air craft	Hawaiian Archipelago, Johnston Atoll	Risk alleviation. Annually at any time of year. Translocations within or between any subpopulations in the species range allowed. Pups near weaning (e.g., within a few days of the mother leaving) and that are at high risk of mortality may be translocated. Seals may also be hazed away from dangerous locations.
6.c Two-Stage Transloca-tion (Enhance-ment)	Weaned Pup	Both	20	3	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation, temporary holding, translocation from areas of low survival via boat, ship, vehicle, or aircraft	Hawaiian Archipelago, Johnston Atoll	Enhance survival: 1st stage of two-stage translocation. Annually at any time of year. Mostly females, but males when warranted. **Translocations within the NWHI, from the MHI to the NWHI, or from the NWHI to the MHI are allowed.** Details to be determined through application of decision framework in Appendix A.
	Juvenile and Sub-adult	Both	30	3	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation, temporary holding, translocation via boat, ship, vehicle, or air craft	Hawaiian Archipelago, Johnston Atoll	Enhance survival: 2nd stage of two-stage translocation. Annually at any time of year. Mostly females, but males when warranted.

Table 3. Proposed annual takes of Hawaiian monk seals under Alternative 4 – Enhanced Implementation. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
					Surviving juveniles that had been translocated as weaned pups returned to their natal or other suitable site (includes seals from 1st stage of translocation that remained at recipient site until at least age 2 yr).		Translocations within or between any subpopulations in the species range allowed. *Note that seals originally born in the MHI and previously taken to the NWHI may be returned to the MHI.* Details to be determined through application of decision framework in Appendix A.
6.d Translocation for Research	Juvenile, sub-adult and adult	Both	6	3	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation, temporary holding, translocate between subpopulations	Hawaiian Archipelago, Johnston Atoll	Research to determine survival of translocated juveniles to inform two-stage translocation enhancement. Annually at any time of year. Translocations within or between any subpopulations in the species range allowed. Seals with unmanageable behavior in the MHI may be translocated to the NWHI as part of this study.
7.a Adult Male Removal (Enhancement)	Adult	Male	20	2	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation/translocation, permanent captivity, or euthanasia	Hawaiian Archipelago; Johnston Atoll	Up to 20 males may be removed annually, but only 10 lethal removals over a five-year period. Taste aversion testing may occur on adult male seals brought into captivity.
7.b Adult Male Hazing (Enhance-ment)	Adult	Male	As warranted (est. <10)	As warranted (est. <10)	Haze	Hawaiian Archipelago; Johnston Atoll	Aggressive males may be hazed away from conspecific victims in cases of immediate risk of injury or death or when specific males repeatedly attack conspecifics.

Table 3. Proposed annual takes of Hawaiian monk seals under Alternative 4 – Enhanced Implementation. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
8. Disentangle and Dehook (Enhancement)	Any	Both	As warranted (est. < 75)	As warranted	Disentanglement and dehooking (with or without capture, sedation, and release); collect vibrissae	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year. All animals may have been taken by Tasks 1-3.
9. Conduct Necropsies (Research)	Any	Both	As warranted	1	Necropsy any seal found dead, that died during restraint, or that was euthanized. After, use seal tissue as bait for permitted shark removals	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year.
10. Opportunistic Retrieval of Samples (Research)	Any	Both	1,100	Unlimited samples	Collect parts (placentae, scats, spews, and molted fur/skin) from haul out areas	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year but predominantly during summer field camps.
11. Import and Export Parts (Research)	Any	Both	Unlimited import/ export	Unlimited samples	Import/export/receive	World-wide (including but not limited to Canada, the Netherlands, Scotland, Greece, Australia)	Annually at any time of year. Export (and re-import) Hawaiian monk seal samples collected under the authority of this permit. Import (and re-export) Mediterranean monk seal specimens for research related to monk seal conservation.
12. Supplemental Feeding	Pup or Juvenile	Both	12	Unlimited	Supplemental feeding of post-rehabilitated seals	NWHI	Annually at any time of year seals may be fed at daily or longer intervals for up to one year.

Table 3. Proposed annual takes of Hawaiian monk seals under Alternative 4 – Enhanced Implementation. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
(Enhance-ment)							
13. Behavioral Modification (Research and Enhance-ment)	Any	Both	20	As warranted (est. <20)	Intentional harassment for behavior modification. Aversive conditioning and other methods including but not limited to: Capture restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), instrumentation, translocation, temporary holding; hazing using visual, audible and tactile means; impeding movement with barriers, etc. Chemical taste aversion with lithium chloride in captivity only.	MHI	Annually at any time of year. Prevent seals from socializing with humans; alter behavior of seals socialized to humans or behaving in a manner dangerous to the seal or public safety. Seals may be brought into temporary captivity for taste aversion research. Experimental protocols to determine optimal methods.
14. Vaccination (Research and Enhance-ment)	Any	Both	1,100	4	Capture, restraint, sedation, sampling (blood, swabs, blubber biopsy, vibrissae), and administration of vaccine	Hawaiian Archipelago	Annually at any time of year.

Table 3. Proposed annual takes of Hawaiian monk seals under Alternative 4 – Enhanced Implementation. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Northwestern Hawaiian Islands (NWHI), and Johnston Atoll. MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. Also all smaller islands and offshore islets, including, but not limited to, Kaula Rock, Lehua, Molokini, etc. NWHI=Nihoa Island (Is.), Necker Is., French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, Kure Atoll, Gardner Pinnacles.

Task	Size (Age)	Sex	No. Seals Taken/ Year	No. Takes/ Seal/Year	Type of Takes	Locations	Dates/Time Period And Details
15. Incidental harassment (Research and Enhance-ment)	Any	Both	400	3	Incidental harassment during any research and enhancement activity including opportunistic sample collection	Hawaiian Archipelago; Johnston Atoll	Total incidental harassment over all activities.
16.a Unintentional Mortality (Research)	Any	Both	2	1	During any research activity	Hawaiian Archipelago; Johnston Atoll	Four unintentional mortalities over a five-year period not to exceed two deaths in any one year.
16.b Unintentional Mortality (Enhance-ment)	Weaned pup	Both	2	1	During any enhancement activity	Hawaiian Archipelago; Johnston Atoll	Four unintentional mortalities over a five-year period not to exceed two deaths in any one year.
	Juvenile/ subadult	Both	4	1	During any enhancement activity	Hawaiian Archipelago; Johnston Atoll	Eight unintentional mortalities over a five-year period not to exceed four deaths in any one year.
	Adult	Male	2	1	During any enhancement activity	Hawaiian Archipelago; Johnston Atoll	Four unintentional mortalities over a five-year period not to exceed two deaths in any one year.

APPENDIX J—HAWAIIAN MONK SEAL STOCHASTIC SIMULATION MODEL

The monk seal stochastic simulation model is one of the primary tools used by the National Marine Fisheries Service (NMFS) Pacific Islands Fisheries Science Center (PIFSC) to perform quantitative analyses for research and management of the species. Historically, the model has been used for a variety of applications. The most common applications are: to make predictions about the future status of the population based on current demography, to evaluate the significance of specific mortality sources (such as shark predation or male aggression), and to evaluate the sensitivity and likely benefits derived from candidate interventions. Details of the model structure and mechanics are provided in Harting (2002), with the fundamental features summarized below.

At its core, the model is a mechanistic, stochastic, metapopulation model with provisions for handling uncertainties in input parameters and modeled processes. The model is heavily data driven, capitalizing on the demographic and life history data collected over more than two decades in the NWHI and, more recently, the incipient demographic data set for the MHI. Necker and Nihoa Islands (NWHI) are relatively data poor and have historically comprised a small portion of total abundance, and are therefore not included in simulations. The demographic data (reproductive, survival, and migration rates) used by the model are derived primarily from resightings of known-aged (or "cohort") seals first tagged as pups.

Demographic data are evaluated separately for each of the 7 breeding sites (six NWHI sites, plus the MHI) handled by the model. For the NWHI sites, Jolly-Seber survival estimates (Jolly 1965; Seber 1965) are calculated using the cohort resighting data as input, with separate estimates for two time periods: all years pooled, and most recent three years pooled. The latter estimates were used for all projections described in this PEIS. Siler's five-parameter competing risk model (Siler 1979, 1983) is then fit to the observed (Jolly-Seber) rates. For the model, parameter uncertainty is handled by random sampling Siler parameters from the variance/covariance matrix from the parameter fitting.

Age-specific reproductive rates are estimated from pooling pupping data from 1990 to the present using methods described in Harting *et al*. (2007). As with survival rates, parameter uncertainty is handled by randomly sampling a unique set of correlated parameters from the fitted distributions. In the model, survival and reproduction are determined stochastically for each individual in the population by binomial sampling (testing a uniform random number in the range [0,1] against the age-specific survival rate). Migration is also determined stochastically for each individual according to the fitted movement rate for each age class.

As compared to the NWHI, data from which to estimate vital rates and population composition are much more limited for the MHI. A detailed description of the methods used to fit both survival and reproductive rates for the MHI is provided in Baker *et al.* (2011). Where data are lacking (*e.g.*, reproductive rates of older MHI females), some inference and extrapolation is necessary based on patterns observed in the NWHI. Uncertainty in parameter estimates is handled in the same manner as for the NWHI, with unique parameters drawn from their fitted distributions at the start of each simulation.

Each simulation is initialized with the most recent starting age/sex distribution for each site, as compiled from the most recent year's observations. Ages are ascribed different degrees of confidence depending on the age at which a seal was first identified. At the start of each simulation, the model randomly assigns all minimum-aged seals (those first identified as adults) a working age for initializing that simulation. The random age assignment is consistent with the estimated survival schedule for each site. Interatoll movement rates are also calculated from the annual resighting data, with different rates for each pups, juveniles, subadults, and adults.

The primary sequence of events during each simulation year is survival and reproduction, specific natural perturbations, migration between subpopulations, and management actions. The model provides multiple options for simulating natural perturbations (survival catastrophes, birth catastrophes, shark predation, and aggressive male interactions) and management interventions (captive rearing/release, translocations, shark removals, and other). The only perturbations and management actions to be included in the projections described in this PEIS were removal of aggressive males, removal (death) of females, and translocation. For the translocations, the model transfers the desired number of seals from the donor site to the recipient site, and tracks their annual survival until they are transferred back to the donor site. Survival rate decrements are applied to these seals as specified in the modeled scenario.

The model produces a diverse array of outputs suitable for evaluating simulation outcomes including abundance, realized growth rate, multiple demographic descriptors, and assorted metrics specific to whatever intervention scenario was executed. The primary output is site-specific, with summary diagnostics for the entire system and the two main regions (NWHI and MHI).

For the purposes of this analysis, certain other model components were disabled, including the option for density dependent adjustment of demographic rates. While that feature of the model is certainly important when performing long-term projections, the precise manner in which density dependence operates on the monk seal population is unknown and its influence can overwhelm and obscure the effects of all other factors included in the simulation scenario.

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Appendix K Historical and Contemporary Significance of the Endangered Hawaiian Monk Seal in Native Hawaiian Culture

Historical and Contemporary Significance of the Endangered Hawaiian Monk Seal in Native Hawaiian Culture

Monk seals hauled out on the beach at Nuʻalolo Kai, Nā Pali, Kauaʻi (photo: J. Kittinger)

Prepared for:

Protected Species Division (PSD), Pacific Islands Regional Office (PIRO) of the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service

By

Impact Assessment, Inc.
Pacific Islands Office
367-C Kapaloala Place
Honolulu, HI 96813
impactassessment@hawaii.rr.com

Title: Historical and Contemporary Significance of the Endangered Hawaiian Monk Seal in Native Hawaiian Culture

Authors: John N. Kittinger[1,*]; Trisann Māhealani Bambico[1]; Trisha Kehaulani Watson[2]; Edward W. Glazier[1]

Affiliations:
[1] Impact Assessment, Inc., Pacific Islands Office, 367-C Kapaloala Place, Honolulu, HI 96813, USA
[2] Honua Consulting, P.O. Box 61395, Honolulu, HI 96839, USA
* corresponding author: Email: jkittinger@gmail.com; Ph: +1 808-397-9077

About this Report

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For further information direct inquiries to:

John N. (Jack) Kittinger, PhD
Lead Scientist & Assistant Director
Impact Assessment Inc., Pacific Islands Office
367-C Kapaloala Place
Honolulu, HI 96813 USA

Phone: +1 808-397-9077
Email: jkittinger@gmail.com

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Abstract

The Hawaiian monk seal is highly endangered but relatively little is known about the socio-cultural significance of the species in Native Hawaiian communities. Accurate assessment of historical and modern socio-cultural values and perspectives is needed to inform conservation and recovery planning for the species, particularly since the species is not universally well-regarded by ocean users. We conducted extensive archival research and oral history interviews to characterize past and current human-monk seal relationships in the Hawaiian archipelago. Though the prehistoric period remains poorly understood, our findings suggest that monk seals were likely rare but not unknown to Hawaiians in the late 19th and early 20th centuries. References are made to monk seals in Hawaiian-language newspapers, traditional knowledge forms, and in familial histories. Our findings also suggest that the species is not uniformly known in contemporary Native Hawaiian communities and that perspectives about the nature and significance of the monk seal appear to be related to place-specific histories and specific groups of knowledgeable persons. We introduce the concept of 'cultural endemism' to characterize this pattern of socio-cultural heterogeneity. This information may prove useful in crafting culturally appropriate management plans for the species and for developing effective outreach activities to engage coastal communities and ocean users.

Key Words: endangered species; wildlife conflict; cultural endemism; historical ecology; human-environment interactions

Introduction

The successful management and recovery of endangered species is dependent on a diverse set of social factors and conditions that shape human interactions with those species and the environments they occupy (Kellert, 1986, Kellert, 1985). In many cases, economic, technological, demographic, institutional, perceptual and political forces will determine the prospects for successful species recovery and stewardship (Bath, 1998, Jacobson and Duff, 1998). Despite this, most endangered species programs focus primarily on the biological aspect of endangered species, and in comparison relatively little research is directed toward human dimensions of endangered species (Jacobson and Duff, 1998, Kellert, 1985).

Social and perceptual factors are especially important in understanding how human societies interact with endangered species and their habitats in places characterized by human-wildlife conflict (Bentrupperbaumer et al., 2006, Tarrant et al., 1997, Clark et al., 1994). Conflict can develop through a myriad of different pathways but commonly stem from the social values, norms and perceptions that structure human-environmental interactions. Kellert (1985:529), identifies the full range of values that society derives from endangered wildlife, and categorizes seven discrete types, including: 1) naturalist/outdoor recreational; 2) economic; 3) moral or existence; 4) scientific; 5) utilitarian; and 6) cultural, symbolic and historical values. These values, like other social phenomena, are not static but evolve through time as societies change.

Social science research can be used to characterize the full range of social values, meanings and perceptions of endangered species and can also provide important baseline information that can be used to assess changes in these values and perceptions over time. Social assessments can be applied to determine the likelihood of success of different proposed conservation actions or to aid in the development of more effective public education and outreach programs. Such data are potentially valuable for resource managers and management programs seeking to engage more effectively with communities in species recovery and conservation efforts.

Human values and perceptions are strongly influenced by the socio-cultural setting and knowledge systems that develop in a place-based manner. This is particularly true in the Pacific Islands and similar settings where indigenous cultures developed in-depth traditional ecological knowledge systems and close relationships with the physical environments that provided goods, values and services upon which they depended. In Polynesian communities, the values and perceptions of species and the ecosystems in which they are embedded are strongly influenced by traditional socio-cultural practices, uses, and knowledge systems. Ecosystem constituents are primarily viewed not as independent units, but as part of an interconnected system in which human are embedded as natural constituents and stewards of environmental conditions (Glazier, 2011, Jokiel et al., 2011, Handy and Pūkui, 1972).

Certain marine and terrestrial species can, however, take on unique meanings and significance, which in turn mediate the way human societies interact with those species and its associated habitats. For example, many Pacific Islander cultures developed customary restrictions on use of sea turtles which served to limit harvest and conserve the species (Rudrud, 2010, Allen, 2007). Socio-cultural values and perceptions have evolved as island communities have been subjected to changing socio-economic, political and institutional conditions, and as a result there is a need to understand how past relationships with endangered species affect current and future conservation efforts. This is particularly important for endangered species, many of which are threatened with extinction due to human activities.

The purpose of this article is to characterize the historical and contemporary significance of monk seals in Native Hawaiian culture. Monk seals are highly endangered and since they gained protection under the Endangered Species Act their populations have been increasing in the main Hawaiian Islands. This has led to increased conflicts with ocean users – particularly fishers – which have resulted in some cases in intentional killings of monk seals. Below, we provide a background context for the study and describe the social-ecological parameters of human-monk seal interactions in Hawai‘i. Next, we describe our mixed methodology and present the detailed results of our research. Finally, we discuss the significance of our findings and how the socio-cultural significance of endangered species can be applied to current challenges in conservation and species recovery planning. We introduce the concept of ‘cultural endemism’ to characterize the place-specific context and socio-cultural factors that influence indigenous societies relationships with natural resources. It is hoped that the research findings can help inform culturally-appropriate conservation planning for endangered species and enhance understanding of the human dimensions of wildlife and ecosystems.

Background

The Hawaiian Islands were among the last places on Earth to be colonized by humans. Voyaging Polynesians arrived in Hawai‘i centuries ago (Wilmshurst et al., 2011) and thereafter they established complex societies and resource production systems that supported a dense human population with complex sociopolitical systems (Kirch, 1985, Vitousek et al., 2004). Polynesians introduced exotic species and utilized both terrestrial and marine ecosystems for basic subsistence, altering endemic populations of fauna and flora and transforming natural ecosystems into cultural land- and seascapes in the process (Burney et al., 2001, Athens, 2009, Maly, 2001, Kaneshiro et al., 2005, Kittinger et al., *In review*).

Hawaiian monk seals are estimated to have inhabited the Hawaiian archipelago for approximately 14 million years and thus the species has adapted to long-term geologic changes in the archipelago (Kenyon and Rice, 1959). Monk seal habitats include shallow water reef habitat for pupping, weaning and foraging, sandy beach areas for hauling out, and deeper reef areas for foraging (Kenyon and Rice, 1959, NMFS, 2007). Hawaiian monk seals are apex predators in coral reef environments, but exhibit extreme sensitivity and vulnerability to human stressors, which renders the species vulnerable to local extirpation and extinction (Ragen and Lavigne, 1999, Ragen, 1999, Kenyon, 1972, Kenyon, 1980, Gilmartin, 2002). The Hawaiian monk seal population is currently comprised of approximately 1,200 individuals and is declining at a rate of approximately 4% per year (Antonelis et al., 2006, NMFS, 2007).

Currently, the majority of Hawaiian monk seals are found in the remote and primarily uninhabited Northwestern Hawaiian Islands (NWHI), but a smaller population is growing in the Main Hawaiian Islands (MHI) (Baker and Johanos, 2004) (Figure 1). Monk seals in the MHI are increasing in number and this region is where the majority of human-monk seal conflicts have occurred. Monk seal recovery is not universally supported in Hawaiian communities, and some ocean users view the species as a nuisance or threat to traditional activities such as subsistence fishing. For example, three monk seals were recently killed by apparent intentional shooting, and foul play cannot be ruled out in the recent deaths of at least three other seals. These conflicts are a major concern for long-term conservation and recovery planning for the species, particularly considering the continuing decline in NWHI populations and increase in the populated MHI.

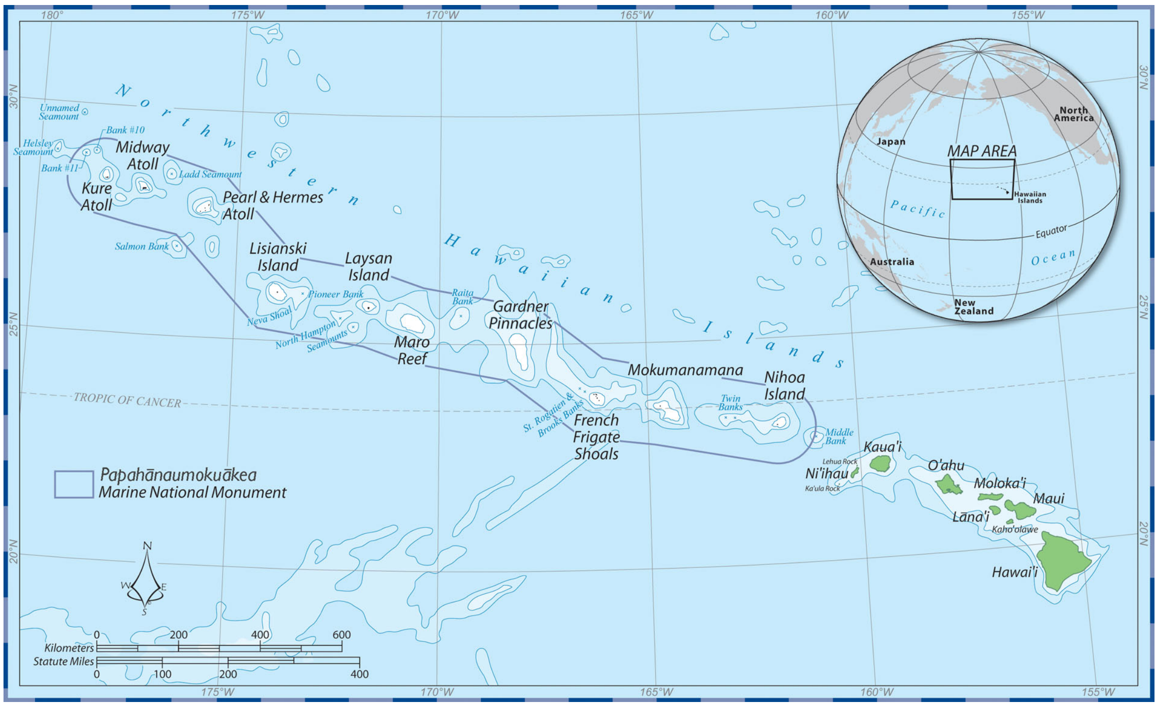

Figure 1: Map showing the Hawaiian Archipelago, comprised of the inhabited high islands of the main Hawaiian Islands (in green) and the uninhabited reefs, banks, and atolls of the Northwestern Hawaiian Islands, which are protected as part of the Papahānaumokuākea Marine National Monument. Map courtesy of the NOAA Papahānaumokuākea Marine National Monument Office.

Methods

To characterize the historical and contemporary significance of the endangered Hawaiian monk seal, we employed two primary methods, including: 1) archival research and document analysis and, 2) ethnographic and oral history interviews with Native Hawaiian community members, elders (*kūpuna*) and cultural practitioners. Archival research efforts targeted a broad range of historical and contemporary information about human-monk seal interactions and cultural significance of the species in documents retrieved from various institutional and online repositories. The research targeted both English-language and Hawaiian-language sources, including the extensive collection of archived Hawaiian-language newspapers and sources in existing compilations of historical documents (Hiruki and Ragen, 1992, Balazs and Whittow, 1979). English-language archival sources also included:

a. Published archaeological reports, containing zooarchaeological faunal assemblages and midden contents;
b. Archival and historical documents containing anecdotal or descriptive data (e.g. reports from naturalists, missionaries and explorers; whaler's logbooks; historical newspapers);
c. Published ethnographic information (e.g. recorded oral histories; interviews with elders); and,
d. Contemporary ecological data (e.g. population studies; genetic studies).

Our research also involved an exhaustive search in Native Hawaiian language newspapers for references to the Hawaiian monk seal. Newspaper searches were conducted in online databases of published and searchable newspapers (Ulukau, 2003, Alu Like Inc. et al., 2006). The Hawaiian-language newspapers are an unparalleled resource in terms of the volume of material and richness of description provided by Native Hawaiian contributors (Nogelmeier, 2010a), and only ~10% of published newspapers have been electronically scanned and made searchable (Nogelmeier, 2010b). As part of the search process, a list of Hawaiian language terms for the monk seal was developed and the etymology of these terms was investigated. All references were translated into English, categorized in terms of the type of account (e.g. fishing story, legend, chant, prayers, etc.) and then analyzed, resulting in an interpretation of each account and its meaning or significance in Native Hawaiian culture.

We also conducted unstructured ethnographic and oral history interviews with 30 Native Hawaiian community members, cultural practitioners and elders (*kūpuna*). Respondents involved in the research were known to possess extensive knowledge of endemic Hawaiian species, marine and coastal environments, and historic and contemporary cultural practices or knowledge that may have some association with monk seals. Interviews focused on historical and contemporary cultural connections with the monk seal among Native Hawaiian communities, as determined through respondents' oral testimonies or reported statements about past and current relationships with the species. These oral traditions consist of a rich pool of collective memories among that encompass an inherited culture in Native Hawaiian communities (Kikiloi, 2010). Respondents were identified through a social network sampling process (Hanneman, 2001), which allowed us to identify and characterize interviewees who are particularly knowledgeable of or experienced with monk seals or Native Hawaiian cultural knowledge systems (cf. Romney et al., 1986).

Interviewees were comprised of respondents who exhibited a broad and sometimes conflicting range of views on the monk seal. This purposive sampling of respondents allowed us to characterize a multiplicity of perspectives among community members, which can reveal different values and information that exist in different social groups and knowledge systems (Shackeroff et al., 2011). The interview methods used by the researchers followed existing standards in social science research (Bernard, 2006, Kvale, 1996, Seidman, 1998). Interviews were conducted in a manner that was culturally appropriate and which respected the traditional ecological knowledge systems of the respondents (Shackeroff and Campbell, 2007).

Interview data were analyzed using an iterative approach to describe, categorize and interpret our qualitative interview data. Most interviews were audio- or video-recorded and, together with notes taken during the interviews, responses were coded into topical categories. We adopted an iterative methodology that is utilized commonly in grounded theory approach, a method that allows the researcher to develop theory on the research topics addressed while simultaneously grounding the results in empirical observations or data (Glaser and Strauss, 1967, Schatzman, 1991, Thomas and James, 2006). Our methods, however, focused more on an inductive analysis to systematically determine patterns in our respondents' narratives rather than on theory generation. The iterative methodology employed was designed to establish rigor in the analysis of our qualitative information (Baxter and Eyles, 1997, Barbour, 2001).

In addition to interviews, we also sought other evidence of monk seals in Native Hawaiian cultural knowledge, including Hawaiian historical accounts, chants (*oli*) songs (*mele*), prayers (*pule*), existing oral histories, place names, and other traditional and customary knowledge forms. We also engaged in other ethnographic research methods including site visits and participant observation in Hawaiian communities and places with names potentially referencing monk seals.

Results

Our research uncovered a diversity of information about historical and contemporary relationships between Hawaiian communities and the monk seal. Below, we discuss our findings discovered through different sources and research efforts. Additional material referenced in these sections is included in the Appendix. It should be noted that although our research included a comprehensive search of sources of cultural knowledge, additional information may still be waiting to be discovered in extant Hawaiian literature and traditional knowledge forms. In addition to this, several respondents also noted that much of the information we sought about monk seals was deliberately kept *hūnā*, or secret, in keeping with tradition and because such knowledge had been improperly used in the past.

English-Language Archival Sources

The results of archival research in English language sources have been published elsewhere (Watson et al., 2011), but a brief overview of these findings and additional description is provided here for context and comparison with other research results. Our research in this diverse set of sources suggests that seal populations were probably locally extirpated in the MHI within the first century after Polynesian settlement (~AD 1250-1350). Pre-human seal populations probably never exceeded 15,000 individuals, which constitutes a small and vulnerable population for a large mammal (Watson et al., 2011). Remains of monk seals in archaeological deposits are limited to just a few sites that primarily date to the historic period (Rechtman, 2011, Office of Hawaiian Affairs, 2010, Rosendahl, 1994), but this evidence suggests that monk seals were opportunistically taken by prehistoric Polynesian hunters. Though several theories still exist, the most likely explanation based on the available evidence is that seal populations were probably rapidly diminished in Hawaiian prehistory by human hunters and harassment by their commensal mammals (particularly dogs [*Canis familiaris*]).

One of the periods that is the least well understood are the first decades after western contact before the Hawaiian language was translated into a written form (AD 1778-1830). During this period, whaling, sealing and other trading vessels increasingly frequented the archipelago and trade between Hawaiian communities and foreigners intensified (Ii, 1993, Kamakau, 1992). Hawaiians became involved in the seal trade as early as 1811 (Ii, 1993), and were conscripted as sailors on whaling and sealing vessels by Hawaiian monarchs (Naughton, 1983, Beechert, 1991, Kuykendall, 1938, Kuykendall, 1957). This period also witnessed major changes in the relationship between commoners and the land, including the abolishment of the traditional Hawaiian religious system (Ralston, 1984, Seaton, 1974), which included restrictions on some marine species (Titcomb, 1972, Beckley, 1883).

Despite several detailed English-language accounts of the Hawaiian Islands that date to this period, no descriptions of seals were recorded in the main Hawaiian Islands (Appendix). This strongly suggests rarity, particularly given many early descriptions come from whalers and sealers that would have been interested in harvesting seals for their oil, or from explorers and naturalists who described other social and environmental contexts in great detail. Of these early descriptions, however, it remains difficult to disentangle which sealing cargoes were derived from ventures outside of Hawaiian waters (e.g. Alaska, the Pacific Northwest, and the California coast) and those which may have been comprised of monk seal populations from Hawaiian waters (Kuykendall, 1929). When seals were discovered several decades later in the remote and uninhabited northwestern Hawaiian Islands, several sealing voyages were undertaken (Cobb, 1905). Seals were also taken opportunistically in the NWHI during this period by visiting ships, including ones bearing Hawaiian monarchs (e.g. Anonymous, 1857). Few monk seals survived the sealing ventures of the 19th century, resulting in near-extinction and extreme rarity throughout the archipelago in the early 20th century (Hiruki and Ragen, 1992).

Hawaiian-Language Newspapers

The Hawaiian-language newspapers are an unparalleled resource in terms of the volume of material and richness of description (Nogelmeier, 2010a). Our search consisted of identifying Hawaiian terms for monk seals and the etymology of these terms. Next, we located articles containing these terms in online databases of digitized Hawaiian-language newspapers (Ulukau, 2003, Alu Like Inc. et al., 2006) and translated these accounts (Appendix).

We discovered many terms for monk seals in our search in Hawaiian-language dictionaries, archives and newspapers, including: *ʻīlioholoikauaua, ʻioleholoikauaua, ʻīlioholoikauaua-a-Lono, ʻīlioheleikauaua, ʻīlioholoikekai, ʻaukai, holoikauaua, hulu, sila*, and *kila* (Table 1). The most commonly used term, *ʻīlioholoikauaua*, roughly translates to "dog running in the rough [seas]" (Pūkui and Elbert, 1986). Two other commonly referenced terms, "*sila*" and "*kila*," are Hawaiian versions of the word 'seal,' and probably date to the post-contact era. Several previously unknown terms were also discovered, including "*hulu*," which is defined in an earlier dictionary as "seal, named for its valuable fur" (Pūkui and Elbert, 1971). This term was also used by some respondents in interviews to reference monk seals (Watson, 2010). Another term "*ohulu*," is defined as a seal hunter (Parker, 1922). The term "*palaoa*" commonly references whales, but in a traditional chant, it may also apply to other marine mammals including monk seals (Nerveza 2010). Some respondents knew of other names for the monk seal, but declined to provide the names because of worries about how the names would be used. A full list of Native Hawaiian terms for monk seals and their meanings is provided in Table 1.

Most references to monk seals in Hawaiian-language newspapers use the term *ʻīlioholoikauaua* and date to the mid to late 19th century (Appendix). References to monk seals are primarily used in a neutral tone with little description. For example, writers used the term *ʻīlioholo-ikauaua* to reference seals in translations of English works. Other descriptions use the same term to describe seals on sealing voyages to Alaska and the US Pacific northwest on which Native Hawaiians served as crew members. One writer describes a trip to the arctic where the crew were kept warm by "the pelt of the *ʻīlio-holo-i-ka-uaua* and the other slippery, furry animals," while another writer describes the Arctic as "Just snow is what is seen there, no plants; the polar bear is still important, with the *ʻīlioholoikauaua*, and the sea elephants." Other writers used the term *ʻīliokai* or *ʻīlio o kai* (seadog) and *sila* (seal) in descriptions of sealing expeditions. "These accounts provide little information about the cultural relationship with monk seals but do provide evidence that the name was known to Hawaiian writers during a time in which seals were rare in the Hawaiian Islands. Other references are more telling of cultural relationships, and several contain negative connotations. For example, one writer implores fellow Hawaiians not to "slacken in their moral resolve like the *ʻīlioholoikauaua*," and another writer uses the term loosely as an insult (Appendix). These references provide some evidence that the monk seal was not always viewed in a positive manner, though the context does not provide enough description in order to determine why these views were held.

The Hawaiian language newspapers also provide some evidence that monk seals were harvested and consumed as part of customary practice. For example, one writer writes in a story "what are the things you think we eat here? Turtle liver, shark fin, and the broiled meat of the *ʻīlioholoikauaua*." Another writer suggests that monk seal furs were collected as part of customary tribute to the land managers (*Konohiki*), writing, "and then, they lay down these things the *Konohiki* (land manager) requested: pig, dog, cloth, fiber, fur (ʻo ka hulu), fishing net, everything. These are the goods that we exhibited in ancient days" (Appendix). These descriptions, though limited, suggest that monk seals were harvested for their meat and fur.

Table 1

Term	Definition	Reference / Notes
ʻīlioholoikauaua	Seal, dog running in the roughness [rough seas]	Pūkui and Elbert, 1986 / entry does not appear in the online dictionary (Ulukau, 2003)
ʻioleholoikauaua*	A rat running beside the wave	Beckwith, 1951
ʻīlioholoikauaua-a-Lono	The dog running at the voice of Lono	Fornander, 1916-1920 (Vol. IV, pg. 273) / Only known reference
ʻīlioheleikauaua	The dog running in the waves	Andrade, 2008
ʻīlioholoikekai	The dog running in the sea	Moʻolelo (oral traditions) from kūpuna and kumu (elders & teachers)
ʻaukai	Seafaring	Moʻolelo (oral traditions) from kūpuna (elders)
holoikauaua	"iʻoa Pearl and Hermes Reef [NWHI]. Lit., [Hawaiian monk seal that] swims in the rough."	Kōmike Huaʻōlelo (2003)
hulu	seal, named for its valuable fur	Pūkui and Elbert, 1971
sila / kila	Hawaiian versions of the English word ʻseal.ʼ	Kōmike Huaʻōlelo (2003) / It is probable that use of this term did not begin until after foreign contact
ohulu (ō-hū'-lu)	"O, to spear; and hulu, fur or feathers. A seal hunter."	Parker, 1922 / Entry does not appear in the online dictionary (Ulukau, 2003)
he ilio o ke kai	Seal	Andrews, 1865
sila pūhuluhulu	Fur seal	Kōmike Huaʻōlelo (2003)
sila Hawaiʻi	Hawaiian monk seal	Kōmike Huaʻōlelo (2003)
ʻīliopiʻi	"Dog running up and down"; Place name: cape & bay, Kalaupapa peninsula	Hawaiian language newspapers; maps

Table 1: Native Hawaiian terms for the monk seal. Definitions and references are provided, including information derived from other archival and interview research efforts on these terms.

***** There have been several changes in the definitions of some terms in Hawaiian language dictionaries over time (Elbert, 1954). For the term *ʻiole*, one edition of the Hawaiian dictionary defines the term as, "**ʻiole**. 1. Hawaiian rat (*Rattus exulans*); introduced rat, mouse (Oink. 11.29); rodent (see *ʻiole-lāpaki, ʻiole-manakuke, ʻiole-puaʻa*); mole (Isa. 2.20). **hōʻiole**. To behave like a rat. *Fig*., to steal, cheat, lie in wait in order to assail. 2. Name for a sinker of a squid lure." (Pūkui and Elbert, 1971). A later edition of the same dictionary contains the following definition, "**ʻiole** n. 1. Hawaiian rat (Rattus exulans); introduced rat, mouse (Oihk. 11.29); rodent (see *ʻiole lāpaki*, *ʻiole manakuke*, *ʻiole puaʻa*); mole (Isa. 2.20); considered by some an ʻaumakua. Cf. *piko pau ʻiole*, *haumakaʻiole*, *paʻipaʻiʻiole*, *papaʻiole*, *ʻuwīʻuwī* 3. **hō.ʻiole** To behave like a rat; ratlike. *Fig.*, to steal, cheat, lie in wait in order to assail. (PNP kiole)" (Pūkui and Elbert, 1971, emphasis added). The reason for the change in definition is unknown, but noteworthy in that the later definition specifies that the animal is known to be an *ʻaumakua*. *ʻAumakua* are "family or personal gods, deified ancestors who might assume the shape of…[various animals]" (Pūkui and Elbert, 1986).

Traditional Cultural Sources

In addition to archival and interview research, other sources of cultural knowledge were accessed and reviewed to ascertain information about Hawaiian monk seals. These sources included *mele* (songs), *oli* (chants), *moʻolelo* (oral traditions), and other traditional knowledge forms. One such source is the Kumulipo, a detailed chant that chronicles the creation story, genealogy and mythology of ancient Hawaiʻi (Beckwith, 1951). Previously it was not believed that any references to the monk seal were found in the Kumulipo, but the term "*ioleholoikauaua*" in one section may reference the Hawaiian monk seal (Appendix). The description of the *ioleholoikauaua* as "a rat running beside the wave," is reminiscent of monk seals and the description of the monk seal in this section of the Kumulipo is also consistent with other descriptions and perceptions of monk seal behavior found in Hawaiian language sources.

The monk seal is also mentioned in the *moʻolelo* (oral tradition) about the Legend of Hawaii-loa. In this story, the monk seal is described as *ʻīlioholoikauaua-a-Lono*, and is associated with the Hawaiian god Lono:

> After Light had been created or brought forth from the *Po* (the darkness or chaos) the gods looked upon the empty space (*ka lewa*) and there was no place to dwell in. They then created the heavens for themselves. Three heavens did they create or call into existence by their word of command. The uppermost heaven was called "*Lani-Makua*," the one next below was called "*he Lani o Ku*," and the lowest was called "*he Lani o Lono*."
>
> * * *
>
> The first man, generally called Kumu Honua, had a number of names – already mentioned; he was a tall, handsome, majestic looking person, and so was his wife. He was along upon the land for about one century (*kipaelui* or *kihipea*) before his wife Lalo Honua was created.
>
> Among the animals enumerated in the legend as dwelling in peace and comfort with Kumu Honua in Kalani i Hauola were:
>
> Ka puaa nui Hihimanu a Kane (the large Hihimanu hog of Kane); ka ilio nui niho oi a Kane (the large sharp-toothed dog of Kane); <u>ka ilio holo i ka uaua a Lono (the dog running at the voice of Lono)</u>; ka puaa maoli (the common hog); ka ilio alii a Kane (the royal dog of Kane); na moo (lizards)… (Fornander, 1916-1920), <u>emphasis added</u>).

This reference is the only known description of the linkage between the god Lono and the monk seal and the only known account of the term "*ka-ilio-holo-i-ka-uaua-a-Lono.*" The association with Lono is also interesting because dogs are typically associated with the god Kane and many other ocean animals are associated with the god Kanaloa.

Another reference to the monk seal may exist in the *mo'olelo* (oral tradition) about the god Hiʻiakaikapoliopele (Hiʻiaka), whose travels through the archipelago are recorded in a lengthy and detailed chant. In a translated version of the chant, Hiʻiaka describes an area on the island of Oʻahu (Kaʻōʻio Point): "there is a plain on the inland side and dangerous waters seaward, a place renowned in the saying, 'Lie calmly in the sea of your chief.' As we go along we will reach Makaua, land of the Maʻakua rain. That is where the <u>ʻīlio hā</u> of Kāne dwells, named Kauhikeʻīmakaokalani, an uncle of ours" (Nogelmeier, 2006), <u>emphasis added</u>). In the story that follows, Hiʻiaka describes, " <u>ʻīlio hā</u> is like saying ʻīlio kāhā, an oversized, hulking dog, the same way a pig can be oversized. It means it is huge, heavy, plump, and fleshy. But this dog-uncle of ours you see there has the body of a massive dog, and the largest expanse of his fur is on his head and neck…" (Nogelmeier, 2006).

Though it is unknown if this description explicitly refers to monk seals, the description of the ʻīlio hā as "huge, heavy, plump, and fleshy" and as an "oversized" dog is reminiscent of the physical appearance of monk seals. Unlike the previous *mo'olelo*, in this story the seal-like animal is associated with the Hawaiian god Kane, who is traditionally associated with dogs.

<u>Hawaiian Place Names</u>

Hawaiian place names serve a variety of functions but commonly convey cultural information and associations with geographical features (Pūkui et al., 1974). Place names are often understood, interpreted, and perpetuated within traditional *mo'olelo* (oral traditions) that developed in a place-based manner. We performed a search through cartographic and archival sources to identify places in the Hawaiian Islands that potentially reference monk seals. We also undertook several site visits at places believed to be named for monk seals, and captured additional information about these place-names in interviews with local residents and through personal observations.

Several sites in the Hawaiian archipelago were found to possess names that likely reference the Hawaiian monk seal and many other sites were found with names warranting more investigation. One site is located on the remote Kalaupapa peninsula on the rugged north coast of Molokaʻi, which has functioned since historical times as an isolated colony for persons with Hansen's disease. A small cape and bay in the area, named ʻĪlio-piʻi, is translated literally as "climbing dog" (Pūkui et al., 1974). The historical name seems appropriate, as monk seals commonly pup on beaches in this area in modern times. Another site, Lae o Ka ʻĪlio, is located in the Hāʻena community on the rural north shore of Kauaʻi island. Andrade (2008) writes that Lae o Ka ʻĪlio translates to "the headland of the dog," and "refers to the endangered Hawaiian monk seal known to Hawaiians as *'īlio hele i ka uaua* (dog running in the rough seas). Residents saw seals there even in the days before the federally established laws now protecting them caused a dramatic increase in their numbers in the main Hawaiian islands" (Andrade, 2008). Finally, the modern name Holoikauaua has been given to Pearl and Hermes Atoll in the NWHI (Kōmike Huaʻōlelo, 2003). The name "celebrates the Hawaiian monk seals that haul out and rest" at the atoll (USFWS et al., 2008). Each of these place names possesses significant ecological importance for the monk seals in current context, and at least two, ʻĪlio-piʻi on Molokaʻi and Lae o Ka ʻĪlio on Kauaʻi, are historical names that likely reference places where monk seals were common in historical times.

Numerous additional sites throughout the archipelago may warrant more research, including: Kane‘īlio, Kū‘īlioloa, and Pu‘uanahulu. Pūkui notes that Pu‘uanahulu was “perhaps named for a supernatural dog of that name; see Ka-lae-o-ka-‘īlio” (Pūkui et al., 1974). The reference to Ka-lae-o-ka-‘īlio reads: “points at Kona, Hawai‘i; Kau-pō, Maui; northwest Molokai (also called ‘Īlio and Ka-‘īlio). Lit., the cape of the dog. (At the Kona point in a sea pool is the body of Anahulu, a supernatural dog that was changed to stone by Pele. See Pu‘u-anahulu)” (Pūkui et al., 1974). Lae o Ka ‘Īlio point on the northwest tip of Moloka‘i, also known as ‘Īlio point, bears similarity in name to the site in Kaua‘i. The Hawai‘i Department of Land and Natural Resources has linked the ‘Īlio Point, or Kalaeokailio, to an ancient legend of a red dog, rather than a monk seal (DLNR, 2009 [citing Ne et al., 1992]), but monk seals are found in the area (Duvall II, 2009). Another place name is Kīpahulu in the Hāna district of Maui, but interviewees indicated this site was used by seabirds and did not know of any association with the monk seal. Finally, a *heiau* (ritual site) in the Wai‘anae district of O‘ahu island is named Kū‘ilioloa (“The long dog form of Kū”), and *mo‘olelo* about this site reference a dog that would bark at the ocean when enemies were coming. Respondents that identified this site said that although the name has *‘ilio* (dog) in it, it does not necessarily mean it was named after the monk seal.

Interviews in Native Hawaiian Communities

We interviewed a representative cross-section of individuals with different knowledge sets, resource use patterns, perspectives and expertise to uncover cultural information about the Hawaiian monk seal. We also reviewed existing interviews that focused on monk seals, marine environments and similar topics for context. All interviewees indicated that monk seals were relatively new to ocean users in the MHI, with the first personal observations dating to the 1940s and most respondents not indicating experiences with the monk seal until the 1960s or after. These observations were consistent with previously published ethnographic research among local fishermen and community elders (*kūpuna*) in the Hawaiian Islands suggesting perceived rarity among tenured ocean users until the past few decades (Maly and Maly, 2003a–d, 2004). Many respondents noted that their encounters with monk seals have increased in the past few decades, and these perceptions were similar to those expressed by some community members at public meetings about the monk seal (ERM – West Inc., 2011). A separate survey effort indicated that more than 80% of respondents had personally encountered monk seals in the MHI, but their knowledge of the species was relatively limited (SRGII, 2011).

Respondents exhibited a plurality of views regarding the monk seal, ranging from hostility or ambivalence to strong feelings of conservation and stewardship. This suggests lack of a consensus in the Native Hawaiian community regarding the monk seal and heterogeneity in perceptions and socio-cultural values associated with the species.

Among interviewees who expressed positive views about the monk seal, a small subset of indicated a strong socio-cultural association with the species. Some interviewees described families on Hawai‘i and O‘ahu islands that consider the species to be *‘aumakua*, the “family or personal gods, deified ancestors who might assume the shape of…[various animals]” (Pūkui and Elbert, 1986). *‘Aumakua* are traditionally protected by their associated families and various cultural protocols are followed to steward the relationships between the family and their spiritual guardian. Notably, the monk seal is not named as a common *ʻaumakua* (Pūkui and Elbert, 1986), but this does not necessarily mean that the families have recently adopted this cultural association. *ʻAumakua* can be associated with families for many generations, reaching far back into history, or can be recent additions based on events that carry special cultural meaning and significance. Additionally, some communities have conducted spiritual ceremonies for monk seals during which the monk seal is recognized as part of the *ʻohana*, or family. Respondents have said that the details of such activities are deliberately kept *hūnā*, or secret.

Some respondents shared *moʻolelo* (oral traditions/stories) about monk seals that indicated a mythological association with the species. In one account from the island of Molokaʻi, a *kupuna* (community elder) told of a monk seal who appeared in the area in 1947 and washed up without a head. The *kupuna* indicated it was the work of Kauhuhu, the famed shark god of the area who patrolled the waters from Moananui to Pelekunu. Another *moʻolelo* from Hawaiʻi Island tells of a pair of lovers who suffered the wrath of the jealous shark god Kua. After his affections were spurned, he curses the woman, turning her into a monk seal and her male companion into a dragonfly so the two could not be together. The pair was later reunited in their human forms by the god Kū (Appendix). These *moʻolelo* indicate a historical cultural association with the monk seal, but appear to be limited to a few places where familial traditions have preserved the stories.

For some *kūpuna*, the specific origins of the animal and its significance in Hawaiian culture are irrelevant, as the traditional Hawaiian sense of stewardship extends to all species and the environment. One respondent, for example, expressed, "whether they are 'hānai' [adopted] or 'hānau' [born of, as in a son or daughter], monk seals are part of the ocean and we, humans, have an obligation to protect them." This perspective has also been shared by other community elders interviewed about the monk seal (Seldon and Lucas, 2010, Watson, 2010). These views indicate an modern, evolving socio-cultural significance ascribed to the species by some interviewees, who draw on traditional conceptions of environmental and resource stewardship in relation to the species.

While some Native Hawaiian community members hold positive views about the monk seal, others view the monk seal negatively and do not associate any cultural significance to the species historically or in modern times. Among these respondents, the seal is viewed as endemic to the NWHI but not to the MHI. Some respondents view the seal as an invasive species in the MHI and believe the seal should remain in the NWHI only. Respondents commonly cite the lack of Hawaiian cultural references to the seal in traditional chants, hula [dance] and other knowledge forms. Other respondents pointed to the lack of evidence that the monk seal was ever used for food, tools, weapons, fabrics, medicine, or combustible material. One respondent emphasized that, "everything in Hawaiʻi had a common use… since there was no [use], then it must not be native." Other respondents pointed to the lack of monk seal bones (*ʻiwi*) found in archeological excavations or petroglyphs (*kiʻi pōhaku*) depicting monk seals. Respondents on Maui were not aware of any place names, sacred sites (*wahi pani*) or fishing shrines (*koʻa*) named after the monk seal. They also mentioned that their *kūpuna* (elders) never mentioned the monk seal, and that they did not know of any families that regarded the monk seal as their *ʻaumakua* (spiritual family guardian).

The most commonly cited source of human-monk seal conflict is negative interactions with fishers (primarily men in Hawai‘i). Fishing has a long history in Hawai‘i and is embedded in the socio-cultural traditions and subsistence lifestyles of Hawaiian communities (Glazier, 2007, Titcomb, 1972). Monk seals are viewed by Native Hawaiian fishers and their families as direct competitors, in that they preferentially take fish specifically targeted by fishers. Many respondents believe that when interactions occur, they inhibit the ability of fishers to provide food for the household. Other fishers cite the aggressive behavior of monk seals as a major problem. Common interactions include seals taking fish off of lines or out of fishers' nets, but increasingly seals are interacting with boats and fishermen directly – in some cases, fishers have been bitten by monk seals. These interactions are viewed by some as impacting cultural fishing practices, and are further compounded by existing regulations that restrict fishing and the depleted condition of fisheries resources in the MHI.

Among respondents who view the species negatively, the belief that the monk seal is not endemic is exacerbated by the prohibitions against interacting with the seal. Some respondents state the perspective that modern cultural knowledge cannot be generated because the monk seal "cannot be touched and used for anything." Restrictions on use have precluded indigenous communities from perpetuating cultural traditions for other protected species such as sea turtles (Kinan and Dalzell, 2005, Rudrud, 2010). Ancient cultural knowledge is believed to be non-existent due to the recent arrival of the monk seal in the MHI, but respondents also suggested that modern knowledge of the seal will accrue with the current generation that is interacting with the monk seal. A key question among this group is how seals will be integrated into Hawaiian culture and what will the cultural exchange be with the species in the modern context.

In a few unique places in the archipelago monk seals are regarded as a natural part of the ecosystem and human-monk seal conflicts appear to be minimal (Figure 2). These areas tend to be rural and fairly isolated communities that are characterized by a higher degree of self-sufficiency, and where familial traditions and local decision-making processes are preserved. On Ni‘ihau Island, for example, monk seals became established nearly three decades ago. Community members discussed the social impacts associated with monk seal colonization (e.g, increased presence of sharks), and ultimately decided to act as stewards of the animals (Robinson, 2008). As a result, a sub-population has become established and residents have developed a stewardship ethic towards the species. A similar situation is occurring in the isolated Kalaupapa community on Moloka‘i Island, where another sub-population is thriving in the MHI, and where community residents largely leave seals alone. In these communities, fishers and other ocean users will move away from areas where seals are visible in order to minimize interactions.

Figure 2: ‘Īliopi‘i point, Kalaupapa peninsula, Moloka‘i, a rural community that has developed a relatively conflict-free relationship with monk seals. As a result, monk seals have flourished in this area. Photo by Patrick Doyle.

Discussion

Findings of the archival research component of this project suggests that the Hawaiian monk seal was likely extirpated in the main Hawaiian Islands soon after voyaging Polynesians settled in the archipelago. Though several other competing hypotheses remain (Watson et al., 2011), based on our review of the available information the most likely explanation is that seal populations were probably rapidly diminished by human hunters and harassment from their commensals. This theory has been advanced before in several forms (e.g. Kenyon, 1980), but to our knowledge has not been substantiated with a comprehensive review and analysis of archival sources. Monk seals remained rare in the MHI through the early historical period, and were hunted to near extinction once populations were discovered in the NWHI. In the post-sealing era of the early 20th century, various human perturbations in the NWHI kept populations relatively low until the species was protected under the Endangered Species Act in the 1970s (Kenyon, 1972, Kenyon, 1980). Starting in approximately the mid-1990s seal populations have increased in the MHI, leading to increased conflicts with ocean users (Baker and Johanos, 2004).

Cultural Endemism and the Heterogenous Production of Knowledge

Our research on the socio-cultural significance of the species suggests that the monk seal is not uniformly known among Native Hawaiian communities. There is little evidence that monk seals played a significant role in traditional Hawaiian culture in prehistoric (<AD 1778) or historical times. The cultural references to the monk seal that were found appear to be sequestered in specific knowledge systems ascribed to either a specific geographic location, familial association or oral tradition. Cultural information about the species is also inconsistent in Native Hawaiian cultural knowledge forms. For example, the reference to *ka-ʻīlio-holo-i-kauaua-a-Lono* associates monk seals with the god Lono, while other *moʻolelo* point to an association with a different god (e.g. Kū; Kane) or to a local demi-god or place name. Knowledge thus appears to be heterogenous in distribution among Native Hawaiian knowledge domains.

We advance the notion of 'cultural endemism' to explain how socio-cultural knowledge domains evolve and are maintained in society. We define cultural endemism as the set of socio-cultural values, norms, practices and traditions that develop in a place-specific context for a discrete or set of linked natural or anthropogenic phenomenon. The development of cultural endemism for a species appears to be a result of reciprocal interactions, whereby the most vulnerable taxa are reduced faster than the development of a cultural profile, and high-value resources that are more resistant to initial impacts become more fully integrated into traditions, values and practices (Kittinger et al., *In Review*).

Our research on the monk seal suggests that although the monk seal is biologically endemic, the species is not uniformly culturally endemic in Hawaiian communities. This heterogeneity can be explained by two processes, including: 1) Species rarity and non-uniform distribution in prehistoric and historic times, and; 2) The dispersed mode of traditional knowledge production in Hawaiʻi. Historical patterns of anthropogenic impacts likely caused the monk seal to become rare ecologically in the MHI shortly after Polynesian settlement, and this pattern persisted into the post-contact and modern eras. Ecological rarity likely precluded the uniform development of a cultural profile for monk seals and further integration into Native Hawaiian cultural practices and traditions. In some areas, monk seals have been incorporated into cultural lore and memory, but these cultural references appear to be rare and not widely known to the broader Native Hawaiian community.

Diversity and lack of consistency in cultural sources and contexts is also likely contributed to the dispersed manner in which knowledge is generated, maintained and built upon in Native Hawaiian communities. Traditionally, cultural knowledge systems accumulate at the local level through kinship networks and familial ties rooted in traditionally circumscribed communities, defined as mountain-to-sea systems based in single watersheds (*ahupuaʻa*). The local development of situated knowledge may have aggregated at higher levels through the indigenous governance systems that linked individual communities (*ahupuaʻa*) into regional districts (*moku*) and through the dispersal of cultural traditions. Because knowledge was preserved in non-written forms (e.g. oral, dance traditions), the production of knowledge resulted in a heterogenous, poly-rhetoric knowledge landscape with variation due to social and environmental geography (Nogelmeier, 2010a). The dispersed knowledge production system explains spatial variation in cultural practices and traditions, and is likely responsible for the different names, cultural associations and significance ascribed to monk seals. Ecological rarity may have further contributed to the development of different patterns of cultural endemism in geographically defined communities and may explain inconsistencies in oral traditions and names.

Though historically monk seals may no have been uniformly endemic to Native Hawaiians, the species is currently developing a more substantive cultural profile in contemporary Hawaiian communities. This is due in part to the increased occurrence of monk seals in the MHI, making them more common throughout the MHI. Perceptions of the monk seal appear to be dichotomous, with one epistemic community that views monk seals as alien and another set of communities that have retained, enhanced or engendered a Native Hawaiian cultural association with monk seals. Community members adverse to the monk seal associate little or no historical cultural references to monk seals, primarily include fishers and their families. Such persons tend to associate the monk seal with increased restrictions on cultural activities and practices, particularly fishing.

Communities that are developing a more substantive cultural profile for monk seals are dispersed and tend to be rural, somewhat isolated, and less integrated in the socio-economic systems that support urban communities in the archipelago. McGregor has termed such communities as cultural *kīpuka*, where traditional livelihoods, cultural practices and lifeways have persisted relatively untouched, and which provide the seeds by which Native Hawaiian culture is regenerated, relearned and revitalized in the setting of modern Hawaiʻi (McGregor, 2007). Kikiloi (2010) has posited that this process of re-learning and developing new knowledge is a fundamental aspect of sustaining a Hawaiian cultural identity and spiritual connections to land and place. Notably, integration of traditional knowledge systems with western conceptions and methodologies occurred historically (Beamer and Duarte, 2006) and is increasingly becoming common in the modern context (Jokiel et al., 2011).

Waldman has described a process of "eco-social anomie," where as species disappear, they lose both relevance to a society and the constituency to champion their revival, further hastening their decline (Waldman, 2010). In the case of the monk seal, the process appears to be the reverse. The re-colonization of the MHI by monk seals over the past few decades has enlivened user conflicts and has brought to the forefront conflicting values and perceptions of the species. The future development of a cultural profile for monk seals will depend largely upon how Hawaiian communities will interact with the species.

Applying Socio-Cultural Dimensions of Wildlife to Conservation

From a social perspective, understanding how humans interacted with protected species in the past and in contemporary communities can help inform modern management and conservation actions (Cordell et al., 1999, Tarrant et al., 1997, Watson et al., 2011). The management of endangered monk seal populations, for example, will likely depend in part on the ability of managers and their conservation programs to engage productively with island communities in stewardship and recovery efforts. Social research in these communities can provide critical information regarding the values and perceptions of local stakeholders, and archival research can help further clarify how human-monk seal relationships have changed through time.

As the monk seals have increased in the MHI, community concerns have emerged about the affect this increased population will have on valued cultural resources and subsistence activities, including fishing. Among some community members, there is a strongly held belief that the monk seal is not culturally endemic, which is a concern for species conservation efforts as interactions with ocean users are likely to increase. The MHI provide increased habitat and carrying capacity, particularly in the availability of sandy beaches (Ragen, 2002), and the establishment of small but growing rookeries in habitats in the MHI provide an important hedge against the possibilities of future major perturbations (e.g. hurricanes, oil spills). Among community members who hold adverse views about the monk seal, the limited information about historical cultural associations may help to alleviate some beliefs and misperceptions, but continued views of the monk seal as alien to Hawaiian culture are likely to persist among some community members and may have historical precedent in Hawaiian language newspapers and the Kumulipo. On the other hand, some communities have independently developed stewardship programs and have minimized human-monk seal conflicts.

This heterogeneity in values and perceptions among Hawaiian communities could help inform or pro-actively evaluate specific management actions. For example, the current practice of translocation of seals from the NWHI to the MHI is viewed as an egregious practice by many fishers, both because of the perceived threat of additional monk seals as competitors for fisheries resources, but also as evidence of the intrusion of federal government programs on local customs and practices. Translocations, and other management actions that may increase user conflicts, ideally should be evaluated within a spatial context to minimize conflicts with specific user groups and may also be aided through involvement of user groups and stakeholders in participatory decision-making processes.

In conclusion, it appears that ecological rarity may have precluded the consistent development of a cultural profile for monk seals in the Hawaiian archipelago. The species is not uniformly culturally endemic in Hawaiian communities, but our research has revealed significant evidence of cultural associations and supports the notion that the species were not unknown to Hawaiian communities in historical times. The future of monk seal recovery will depend in part on the productive engagement of Hawaiian stakeholder groups, which can be aided by assessments of socio-cultural values, perceptions and practices associated with species and the environments in which they are embedded.

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Appendix

Table of Contents

1.0 Kumulipo

Kumulipo (Beckwith, 1951)
Ka Wa Eone / Chant Six

0539. O kupukupu kahili o Kua-ka-mano
Many new fines of chiefs spring up
0540. O kuku ka mahimahi, o ka pihapiha kapu
Cultivation arises, full of taboos
0541. O ka holo [a]na kuwaluwalu ka linalina
[They go about scratching at the wet lands
0542. Holi [a]na, hoomaka, hoomakamaka ka ai
It sprouts, the first blades appear, the food is ready] [?]
0543. Ka ai ana ka piipii wai
Food grown by the water courses
0544. Ka ai ana ka piipii kai
Food grown by the sea
0545. Ka henehene a lualua
Plentiful and heaped up
0546. Noho poopoo ka iole makua
The parent rats dwell in holes
0547. Noho pupii ka iole liilii
The little rats huddle together
0548. O ka hulu ai malama
Those who mark the seasons
0549. Uku lii o ka aina
Little tolls from the land
0550. Uku lii o ka wai
Little tolls from the water courses
0551. O mehe[u] ka akiaki a nei[a] haula
Trace of the nibblings of these brown-coated ones
0552. O lihilihi kuku
With whiskers upstanding
0553. O peepee a uma

They hide here and there
0554. He iole ko uka, he iole ko kai
A rat in the upland, a rat by the sea
0555. He ʻiole holo i ka uaua
A rat running beside the wave
0556. Hanau laua a ka Pohiolo
Born to the two, child of the Night-falling-away
0557. Hanau laua a ka Poneeaku
Born to the two, child of the Night-creeping-away
0558. He nenee ka holo a ka iole uku
The little child creeps as it moves
0559. He mahimahi ka lele a ka iole uku
The little child moves with a spring
0560. He lalama i ka iliili
Pilfering at the rind
0561. Ka iliili hua ohia, hua ole o ka uka
Rind of the ʻohiʻa fruit, not a fruit of the upland
0562. He pepe kama a ka po, hiolo i hanau
A tiny child born as the darkness falls away
0563. He lele kama a laua o ka po nee aku
A springing child born as the darkness creeps away
0564. O kama a uli a kama i ka po, nei la
Child of the dark and child in the night now here
0565. Po--no
Still it is night

2.0 Moʻolelo of Hiʻiakaikapoliopele (Hiʻiaka)

Translation by M. Puakea Nogelmeier (Nogelmeier, 2006:161-162)

As Hiʻiaka travels through Oʻahu on her way to Kauaʻi, she describes an area near Kaʻōʻio Point: "there is a plain on the inland side and dangerous waters seaward, a place renowned in the saying, 'Lie calmly in the sea of your chief.' As we go along we will reach Makaua, land of the Maʻakua rain. That is where the ʻīlio hā of Kāne dwells, named Kauhikeʻīmakaokalani, an uncle of ours"

The translation continues:

> "Hey, dear friend!"
>
> Wahineʻōmaʻo responded, "Yes?"
>
> Then Hiʻiaka asked, as her hand indicated a ridge of steep cliffs descending sharply to the read, "Do you see that line of cliffs overgrown with ti leaves?" Wahineʻōmaʻo agreed that she did, and her friend asked again, "Do you see that stone lying there, shaped like an ʻīlio, a dog, with the head, the body, and all the features of a dog?"

Looking carefully at the stone her friend pointed out, Wahineʻōmaʻo could make out a great strong that looked just like a dog lying down with its head up, facing inland of the cliff. When Wahineʻōmaʻo had spotted the stone, she said, "Oh Hiʻi, I do see the stone you are talking about; it is like a great dog. But our dogs are tiny, and that one is huge. That is amazing. Was that rock craft like that by the people of this pace? What is the nature of that stone, my friend?"

"That is no stone carved by man, but rather the rock form of one of our uncles, one I mentioned to you. That is Kauhikeʻīmakaolani. He is the ʻīlio hā that Kane brought from Kahiki, and he is always seen yonder, at Kaʻōʻio Point, that high spot before one reaches the flatlands on the way to Kāneʻohe. The third place where he's often seen is at the mouth of Nuʻuanu Valley, where one enters Kahaukomo.

As I told you, this ʻīlio hā belongs to Kāne, and his lineage is recited, for he is from Kumuhonua and his wife Polohina. His lineage chant is a prayer memorized by our ancestors. Just so you will understand, I shall show you a bit of that prayer, and here it is."

And then Hiʻiaka recited the prayer below, shown here by the writer as a hay in this version of the Story of Hi`iaka.

[CHANT SIXTY-TWO]

The supernatural ʻīlio hā rules the island
Born of the royal ones, Kūhonua
Polohaina as his wife
Royal ones made scared by Kāne

"And what is an ʻīlio hā?" Wahineʻōmaʻo asked her friend.

"Yes, replied Hiʻiaka, going on to say, "There is much confusion among people about this thing, an ʻīlio hā. Some thought it was a form of moʻo [lizard], but that is not true. ʻĪlio hā is like saying ʻīlio kāhā, an oversized, hulking dog, the same way a pig can be oversized. It means it is huge, heavy, plump, and fleshy. But this dog-uncle of ours you see there has the body of a massive dog, and the largest expanse of his fur is on his head and neck …"

3.0 Moʻolelo of Pinao and Kamālama at Ka Lae o ka ʻĪlio, Hawaiʻi Island

The following is an oral tradition and story (*moʻolelo*) from a kūpuna interviewed on Hawaiʻi Island, near Ka Lae o ka ʻĪlio ("the cape of the dog"), about the monk seal. Names and some information have been withheld to protect the identity of the respondent.

Respondent:

I'm from Kaʻū [Hawaiʻi Island], but originally I come from Molokaʻi, from the area called Kalamaʻula. I relocated here [to Kaʻū] because of my husband. My husband was a cowboy by trade.

Today I'm going to share with you a little moʻolelo, a little story that comes from the opposite end called Ka Lae. A lot of people call this area South Point, but it's really Ka Lae.

Now in this area, there was this young woman and her name was Kamālama. And Kamālama had a good friend who she loved dearly and his name was Pinao.

Well Pinao and Kamālama were always happy together. They loved each other dearly.

But one day, Kua, the Shark God, he's traveling the moana, the ocean. He sees her [Kamālama] [heart fluttering motion]. Hū [oh] my goodness, he loves this young lady.

No. She don't want him at all.

Kua is very upset; and so Kua causes a pōʻino. He puts a curse on this young lady, Kamālama, and Pinao.

And, Kamālama no longer stays as a woman; but she withdraws to the ocean and she becomes an *ʻaukai*, a sea-god or a seal. And poor Pinao. Pinao who stands so very tall; now begin to bear wings and he begin to flutter and fly. He becomes a dragonfly. Auē! They no longer can be together.

And whenever Kamālama come up to the white sand, at this particular beach, she's not able to embrace her good friend Pinao. And Pinao, he comes and he flutters down upon her, and he is no longer able to hold her anymore.

Well, the god Kū, finally comes to realize what is happening; and he feels love and compassion for this young couple, for this young man and this young lady. And so what happens: Kū decides that this should not happen, that Kua's jealousy gets in the way. And so, the god Kū decides to make a new rule, and he says: when Nā Huihui [reference to the star cluster Nā-Huihui-a-Makaliʻi, otherwise known as Pleiades, whose rise & fall in the Hawaiian night skies marks the start and end of the Makahiki Season, generally from end Oct/beg Nov to end Jan/beg Feb] all the stars shine during these particular months then this young man and this young lady will be able to have the… This young man and this young lady will be able to share this time to Kū, to take on their human forms again, so that they will no longer be this dragonfly, nor will she be this *ʻaukai*, this seadog or this seal of the ocean.

And so from the months of October, November, December [until] part of February, they then take on this form, and they come back to who they really were; and they're able to enjoy each other's company, and to embrace each other once again.

And so this is the short story of Pinao and Kamālama. I'm not sure if that's what you was looking for.

I doubt if you're going to find it in any books, like you do [the moʻolelo of] Kauila because I heard this, again, from my father-in-law.
When he was here, he was busy sharing things. And he was trying to recall things and I didn't realize what he was doing is recalling because he was going to go on his journey [pass away]. He was going to leave us.
And so, um, most of the stories that I am sharing every now and then, I haven't seen it in any book. So, and, I haven't shared this, except for my own family. This is the first time I've shared it outside.

4.0 Historical English Language and Translated Hawaiian Language Sources

Early observations of the Hawaiian Islands were recorded by explorers, traders and merchants, whaling and sealing crew members and captains, missionaries and Native Hawaiians. These written accounts vary with respect to their description, but most contain information about coastal environments and social relationships with these ecosystems. Of the sources listed below (summarized in part by Marion Kelly in the forward to Freycinet, 1978), no references to the Hawaiian monk seal were found (Watson et al., 2011).

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Broughton 1804
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Cook 1842; 1999; Cook and King 1784
Campbell 1825
Corney 1965
Ellis 1826
Eveleth 1829
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Ii 1993
Kamakau 1961, 1976, 1992, 1993
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Krusenstern 1821
La Pérouse 1807
Langsdorft 1817
Ledyard 1781
Lisiansky 1814
Malo 1951
Mathison 1825
Meares 1790
Mortimer 1791
Portlock & Dixon 1789
Quimper Benitez del Pino 1822

Stewart 1828
Turnbull 1813
Vancouver 1798, 1801

5.0 Hawaiian-Language Newspapers

Misc. Notes	ʻŌlelo Hawaiʻi (Hawaiian)	English translation
KHH 1a before & 1a (& 1 b before & b/c)	**Ka Hae Hawaiʻi** ʻOkatoba 19, 1859, 115 [ʻAoʻao 6, Paukū 1] Haʻawina XXIV. No ke kākau hōʻike ʻana i nā moku. Paukū 630. ʻAʻole e pono ke kākau hōʻike iā kekahi moku ma kēia Aupuni, ʻaʻole hoʻi e manaʻo iā kekahi moku, he moku Hawaiʻi i loaʻa nā pōmaikaʻi i pili i nā moku Hawaiʻi, ke ʻole ʻo ia ka waiwai ponoʻī a kekahi kanaka kupa a mau kānaka hoʻokupa ʻia paha o kēia Aupuni. Akā hoʻi, ʻo hiki nō ke kākau hōʻike iā kekahi moku, i hoʻomākaukau ʻia no ka lā… [ʻAoʻao 1, Paukū 1 (ka hopena a ka paukū 630 ma luna aʻe)] …waia ʻōkoholā, a no ka ʻimi ʻana i nā **ʻīliokai**, ma ka moa[na] o ka mea nona kekahi hapa o ia moku, inā he kanaka kupa ia a he kanaka kupa ʻole paha, a inā e noho paʻa a[n]a ʻo ia i loko o kēia Aupuni. [ʻAoʻao 2, Paukū 3] Paukū 636. Ma ke kākau hōʻike ʻana i kekahi moku, e like me ka ʻōlelo a ka paukū ma luna aʻe nei, e koi aku ka Luna Dute Nui, i ka mea nāna i noi mai a ʻo ke kākau hōʻike ʻana, e hāʻawi mai ʻo ia i palapala hoʻopaʻa me nā hope kūpono i ka manaʻo o ka Luna Dute Nui, no nā dālā ʻaʻole ʻemi mai ma lalo o nā haneri ʻelua, ʻaʻole hoʻi ʻoi [a]ku i ʻelua tausani, e hoʻohālike ʻia e ka Luna Dute Nui me ka nui o nā tona o ka moku; e ʻōlelo ana ia palapala hoʻopaʻa, e hana ʻia ka palapala hōʻike i ke kākau ʻana no ka moku, āna i hāʻawi ʻia ai wale nō, ʻaʻole hoʻi e kūʻai ʻia, a e	**The Hawaiian Flag** October 19, 1859, 115 [Page 6, Paragraph 1] Article XXIV. Regarding writing bonds for vessels Paragraph 630. This vessels ought not be a written bond, without due consideration of this vessel, a Hawaiian vessel with all profits acquired belonging to Hawaiian vessels, when he refuses the due assets of a citizen and one who may become a citizen of this Kingdom. But also, a vessel may give written bond, prepared for the day… [Page 1, Paragraph 1 (end of paragraph 630 directly above)] …disgraced whaling, and for searching for the **seadog**, in the ocean of the one for whom is half of the vessel, if a citizen or not a citizen, and if permanently residing in this Kingdom. [Page 2, Paragraph 3] Paragraph 636. In bond writing for a vessel, similar to the language of the paragraph directly above, the Chief Customs Officer requires, of the one who request the bond writing, to give him an insurance policy with equitable legal surety as is the will of the Chief Customs Officer, for a sum not less than $200.00, and not too exceed $2,000.00, to be matched by the Chief Customs Officer with the larger part of the tonnage of the

Misc. Notes	ʻŌlelo Hawaiʻi (Hawaiian)	English translation
	hāʻawi lilo ʻole ʻia, a e hoʻolilo ʻia paha ma ke ʻano ʻē aʻe, i kekahi kanaka; a inā e lilo ia moku a pau, a ʻo kekahi hapa paha o ka moku, inā ʻaʻole ia he moku ʻōkoholā a moku ʻimi **ʻīlio o kai**, no kekahi haole a mau haole paha i kupa ʻole ma kēia ʻAupuni, a inā paha e pōʻino, a i lawe pio ʻia paha e kekahi ʻenemi, a i hoʻopau ʻia i ke ahi, a i wāwahi ʻia ka moku paha, a laila, e hoʻihoʻi ʻia mai ka palapala hōʻike i ka Luna Dute Nui, ma loko o nā Mālama ʻeono, ma hope iho o ia hoʻolilo ʻana o ka moku i ka ona ʻē, a ʻo kona pōʻino ʻana, a lawe pio ʻana, a pau ʻana i ke ahi, a wāwahi ʻana paha; Akā hoʻi, inā i lawe pio ʻia a pau i ke ahi, a pōʻino paha, a laila, e hoʻokuʻu ʻia nā mea i kākau inoa ʻia i ua palapala hoʻopaʻa la, inā e hoʻomaopopo i ka Luna Dute Nui, ʻaʻole e hiki, ke hoʻopakele i ka palapala hōʻike.	vessel; this insurance policy states, the insurance policy shall be done in writing for the vessel, only for what he was awarded, not to be sold, and not to be granted absolutely, or conveyed in a different manner, to a person; and if the entire vessel is transferred, or half of the vessel, or if it is not a whaling vessel and a **sea dog** investigating vessel, for a foreigner or foreigners not citizens in this Kingdom, or if damaged, or if abducted by an enemy, and consumed in a fire, or ship-wrecked, then, the insurance policy shall be returned to the Chief Customs Officer, within six months, after this transference of the vessel to a different owner, for his damage, abduction, consumption due to fire, or ship-wrecked; but also, if extinguished entirely by fire, or misfortuned, then, the things signed on this insurance policy shall be relinquished, as understood by the Chief Customs Officer, [who is] unable to be released from the insurance policy.

Misc. Notes	ʻŌlelo Hawaiʻi (Hawaiian)	English translation
KM 1a (& b/c)	4 Honolulu, Oʻahu Pōʻakahi, Maraki 19, 1894. **Ka Makaʻāinana** ***He Nūpepe ʻŌʻili Pule*** W.H. Kapu Luna Nui a Lunahoʻoponopono F.J. Testa (Hoke), Puʻukū. Pōʻakahi, Maraki 19, 1894. [ʻAoʻao 1, Kolamu 2, Paukū 2] Mai Pūlama Aku. ʻO ia nō kēia mākou e uwalo aku nei i nā hoa makaʻāinana a pau, mai pūlama aku i nā hana a kēia poʻe no ka mea pili i ka pono koho balota no nā ʻelele i ka ʻaha hana	4 Honolulu, Oʻahu Monday, March 19, 1894. **The Citizen** ***A Blessed Newspaper*** W.H. Kapu Chief Officer and Editor F.J. Testa (Hoke), Treasurer. Monday, March 19, 1894. [Page 1, Column 2, Paragraph 2] Don't Bother This is what we declare to all of the fellow residents, don't bother with the activities of this group because they are associated with the equal

	kumukānāwai a lākou. Ua lohe ʻia mai aia kā nā poʻe o na Kona a me Kaʻū, Hawaiʻi, ke pīkokoi nui lā e kākau inoa ma lalo o ka hoʻohiki a ua poʻe pākaha nei, a mākou nō hoʻi i hōʻaiʻai aku ai ma ka helu i hala i ka waiwai ʻole o ko ka lāhui kumu hana aku pēlā, no ka mea, ke hoʻokō, ʻo ka ʻāpono ʻana nō ia iā lākou nei, a lilo kā lākou nei ʻino i hana mai ai iā kākou i mea maikaʻi. ʻO kā mākou hoʻi e makemake nei, ʻo ia nō ko kākou kū mai nō i ka wā, ʻoiai, aia iā Amerika Huipū ʻia ka hana. No ka mea, ua ʻoiaʻiʻo loa nō kā mākou i hoʻomahuʻi aku ai inā kākou e kōkua ʻole aku, ʻaʻale loa lākou e ʻike ʻia mai a huli ke ao nei. ʻO ko kākou wā kēia e hōʻike ai i ko kākou lōkahi, ʻaʻohe manawa e aku nō kākou; a inā nō ʻo nā poʻe lawelawe ʻoihana Aupuni a poʻe naʻaua[o] paha ma lalo o lākou, ʻaʻohe nō ia o ka lāhui, akā, e hoʻokuʻu aku nō i kēlā poʻe a ʻaluʻalu aku i ko lākou pono e like lā me nā **ʻīlio holo i ka uaua**. Aka, no ka lāhui hoʻi, e unuhi mai nō a kaʻawale; a laila, lawe aku nō a kai hohonu, hoʻokuene pono iho ʻana i laila.	ballot election for the delegates in their constitutional labor convention. It was heard, there were the groups of Kona and Kaʻū, Hawaiʻi, largely gathering to register beneath the names of these crooks, and we also released in the list of offenses national concerns and such that are unbeneficial, because, when ratified, it will then be enforced by them, and their offenses will become worthless to our benefit. As for our needs, it's for us to rise to the time, while the United States is reasonable. Because, our impersonation was incredibly accurate, if we didn't render aid, they certainly wouldn't have been seen until the day was over. This is our time to demonstrate our unity, there is no time for us to run; else indeed the Kingdom officials and possibly the learned persons below them, truly without a nation, but, released to that group, will then slacken in their moral resolve like the **dog-running-in-the-rough-seas**. But, as for the nation, it will transform and separate; and then, truly be taken unto the depths of the ocean, and properly arranged there.

Misc. Notes	ʻŌlelo Hawaiʻi (Hawaiian)	English translation
LH a (&b)	**Lama Hawaiʻi** [ʻAoʻao 1, Kolamu 3, Paukū 3] No kekahi ʻaoʻao kahiko. Eia kekahi mea kupanaha a mākou: ʻo ke kūkini. Inā i ʻōlelo ʻia he mau kūkini: ʻapōpō, holo; a laila, hele maila kanaka he nui loa me ka waiwai, a pili a mau ihola, a laila, hele akula ua mau kanaka lā ʻelua a hiki i ka pahukū. Kūkini maila ua mau kanaka lā, a hopu i ka pahu kekahi, a laila, eo aʻela nāna. ʻOliʻoli ihola ka poʻe i kō. Akā, ʻo ka poʻe i eo, mihi ihola lākou i ke eo ʻana. Inā e ʻōlelo ke Konohiki i nā makaʻāinana, ʻapōpō kākou koʻele a pau, a ahiahi iho, hōʻike i ka waiwai:	**Hawaiian Torch** [Page 1, Column 3, Paragraph 3] Concerning an ancient way of life. Here is something wondrous for us: runners. If some runners said: tomorrow, is a race; and then a multitude of persons came with money, and continued to place bets down, and then, two of these persons then ran until they reached the goal. These people then raced, and grabbed the baton, and then, it was won for him. The people were then joyful for the triumph. But, as for the

	A laila, hana ihola lākou i ua mau mea nei a ke Konohiki i ʻōlelo mai ai: ʻo ka puaʻa, ʻo ka ʻīlio, ʻo ke kapa, ʻo ke olonā, ʻo ka **hulu**, ʻo ka ʻupena, ʻo kēlā mea kēia mea a pau. ʻO ia ka waiwai, a mākou i hōʻike ai i ka wā kahiko.	persons who lost, they apologized for losing. If the Konohiki said to the citizens, tomorrow we all walk until the evening to show the tribute: and then, they lay down these things the Konohiki requested: pig, dog, cloth, fiber, **fur**, fishing net, everything. These are the goods that we exhibited in ancient days.

Misc. Notes	ʻŌlelo Hawaiʻi (Hawaiian)	English translation
KA 1a (b/c/d)	30 **Ke Alaula** [ʻAoʻao 1, Kolamu 1, Paukū 1] …kou holoholona i mālama loa ai. ʻAi nō hoʻi ʻo Kauka Kaina i ka ʻīlio a me nā ʻiole i loaʻa iā lākou ma luna o ka moku. Loaʻa iā lākou ma nā ʻae kai nā **ʻīlio-holo-i-ka-uaua** a me nā ʻelepani kai. He makaʻu nā kamaʻāina Ekimo i kēia holoholona nui, akā make nō ia lākou i kekahi manawa. I ka hoʻi ʻana mai o Kauka Kalina i Piledelepia, hoʻopuka ʻo ia he buke moʻolelo o nā mea āna i ʻike ai ma ia ʻāina anu, a ua piha ia buke i nā kiʻi nani loa. Eia mai ke kiʻi o ka ʻelepani-kai.	30 **The Dawn** [Page 1, Column 1, Paragraph 1] ...your animal to attend. Doctor Kaina also eats dogs and rats they found on the ship. They catch on the seashore the **dogs-running-in-the-rough-seas** and the sea elephants. The local Eskimo are afraid of this big animal, but they also sometimes kill it. When Doctor Kaina returned from Philadelphia, he published a story book of the things he saw in this frozen land, and this book was filled with very beautiful pictures. Here is the picture of the sea elephant.
KA 2a (b/c)	**Ke Alaula** Honolulu, Novemaba, 1867 Buke II, Helu 8 [ʻAoʻao 1, Kolamu 2, Paukū 2] Kokoke aku lākou i ka Wēlau ʻĀkau. I ka noho ʻana o lākou i ka moku, holo aʻe kekahi poʻe o lākou i ka ʻākau ha[u] aku ma luna o nā holopapa i kauō ʻia e nā ʻīlio. Ke ʻike lā ʻoukou ma ke kiʻi ma luna aʻe nei i ke ʻano o ka hoʻokaulua ʻia o nā ʻīlio, a hoʻohui ʻia lākou e kauō i ka holopapa. Noho iho ke kanaka ma luna o ka papa, a kauō māmā loa ʻia ʻo ia e nā ʻīlio ma luna o ka hau paʻa. I kekahi manawa ʻelima a ʻeono ʻīlio kā i hoʻopaʻa ʻia i ka papa; i kekahi hoʻi he nui aku – he ʻumikūmāmāhā a ʻumikūmāmāono paha.	**The Dawn** Honolulu, November 1867 Book II, Volume 8 [Page 1, Column 2, Paragraph 2] They are approaching the North Pole. When they were staying on the ship, a group of them went to the icy north on top of the sled dragged by the dogs. You see in the picture above the disposition of the harnessed dogs, and they are united to drag the sled. The people sit on top of the sled, and he is quickly sled by the dogs on top of the hard snow. One time five maybe six dogs were

	Holo aku kekahi po'e o lākou i ka 'ākau a hiki i ka latitu 82° 30'. I laila 'ike aku lākou i ka Moana Anu 'Ākau. 'Akahi nō a launa kokoke aku kekahi i ka wēlau 'ākau e like me kēia – 450 wale nō mile koe a loa'a aku nō. Akā, 'a'ole nō he kanaka i hiki aku i laila, no ke anu loa – make e ma'i nō i ke anu. 'A'ole i loa'a iā lākou he wahi meheu no Sir Ioane Feranekelina. Ma hope loa mai ua loa'a 'ia i kekahi po'e 'ē a'e. 'Elua a 'ekolu paha o kēia po'e a Kauka Kaina i loa'a i ka ma'i a make; ho'okahi i loa'a i ke anu ma kekahi wāwae a 'oki 'ia aku ka wāwae ; lilo ho'i 'elua manamana wāwae o kekahi. 'O ko lākou kapa e mehana ai, 'o ka 'ili o ka **'īlio-holo-i-ka-uaua** a me nā holoholona huluhulu pahe'e 'ē a'e, e like me kā nā kānaka i hō'ike'ike 'ia ma ke ki'i ma luna a'e nei.	secured to the sled; another time more – fourteen maybe fifteen. Some of them went to the north until the latitude 82° 30'. There they saw Arctic Ocean. It was the first time someone approached the end of the north pole like this – just 450 miles left until the end. But, there was no person that could go there, because of the extreme cold – becoming deathly ill because of the cold. They didn't find a trace of Sir John Franklin. A long time afterward, it was reached by other people. Two maybe three of these groups and Doctor Kaina got sick and died; one got frostbite on a foot and the foot was cut off; and two toes of one was lost as well. Their clothing to keep warm was the pelt of the **dog-running-in-the-rough-seas** and the other slippery, furry animals, like the men shown in the picture directly above.

Misc. Notes	**'Ōlelo Hawai'i (Hawaiian)**	**English translation**
KN 1a (b/c)	**Ka Nonanona** Buke 1, Pepa 3, 'Ao'ao 9-01 'Augate 3, 1841; 3 'Aukake 1841 ['Ao'ao 1, Kolamu 2, Paukū 4] No Ka Ulu Moku 'Imi 'Āina. I ka mālama o 'Okatoba 1841, hiki maila ka ulu moku 'imi 'āina no Amerika huipū 'ia, ma Honolulu nei. 'Ehā moku, 'o ka moku nui, ('o ka Winisani, a me ka Pīkaka) a 'elua ho'i moku nuku iho, ('o ka Nai'a, a me ka Mālolo) a 'o Kali Wilika ko lākou ali'i nui. Ua 'imi 'āina nā ulu moku nei ma ka huina loa, a ua 'ike lākou i ka 'āina nui ma laila, i ka lā 13 o Ianuari, 1840, ma ka latitu 65°30 lonitu 104°24. Pōpilikia 'ia ko lākou holo 'ana ma kēlā moana hema, no ka nui loa o ka hau; me he mau moku 'āina nui lā, e lana wale ana, a e huikau ana, ua hau pa'a nei ma kēlā wahi. Ili ka Pīkaka i ka moku hau, a	**The Multitude** Book 1, Paper 3, Page 9-01 August 3, 1841; 3 August 1841 [Page 1, Column 2, Paragraph 4] About the Land Exploration Fleet. In the month of October 1841, the land exploration fleet arrived from the United States of America, here in Honolulu. There were four ships, the large ships, (the Winisani, and the Pīkaka) as well as two nose diving ships [submarines?], the Dolphin, and the Flying Fish and Kali Wilika was their high commander. The fleet explored land in it's entire length, and they saw great lands there, on the 13th day of January, 1840, in the latitude 65°30' longitude 104°24'. Their progression was troubled upon that

	mai nāhāhā loa: ua pākela nō naʻe no ke akamai loa o kona kāpena ʻo Hudesona. Holo kokoke i kēlā ʻāina hema ka Winisani i 1700 mile a ʻike pinepine lākou i ka ʻāina; he ʻāina pali, paupū i ka hau, ʻaʻole kanaka, he mau walerusa, a me nā **sila** wale nō ko laila holoholona. Pau kēia;	Antarctic ocean, because of the expanse of the ice; like great big islets, just floating, haphazard, ice-locked in that place. The Pīkaka was run aground on an iceberg, and very nearly wrecked: we escaped because of the good judgment of his Captain Hudson. The Winisani approached that arctic land which is 1700 miles and they frequently saw land; a precipice, filled with ice, no people, just walruses and **seals** were the animals that belonged there. This is done;

Misc. Notes	**ʻŌlelo Hawaiʻi (Hawaiian)**	**English translation**
KNK 1a	**Ka Nūpepa Kūʻokoʻa** [ʻAo ʻao 1, Kolamu 1, Pauku 6] A i ka pō ʻana iho, hele akula ia i ka Halepule, me ke ʻeke ma luna o kona kua, he pūʻolo ma lalo o ka lima, a he ipu-kukui ma ka lima. He pāpaʻi ko loko o ke ʻeke, a he ihoiho kukui pokopoko ko loko o ka pūʻolo. I kona komo ʻana aku i loko o ka pā o ka Halepule, wehe aʻela ʻia hoʻokahi pāpaʻi mai loko aʻe o ke ʻeke, a hoʻopili ihola i ka ihoiho kukui ma luna o ke kua a hoʻokuʻu iho i lalo e kolo ai. A wehe aʻela ʻia i ka lua, i ke kolu, a pēlā aku, a hiki i ka pau ʻana o ka papaʻi o loko o ke ʻeke. Ma hope o ia, komo ihola ia he koloka lōʻihi ʻeleʻele, he kapa like ʻia me ko ka **Mōnaka** (Monk) a hoʻopili aʻela he ʻumiʻumi hina ma kona ʻauwae. No ia mea, ua ʻano ʻē loa aʻela ia, a hele akula. Ia wā, kani ka pele o ka Luakini i ka hora hope, hoʻomaka aʻela ka ʻAihue Akamai, e kāhea me ka leo nui, "E lohe ʻoukou e nā lawehala a pau loa! E lohe, e lohe! Ua hiki mai ka hopena o ka honua, a ua kokoke ka lā nui; e lohe, e lohe! ʻO ka mea e makemake ana e piʻi i ka lani me aʻu, e komo mai i loko o kēia ʻeke. ʻO Petero au, ka mea nāna e wehe a e pani ka puka o ka lani. E nānā aku ʻoukou i loko o ka pā i ʻike ʻoukou i ka poʻe make e hele ana i ʻō a i ʻaneʻi, e ʻohi ana i ko lākou mau iwi. E komo mai, e komo mai i loko i ke ʻeke; no ka mea, e nalo aku ana ka honua."	**The Independent Newspaper** [Page 1, Column 1, Paragraph 6] And when night came, he went into the Church, with the sack on top of his back, a bag below his arm, and a lamp in his hand. Crabs were inside of the sack, and short kukui-nut candles were inside of the bag. When he entered the yard of the Church, one crab was loosed from inside of the sack, and a kukui nut candle affixed on top of the back and it was released below to crawl. The second was then freed, the third, and so on, until all of the crabs inside of the sack were gone. After this, he put on a black, long cloak, a cloth likened to that of a **Monk's** and affixed a gray beard to his chin. With this, he was made very different, and then left. At this time, the bell of the Temple rang the last hour, and then the Cunning Thief began to call out with a loud voice, "Listen all of you sinners! Listen, listen! The end of the world has come, and the day of reckoning has approached; listen, listen! Those desiring to rise to heaven with me, come inside of this sack. I am Peter, the one who opens and closes the door of heaven. All of

		you look in the yard and you will see the dead, walking here and there, gathering their bones. Come, come inside of the sack; because, the world shall disappear.”
KNK 2a (b/c/d)	**Ka Nūpepa Kūʻokoʻa** ***Ke Kilohana Poʻokela no ka Lāhui Hawaiʻi*** Buke III. Helu 51. Honolulu, Dekemaba 17, 1864. Nā Helu A Pau 100. [ʻAoʻao 1, Kolamu 4, Pauku 10] Ka Lāʻau Ka-umaka e pau ai ka Niniaole O Nā Maka Hūʻalu Pepeʻekue O W.H. Kalae-O-Kaena. E Ka Nūpepa Kūʻokoʻa E; Aloha ʻoe: -- Ua ʻikea iho ma kou ʻaoʻao 3 o ke Kahua kaua o ka lā 27 o ʻOkatoba, Helu 44 o ka Buke III o ke “Kilohana Poʻokela o ka Lāhui Hawaiʻi.” Aia ma laila ka pehina (throwing/pelting, as of rain) mai nei a W.H. Kalaeokaena, i nā pōhaku ʻelekū pukapuka o nā hekili kuʻi-pāmalō a ua **ʻīlioholoikauaua** lā, ʻaluʻalu pāpaʻi niho kekē o Koholāloa; e hāhā pōʻele lā i ua iʻa lā o ka ʻāina āna (W.H.K.) e noho lā; me he Ihuanu lā e manaʻo ana e hina o ʻAiwohikupua, i ka hele wahi ʻana a kani ka pola o ka malo; ʻū! e olo hoʻi! hina lā ana kei! a ʻo paha e olo ka hina o ke ʻAʻaliʻikūmakani o Kaʻū iā ʻoe, e nā lāʻauohala kumu Pūhala neʻineʻi.	**The Independent Newspaper** ***The Foremost Champion for the Hawaiian Nation*** Book III, Number 51. Honolulu, December 17, 1864. The Numbers Until 100. [Page 1, Column 4, Paragraph 10] The Beloved Medicine that cured the waterlessness of the thick viscous membrane covering the eye of W.H. Kalae-O-Kaena (loose skin over the eyeball; slight viscous membrane covering the eye) Dear Independent Newspaper; Greetings to you: -- It was observed in your 3rd page of the war section on the 27th day of October, Number 44 of Book III of the “Foremost Champion for the Hawaiian Nation.” There was W.H. Kalaeokaena’s raining of the hole riddled basalt rocks [bullets] of the roaring thunder-with out rain [gun] upon this **dog-running-in-the-rough seas**; the misshapen crab claw of Koholāloa, ignorantly groping for this fish on the land where he (W.H.K.) lives; like the Ihuanu wind thinking to topple over ʻAiwohikupua, going somewhere until the flap of the loincloth sounds; ʻū! resounding! glorious toppling! and perhaps resounding the steady blowing of the ʻAʻaliʻikūmakani wind of Kaʻū to you, the hala leaves of the grove of the low-lying hala trees.
KNK 3a (b/c/d)	**Ka Nūpepa Kūʻokoʻa** Vol. 4, No. 26 29 June 1865 [ʻAoʻao 1, Kolamu 6, Paukū 7]	**The Independent Newspaper** Vol. 4, No. 26 29 June 1865 [Page 1, Column 6, Paragraph 7]

	He ʻAumoku hou, e holo ana ka Wēlau ʻĀkau. Ke hoʻomākaukau nei o Kapena Osbone (Osborne) o nā Moku manuwā o Beritania e holo i ka Wēlau ʻĀkau. Ua makemake ʻia i ʻelua mau moku māhu liʻiliʻi me nā kānaka he 120, a i ka Makahiki 1866 e hiki mai ana e holo ai ia. I loko o ke kau e holo aku lākou i ke Kaikūʻono o Bafine ma ke komohana o ʻĀinaʻōmaʻomaʻo, a hala loa aku i loko e like me ka lōʻihi o kahi e hiki ai ke hele aku. I loko o kēia mau makahiki aku ʻelua, e holo ana lākou me nā waʻapā a me nā koa na ka ʻīlio e kauō a hiki i ka Wēlau. ʻO kākou o ka poʻe hoʻi e noho nei i ka lā pumehana o Hawaiʻi nei, kai ʻike ʻole i ke anu o ia wahi. Ua ʻemi iho ka waidālā o ka hōʻailona māhu (thermometer) i kekahi manawa, i nā degere he 50 ma lalo o ka ʻole. He hau wale nō ka mea ʻike ʻia ma laila, ʻaʻole mea kanu; ʻo nā bea keʻokeʻo naʻe ka mea nui, me nā **ʻīlioholoikauaua**, a me nā ʻelepani o ke kai. I loko nā kānaka o nā hale hau e noho ai me nā lole hulu, a ʻo kā lākou ʻai o ka ʻiʻo momona me ka ʻaila a me kekahi mau mea ʻē aʻe. Ma laila e lilo ai ka bia a me kekahi mau wai ona ʻē aʻe i mea ʻoʻoleʻa me he pōhaka lā. I ka wā hoʻoilo, he pō lōʻihi ko lākou no nā mālama he nui wale, i ahona iki i ka mahina, no ka mea, he kōnane maikaʻi loa ka mahina ma laila, a me kekahi mālamalama ʻano ʻē ma laila ia kapa ʻia ka Aurora Borealisa (Aurora Borealis) a ʻo ka Mālamalama ʻĀkau. Ma ka Wēlau ma laila ka pō no nā mālama ʻeono, a me ka lā no nā mālama ʻeono. Inā e hiki ʻiʻo ʻo Kapena Osebone ma ia wahi, e kaulana nō kona inoa, no ka mea, ʻo ia ke kanaka mua i hiki ma laila.	A new fleet, sailing to the North Pole. Captain Osborne is preparing the British battleships to sail to the North Pole. Two small steamships were wanted with 120 men, and in the coming year 1866 he will set sail. During the summer they will sail through Baffin Bay in the west of Greenland, and stay awhile in there like the length of one who comes and goes. Within these two years, they will go with sleds and guards for the dogs to tow until they arrive at the Pole. We are to be sure the ones living here in the warmth of Hawaiʻi, unacquainted with the chill of this place. The mercury of the thermometer lowered once to 50 degrees below zero. Just snow is what is seen there, no plants; the polar bear is still important, with the **dogs-running-in-the-rough-seas**, and the sea elephants. Inside, the people stay in igloos with fur clothing, and as for their food it is rich meat and oil and other things. There, beer and alcoholic drinks become as hard as stone. In the winter, they have a long night for many months; the moon is a little better, because, the moon there has very good clear, bright moonlight; and there is a kind of strange light there named the Aurora Borealis otherwise known as the Northern Lights. At the Pole it's night there for six months, and day for six months. If Captain Osborne actually goes there, his name will be truly famous, because, he will be the first man to go there.
KNK 4a (b/c/d)	**Nūpepa Kūʻokoʻa** ***Ke Kilohana Poʻokela no ka Lāhui Hawaiʻi,*** Buke XV, Helu 8, Honolulu, Pōʻaono, Feberuari 19, 1876, Nā Helu a pau 742. [ʻAoʻao 1, Kolamu 4, Paukū 8] "Ba," i uilani aʻe ai o Nede me nā ʻano huhū: "he aha kāu i manaʻo ai no nā mea a	**Independent Newspaper** ***The Foremost Champion for the Hawaiian Nation,*** Book XV, Number 8, Honolulu, Saturday, February 19, 1876, The numbers until 742. [Page 1, Column 4, Paragraph 8] "Ba," queried Nede in anger:

	kākou e ai ai ma'anei? He ake honu, he lālā manō, a me nā 'i'o kō'ala 'ia o ka **'Īlioholoikauaua**."	"what are the things you think we eat here? Turtle liver, shark fin, and the broiled meat of the **Dog-running-in-the-rough-seas**.
KNK 5a (b/c/d/e)	**Nūpepa Kū'oko'a** ***Ke Kilohana Po'okela no ka Lāhui Hawai'i,*** Buke 15, Helu 12 18 Malaki 1876 ['Ao'ao 1, Kolamu 2, Paukū 16]	**Independent Newspaper** ***The Foremost Champion for the Hawaiian Nation,*** Book 15, Number 12 18 March 1876 [Page 1, Column 2, Paragraph 16] **'Īliopi'i** – cape & bay, Kalaupapa peninsula, *lit. climbing dog*.
KNK 6a (b/c/d)	**Nūpepa Kū'oko'a** ***Ke Kilohana Po'okela no ka Lāhui Hawai'i,*** Buke XV, Helu 32, Honolulu, Pō'aono, Augate 5, 1876, Ka Helu a pau 766. He 'Iwakālua Tausani Legue Ma Lalo O Ke Kai! --Nā Mea-- Kupanaha O Ka Moana! Ke Ala O Ka Mea Huna --A 'O Ka Mea-- Pohihihi O Ka 1866! Mahele 1 Mokuna XVI He Ululā'au Moana. ['Ao'ao 1, Kolamu 2, Paukū 8] Aia ma kēia wahi, he mea e ka lehulehu o nā i'a li'ili'i o kēlā me kēia 'ano, i kūpono 'ole no ke kī 'ana me nā pōkā. A no ka lelehu loa o nā i'a li'ili'i, ua hiki pono 'ole ia'u ke 'ike aku i nā mea nui; akā, 'o Kapena Nimo, ua 'ike akula nō ia i kekahi holoholon[a] nui, he otera ka 'ino, he holohona 'ano like me ka **'īlio holo-ikauaua**; a 'o ke kī koke akula nō ia no ia o ua Kapena Nimo, a mae ana ua holoholona nei. He 'elima kapua'i kona loa, a he mea ho'i i makemake nui ia, no ka nani o kona hulu. 'O nā kapa i hana 'ia no loko mai o ia 'ano hulu, he $400.00 ke kumukū'ai. Ua 'ike nui ia nā kapa o kēia 'ano ma nā mākeke o Rusia a me Kina. 'O kahi noho nui o kēia 'ano holoholona, aia ma ka Moana Pakipika 'Ākau.	**Independent Newspaper** ***The Foremost Champion for the Hawaiian Nation,*** Book XV, Number 32, Honolulu, Saturday, August 5, 1876, The number until 766. 20,000 Leagues Under The Sea! --The-- Wonders of the Ocean! The Path Of Secret --And -- Mystery of 1866! Section 1 Chapter XVI A Fleet At Sea. [Page 1, Column 2, Paragraph 8] In this place is something of a multitude, a variety of little fish, for which it is illegal to shoot with bullets. And because of the very duskiness of the little fish, I couldn't properly see the larger things; but, Captain Nimo then saw a large animal, a vicious otter, an animal somewhat like the **dog-running-in-the-rough-seas** (seal); and Captain Nimo then shot it, and this animal slumped over. It is five foot long, and something for which it is greatly desired, is the beauty of its coat. Blankets made from this type of fur is a costly $400.00. Blankets of this type are largely seen in the markets of Russia and China. The place where this type of animal mainly inhabits is the

		North Pacific Ocean.
KNK 7a (b/c)	**Nūpepa Kūʻokoʻa** ***Ke Kilohana Poʻokela no ka Lāhui Hawaiʻi,*** Buke 18, Helu 11 15 Malaki 1879 [ʻAoʻao 1, Kolamu 3, Pauku 18]	**Independent Newspaper** ***The Foremost Champion for the Hawaiian Nation,*** Book 18, Number 11 15 March 1879 [Page 1, Column 3, Paragraph 18] **ʻĪliopiʻi** – cape & bay, Kalaupapa peninsula, *lit. climbing dog*.

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Appendix L
National Historic Preservation Act
Section 106 Compliance

NATIONAL HISTORIC PRESERVATION ACT
SECTION 106 COMPLIANCE
FOR THE
HAWAIIAN MONK SEAL
RECOVERY ACTIONS

National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Pacific Island Regional Office

Portions prepared under contract by:
Pacific Legacy, Inc.

November 8, 2013

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1.0 INTRODUCTION

1.1 OVERVIEW

Pacific Legacy, Inc. has prepared the following report to assist the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) in complying with its duties under Section 106 of the National Historic Preservation Act (NHPA). Section 106 consultation with Native Hawaiian organizations (NHOs) and other interested parties was conducted to consider the potential effects on historic properties of proposed Hawaiian monk seal recovery actions.

The proposed recovery actions include research and enhancement activities presented in an application prepared by NMFS for a research and enhancement permit under the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) (NOAA NMFS Permit application 16632). In compliance with the National Environmental Policy Act (NEPA), these activities and their potential environmental impacts are described and analyzed in the Programmatic Environmental Impact Statement for Hawaiian Monk Seal Recovery Actions (PEIS). The following report presents the process implemented by NMFS to comply with NHPA Section 106 for the undertaking of a program funded and carried out by a Federal agency and associated with issuance of the ESA-MMPA permit for Hawaiian monk seal recovery actions. The report includes descriptions of the undertaking, the potential area of effects, steps taken to identify the Historic properties potentially affected, and the consultation process conducted to assess the potential effects. The report concludes with a determination of no historic properties affected and presents the basis for this determination.

1.2 RELEVANT STATUTES AND AGENCY REGULATIONS

The proposed Hawaiian monk seal recovery actions entail "take" of Hawaiian monk seals under the ESA and MMPA. Issuance of a permit for "take" under the ESA and MMPA requires compliance with other federal laws including, but not limited to, NEPA and NHPA. Under these statutes, NOAA, as a federal agency, has the responsibility to ensure effective stewardship of the cultural resources that may be impacted by its proposed actions. The Code of Federal Regulations (Federal Code) implements these federal statutes.

1.2.1 National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321 *et seq*., § 4331(a)(4) (2012), requires, in part, the consideration, discussion, and analysis of possible impacts to cultural resources as part of the human environment. The NEPA requirements related to Hawaiian monk seal recovery actions are implemented though the Federal Code provisions for environmental impact statements, 40 C.F.R. §§ 1502, § 1502.16(g) (2012), and the NHPA Section 106 consultation process discussed below.

Among the potential effects of federal actions to be considered under NEPA are historic and cultural effects, "whether direct, indirect, or cumulative" (40 C.F.R. §1508.8(b)), including "considerations of both context and intensity" (40 C.F.R. §1508.27). The unique characteristics of the proposed project's geographic area, including its proximity to historic or cultural resources, must also be taken into consideration (40 C.F.R. §1508.27(b)(3)). According the Federal Code, the Environmental Impact Statement is required to discuss the potential impacts that all of the proposed alternatives may have on cultural resources, including analysis of the proposed actions, any unavoidable adverse effects if the proposals are implemented, the relationship of the short-term uses of the environment to the maintenance and enhancement of long-term use, and any irreversible or irretrievable commitment of resources involved in the proposals if they are implemented. It must also consider "the degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources" (40 C.F.R. §1508.27(b)(8)).

1.2.2 National Historic Preservation Act

The goal of the National Historic Preservation Act of 1966 (NHPA, Public Law 89-665 and amendments thereto; 16 U.S.C. §§ 470 *et seq*.) is to empower Federal agencies to act as responsible stewards of U.S. cultural resources when agency actions affect historic properties. The NHPA established the Advisory Council on Historic Preservation (ACHP), an independent federal agency that promotes the preservation, enhancement, and productive use of historic resources, and advises the President and Congress on national historic preservation policy. The ACHP is the only entity with the legal responsibility to encourage Federal agencies to factor historic preservation into Federal project requirements. It also authorized the Secretary of the Interior to expand and maintain a National Register of Historic Places composed of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture. (Title I Section 101 (a)(1)(A)). Historic properties meeting criteria for evaluation defined in Federal Code 36 C.F.R. § 60.4 are eligible for designation as "National Historic Landmarks" and can be included on the National Register.

Section 106 of the NHPA (16 U.S.C. § 470 (f)) requires Federal agencies to take into account the effects of their undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places. An "undertaking," as defined as "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval" (36 C.F.R. § 800.16(y)). The Section 106 process seeks to accommodate historic preservation concerns with the needs of Federal undertakings through consultation among the agency officials and other parties with an interest in the effects of the undertaking on historic properties during the early stages of project planning (36 C.F.R. § 800.1(a)).

The Federal Code implementing the NHPA, 36 C.F.R. §§ 800 *et seq*. (2012), specifies the process for Section 106 consultation. The provision for consultation required under Section 106 applies when a project 1) includes a federal or federally licensed action, and 2) the action has the potential to affect properties that are listed in or are eligible for listing in the National Register of Historic Places. As part of the Section 106 process, the Federal agency must identify historic properties located within the Area of Potential Effects (APE) of the undertaking (CFR § 800.4 (b)). Identification efforts may include background research, consultation, oral history interviews, investigation, and field survey depending upon the scope of the APE. The process of identifying historic properties that may be affected by the agency's undertakings involves:

1. Determining and documenting the area of potential effects for the project.
2. Reviewing existing information on historic properties within the area of potential effects, including any data concerning possible historic properties not yet identified.
3. Seeking information, as appropriate, from consulting parties, and other individuals and organizations likely to have knowledge of, or concerns with, historic properties in the area, and identify issues relating to the undertaking's potential effects on historic properties.
4. Gathering information from any Native Hawaiian organization to assist in identifying properties which may be of religious and cultural significance to them and may be eligible for the National Register (CFR § 800.4 (a)).

Section 101 of the NHPA states that, "In carrying out its responsibilities under section 106 of this Act, a Federal agency shall consult with any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to properties described in subparagraph (A)" (Section 101 (d)(6)(B)). These are, "Properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization [that] may be determined to be eligible for inclusion on the National Register" (Section 101 (d)(6)(A)). The intent of this consultation is to identify historic properties potentially affected by the undertaking and to seek ways to avoid, minimize or mitigate any adverse effects on those properties (36 C.F.R. § 800.1(a)).

The NHPA, Section 301 Title III (16 U.S.C. 470 (w) – Definitions (5)) defines a Native Hawaiian organization (NHO) as any organization which "serves and represents the interests of Native Hawaiians," "has as a primary and stated purpose the provision of services to Native Hawaiians" and "has demonstrated expertise in aspects of historic preservation that are culturally significant to Native Hawaiians." This includes, but is not limited to, the Office of Hawaiian Affairs of the State of Hawai'i and Hui Mālama I Nā Kūpuna O Hawai'i Nei, an organization incorporated under the laws of the State of Hawai'i.

The Federal agency must ensure that the Section 106 process is initiated early in the undertaking's planning, so that a broad range of alternatives may be considered during the planning process. It must also complete the Section 106 process prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license. This, however, does not prohibit the agency from conducting or authorizing nondestructive project planning activities before completing compliance with Section 106, provided that such actions do not restrict the subsequent consideration of alternatives to avoid, minimize or mitigate the undertaking's adverse effects on historic properties (36 C.F.R. § 800.1 (c)).

Under the Federal Code, the consultation process provides for the inclusion of certain parties, including the State Historic Preservation Officer (36 C.F.R. § 800.2 (c)(1)), Native Hawaiian Organizations (36 C.F.R. § 800.2 (c)(2)), representatives of local governments (36 C.F.R. § 800.2 (c)(3)), additional consulting parties with a demonstrated interest in the undertaking (36 C.F.R. § 800.2 (c)(5)), and the public (36 C.F.R. § 800.2 (c)(5)(d)). There are specific provisions in 36 C.F.R. § 800.2 for coordination with the NEPA process and for consultation with any NHO that attaches religious and cultural significance to historic properties that may be affected by an undertaking. 36 CFR §800.2 (c)(2)(ii)(A) requires that the federal agency conducting Section 106 consultation must insure that the consultation process provides the NHOs involved with a reasonable opportunity to identify their concerns about historic properties, to advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, to articulate their views on the undertaking's effects on such properties, and to participate in the resolution of any potential effects.

2.0 BACKGROUND

2.1 HAWAIIAN MONK SEAL RECOVERY PROGRAM AND PROPOSED RECOVERY ACTIONS

NMFS is the federal agency responsible for management of Hawaiian monk seals, under the ESA (16 United States Code [U.S.C.] 1531 *et seq*.) and MMPA (16 U.S.C. 1361 *et seq*.). NMFS funds, permits, and conducts research and enhancement activities on Hawaiian monk seals in the Northwestern Hawaiian Islands (NWHI) and main Hawaiian Islands (MHI).

Populations of the Hawaiian monk seal (*Monachus schauinslandi*) have experienced a prolonged decline. In 1976, NMFS listed Hawaiian monk seals as "endangered" under the ESA (41 Federal Register [FR] 51611) and "depleted" under the MMPA. NMFS implements recovery actions (research and enhancement) for Hawaiian monk seals to promote the conservation and recovery of the species population to levels at which ESA protection is no longer needed. NMFS has proposed new research and enhancement activities for Hawaiian monk seals and has applied for authorization under the ESA and MMPA to conduct these activities (collectively referred to as recovery actions). The activities associated with this undertaking include, but are not limited to, monitoring, tagging, limited on-site medical treatment and the temporary translocation of seals between islands to enhance juvenile survival.

The intent of this report is to assess the potential effects to historic properties of the research and enhancement activities proposed in the ESA and MMPA permit application, to provide a summary of NHPA Section 106 consultations held regarding these potential effects, and to present the determination made by NMFS regarding these potential effects pursuant to NHPA Section 106.

Several actions proposed in the permit application may have the potential to affect historic properties within the Hawaiian archipelago. These historic properties may include both shoreline sites and submerged sites. Areas of traditional cultural significance, such as bays and beaches associated with legendary or historic events, which may be eligible for listing on the National Register as Traditional Cultural Properties could also be affected by activities related to the undertaking. The Section 106 consultation held in association with this undertaking focused on identifying Native Hawaiian concerns regarding the potential effects of the proposed NMFS Hawaiian monk seal research and enhancement activities on historic properties.

2.2 HAWAIIAN MONK SEAL

The Hawaiian monk seal is among the rarest of all marine mammals. It is endemic to the islands of the Hawaiian chain and found nowhere else on earth. Hunted to the brink of extinction in the late 19th century, Hawaiian monk seals have been declining in population since the late 1950s. The monk seal population is currently declining overall. While the larger monk seal population in the NWHI is shrinking, the population within the MHI is growing.

At present, the majority of monk seals live in six main breeding subpopulations located within the NWHI on Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island, and French Frigate Shoals. Smaller breeding sub-populations also occur on Mokumanamana (Necker) and Nihoa Islands. Monk seals have also been observed at Gardner Pinnacles and Maro Reef. Monk seals are also found within the MHI where births have occurred on many of the major islands.

As a general rule, Hawaiian monk seals are relatively solitary and do not congregate in large groups as do other seal species such as sea lions and harbor seals. Monk seals occupy a range of marine and coastal habitats. They frequent the waters surrounding atolls, islands, and areas farther offshore on reefs and submerged banks. Monk seals are also found using deepwater slopes and coral beds as foraging habitats. They often haul-out on land to rest during the day, and prefer sandy, protected beaches surrounded by shallow waters when pupping. Hawaiian monk seals are apex predators within the coral reef environment. They are primarily benthic foragers, feeding along the sea bottom on a variety of prey including fish, cephalopods, and crustaceans, although their diet varies depending upon location, sex, and age.

2.3 Area of Potential Effects

The Project Area for the proposed Hawaiian monk seal recovery actions encompasses the range where Hawaiian monk seals are found throughout the Hawaiian Archipelago, including the main Hawaiian Islands, the Northwestern Hawaiian Islands, and Johnston Atoll (Figure 1). It includes portions of the open-ocean and near-shore environment where monk seals may be found, as well as the shore zone of the islands, islets and atolls that make up the Hawaiian Archipelago and Johnston Atoll. For the purposes of NEPA, the shore zone generally includes those terrestrial areas 5 meters inland from the line where the shore meets the sea. In addition, secondary use areas, such as research field camps in the NWHI, are also considered for inclusion.

For the purposes of NHPA Section 106 consultation, the Area of Potential Effects (APE) of an undertaking is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist (CFR 36 § 800.16 (d)). The APE for the proposed Hawaiian monk seal recovery actions includes the shore zone, encompassing those terrestrial areas up to 25 meters inland from the upper reaches of the wash of the waves, at high tide during the season in which the highest wash of the waves occurs (usually evidenced by the edge of vegetation growth or the upper limit of debris), and the inshore waters up to 300 meters off from the shoreline, as well as camp sites further inland on the NWHI (as described in Section 3.4.6. of the PEIS). This APE has been extended further inland than the NEPA project area out of an abundance of caution regarding the potential direct and indirect effects of monk seal recovery actions on historic properties.

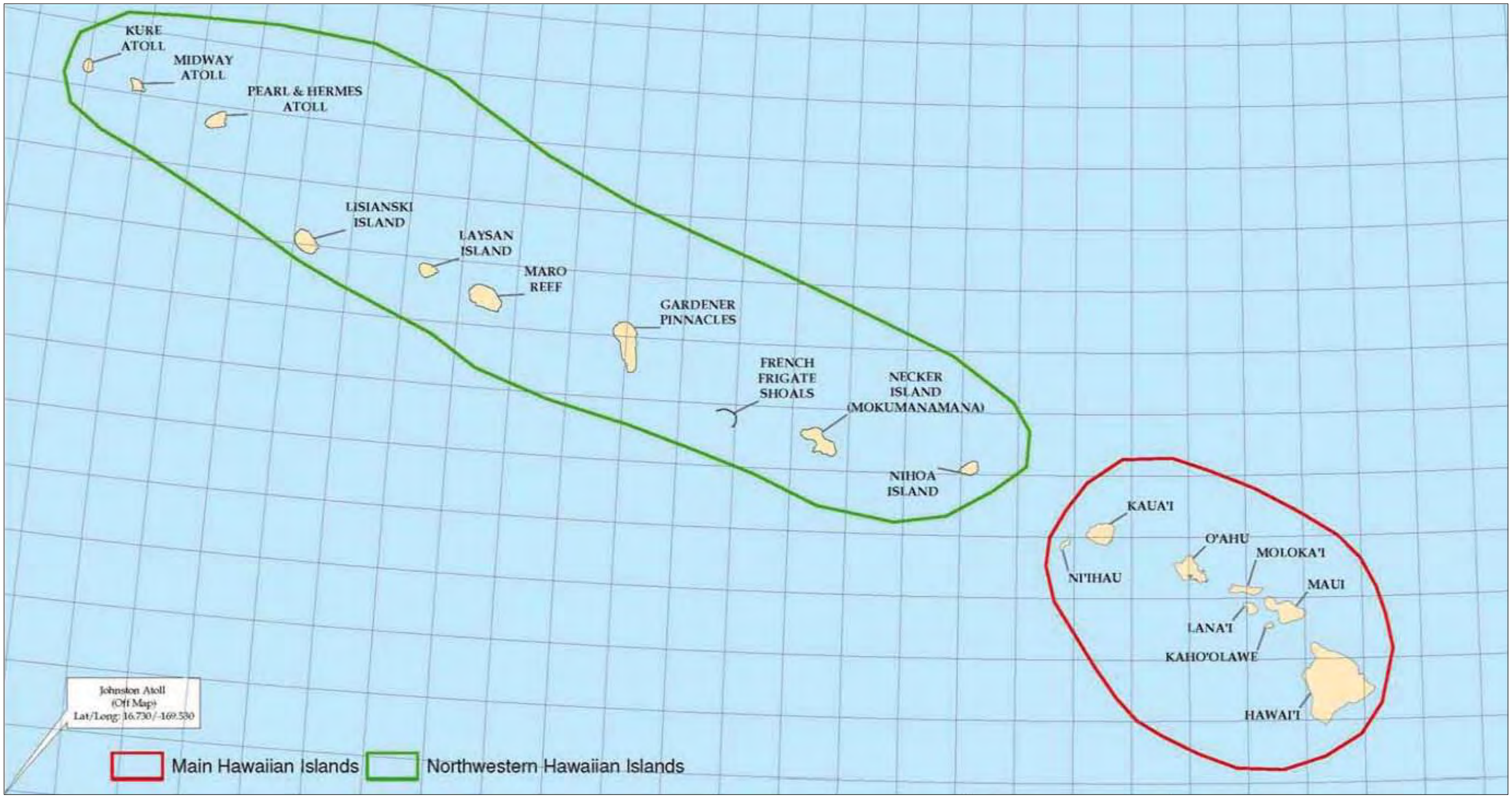

Figure 1. Project area for the Programmatic Environmental Impact Statement (PEIS) for the Hawaiian Monk Seal Recovery Actions.

2.3.1 Main Hawaiian Islands

The eight main islands of the Hawaiian chain include the high volcanic islands of Hawai‘i, Maui, Kaho‘olawe, Lāna‘i, Moloka‘i, O‘ahu, Kaua‘i and Ni‘ihau, which rest at the southeastern end of the archipelago. The main Hawaiian Islands (MHI) comprise approximately 12,548 square kilometers of land and 1,431 km of coastline (Coastal Geology Group 2011; DBEDT 2010). Hawaiian monk seals can be found in small numbers throughout MHI (Antonelis *et al.* 2006). The areas within these main Hawaiian Islands (MHI) potentially affected by monk seal recovery actions addressed in the PEIS include the shoreline areas and the immediate offshore zone.

2.3.2 Northwestern Hawaiian Islands

The Northwestern Hawaiian Islands (NWHI) consist of those islands, atolls, rocks, reefs and shoals that lie to the northwest of the MHI. Also known as the Leeward Islands, the NWHI extend approximately 1,240 miles (2,000 kilometers) from the island of Nihoa in the southeast to Kure Atoll in the northwest (Figure 2). The land that makes up the NWHI totals approximately 13.6 square kilometers (approximately 5.2 square miles). None of the island groups cover more than 6 square kilometers (approximately 4 square miles) in total area. The mean elevation of the islands is less than 33 feet (10 meters), with the highest elevation being at 275 meters on Nihoa Island (Juvik and Juvik 1998). The NWHI are surrounded by over 30 submerged ancillary banks and seamounts. The majority of the islands are uninhabited, with the exception of Midway Atoll, Kure Atoll, Laysan Island, and French Frigate Shoals, which have been occupied by various government agencies for extended periods over the last century (Friedlander et al. 2009).

In 2006, the entire NWHI were included within the Papahānaumokuākea Marine National Monument, which was created by Presidential Proclamation 8031 on June 15, 2006 under the authority of the Antiquities Act of 1906 (16 U.S.C. §§ 431-433). The Monument, which encompasses an area of approximately 142,948 square miles (370,234 square kilometers), includes the ten main islands and atolls that make up Northwestern Hawaiian Islands and the surrounding waters. Its boundaries begin 125 miles west of the main Hawaiian Island of Kaua‘i. Papahānaumokuākea Marine National Monument is the largest protected area in the United States, as well as the world’s largest fully protected marine area. On June 30, 2010, the World Heritage Committee of the United Nations Educational, Scientific and Cultural Organization (UNESCO) unanimously inscribed Papahānaumokuākea as a mixed (i.e., cultural and natural) site. The management of the Monument is under the co-trusteeship of the National Oceanic and Atmospheric Administration, the U. S. Fish and Wildlife Service and the State of Hawai‘i.

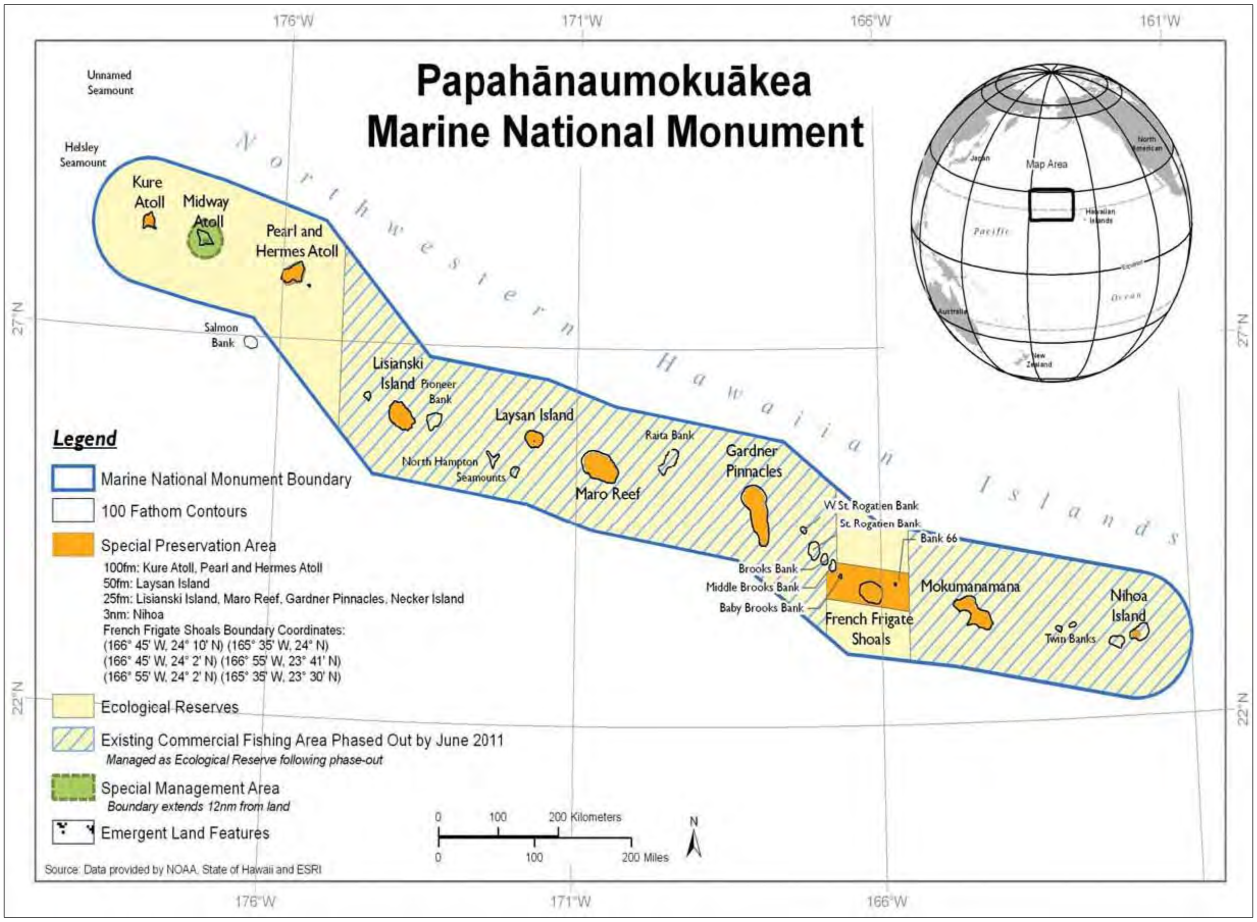

Figure 2. Northwestern Hawaiian Islands.

2.4 Previous Studies

The following previously existing studies were taken into consideration in preparing this report.

A document entitled "Draft Section 106 Analysis of Programmatic Environmental Impact Statement for the Hawaiian Monk Seal Recovery Program" was prepared for NMFS in 2011 (Watson 2011). This report determined that the research and enhancement activities proposed for Hawaiian monk seal recovery possessed no potential to cause effects on historic properties, and therefore Section 106 consultation was not required.

Considering public comment on the draft PEIS and further analysis during preparation of the final PEIS, NMFS reconsidered the "no potential to affect" finding of the 2011 report and determined that a potential to affect historic properties likely did exist. The present report documents the process and findings of the NHPA 106 compliance process under this assumption that there was a potential to affect historic properties.

Also in 2011, a *Maritime Heritage Research, Education, and Management Plan* was prepared for the Papahānaumokuākea Marine National Monument. This Management Plan addressed the sites in the Monument associated with the historic period and provides extensive information on these historic resources. The information contained in this document regarding the historic resources of the NWHI has been utilized in preparing the present report.

NMFS conducted a NHPA Section 106 consultation in 2008 regarding Hawaiian monk seal research and enhancement activities on Nihoa. The activities included camping restricted to specified locations and limited access to the interior of the island seal as needed for the purposes of seal monitoring and translocation. As a result of this consultation, NMFS determined it would mitigate physical damage and ensure the preservation of cultural properties at Nihoa consistent with a no adverse effects determination, and the Hawaii SHPO transmitted its concurrence with this determination on March 24, 2008. (As discussed in Section 7 below, unlike the undertaking considered in 2008, the activities associated with present undertaking considered in this report are limited to intertidal and coastal areas below the sea cliffs of Nihoa , and do not include camping or access to the interior of Nihoa.)

2.5 Scope of Work and Objectives

Several of the newly developed recovery actions may possess the potential to affect historic properties within in the Hawaiian archipelago. These properties include both shoreline sites (such as dune burials, coastal habitation structures, fishponds and fishing shrines) and submerged sites (such as offshore wrecks or underwater fishing *koʻa*). Traditional Cultural Properties eligible for listing on the National Register of Historic Places (such as geographic locations possessing traditional religious significance or headlands, bays and beaches associated with legendary or historic events) may also be affected. The following report focuses on addressing the potential effects of proposed Hawaiian monk seal recovery actions on these historic properties. The objective of the present study is to assist NMFS in fulfilling its statutory obligations under Section 106 of NHPA to protect historic properties during the planning and implementation of the proposed Hawaiian monk seal recovery actions.

3.0 METHODOLOGY

3.1 BACKGROUND RESEARCH

In order to understand the potential effects of Hawaiian monk seal recovery actions on historic properties, a thorough study was made of the types of archaeological and cultural sites that may be present within the project APE. Due to the geographic extent of the APE, an effort was made to identify the range of sites that may be affected rather than to identify individual historic properties. This was particularly necessary given that many of the potential activity locations within the APE have not been the subject of detailed archaeological investigations, and therefore not all of the sites present within them have been identified or documented.

An analysis was also undertaken of the range of research and enhancement activities proposed in order to determine their potential physical effects to historic properties. Not only were the recovery actions themselves taken into consideration (e.g. transit to and from project sites, activities involved in seal relocation), but consideration was also given to their consequences (e.g. translocated seals interacting with and impacting historic properties).

3.2 COMMUNITY MEETINGS

As part of public outreach associated with the preparation of the Hawaiian monk seal PEIS, a series of community meetings were held at various venues on the islands of Molokaʻi, Lānaʻi, Maui, Hawaiʻi, and Oʻahu. Examples of the meeting announcements published in island newspapers and posted on the NMFS PIRO website are provided in Appendix A of this report. The purpose of these meetings was to provide the public with the opportunity to offer information on the historic properties, cultural resources and traditional practices that may be affected by the recovery actions. The meetings were also intended to enable Native Hawaiian organizations and other interested parties to assist in developing strategies to prevent or minimize any potential effects resulting from these proposed actions. The results of these community meetings are discussed in Section 7.0.

3.3 SECTION 106 CONSULTATION

In complying with the statutory requirements of Section 106 of the NHPA, NMFS has identified, contacted and consulted with Native Hawaiian Organizations (NHOs) and other interested parties to obtain their assistance in identifying historic properties that may be affected by the recovery actions proposed. Copies of correspondence between NMFS and NHO's regarding the consultation are provided in Appendix C, D, E and F of this report. This consultation was also intended to provide the NHOs and other parties with an opportunity to express any concerns they might have about the potential effects of monk seal recovery actions on these historic properties and to recommend measures to avoid, minimize, or mitigate any potential adverse effects. This consultation process is discussed in detail in Section 7.0.

4.0 ACTIVITIES RELATED TO THE UNDERTAKING

4.1 CURRENT ACTIVITIES

The existing permit issued to the NMFS Pacific Islands Fisheries Science Center (PIFSC) under the Marine Mammal Protection Act (MMPA-ESA Permit No. 10137-07) authorizes research and enhancement activities on Hawaiian monk seals. These activities (which are listed in Table 2.10-1 of the PEIS) include aerial, vessel, and ground surveys, sample collection, medical treatment, marking of animals, attachment of telemetry instruments, translocation and temporary captivity. The PIFSC is authorized to undertake these activities each year through June of 2014, at which time the existing permit will expire.

4.2 ACTIVITIES PROPOSED IN ESA-MMPA PERMIT APPLICATION

The proposed recovery actions (referred to as research and enhancement activities) are presented in the ESA-MMPA Permit application (NMFS application number 16632). The actions are also described in the PEIS in the sections that present the preferred alternative (alternative 3). The activities are briefly summarized below. The entire permit application may be reviewed at the following website:
http://www.nmfs.noaa.gov/pr/permits/monkseal16632.htm.

4.2.1 Proposed Activities

The proposed actions presented in the ESA-MMPA permit application encompass the range of research and enhancement activities considered most promising for fostering monk seal recovery over the next five years. All activities currently permitted would continue (these activities are listed in Table 2.10-1 of the PEIS). The PEIS considers the suite of recovery actions that would be conducted on an intermittent basis over a 10-year period. Additional actions would include increased handling of Hawaiian monk seals, as well as a seal behavior modification program intended to prevent or reduce human-monk seal interactions. The scope and number of seal translocations would also be expanded to include the translocation of Hawaiian monk seals within the MHI or within the NWHI, as well as the translocation of a limited numbers of seals from the MHI to the NWHI (see PEIS Section 3.9). As a result, boat and land vehicle activity, as well as shoreline activities, would be greater than at present. Activities conducted would include aerial, vessel and land-based surveys, and some handling and transportation of Hawaiian monk seals. Boats and land vehicles will be used to transport researchers and possibly animals. Researchers will cross beach and dune areas on foot to reach monk seal locations. Recovery activities will be conducted throughout the APE, in the MHI, NWHI, and on Johnston Atoll. Researchers will seasonally (typically April or May through August) occupy existing camp sites in the NWHI.

The APE for this undertaking is relatively large considering the natural range of the Hawaiian monk seal. Nevertheless, the actual spatial "footprint" of the recovery activities themselves would be quite small in comparison, and the activities would occur infrequently and rarely repeatedly in any one location. The activities would also be quite limited in terms of intensity and duration. Only a limited number of staff (usually less than 10) and only one or two vehicles and/or small vessels would be involved in conducting any of the activities, and the activities would usually be completed in one hour or less. In addition, none of the activities would entail alteration of any structure, shoreline, or seafloor substrate, nor would any activity entail any new restriction on resource use or access.

4.3 RELEVANT TASKS ASSOCIATED WITH UNDERTAKING

1. <u>Translocation</u>
This activity involves the temporary or permanent translocation of weaned pups, juveniles and sub-adults, and adult males within or between subpopulations within the species range. It will include translocations within the NWHI, within the MHI, and from the MHI to the NWHI.

<u>Tasks Involved:</u>
<u>Translocation within the NWHI</u>

Capture of the seal:
Seals are captured by manual physical restraint, herding (sometimes with plywood boards), and placed in nets or cages for transport. The removal cage (for adults) or net (for pups) is transported to the capture site by boat and is hand-carried from the boat to the seal's location on the beach. Depending on the size of the seal, two to four NOAA staff will be present to carry the cage or carrier and to monitor the seal. There is no large-scale movement of sand or digging.

Transport to the release site:
The captive seal is then hand-carried to the release site or to the waiting boat for transport to the release site.

Release of the seal:
The capture process is reversed at the release site, whether from a net or cage. The captive seal is hand-carried from the boat to the release site. Pups are typically released on the beach above the water-line. Depending on the size of the seal, two to four NOAA staff will be present to carry the cage or net and to monitor the seal.

<u>Translocation within the MHI and from the MHI to the NWHI</u>

Capture of the seal:
Seal cages are typically transported to the capture site by truck. As a seal is usually translocated from an area of human population to a more remote locale, the capture site is likely to have nearby vehicle parking for the truck, as in the case of a beach park, or at least nearby access to a paved road. No off-road vehicle access is involved. The cage (for adults) or net (for pups) is hand-carried from the truck to the seal's location on the beach. Depending on the size of the seal, two to four NOAA staff will be present to carry the cage or carrier and to monitor the seal. There is no large-scale movement of sand or digging.

Transport to the release site:
The captive seal is hand-carried to the waiting truck or boat for transport to the release site. The cage is typically not carried a long distance due to its weight. As the release site is usually remote, seals are often transported by boat.

Release of the seal:
The capture process is reversed at the release site, whether from a net or cage. The captive seal is hand-carried from the boat to the release site. Pups are typically released on the beach above the water-line. Depending on the size of the seal, two to four NOAA staff will be present to carry the cage or net and to monitor the seal.

2. Carcass Removal
Removal of a deceased animal in the MHI involves collection of the carcass and its transport to a necropsy facility. The site is accessed according to the same process outlined above for translocation via truck for a populated area or boat for a remote area. When the site is remote, two to four NOAA staff may be required to hike from the road, producing cross-country pedestrian traffic.

This activity in the NWHI involves access to the site and carcass removal by boat or on foot. Some necropsies are conducted where carcasses are found in the NWHI (without transporting the carcass).

3. Other Tasks
Other activities proposed, including disentanglement, health assessment, etc., may involve pedestrian traffic or boat traffic to access the seals. The sites would be accessed according to the same process outlined above for translocation via truck for a populated area or boat for a remote area. When the site is remote, two to five NOAA staff may be required to hike from the road, producing cross-country pedestrian traffic. This activity in the NWHI usually involves access to the site by boat.

5.0 HISTORIC PROPERTIES POTENTIALLY AFFECTED

5.1 HISTORIC PROPERTIES

The NHPA of 1966 (Section 101) authorized the Secretary of Interior to maintain and expand a National Register of Historic Places (National Register) that contains a listing of districts, sites, buildings, structures and objects significant in American history, architecture, archaeology, engineering and culture. The National Register is defined as an authoritative guide to be used by Federal, State, and local governments, private groups, and citizens to identify the nation's cultural resources and to indicate what properties should be considered for protection from destruction or impairment.

The term "historic property" is defined in the NHPA (Section 301 Title III, 16 U.S.C. 470w – Definitions (5)) as: "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the National Register." Historic properties eligible for inclusion in the National Register include both properties formally listed on the National Register and all other historic and cultural sites that meet the National Register criteria (36 C.F.R. § 800.16(1)). These include properties of traditional religious and cultural importance.

A property may be listed on the National Register if it meets the criteria for evaluation as defined in Title 36 C.F.R. § 60.4:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) That are associated with the lives of persons significant in our past; or
>
> (c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) That have yielded, or may be likely to yield, information important in prehistory or history.

The Advisory Council on Historic Preservation has recently recognized that large scale historic properties of religious and cultural significance are often comprised of multiple, linked features that form a cohesive "landscape" (ACHP 2011). The component sites that make up such a Traditional Cultural Landscape all contribute their individual significance to form a greater landscape-wide whole. The range of criteria under which a cultural landscape can be determined to be significant is often greater than that of its component sites.

The Secretary of Interior has also recognized the significance of Traditional Cultural Properties (TCPs). The National Register Bulletin 38 "Guidelines for Evaluating and Documenting

Traditional Cultural Properties" (Parker and King 1990) defines "[a] traditional cultural property … as one that is eligible for inclusion on the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1990:1).

A TCP can be considered a historic property even if it does not possess any recognizable archaeological remains. The lack of any physical evidence of an area's past use and significance would in no way reduce its importance as a TCP. "Although many traditional cultural properties have visual physical indications, others do not. Importantly, the historical significance of most traditional cultural properties can only be evaluated in terms of the oral histories of the community" (Sebastian 1993:22). The Advisory Council on Historic Preservation (ACHP) 1985 guidelines also note that "[a] property need not have been in consistent use since antiquity by a cultural system in order to have traditional cultural value..." (ACHP 1985:7).

As mentioned above, a historic property need not be formally listed on the National Register to receive NHPA protection. The property need only meet the National Register criteria (i.e., be eligible for listing in the National Register). Therefore, in those cases where the archaeological sites within an area have not yet been formally identified or documented, the sites may still warrant protection under NHPA if they meet the requirements to be eligible for listing in the National Register.

5.2 Historic Properties within the Area of Potential Effects

A wide range of historic properties are known to be present within the APE of the proposed monk seal recovery actions. NMFS has determined that the APE for this project encompasses the range where Hawaiian monk seals are found throughout the Hawaiian Archipelago, including the NWHI, MHI and Johnston Atoll. The APE includes the shore zone, encompassing those terrestrial areas up to twenty-five meters inland from the line where the shore meets the sea, and the inshore waters up to 300 meters off from the shoreline, as well as camp sites further inland on the NWHI (as described in Section 3.4.6. of the PEIS). Historic properties that may be present in these areas include both traditional Hawaiian and post-Contact sites.

Given the vast geographic extent of the APE, as well as the programmatic nature of the actions themselves, it is not practical to list all of the historic properties that have the potential to be affected by the undertaking. This list would easily extend into the thousands of sites. There also remain many coastal areas within the MHI where the archaeological sites have not yet been identified or adequately documented.

In order to determine the potential effects of monk seal recovery actions on historic properties within the APE and to propose measures that may serve to mitigate these effects, it is necessary to examine the range of sites that may be affected. The following sections describe the general types of historic properties that can be predicted to be present within the Area of Potential Effects of the monk seal recovery program in both the Northwestern Hawaiian Islands (NWHI) and the Main Hawaiian Islands (MHI).

5.3 NORTHWESTERN HAWAIIAN ISLANDS

The relative density of historic properties within the NWHI is much less than in the MHI. This is due primarily to the relative lack of habitable land area on many of the islands, reefs and atolls. Although recent studies suggest that several of the Leeward Islands were known to early Hawaiian voyagers (Kikiloi 2006, 2010), the only islands which have been found to contain evidence of traditional Hawaiian occupation are Nihoa and Mokumanamana (Necker), the closest islands to the main Hawaiian chain. These islands have been the subject of several archaeological investigations (Emory 1928, Cleghorn 1988, and Kikiloi and Graves 2005). Both islands were designated as archaeological districts (the Nihoa Island Archaeological District, Site # 92-01-89; and the Necker Island Archaeological District, Site # 91-01-53) and placed on the National Register in 1988. Together the two islands contain over 140 documented archaeological sites.

Located at the southeastern end of the NWHI chain, the island of Nihoa covers only about 1 square kilometer (171 acres) of land. This remnant volcanic island is bounded by sea cliffs, some of which rise up to 900 feet in height. More than 90 historic properties have been recorded on the island; 66 by the Tanager Expedition (Emory 1928) and an additional 22 in 1984 (Cleghorn 1984, Kikiloi and Graves 2006). These sites include habitation terraces and bluff shelters, agricultural terraces, ceremonial structures, and burial caves (State of Hawai‘i 2008:16). The presence of stone faced and soil filled terraces suggests cultivation of dryland crops, possibly ‘*uala* (sweet potato, *Ipomoea batatas*). It has been suggested that the island's abundant natural resources, including fish, shell fish, birds, bird eggs, and presumably monk seals, as well as the presence of at least three freshwater seeps, allowed it to support as many as 100 people on a semi-permanent basis between A.D. 1000 and A.D. 1700 (Cleghorn 1988). All of the archaeological sites situated on the island are located on the gentler upland slopes above the coastal cliffs, while monk seal recovery activities would be restricted to the basalt ledges washed by the tide. Given Nihoa's topography, there is little likelihood that monk seal recovery actions will affect the islands historic properties.

Much the same is true for the remnant volcanic island of Mokumanamana (Necker). Of the fifty-five documented historic properties on Mokumanamana, thirty-three are religious sites, seventeen are shelter caves, and two sites are of unknown function. The island possesses the highest concentration of religious structures found anywhere in the Hawaiian Archipelago (State of Hawai‘i 2008:16-17). Unlike Nihoa, however, the island does not possess agricultural terraces. This small, dry island has little soil suitable for cultivation. It seems probable that Hawaiian voyagers traveled to Mokumanamana from Nihoa and the MHI primarily for religious purposes. The island's archaeological sites are all located along the upper slopes of its central ridge well away from the shoreline and outside the APE of the undertaking. Given the topography of the island there is little likelihood that monk seal recovery activities will geographically overlap the areas occupied by these historic properties and therefore will not affect them.

Many of the low-lying atolls located to the north and west of Nihoa and Mokumanamana are subject to dynamic environmental conditions. Small sand islands and sand spits shift over time and are washed over in the winter by strong storm waves. To date, no direct archaeological evidence of Polynesian presence has been discovered on the remaining islands of the NWHI or on Johnston Island (Apple 1973; Ziegler 1990). A systematic archaeological survey for such sites has yet to be undertaken.

Historic era shipwrecks are present in the offshore waters of several ofNWHI. Archival research indicates that there may be as many as sixty shipwreck sites, the earliest dating back to 1818 (Papahānaumokuākea Marine National Monument 2011:20-21), and at least sixty-one aircraft sites in the waters of the Papahānaumokuākea Marine National Monument. To date, seventeen shipwreck sites have been discovered and documented by NOAA archaeologists. These vessels range from nineteenth century whaling ships and cargo vessels to World War II Liberty ships (Papahānaumokuākea Marine National Monument 2011:34-43). At least 67 naval aircraft are recorded as being lost in the vicinity of the NWHI. During the World War II, an intense air battle was waged directly over and around Midway Atoll. Numerous Japanese and American planes were shot down and their wrecks are considered to be war graves (Papahānaumokuākea Marine National Monument 2011:22). Shipwrecks and underwater plane crash sites located within 300 meters of the shoreline have the potential to be affected by the anchoring of vessels associated with monk seal recovery actions.

During the historic period, Midway Atoll was the most heavily utilized of the NWHI, and the relics of that use remain today in a variety of forms. By 1903 a cable station was in operation on the island, and in the 1930s, Midway became a stopover for the famous Pan American Airways flying clipper seaplanes on their five-day transpacific passage. The construction of a naval air facility at Midway began in 1940. The island played a major role in one of the most important battles of the war. The Battle of Midway, which took place from June 4 to 7, 1942, is considered the turning point of the war in the Pacific. Because of its association with the battle, Midway Atoll has been designated a National Memorial (Papahānaumokuākea Marine National Monument 2011:21-22). Historic properties present on the island include several ammunition magazines, a concrete pillbox, and gun and battery emplacements. For the most part these historic properties are located outside the APE of the undertaking. Although Johnston Island was at one time the site of a U. S. Navy air station, the only remnant of its historic remaining today is the airfield.

5.4 MAIN HAWAIIAN ISLANDS

Although relatively few of the archaeological and cultural resources located within the NWHI have the potential to be affected by the research and enhancement recovery activities, this is not the case in the MHI. The shoreline and immediate offshore areas within the MHI contain large numbers of both pre-Contact and historic archaeological sites. The individual sites are far too numerous to be listed here and, as noted above, many have not yet been formally identified or documented.

The Hawaiʻi State Historic Preservation Division (SHPD) is presently updating its Geographic Information System (GIS) database of historic properties which have been assigned State Inventory of Historic Places (SIHP) site numbers. When completed, the database will show the exact location of all SIHP sites for which accurate location coordinates are available. Once the database is fully operational, it will be possible to quickly identify all those documented sites that fall within the relative proximity of a proposed monk seal recovery action. The SHPD GIS database can therefore serve as a useful tool in planning monk seal recovery actions so as to avoid adversely affecting known historic properties.

Several types of traditional Hawaiian historic properties are likely to be encountered within the APE for monk seal recovery actions. These properties can be grouped into onshore sites, sites located within the intertidal zone, and offshore sites.

5.4.1 Onshore Traditional Historic Properties

Traditional Hawaiian sites can be found along the shorelines of all of the MHI. They occur in a range of natural environments from rocky headlands to sandy beaches. Due to the fact that many of these onshore features occur within or atop sand dunes, coastal sites can often be relatively fragile and susceptible to damage from pedestrian traffic and other activities. The types of historic properties found up to 25 meters inland from the line where the shore meets the sea include the following:

<u>Coastal house sites and other habitation structures</u>: These might consist of stone faced platforms or terraces that served as the foundations of pole and thatch dwellings or walled house enclosures. They can be built on or immediately behind sand dunes, on coastal flats, or atop shoreline promontories. The walls and facings of these structures, being of stacked stone, are relatively fragile and can be easily tumbled if climbed upon.

<u>Buried cultural deposits</u>: These subsurface deposits of cultural features (stone lined fire hearths, post holes, pits, etc.) and materials (artifacts, food remains, etc.) usually represent the remnants of former habitation areas. They are often present in sand flats and dunes situated just back of the high tide line and are visible as dark, charcoal stained layers exposed in the face of wave cuts. These deposits are highly susceptible to erosion by wave action or pedestrian traffic.

<u>Canoe landings and canoe sheds</u>: While canoe landings are often natural features such as small sand beaches or areas of gently sloping shingles where a canoe could easily be brought ashore, canoe sheds were long and narrow, stone walled enclosures that were originally roofed with thatch. Like other stacked stone structures, canoe sheds are susceptible to collapse.

<u>Fishing shrines and other religious sites</u>: Small fishing shrines (*ko'a*) were often built near the shoreline, usually on low promontories overlooking the sea. It was at these *ko'a* that the first fish of the catch was left as an offering to Kū'ulakai or one of the other patron gods of fishing. Larger religious structures (*heiau*) were usually set further back from the shore, but at times they can be found just above the high tide line. Both of these types of ceremonial sites, being stacked stone structures (platforms, terraces or enclosures), are susceptible to human impacts.

<u>Human burials</u>: It is relatively easy to excavate a shallow pit into soft sand. For this reason, sand dunes and sandy shorelines were among the preferred burial areas (*ilina*) utilized

during both the pre-Contact and early historic periods. Dune burial was particularly frequent in the early years of the post-Contact era when epidemics of introduced diseases decimated the Hawaiian population, leaving little time for more elaborate burial measures. Some coastal burial areas consist of formal cemeteries with individual graves marked by stone mounds or headstones. Other *ilina* are unmarked and may not be immediately recognizable on the surface. It is always safest to assume that a sizeable sand dune is likely to contain burials. Dune burials, like the dunes themselves, are extremely fragile and can be easily disturbed and damaged if exposed by wave action or human activity.

5.4.2 Intertidal Traditional Historic Properties

Very little archaeological evidence of past human activities has survived in the turbid environment of the surf zone. Some traditional features, however, have been documented within more gentle intertidal areas. Most of the historic properties present within the intertidal zone are relatively impervious to minor disturbances such as those that might result from monk seal recovery actions. These intertidal sites may include:

<u>Fishing-related features</u>: Along the shoreline where low promontories and fingers of lava extend out into the sea, it is not unusual to encounter depressions of various sizes and shapes that have been battered or ground into the surface of *pāhoehoe*. These depressions were created and used for a range of purposes. They include bait cups (mortar-like depressions used in grinding *palu*, bait) and fish poison basins (shallow depressions where plants like *ʻauhuhu* and *ʻakia* were pounded to extract their juices, which were then used to stun fish in tidal pools). These features were created by the Hawaiians who fished the tidal pools and the shallow offshore waters.

<u>Salt pans</u>: Some of the shallow depressions pecked and ground into the *pāhoehoe* lava at or just above the high tide line were used for the manufacture of salt. These basins were filled with sea water, which was then allowed to evaporate and the resulting salt crystals were collected and used to season food and for ceremonial purposes.

<u>Rock art</u>: Some traditional Hawaiian petroglyphs are known to have been carved into the surface of level lava or sandstone benches which extend out into the intertidal zone. The primary example of an occasionally submerged petroglyph field is in the *ahupuaʻa* of Kahaluʻu on the island of Hawaiʻi.

5.4.3 Off-Shore Traditional Historic Properties

While there are a substantial number of pre-Contact historic properties located within the shoreline zone of the monk seal APE, there are relatively few located in the offshore waters up to 300 meter from the shore. The sites that do exist are for the most part stacked stone structures that could potentially be disturbed by activities such as the capture and translocation of a monk seal.

<u>Fishponds and fish traps</u>: Stone walled fishponds (and, to a lesser extent, fish traps) were traditionally constructed in the shallow off-shore waters that fringe the leeward coasts (and sheltered portions of the windward coasts) of several of the MHI. The largest concentrations of traditional *loko iʻa* (fishponds) are located along the southern coastlines of Oʻahu and Molokaʻi, and the west coast of Hawaiʻi island, though *loko iʻa* can be found on

almost all of the main islands. The State of Hawaiʻi Office of Planning maintains a GIS database that shows the locations of several fishponds presently listed on the NRHP (Figure 3). Traditional fishponds are most commonly of two types, either *loko kuapā* (walled shoreline ponds) or *puʻuone* (inland ponds connected to the sea). While many ancient ponds are long abandoned (the walls of some having been damaged or destroyed, others silted in), some ponds have been restored and are actively used for aquaculture. The stacked stone walls of these ponds are susceptible to damage from human activity.

Ceremonial sites: There is archaeological evidence that some traditional ceremonial structures were located within the off-shore zone. Such sites are relatively rare. The most well known of these is the *heiau* of Hale o Kapuni located in Pelekane bay on the Kohala coast of the island of Hawaiʻi. This shrine is submerged just offshore below the larger *heiau* of Mailekini and Puʻu Koholā and near the former royal compound within Puʻu Koholā National Historic Site. A site like Hale o Kapuni could be damaged by vessels unaware of its existence.

5.4.4 Post-Contact Historic Properties

Post-Contact shoreline structures include piers, jetties, lighthouses and other historic properties associated with maritime activities. Stone walled livestock enclosures were sometimes constructed just back of the beach, particularly when cattle and other livestock were to be taken or swum out to vessels waiting offshore to transport them to other islands. The remains of historic residential sites are less common, but are sometimes present close to the shoreline. Also found are the remnants of the cement pillboxes erected during World War II as part of a coastal defense system aimed at defending against a potential Japanese invasion. These military defensive positions are located at strategic points along the coastlines of most of the main islands. In general, because of the materials used in their construction, post-Contact shoreline sites tend to be more robust than pre-Contact sites and are less likely to be impacted by monk seal recovery activities.

The most common offshore historic properties that date from the post-Contact period are historic shipwrecks. Shipwrecks in shallow water close to shore have been reported off most of the MHI. There are several shipwrecks off the coast of Oʻahu which are listed on the NRHP. Many of these are located within Pearl Harbor, including the U.S.S. Arizona, U.S.S. Bowfin, and U.S.S. Utah. Shipwrecks are generally much more fragile than most historic era shoreline sites, and have the potential to be affected by vessels anchoring on or near them to conduct monk seal recovery activities.

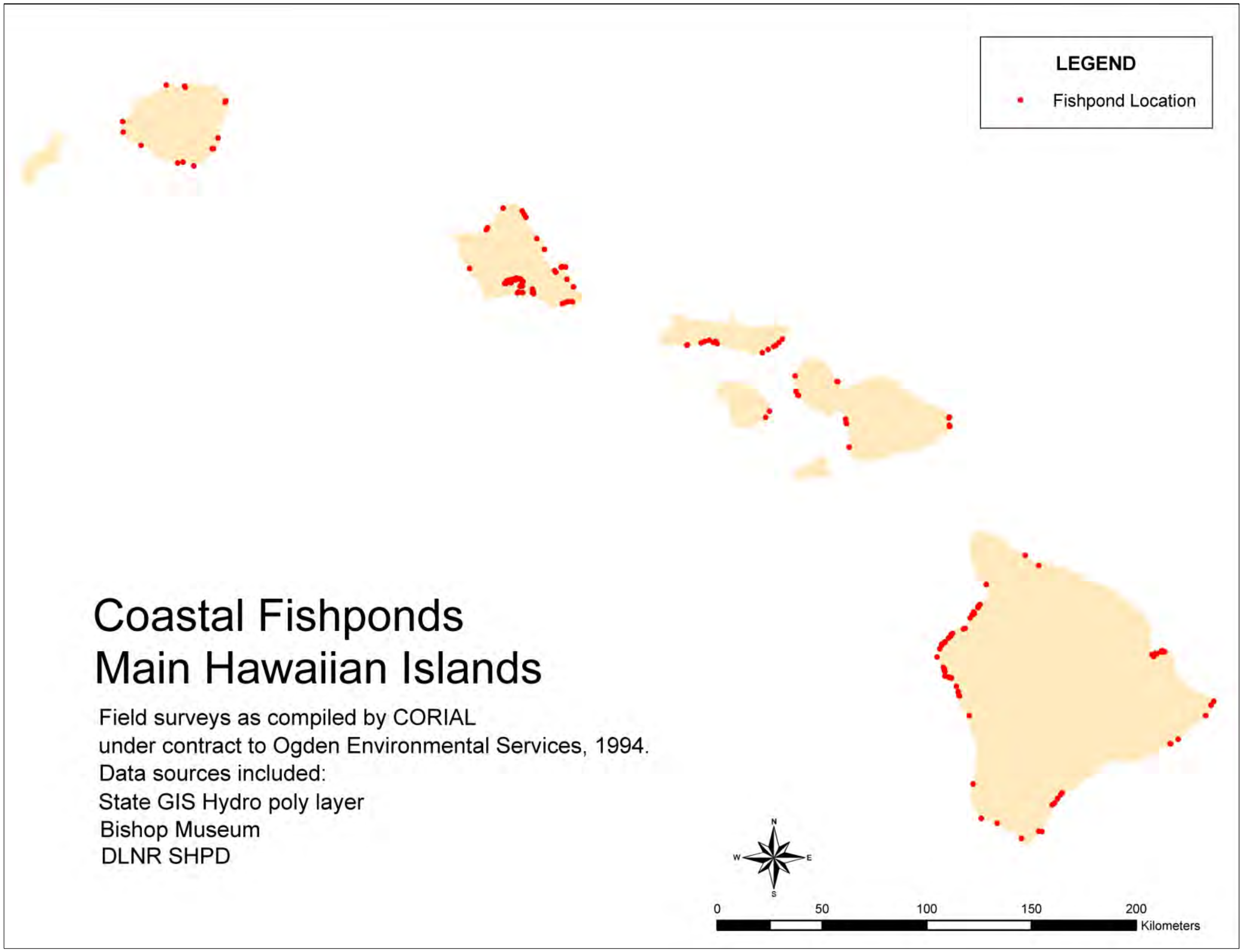

Figure 3. Locations of known coastal fishponds within the main Hawaiian Islands (data courtesy State of Hawai‘i Office of Planning Geographic Information System database).

5.4.5 Traditional Cultural Properties

Traditional Cultural Properties (TCPs) are far more difficult to recognize than most archaeological sites since their significance often depends less on a physical structure than on some mythical or historic event that may have taken place there or some ritual associated with the place. At present, there are no TCP listed on the National Register for Hawaiʻi. There are, however, numerous known *wahi pana* (storied places) which may be eligible for nomination. Sites eligible for listing as a coastal TCP may include physical features such as *leina a ke akua*, the leaping off points from which a departing spirit enters the next world. There are several of these within the MHI. Bays and beaches, stretches of shoreline and other natural landmarks may be associated with mythic or historic figures, traditional activities or historic events. One example is the westernmost tip of the island of Kahoʻolawe, which is known as Lae o Kealaikahiki, the point of the pathway to Kahiki (foreign lands). This point and the adjacent channel are traditionally associated with the epic sea voyages which once took place between Hawaiʻi and the islands of Central Polynesia. In most cases the activities associated with monk seal recovery will have little effect on areas that may be eligible for listing as TCPs. It is important, however, that NMFS staff and volunteers be aware of such areas and treat them with respect.

6.0 POTENTIAL EFFECTS TO HISTORIC PROPERTIES

Section 106 of NHPA requires Federal agencies to take into account the effects of their undertakings on any historic properties located within the APE of a proposed project. The Federal Code that implements Section 106 of the NHPA defines "effect" as an "alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register" (36 C.F.R. § 800.26). These effects may be either direct or indirect. Effects to historic and cultural resources, including historic structures, archaeological sites, and traditional cultural properties, would be considered significant if they affected the integrity of historic properties that are listed (or are eligible for listing) on the National Register of Historic Places. Integrity can be considered to mean not simply the physical integrity of a structure, but "the integrity of [its] location, design, setting, materials, workmanship, feeling, and association" (Title 36 C.F.R. § 60.4). Adverse effects are those that detract from the qualities that give a property its significance and contribute to its NRHP eligibility. Direct effects are those that physically alter the historic property in some way. Indirect effects diminish some significant aspect of the historic property, but do not physically alter it.

Adverse effects to historic properties may include, but are not limited to:

1. Physical destruction of or damage to all or part of the property.
2. Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines.
3. Removal of the property from its historic location.
4. Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.
5. Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features.
6. Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization.
7. Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance (36 CFR § 800.5(a)(2)).

As detailed in the previous section, a variety of historical properties are present within the APE for the proposed Hawaiian monk seal recovery actions. These historic properties are most abundant within the MHI, but also occur in the NWHI. The purpose of this section is to identify direct, indirect and cumulative effects to cultural and historical resources that may result from proposed monk seal recovery actions.

None of the proposed actions associated with Hawaiian monk seal recovery entail the intentional alteration or destruction of any structure, land, shoreline or seafloor substrate. Therefore, all potential effects to historic properties would be the unintended result of conducting recovery activities. Potential direct effects to historic properties could result from the physical activities associated with Hawaiian monk seal recovery actions or from the activities of monk seals relocated as part of the recovery effort.

Pedestrian and vehicle traffic through remote areas in order to access seal locations and vessel traffic to access seals on remote beaches have the greatest potential to affect historic properties in the form of specific sites or structures. Land based pedestrian and vehicle traffic has the potential to directly affect fragile stacked stone structures, subsurface archaeological deposits, and human burials. Such sites may be located along the route of travel from the established road to the study or translocation area, on the beach itself, or in adjacent sand dunes. There is much less likelihood that recovery activities will affect broader areas that may be eligible for listing as TCPs, such as bays and beaches, stretches of shoreline and other natural landmarks. The highly intermittent frequency and small "footprint" of the proposed activities, combined with the very low physical impact of the activities themselves, especially at a landscape level, would likely cause no effect to these TCPs. It is important, however, that NMFS staff and volunteers be aware of such areas and treat them with respect.

Due to the short term nature of Hawaiian monk seal recovery activities there is much less potential for indirect effects on historic properties. Indirect effects which might be considered to diminish some significant aspect of a historic property include long term visual and auditory effects. These sorts of effects are unlikely to occur as a result of Hawaiian monk seal recovery actions.

During their normal haul out activities, Hawaiian monk seals seldom venture further inland than the high tide line. Translocated seals are therefore unlikely to adversely affect on-shore historic properties. The only off-shore historic properties seals may be likely to affect are coastal fishponds or fish traps. A number of traditional *loko i'a* (fishponds), located along the coastlines of the MHI, have been returned to operation in the last few years. A translocated monk seal that managed to enter such a pond could feed on the fish being raised there, and thus disrupt aquaculture operations. The physical activities involved in removing the monk seal from within the pond could possibly result in damage to the structure.

6.1 POTENTIAL EFFECTS OF PROPOSED ACTIONS

The proposed undertaking includes activities that can include aerial, vessel, and land-based surveys, as well as some handling and transportation of the monk seals. Boats and land vehicles will be used to transport researchers and possibly animals. Researchers will also cross beach and dune areas on foot to reach monk seal locations. Recovery activities will be conducted throughout the APE, in the MHI, NWHI, and on Johnston Atoll. Researchers will seasonally (typically April or May through August) occupy existing camp sites in the NWHI.

Hawaiian monk seal recovery actions are likely to take place in both well-traveled beach areas and in more remote locations that have not been subject to much human traffic. These remote areas can be fragile and susceptible to disturbance. Archaeological sites located along the path of access to and from monk seal locations have the potential to be affected. Stacked stone structures and surface scatters of cultural material could be impacted by pedestrian traffic, as could fragile dune areas that may contain buried cultural deposits or human remains. In order to mitigate potential effects, researchers and volunteers undertaking monk seal recovery activities would need to recognize and avoid these sensitive sites and areas. While vessel-based activities are less likely to impact historic sites, anchoring could result in damage to marine wreck sites. There is also the possibility that Hawaiian monk seals translocated by NMFS as part of the proposed undertaking might enter fishponds on their own accord and may have to be physically removed from the fishponds. The activities associated with the removal of a translocated monk seal from the interior of a fishpond have the potential to result in damage to the fishpond walls and other structural features.

The proposed research and enhancement recovery activities associated with the undertaking have the potential to result in effects on historic properties within the APE. However, given the temporary and limited nature of the proposed monk seal recovery actions, the likelihood of adverse effects to historic properties is very low. The implementation of the measures to recognize, report and avoid historic properties outlined in Section 8.0 will further reduce the potential for effects to historic properties.

7.0 SECTION 106 CONSULTATION

Based on the analysis presented above, NMFS has determined that the proposed actions to recover the Hawaiian monk seal have the potential to cause effects on listed or eligible historic properties. For this reason, Section 106 consultation was initiated.

Section 106 of the NHPA requires that Federal agencies initiating undertakings in Hawaiʻi consult with Native Hawaiian Organizations (NHOs) that attach traditional religious and cultural significance to eligible or listed historic properties that may be affected by that agency's undertakings (Section 101 (d)(6)(A&B)). Section 301 Title III of the NHPA (16 U.S.C. 470w – Definitions (5)) defines a Native Hawaiian organization as any organization which "serves and represents the interests of Native Hawaiians," "has as a primary and stated purpose the provision of services to Native Hawaiians" and "has demonstrated expertise in aspects of historic preservation that are culturally significant to Native Hawaiians." This includes, but is not limited to, the Office of Hawaiian Affairs of the State of Hawaiʻi and Hui Mālama I Nā Kūpuna O Hawaiʻi Nei. The goal of this consultation is to identify historic properties potentially affected by the undertaking, assess its effects and seek ways to avoid, minimize or mitigate any potential adverse effects on historic properties that are eligible to the National Register of Historic Places (36 C.F.R. §800.1(a)).

36 CFR §800.2 (c)(2)(ii)(A) requires that the federal agency conducting Section 106 consultation must ensure that the consultation process provides the NHOs involved with a reasonable opportunity to identify their concerns about historic properties, to advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, to articulate their views on the undertaking's effects on such properties, and to participate in the resolution of adverse effects.

7.1 THE CONSULTATION PROCESS

In fulfilling its responsibilities under Section 106 of the NHPA, NMFS has undertaken a program of consultation with NHOs and other organizations and individuals with an interest in the eligible or listed historic properties that may be affected by the activities associated with Hawaiian monk seal recovery actions. The intent of the consultation was to:

1. Identify historic properties that may be affected by the proposed Hawaiian monk seal research and enhancement recovery actions. .
2. Identify potential adverse effects that may occur to these properties as a result of the actions.
3. Develop acceptable measures to recognize, report and avoid historic properties and thereby minimize any potential adverse effects.

7.2 INITIATION OF CONSULTATION

36 C.F.R. § 800.1(c) recommends that consultation be initiated early in the undertaking's planning, so that a broad range of alternatives may be considered during the planning process

for the undertaking. For this reason, NMFS initiated the Section 106 consultation process with the State Historic Preservation Division in March of 2011 (Appendix B). On October 17, 2012, letters (Appendix C) were sent to the State Historic Preservation Division and the following NHO's:

- Office of Hawaiian Affairs;
- Association of Hawaiian Civic Clubs;
- Hui Malama I Na Kupuna O Hawaiʻi Nei; and
- Island Burial Councils for Kauaʻi/Niʻihau, Oʻahu, Maui/Lānaʻi, Molokaʻi and Hawaiʻi islands.

In concurrence with the Code of Federal Regulations implementing Section 106 consultation, NMFS requested these agencies and NHOs to assist in identifying historic properties which may be of religious and cultural significance to them and may be eligible for listing on the National Register (36 CFR 800.3 (f)(2)), as well as to identify any effects to those properties that might result from the proposed action. The letters also requested assistance in identifying additional NHO's with which to consult. NMFS received no response to these letters sent to the NHO's on October 17, 2012.

7.3 COMMUNITY MEETINGS

The Code of Federal Regulations implementing Section 106 stipulates that the agency involved must provide the public with information concerning the undertaking and its effects on historic properties and seek public comment and input (36 C.F.R. § 800.2 (c)(5)(d)(2)). In order to better inform the public about the proposed Hawaiian monk seal recovery actions and to seek public input, NMFS held a series of 11 public meetings between October and December 2012 on the islands of Kauaʻi (N=2), Oʻahu (N=3), Molokaʻi (N=1), Lānaʼi (N=1), Maui (N=2), and Hawaiʻi (N=2). The purpose of these meetings was to discuss the proposed undertaking, obtain assistance in identifying potentially affected historic properties, and invite participation by NHOs and other interested parties in the Section 106 consultation process. The public was notified of these meetings via newspaper ads placed in major local newspapers, posting on the NMFS website, and e-mail announcements sent to various group lists on file.

All meetings were held at public venues (elementary, middle or high schools) between 6:00 and 8:00 pm to allow them to be attended by individuals who worked or attended school during the day. Examples of public notices for these meetings are provided in Appendix A of this report. The meetings were held at eleven venues on six islands.

Molokaʻi

Kaunakakai (29 October 2012)	Molokaʻi High School

Lānaʻi

Lānaʻi City (30 October 2012)	Lānaʻi High and Elementary School

Kauaʻi

Waimea (7 November 2012)	Waimea High School
Kapaʻa (8 November 2012)	Kapaʻa Middle School

Maui	
Hāna (14 November 2012)	Hāna High School
Lāhainā (15 November 2012)	Lāhaināluna High School
Hawai'i	
Hilo (27 November 2012)	Hilo High School
Kona (28 November 2012)	Kealakehe Elementary
O'ahu	
Wai'anae (11 December 2012)	Wai'anae High School
Waialua (12 December 2012)	Waialua High and Intermediate School
Waimānalo (13 December 2012)	Waimānalo Elementary and Intermediate School

At these meetings, the proposed Hawaiian monk seal recovery actions associated with the undertaking were described and input was received from the public regarding the nature and extent of historic and cultural properties, resources, and practices that were expected to be located within, and/or associated with, the APE. These meetings were planned, convened, and facilitated by Dr. Paul Cleghorn of Pacific Legacy, Inc., working under a NMFS contract. Members of the NMFS staff participated in each meeting, providing information and responding to concerns expressed by those attending.

While meeting participants expressed comments and concerns about Hawaiian monk seals in general, very few comments were offered about potential effects to historic properties. More detailed descriptions of the individual meetings are provided in a separate cultural impact assessment report (Section 6.3) that was 3prepared by NMFS and provided in Appendix M of the PEIS.

7.3.1 Identified Historic Properties

Participants in the community meetings identified several types of historic properties that might be affected by proposed Hawaiian monk seal recovery activities. These included:

- Coastal *heiau* (religious sites);
- *Ko'a* (fishing shrines);
- Traditional stacked stone walls;
- Sand dunes containing buried cultural deposits;
- *Iwi kāhiko* (ancient human remains);
- Fishponds; and
- Fishing villages.

7.3.2 Concerns Expressed

The majority of concerns raised at these community meetings did not deal directly with historic properties, but were primarily related to issues affecting cultural resources and traditional cultural practices, public safety and commercial fishing. Some concern was expressed regarding the possibility that translocated monk seals might enter fishponds. Resulting discussions addressed the question of how best to remove a seal while minimizing impact to the pond itself. It was suggested that NMFS staff and volunteers be trained in removing seals from fishponds and that NMFS develop a protocol for such situations that would involve consulting with the *kahu* (caretaker) of the pond.

7.3.3 Measures Recommended to Prevent or Minimize Adverse Effects

A number of possible measures intended to prevent or minimize effects to historic properties during monk seal recovery activities were recommended by individuals attending the community meetings. These included:

Education of NOAA Staff and Volunteers

It was recommended that all personnel associated with the undertaking go through an orientation program that would include training in:

- Recognition and identification of cultural sites;
- Proper behavior around identified sites;
- How to report the presence of newly discovered sites; and
- Getting seals out of fishponds.

This training might need to be repeated every few years.

Consultation and Coordination

It was suggested that NMFS work with a cultural representative for each *moku* (district) on each island. Input should be sought from each *moku* individually.

It was also suggested that if a seal needs to be removed from a sensitive cultural area, such as a fishpond, that NMFS contact the *kahu* (caretaker) of that site or a community contact/expert to get direction about such things as the best way to access the site, where to stage activities, where to place the cage for the seal, etc. It was recommended that a protocol be developed to govern this community consultation prior to an activity, and a list of community contacts should be developed.

7.4 CONSULTATION

In March of 2013, the NMFS sent a second consultation letter to the original consulting parties listed in Section 7.2 above (Appendix D). This letter provided an update on the project and summarized NHPA Section 106 compliance efforts that had taken place to that point.

In April 2013, as a means of broadening the potential consulting parties, the NMFS sent out a letter (Appendix E) to 73 NHOs whose contact information was obtained from a list maintained by the Department of Interior, Office of Hawaiian Affairs (http://www.doi.gov/ohr/nativehawaiians/nhol.cfm).

Six of the NHOs contacted responded that they would be interested in consulting on the potential effects of the undertaking. Follow-up letters (Appendix F) were sent to the following six NHOs:

- Winifred Basques; Ha‘ouiwi Homestead Association on Lāna‘I;
- Lu Ann Faborito; Makaha Hawaiian Civic Club;
- Roy Oliveira; Waiehu Kou Phase 3 Association;

- Jade Alohalani Smith; Moku o Kaupō;
- Hardy Spoehr; Papa Ola Lōkahi; and
- Matt Sproat; Honua Consulting.

Two of the above NHOs were unable to attend consultations (Basques and Faborito), despite repeated attempts by NMFS to include them in the process. The remaining four NHOs participated in two separate consultation sessions. Spoehr and Sproat attended a consultation meeting at the NMFS office on 12 June 2013 and Oliveira and Smith participated in a conference call consultation meeting on 24 July 2013. The consulting parties all voiced satisfaction with the measures proposed by NMFS (see Section 8.0) to recognize and avoid effects to historic properties and thought that with these in place the potential for any effects on historic properties would not be likely. All consulting parties indicated that the program would be more successful if NMFS could involve the various local communities in their activities.

8.0 RECOGNITION AND AVOIDANCE MEASURES

Although the actions associated with the undertaking are, by their nature, unlikely to affect historic properties, NMFS has developed a set of measures designed to further reduce the likelihood of effects. These measures have been developed in part via the community meetings and Section 106 consultations described in previous sections of this report. These measures serve in part to provide the basis for a determination of no historic properties affected by the undertaking.

8.1 NORTHWESTERN HAWAIIAN ISLANDS

Permits are presently required to conduct Hawaiian monk seal research and enhancement activities within the limits of the Papahānaumokuākea Marine National Monument. Any activities associated with monk seal recovery actions undertaken within the NWHI must therefore comply with Monument regulations and the terms and conditions of Presidential Proclamation 8031. Monument regulations state that "permittees [must] attend a cultural briefing on the significance of Monument resources to Native Hawaiians and that there are "prohibitions against the disturbance of any cultural or historic property" (NOAA 2008b). Thus, the "Monument permit program allows for a comprehensive review of proposed activities and will be administered to ensure compliance with Presidential Proclamation 8031, as well as other applicable Federal statutes (such as the NHPA) and state laws and regulations" (NOAA 2008b). Under the terms of the Monument permit, researchers and volunteers involved in Hawaiian monk seal recovery actions coordinate their activities with the Monument archaeologist and historic preservation specialists to insure that they do not adversely impact any of the Monument's historic properties. All researchers landing on Nihoa or Mokumanana (Necker) are instructed to limit their activities to the immediate coastal area below the sea cliffs. The campsites in the NWHI to be used by researchers (not including Nihoa and Mokumanamana where no camping will occur) have already been in seasonal use since the 1980s, with rigorous protocols in place to protect the natural and cultural resources surrounding them (Monument Permit PMNM 2011-001, Appendix G of the PEIS). These protocols will be followed by all researchers involved in Hawaiian monk seal recovery actions to ensure that use of the NWHI camps will not impact cultural and historic resources.

8.2 MAIN HAWAIIAN ISLANDS

8.2.1 Terrestrial Effects

Historic properties located within the shoreline and intertidal zones have the potential to be impacted by terrestrial activities associated with Hawaiian monk seal recovery activities. The following measures will be implemented whenever feasible (see note below) to minimize these potential effects.

- At least one trained staff person and/or volunteer will be on hand and responsible for recognizing and avoiding historic properties whenever a recovery action is conducted within the APE. These personnel will be trained in the avoidance of known historic properties and the recognition, avoidance and reporting of previously unknown historic properties, including archaeological sites and human remains.

- If previously unknown historic properties are found or suspected (such as an inadvertent find of a burial site), all personnel and activities associated with the recovery actions will be immediately moved away from the area of the found or suspected historic property, and the appropriate SHPD office will be notified as soon as possible.

- Any natural features (such as large sand dunes) that have a high potential to contain buried cultural deposits and human remains will be avoided.

- NMFS staff will reference the SHPD GIS database of historic properties when available or other available data provided by SHPD for the purposes of avoiding historic properties.

- Access routes will be planned in advance so as to avoid historic properties. NMFS staff and volunteers taking part in the activity will be instructed as to the locations, significance, condition and susceptibility to disturbance of all known historic properties in the area.

- All land based vehicles used to transport researchers and animals will be restricted to existing roadways (paved and unpaved).

- All equipment (temporary pens, markers, etc.) will be promptly removed from an area once monk seal recovery activities in that area are completed.

8.2.2 Marine Effects

Historic properties located within the off-shore zone have the potential to be impacted by vessel based activities associated with Hawaiian monk seal recovery. There is also the potential that activities associated with the removal of monk seals from fishponds may result in unintentional damage to those structures. The following measures will be implemented to minimize the potential effects of monk seal research and enhancement activities on off-shore historic properties.

- As described in NAO 217-103 (Management of NOAA Small Boats), and BMPs 004 (Small Boat Operations Diving Activities in Water), NMFS follows strict policies for operation of small boats that would be used for monk seal research and enhancement.

- Boat crews will be made aware of the locations of any known shipwrecks that may qualify as historic properties. These locations will be avoided so as not to disturb any subsurface features. Through coordination with SHPD staff, boat crews will also be made aware of the locations of all other known submerged cultural or historic sites.

- All boats will be launched and retrieved from established boat harbors, other developed locations, or shoreline areas (such as sandy beaches) previously determined to be absent of historic properties. Larger vessels will anchor in previously designated locations away from any known shipwrecks or other submerged cultural or historic sites.

- Should a Hawaiian monk seal enter a traditional fishpond that has been translocated as part of the recovery actions included in the undertaking, NMFS staff will work closely with SHPD, the landowner, local NHOs, and other appropriate entities to plan and coordinate seal removal efforts so as to ensure that suitable actions are taken to minimize impacts to the fishpond. (See Section 8.6.)

8.3 TRAINING

While many of the archaeological and cultural sites located within the APE for proposed Hawaiian monk seal recovery actions have been previously identified and can therefore be avoided, others remain either undiscovered or unrecorded. As specified above in the measures intended to mitigate potential terrestrial effects, specific NMFS staff and/or volunteers will be designated to be responsible for recognizing, avoiding, and reporting historic properties in the field and these personnel will receive sufficient training to carry out this responsibility. This training would include an overview of the types of traditional and historic archaeological sites and traditional cultural properties that they are likely to encounter, as well as instructions in how to recognize and avoid these sites. Proper and respectful protocol to be practiced while working around cultural sites would also be discussed. In addition, the training would cover the procedures for reporting the inadvertent discovery of unrecorded historic properties, most particularly human remains, should they be encountered.

8.4 PLANNING

Consideration of historic properties will be incorporated into the planning process for seal relocations whenever feasible (see note below). As part of this process, efforts will be made to identify any known historic properties that may be present in the vicinity of a proposed translocation site. The proximity of historic properties (such as coastal settlement structures, religious sites, or sand dunes that may contain cultural deposits or human burials) will be taken into consideration when considering potential alternative sites for monk seal translocation. If an area is known to possess fragile historic and cultural resources, such as sand dunes containing cultural deposits or human burials, translocation at this site will be avoided or carefully planned and conducted to avoid any pedestrian traffic or other activity on or adjacent to the site.

In the MHI, planning would involve referencing the SHPD GIS database of historic properties when available (see Section 8.5.1 below). Prior to that, NMFS will consult with SHPD to the maximum extent practicable prior to carrying out recovery activities. Planning will also involve finalization, and periodic revision as needed, of reporting procedures for field researchers to use in the event of inadvertent discoveries of archaeological sites and human remains. In general, SHPD staff and the appropriate Island Burial Council Chairperson will be the primary initial points of contact, but other contact persons may be added depending on the type of inadvertent discovery and the specific site and/or island at which the inadvertent discovery is made. In the NWHI, under the terms of the Monument permit, researchers and volunteers involved in Hawaiian monk seal recovery actions coordinate their activities with the Monument archaeologist and historic preservation specialists as described above to insure that they do not adversely impact any of the Monument's historic properties.

8.5 COORDINATION

As part of the planning process, to the maximum feasible extent, NMFS will coordinate with appropriate stakeholders to help identify historic properties located within areas targeted for Hawaiian monk seal recovery actions.

8.5.1 Coordination with the Hawai'i State Historic Preservation Division

As mentioned in Section 4.3, SHPD is currently updating its GIS database of historic properties located within the MHI. This database will show the exact location of all documented historic properties for which accurate location coordinates are available. Once the database is fully operational, it will be possible to quickly identify any recorded sites located within the APE of a proposed action.

The SHPD GIS database can serve as a useful tool in planning Hawaiian monk seal research and enhancement activities so as to avoid impacting known historic properties. Teams planning the translocation of a seal would be able to ascertain the types and locations of the identified historic properties located within the APE of the various relocation alternatives. This information, supplemented by knowledge from local individuals, could help in determining which relocation site will have least impact on historic properties. The SHPD GIS database can also help teams conducting monk seal monitoring or medical related activities recognize and avoid identified historic properties. In addition, SHPD staff are located in each county and possess a broad knowledge base of documented historic properties on their respective islands. The SHPD staff may be able to suggest areas that would be suitable and unsuitable for the translocation of seals. Whenever feasible, NMFS staff will consult with SHPD during the planning of monk seal translocation activities so as to obtain their input and guidance.

8.5.2 Additional Coordination

The often brief and intermittent nature of many Hawaiian monk seal recovery actions makes it difficult to involve community members in specific activities. However, when appropriate and feasible, NMFS staff will contact and consult with island burial councils and the other identified knowledgeable individuals within the local communities in which recovery actions, such as translocations, are planned. These consultations will be conducted in part to determine if there are any known burials or possible burial locations within the identified areas and what, if any, cultural protocols may be appropriate.

8.6 PROTOCOLS REGARDING MONK SEALS IN FISHPONDS

NMFS will develop a protocol for dealing with the removal of Hawaiian monk seals that have entered traditional fishponds. This protocol would involve consultation with the land owner and/or *kahu* (caretaker) of the pond, SHPD, local Native Hawaiian Organizations (if appropriate), and other appropriate entities to plan and coordinate the removal of the monk seal in a manner that would have the least impact on the structural integrity of the fishpond. A general protocol will be developed before recovery actions are conducted in the MHI, with the intent to revise and update this protocol to incorporate lessons learned and location specific information gathered if/when the protocol is implemented.

Note: In the course of implementing the recovery actions, there may be unplanned situations when some or all of these measures will not be feasible because human safety and/or animal welfare would be put at risk as a result of the time and/or actions necessary to implement the measures. These situations would typically arise as a result of factors beyond NMFS's control, such as changes in weather, changes in seal health status, equipment failure, vehicle break down, travel delays, and other unanticipated problems. Nevertheless, these situations will likely be very infrequent, and the measures specified above will be considered by NMFS as "best practices" and every reasonable effort will be made to implement them consistently.

9.0 SECTION 106 DETERMINATION

9.1 ASSESSMENT OF EFFECTS

As part of the Section 106 process, the federal agency proposing an undertaking is required to assess the effects that the undertaking will have on historic properties located within the project's APE. This is done by applying the criteria of adverse effect. In applying these criteria, the agency needs to consider any views concerning such effects that have been provided by consulting parties and the public during the Section 106 consultation process (36 CFR § 800.5(a)).

9.2 CRITERIA FOR DETERMINATION

The Code of Federal Regulations that implements NHPA Section 106 consultation (36 CFR § 800) defines an "effect" as an alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register (36 CFR § 800.16 (i)). "An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association" (36 CFR § 800.5(a)(1)). Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative in nature (36 CFR § 800.5(a)(1)).

Adverse effects to historic properties may include, but are not limited to:

1. Physical destruction of or damage to all or part of the property.
2. Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines.
3. Removal of the property from its historic location.
4. Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance.
5. Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features.
6. Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization.
7. Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance (36 CFR § 800.5(a)(2)).

9.3 FINDING OF NO EFFECT

According to Federal regulations, if the Federal agency planning an undertaking finds that either there are no historic properties present within the APE of the undertaking, or that there are historic properties present but the undertaking will have no effect upon them (will not alter the characteristics of the historic property that qualify it for inclusion in or eligibility for the National Register), the agency may submit a determination of No Historic Properties Affected (36 CFR § 800.4 (d)(1)).

Although some of the Hawaiian monk seal recovery actions proposed could potentially cause physical damage to listed or eligible historic properties within the APE (as described in Section 6.0), the potential for any damage that would cause an effect as defined in the NHPA (36 CFR 800.16 (i)) is very low. The proposed activities entail small numbers of trained researchers engaged in light foot traffic in shoreline areas, use of light vehicles on pre-existing roadways, and operation of small vessels in inshore waters, to monitor, assess, restrain, capture, medically treat, apply seal behavior management procedures, and translocate endangered Hawaiian monk seals. None of the activities involve any land or ocean floor alteration or construction. These activities would be conducted intermittently and/or seasonally, and would occur within very small spatial areas dispersed very widely over the entire Hawaiian Archipelago. In addition, a suite of measures involving training and other procedures to recognize and avoid historic properties and report inadvertent finds (outlined in Section 8.0) is expected to further minimize and diminish any potential effects of these actions. This will result in the proposed undertaking having no effect upon historic properties present within the APE of the project. For this reason, NMFS has determined that the recovery actions proposed in the NMFS ESA-MMPA permit application (application number 16632) and described in the PEIS for Hawaiian Monk Seal Recovery Actions will result in no historic properties being affected.

9.4 No Effects Documentation

Federal regulations stipulate that should a determination of no historic properties affected be arrived at, the agency proposing the undertaking is required to provide documentation of this finding to the State Historic Preservation Officer. The agency shall also notify all consulting parties, including Native Hawaiian organizations, and make the documentation available for public inspection prior to approving the undertaking (CFR § 800.4 (d)(1)).

The documentation of this finding shall include:

1. A description of the undertaking, specifying the Federal involvement, and its area of potential effects, including photographs, maps, drawings, as necessary.
2. A description of the steps taken to identify historic properties.
3. The basis for determining that no historic properties are present or affected (CFR § 800.4 (d)).

In order to comply with these regulations, NMFS has prepared a No Effects Determination letter for this undertaking. The document has been sent to the Hawaiʻi State Historic Preservation Officer, and copies have been made available to the public and provided to all of the parties directly involved in Section 106 consultation.

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APPENDIX A

Announcements of Community Meetings

COMMUNITY INPUT SOUGHT ON NOAA'S PROPOSED HAWAIIAN MONK SEAL RECOVERY ACTIONS*

NOAA Fisheries and Pacific Legacy, Inc., are holding a series of community meetings seeking community input on proposed Hawaiian Monk Seal Recovery actions. Specifically, we are seeking information on potential adverse effects to historic properties and/or traditional cultural properties (e.g., archaeological sites), as well as information on potential impacts to cultural resources and practices (e.g., fish ponds and fish pond operation) that may result from implementation of actions proposed in the Draft Programmatic Environmental Impact Statement (PEIS) for Hawaiian Monk Seal Recovery. Examples of the proposed actions include capture, veterinary treatment, transportation, and release of monk seals on shorelines throughout the Hawaiian archipelago. Input from community meetings around the State will be incorporated into a revised Cultural Impact Assessment for the PEIS and will form an important component of NOAA's compliance with the National Historic Preservation Act Section 106. The Draft PEIS is available for review at:
http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonkseal.htm

MEETING SCHEDULE
(all meetings to be held between 6:00 – 8:00 pm)

Moloka'i
Kaunakakai (29 October 2012) — Moloka'i High School

Lāna'i
Lāna'i City (30 October 2012) — Lāna'i High and Elementary School

Kaua'i
Waimea (7 November 2012) — Waimea High School
Kapa'a (8 November 2012) — Kapa'a Middle School

Maui
Hāna (14 November 2012) — Hāna High School
Lāhainā (15 November 2012) — Lāhaināluna High School

Hawai'i
Hilo (27 November 2012) — Hilo High School
Kona (28 November 2012) — Kealakehe Elementary

O'ahu
Wai'anae (11 December 2012) — Wai'anae High School
Waialua (12 December 2012) — Waialua High and Intermediate School
Waimānalo (13 December 2012) — Waimānalo Elementary and Intermediate School

* THE PURPOSE OF THESE MEETINGS IS TO GATHER INPUT AND CONSULT WITH INTEREST PARTIES FOR THE PREPARATION OF A CULTURAL IMPACT ASSESSMENT (CIA) AND COMPLIANCE WITH THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 FOR THE HAWAIIAN MONK SEAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT.

For further information or to request sign language interpretation or other auxiliary aids, please contact Paul Cleghorn at cleghorn@pacificlegacy.com, (808) 263-4800 (phone), or (808) 263-4300 (fax). These meetings are accessible to people with disabilities.

Contact: Paul L. Cleghorn
Pacific Legacy
Phone: (808) 263-4800
Fax: (808) 263-4300

30 Aulike Street, Suite 301
Kailua, HI 96734
cleghorn@pacificlegacy.com

NOAA FISHERIES

PRESS RELEASE

COMMUNITY INPUT SOUGHT ON NOAA'S PROPOSED HAWAIIAN MONK SEAL RECOVERY ACTIONS*

NOAA Fisheries is holding a series of community meetings seeking community input on proposed Hawaiian monk seal recovery actions. Specifically, we are seeking information on potential adverse effects to historic properties and/or traditional cultural properties (e.g., archaeological sites), as well as information on potential impacts to cultural resources and practices (e.g., fish ponds and fish pond operation) that may result from implementation of actions proposed in the Draft Programmatic Environmental Impact Statement (PEIS) for Hawaiian Monk Seal Recovery. Examples of the proposed actions include capture, veterinary treatment, transportation, and release of monk seals on shorelines throughout the Hawaiian archipelago. Input from community meetings around the State will be incorporated into a revised Cultural Impact Assessment for the PEIS and will form an important component of NOAA's compliance with the National Historic Preservation Division Section 106. The Draft PEIS is available for review at: http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonkseal.htm

MEETING SCHEDULE
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Maui

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O'ahu

Wai'anae (11 December 2012)	Wai'anae High School
Waialua (12 December 2012)	Waialua High & Intermediate School
Waimānalo (13 December 2012)	Waimānalo Elementary & Intermediate School

* **THE PURPOSE OF THESE MEETINGS IS TO GATHER INPUT AND CONSULT WITH INTERESTED PARTIES FOR THE PREPARATION OF A CULTURAL IMPACT ASSESSMENT (CIA) AND COMPLIANCE WITH THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 FOR THE HAWAIIAN MONK SEAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT.**

For further information or to request sign language interpretation or other auxiliary aids, please contact Paul Cleghorn at cleghorn@pacificlegacy.com, (808) 263-4800 (phone), or (808) 263-4300 (fax). These meetings are accessible to people with disabilities.

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APPENDIX B

Letter to State Historic Preservation Division — Dated March 28, 2011

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

MAR 2 8 2011

Pua Aiu, Ph.D.
Administrator
State Historic Preservation Division
Hawai'i Department of Land and Natural Resources
601 Kamokila Boulevard, Suite 555
Kapolei, HI 96707

Dear Dr. Aiu:

The U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Pacific Islands Regional Office is preparing a Programmatic Environmental Impact Statement (PEIS) to assess the potential impacts of implementing specific management actions and administering a research and enhancement program to improve survival of Hawaiian monk seals (*Monachus schauinslandi*) in the Northwestern and Main Hawaiian Islands.

The purpose of this proposed action is to ensure the long-term viability of the Hawaiian monk seals in the wild, with the eventual goal of achieving reclassification to threatened status and, ultimately, removal from the List of Endangered and Threatened Wildlife under the ESA. Alternatives considered in the PEIS would generally include the provision of limited on-site medical treatment to monk seals and temporarily translocating seals from areas of low juvenile survival to areas of high juvenile survival. None of the alternatives under consideration entail destruction or alteration of land, substrate, or habitat. The Hawaiian monk seal population has experienced a prolonged decline and currently less than 1,200 monk seals remain. Additional information including the Federal Register notice and the first project newsletter are enclosed for reference.

Section 106 of the National Historic Preservation Act (NHPA) requires that Federal agencies identify historic properties that may be impacted by a federal undertaking, and seek to protect those properties that are eligible to the National Register of Historic Places (Register). NHPA regulations at 36 CFR Part 800 identify a consultative process to determine site eligibility, to evaluate potential impacts, and to identify impact avoidance or mitigation actions. Consultation parties are typically the State Historic Preservation Officer (SHPO) and any Native Hawaiian organization that attaches religious or cultural significance to any properties that may be affected by an undertaking. NMFS has identified this project as an "undertaking," as defined in 36 CFR Part 800, and this letter serves as notice that NMFS is initiating consultation under Section 106 of the NHPA. NMFS is currently studying the potential of the proposed project to affect historic properties, and will provide our findings to your office for comment once they are developed. We are seeking your assistance in identifying those properties within the Area of Potential Effects (APE) that may be eligible for the National Register listing, as well as potential impacts.

The APE for this project encompasses the range where Hawaiian monk seals are found throughout the Hawaiian Archipelago and Johnston Atoll including the NWHI and MHI. More specifically, the APE includes portions of the open ocean and near shore environment where monk seals may be found as well as the shore zone of the islands, islets, and atolls that make up the Hawaiian Archipelago and Johnston Atoll. For the purposes of this project, the shore zone includes terrestrial habitat 5 m inland from the upper reaches of the wash of the waves, at high tide during the season in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth or the upper limit of debris. In addition, secondary use areas, such as research field camps in the Northwestern Hawaiian Islands, are also considered for inclusion in the APE. Known shipwrecks or navigational hazards within 300 meters from shore will be evaluated.

Once our current assessment has yielded results, NMFS will provide you a summary of our findings of effect and invite the agency to comment. If you have any questions about the project or our Section 106 compliance efforts, please contact Jeff Walters, our Marine Mammal Branch Chief, at (808) 944-2235, or via email at jeff.walters@noaa.gov.

Sincerely,

Michael D. Tosatto
Regional Administrator

Enclosures

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APPENDIX C

Letter to State Historic Preservation Division and Selected NHO's — Dated Oct. 17 2012

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

OCT 1 7 2012

Pua Aiu, Ph.D.
Administrator
State Historic Preservation Division
Hawai'i Department of Land and Natural Resources
601 Kamokila Boulevard, Suite 555
Kapolei, HI 96707

Dear Dr. Aiu:

To follow up on my March 28, 2011, letter, the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Pacific Islands Regional Office is preparing a Programmatic Environmental Impact Statement (PEIS) to assess the potential impacts of implementing specific management actions and administering a research and enhancement program to improve survival of Hawaiian monk seals (Monachus schauinslandi) in the Northwestern and main Hawaiian Islands. The Hawaiian monk seal population has experienced a prolonged decline and currently less than 1,200 monk seals remain.

The purpose of this proposed action is to ensure the long-term viability of Hawaiian monk seals in the wild, with the eventual goal of achieving reclassification to threatened status and, ultimately, removal from the List of Endangered and Threatened Wildlife under the Endangered Species Act. Alternatives considered in the PEIS include recovery actions conducted along shorelines and in the ocean, including monk seal monitoring; temporary seal restraint, capture and release; limited on-site medical treatment, and translocating seals from areas of low juvenile survival to areas of high juvenile survival. None of the alternatives under consideration entails destruction or alteration of any structure, land, shoreline, seafloor substrate, or habitat.

As you are aware, Section 106 of the National Historic Preservation Act (NHPA) requires that federal agencies identify historic properties that may be impacted by a federal undertaking, and seek to protect those properties that are eligible to the National Register of Historic Places. NHPA regulations at 36 CPR Part 800 identify a consultative process to determine site eligibility, to evaluate potential impacts, and to identify impact avoidance or mitigation actions. Consultation parties are typically the State Historic Preservation Officer and any Native Hawaiian organization (NHO) that attaches religious or cultural significance to any properties that may be affected by an undertaking. NMFS has identified this project as an "undertaking," as defined in 36 CPR Part 800, and as indicated in my March 28, 2011, letter, NMFS is initiating consultation under Section 106 of the NHPA. We are currently studying the potential of the proposed project to affect historic properties, and will provide our findings to your office for comment once they are developed. We are seeking your assistance in identifying those properties within the Area of Potential Effects (APE) that may be eligible for the National Register listing, as well as potential impacts.

The APE for this project encompasses the range where Hawaiian monk seals are found throughout the Hawaiian Archipelago and Johnston Atoll including the Main Hawaiian Island and the Northwestern Hawaiian Islands. More specifically, the APE includes portions of the open ocean and near shore environment where monk seals may be found as well as the shore zone of the islands, islets, and atolls that make up the Hawaiian Archipelago and Johnston Atoll. For the purposes of this project, the shore zone includes terrestrial habitat 5 meters inland from the upper reaches of the wash of the waves, at high tide during the season in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth or the upper limit of debris. In addition, secondary use areas, such as research field camps in the Northwestern Hawaiian Islands, are also considered for inclusion in the APE. Known shipwrecks or navigational hazards within 300 meters from shore will be evaluated.

NMFS is initiating the Section 106 consultation process with the SHPD and the following NHOs: Office of Hawaiian Affairs; Association of Hawaiian Civic Clubs; Hui Malama I Na Kupuna O Hawai'i Nei; and the Burial Councils for Kauai/Niihau, Oahu, Maui/Lanai, Molokai and Hawaii. We are seeking your assistance in identifying additional NHOs.

NMFS has contracted Pacific Legacy, Inc. to assist in the Section 106 consultation process including consultations with NHOs and other interested parties, and in revising the current cultural impact assessment in the PEIS. In this regard, community meetings will be held around the state to: (1) identify additional NHOs, (2) obtain information regarding the existence of historic properties of religious and cultural significance to NHOs, and (3) determine if the undertaking has the potential to impact traditional practices within the APE. The schedule for these community meetings is enclosed.

Once our current assessment has yielded results, we will provide you a summary of our findings of effect and invite the agency to comment. We look forward to hearing from you regarding additional NHOs, or if you have any questions or comments. Please contact Dr. Jeff Walters, our Marine Mammal Branch Chief, regarding this matter at (808) 944-2235, or via email at jeff.walters@noaa.gov.

Sincerely,

Michael D. Tosatto
Regional Administrator.

Enclosure

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

OCT 1 7 2012

Mr. Clisson Kunane Aipoalani, Chair
Kauai/Niihau Island Burial Council
c/o Mr. Hinano Rodriques
History and Culture Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
DLNR Maui Office Annex
130 Mahalani Street
Wailuku, HI 96793

Dear Mr. Aipoalani:

The U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Pacific Islands Regional Office is preparing a Programmatic Environmental Impact Statement (PEIS) to assess the potential impacts of implementing specific management actions and administering a research and enhancement program to improve survival of Hawaiian monk seals (Monachus schauinslandi) in the Northwestern and main Hawaiian Islands. The Hawaiian monk seal population has experienced a prolonged decline and currently less than 1,200 monk seals remain.

The purpose of this proposed action is to ensure the long-term viability of Hawaiian monk seals in the wild, with the eventual goal of achieving reclassification to threatened status and, ultimately, removal from the List of Endangered and Threatened Wildlife under the Endangered Species Act. Alternatives considered in the PEIS include recovery actions conducted along shorelines and in the ocean, including monk seal monitoring; temporary seal restraint, capture and release; limited on-site medical treatment, and translocating seals from areas of low juvenile survival to areas of high juvenile survival. None of the alternatives under consideration entails destruction or alteration of any structure, land, shoreline, seafloor substrate, or habitat.

Section 106 of the National Historic Preservation Act (NHPA) requires that federal agencies identify historic properties that may be impacted by a federal undertaking, and seek to protect those properties that are eligible to the National Register of Historic Places. NHPA regulations at 36 CPR Part 800 identify a consultative process to determine site eligibility, to evaluate potential impacts, and to identify impact avoidance or mitigation actions. Consultation parties are typically the State Historic Preservation Officer and any Native Hawaiian organization (NHO) that attaches religious or cultural significance to any properties that may be affected by an undertaking. NMFS has identified this project as an "undertaking," as defined in 36 CPR Part 800, and NMFS is initiating consultation under Section 106 of the NHPA. We are currently studying the potential of the proposed project to affect historic properties, and will provide our findings to your office for comment once they are developed. We are seeking your assistance in identifying those properties within the Area of Potential Effects (APE) that may be eligible for the National Register listing, as well as potential impacts.

The APE for this project encompasses the range where Hawaiian monk seals are found throughout the Hawaiian Archipelago and Johnston Atoll including the Main Hawaiian Island and the Northwestern Hawaiian Islands. More specifically, the APE includes portions of the open ocean and near shore environment where monk seals may be found as well as the shore zone of the islands, islets, and atolls that make up the Hawaiian Archipelago and Johnston Atoll. For the purposes of this project, the shore zone includes terrestrial habitat 5 meters inland from the upper reaches of the wash of the waves, at high tide during the season in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth or the upper limit of debris. In addition, secondary use areas, such as research field camps in the Northwestern Hawaiian Islands, are also considered for inclusion in the APE. Known shipwrecks or navigational hazards within 300 meters from shore will be evaluated.

NMFS is initiating the Section 106 consultation process with the State Historic Preservation Division and the following NHOs: Office of Hawaiian Affairs; Association of Hawaiian Civic Clubs, Hui Malama I Na Kupuna O Hawai'i Nei; and the Burial Councils for Kauai/Niihau, Oahu, Maui/Lanai, Molokai and Hawaii. We are seeking your assistance in identifying additional NHOs.

NMFS has contracted Pacific Legacy, Inc. to assist in the Section 106 consultation process including consultations with NHOs and other interested parties, and in revising the current cultural impact assessment in the PEIS. In this regard, community meetings will be held around the state to: (1) identify additional NHOs, (2) obtain information regarding the existence of historic properties of religious and cultural significance to NHOs, and (3) determine if the undertaking has the potential to impact traditional practices within the APE. The schedule for these community meetings is enclosed.

Once our current assessment has yielded results, we will provide you a summary of our findings of effect and invite your organization to comment. We look forward to hearing from you regarding identifying additional NHOs, or if you have any questions or comments. Please contact Dr. Jeff Walters, our Marine Mammal Branch Chief, regarding this matter at (808) 944-2235, or via email at jeff.walters@noaa.gov.

Sincerely,

Michael D. Tosatto
Regional Administrator.

Enclosure

Similar letters, all dated October 17, 2012, were sent to:

Ms. Hinaleimoana Wong Kalu, Chair
Oahu Island Burial Council
c/o Mr. Hinano Rodriques
History and Culture Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
DLNR Maui Office Annex
130 Mahalani Street
Wailuku, HI 96793

Ms. Jersula L. Manaba, Chair
Molokai Island Burial Council
c/o Mr. Hinano Rodriques
History and Culture Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
DLNR Maui Office Annex
130 Mahalani Street
Wailuku, HI 96793

Mr. Kimo Lee, Chair
Hawaii Island Burial Council
c/o Mr. Hinano Rodriques
History and Culture Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
DLNR Maui Office Annex
130 Mahalani Street
Wailuku, HI 96793

Mr. Keeaumoku Kapu, Chair
Maui/Lāna`i Island Burial Council
c/o Mr. Hinano Rodriques
History and Culture Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
DLNR Maui Office Annex
130 Mahalani Street
Wailuku, HI 96793

Mr. Edward Halealoha Ayau
Hui Mālama I Nā Kūpuna O Hawaiʻi Nei
622 Wainaku Ave
Hilo, HI 96720

Ms. Mahealani Cypher
President
Association of Hawaiian Civic Clubs
P.O. Box 664
Honolulu, HI 96813

Mr. Kamana'opono Crabbe
CEO
Office of Hawaiian Affairs
711 Kapiolani Blvd., Suite 500
Honolulu, HI 96813

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APPENDIX D

Letter to State Historic Preservation Division and Selected NHO's — Dated March, 27 2013

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 ▪ Fax (808) 973-2941

MAR 27 2013

Ms. Pua Aiu, Ph.D
Administrator
State Historic Preservation Division
Department of Land and Natural Resources
601 Kamokila Blvd., Suite 555
Kapolei, HI 96707

Dear Ms. Aiu:

I would like to provide an update to my October 17, 2012, letter regarding a National Historic Preservation Act (NHPA) Section 106 consultation process currently underway in association with a suite of proposed actions intended to promote recovery of the endangered Hawaiian monk seal. I would also like to take this opportunity to reiterate my request for your assistance in identifying any additional Native Hawaiian Organizations (NHOs) that may be interested in joining this consultation.

A permit application for authorization under the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) to conduct the Hawaiian monk seal recovery actions has been submitted to the National Marine Fisheries Service (NMFS), Office of Protected Resources. The 45-day public comment period for this permit application closes on April 15, 2013. The application, related documents, and guidance on submitting public comments may be viewed online at: http://www.nmfs.noaa.gov/pr/permits/monkseal16632.htm.

We are considering the suite of recovery actions included in the ESA-MMPA permit application to be an "undertaking" under the NHPA as defined in 36 CFR Part 800. As indicated in my October 17, 2012, letter regarding the Hawaiian monk seal recovery actions, the National Marine Fisheries Service (NMFS) has initiated a consultation process under Section 106 of the NHPA.

NMFS is preparing a "Final Programmatic Environmental Impact Statement (PEIS) for Hawaiian Monk Seal Recovery Actions" in compliance with the National Environmental Policy Act. The intent of the PEIS is to evaluate the potential direct, indirect, and cumulative impacts on the human environment of the alternative approaches to implementing Hawaiian monk seal recovery actions, including the actions specified in the ESA-MMPA permit application mentioned above.

We would like to point out that the recovery actions specified in the ESA-MMPA permit application no longer include temporarily moving seals from the Northwestern Hawaiian Islands (NWHI) to the main Hawaiian Islands (MHI) as part of the two-stage translocation process described in the "Draft PEIS for Hawaiian Monk Seal Recovery Actions." NMFS is not currently pursuing this specific type of two-stage translocation recovery action pending further development of associated monk seal monitoring and management capacity. Since NMFS is not currently pursuing this specific recovery action and it is not included in the current ESA-MMPA permit application, the two-stage translocation action (i.e., moving seals from the NWHI for temporarily release in the MHI) is not be part of the "undertaking" under consideration during the current ongoing NHPA Section 106 consultation process.

We would also like to clarify that the area of potential effect (APE) under consideration in our NHPA 106 consultation process encompasses the range in which Hawaiian monk seals are found throughout the Hawaiian Archipelago and Johnston Atoll including the main Hawaiian Islands and the Northwestern Hawaiian Islands. More specifically, the APE includes portions of the open ocean and near shore environment where monk seals may be found as well as the shore zone of the islands, islets, and atolls that make up the Hawaiian Archipelago and Johnston Atoll. For the purposes of this project, the shore zone includes terrestrial habitat 25 meters inland from the upper reaches of the wash of the waves, at high tide during the season in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth or the upper limit of debris. (We note that the October 17, 2012, letter erroneously indicated the shore zone included terrestrial habitat 5 meters inland, however, a 25-meter distance inland was specified in the Draft PEIS and has been used in all other communications with the public and consulting parties.) In addition, secondary use areas, such as research field camps in the Northwestern Hawaiian Islands, are considered for inclusion in the APE. Known shipwrecks or navigational hazards within 300 meters from shore will also be evaluated.

Regarding the NHPA Section 106 and NEPA processes, we have completed a round of public meetings to discuss the proposed recovery actions, identified potentially affected historic properties, and invited participation by Native Hawaiian Organizations and other interested parties in the Section 106 consultation process. Eleven public meetings were held on the islands of Kauai, Oahu, Lanai, Maui, Molokai, and Hawaii Island from October through early December 2012. The public was notified of these meetings via newspaper ads placed in major local newspapers, posting on a NMFS website, and e-mail announcements sent to various group lists on file. At these public meetings, the proposed actions associated with the undertaking were described and input was received from the public regarding the nature and extent of historic and cultural properties, resources, and practices that were expected to be located within, and/or associated, with the APE. Examples of the proposed actions discussed include capture, veterinary treatment, transportation, and release of monk seals on shorelines throughout the Hawaiian archipelago. Potential mitigation measures were also discussed at the meetings, including providing cultural and historical awareness training for program staff, and developing and maintaining close relationships with cultural practitioners in areas in which the proposed actions would be conducted. While meeting participants expressed comments and concerns about Hawaiian monk seals in general (e.g., concerns about impacts that may arise from the growing monk seal population in the main Hawaiian Islands), we heard very few concerns specifically regarding potential effects to historic properties or traditional cultural properties as defined in the NHPA. Furthermore, to date, only one NHO representative has expressed interest in participating in the Section 106 consultation.

At this time, we have identified the following types of historic properties of religious and cultural significance to NHO's within the APE that may be affected by the proposed undertaking: coastal house sites and other habitation structures, buried cultural deposits, canoe landings and canoe sheds, fishing shrines and other religious sites, human burials, fishing related features, rock art, salt pans, and ceremonial sites. We note that none of the proposed actions associated with the undertaking entail alteration or destruction of any structure, land, shoreline or seafloor substrate. However, we recognize that your organization has special expertise in assessing the eligibility of properties of religious and cultural significance to NHO's, as well as in applying the criteria of adverse effects under 36 C.F.R. Part 800. Accordingly, before we conclude the identification process, and further to our letter dated October 17, 2012, we invite you to assist us in carrying out identification efforts and evaluating National Register eligibility of identified properties. In addition, we request your assistance in identifying additional NHOs and interested parties interested in joining this consultation.

We look forward to hearing from you no later than April 19, 2013 regarding identifying additional properties and NHOs and/or if you have any questions or comments. Please contact Dr. Jeff Walters, our Marine Mammal Branch Chief, regarding this matter at (808) 944-2235, or via email at jeff.walters@noaa.gov.

Sincerely,

Michael D. Tosatto
Regional Administrator

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

MAR 27 2013

Mr. Clisson Kunane Aipolani
Chair
Kaua'i/Ni'ihau Island Burial Council
c/o Hinano Rodriques
History and Cultural Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
Maui Annex Office
130 Mahalani Street
Wailuku, HI 96793

Dear Mr. Aipolani:

I would like to provide an update to my October 17, 2012, letter regarding a National Historic Preservation Act (NHPA) Section 106 consultation process currently underway in association with a suite of proposed actions intended to promote recovery of the endangered Hawaiian monk seal. I would also like to take this opportunity to reiterate my request for your assistance in identifying any additional Native Hawaiian Organizations (NHOs) that may be interested in joining this consultation.

A permit application for authorization under the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) to conduct the Hawaiian monk seal recovery actions has been submitted to the National Marine Fisheries Service (NMFS), Office of Protected Resources. The 45-day public comment period for this permit application closes on April 15, 2013. The application, related documents, and guidance on submitting public comments may be viewed online at: http://www.nmfs.noaa.gov/pr/permits/monkseal16632.htm.

We are considering the suite of recovery actions included in the ESA-MMPA permit application to be an "undertaking" under the NHPA as defined in 36 CFR Part 800. As indicated in my October 17, 2012, letter regarding the Hawaiian monk seal recovery actions, the National Marine Fisheries Service (NMFS) has initiated a consultation process under Section 106 of the NHPA.

NMFS is preparing a "Final Programmatic Environmental Impact Statement (PEIS) for Hawaiian Monk Seal Recovery Actions" in compliance with the National Environmental Policy Act. The intent of the PEIS is to evaluate the potential direct, indirect, and cumulative impacts on the human environment of the alternative approaches to implementing Hawaiian monk seal recovery actions, including the actions specified in the ESA-MMPA permit application mentioned above.

We would like to point out that the recovery actions specified in the ESA-MMPA permit application no longer include temporarily moving seals from the Northwestern Hawaiian Islands (NWHI) to the main Hawaiian Islands (MHI) as part of the two-stage translocation process described in the "Draft PEIS for Hawaiian Monk Seal Recovery Actions." NMFS is not currently pursuing this specific type of two-stage translocation recovery action pending further development of associated monk seal monitoring and management capacity. Since NMFS is not currently pursuing this specific recovery action and it is not included in the current ESA-MMPA permit application, the two-stage translocation action (i.e., moving seals from the NWHI for temporarily release in the MHI) is not be part of the "undertaking" under consideration during the current ongoing NHPA Section 106 consultation process.

We would also like to clarify that the area of potential effect (APE) under consideration in our NHPA 106 consultation process encompasses the range in which Hawaiian monk seals are found throughout the Hawaiian Archipelago and Johnston Atoll including the main Hawaiian Islands and the Northwestern Hawaiian Islands. More specifically, the APE includes portions of the open ocean and near shore environment where monk seals may be found as well as the shore zone of the islands, islets, and atolls that make up the Hawaiian Archipelago and Johnston Atoll. For the purposes of this project, the shore zone includes terrestrial habitat 25 meters inland from the upper reaches of the wash of the waves, at high tide during the season in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth or the upper limit of debris. (We note that the October 17, 2012, letter erroneously indicated the shore zone included terrestrial habitat 5 meters inland, however, a 25-meter distance inland was specified in the Draft PEIS and has been used in all other communications with the public and consulting parties.) In addition, secondary use areas, such as research field camps in the Northwestern Hawaiian Islands, are considered for inclusion in the APE. Known shipwrecks or navigational hazards within 300 meters from shore will also be evaluated.

Regarding the NHPA Section 106 and NEPA processes, we have completed a round of public meetings to discuss the proposed recovery actions, identified potentially affected historic properties, and invited participation by Native Hawaiian Organizations and other interested parties in the Section 106 consultation process. Eleven public meetings were held on the islands of Kauai, Oahu, Lanai, Maui, Molokai, and Hawaii Island from October through early December 2012. The public was notified of these meetings via newspaper ads placed in major local newspapers, posting on a NMFS website, and e-mail announcements sent to various group lists on file. At these public meetings, the proposed actions associated with the undertaking were described and input was received from the public regarding the nature and extent of historic and cultural properties, resources, and practices that were expected to be located within, and/or associated, with the APE. Examples of the proposed actions discussed include capture, veterinary treatment, transportation, and release of monk seals on shorelines throughout the Hawaiian archipelago. Potential mitigation measures were also discussed at the meetings, including providing cultural and historical awareness training for program staff, and developing and maintaining close relationships with cultural practitioners in areas in which the proposed actions would be conducted. While meeting participants expressed comments and concerns about Hawaiian monk seals in general (e.g., concerns about impacts that may arise from the growing monk seal population in the main Hawaiian Islands), we heard very few concerns specifically regarding potential effects to historic properties or traditional cultural properties as defined in the NHPA. Furthermore, to date, only one NHO representative has expressed interest in participating in the Section 106 consultation.

At this time, we have identified the following types of historic properties of religious and cultural significance to NHO's within the APE that may be affected by the proposed undertaking: coastal house sites and other habitation structures, buried cultural deposits, canoe landings and canoe sheds, fishing shrines and other religious sites, human burials, fishing related features, rock art, salt pans, and ceremonial sites. We note that none of the proposed actions associated with the undertaking entail alteration or destruction of any structure, land, shoreline or seafloor substrate. However, we recognize that your organization has special expertise in assessing the eligibility of properties of religious and cultural significance to NHO's, as well as in applying the criteria of adverse effects under 36 C.F.R. Part 800. Accordingly, before we conclude the identification process, and further to our letter dated October 17, 2012, we invite you to assist us in carrying out identification efforts and evaluating National Register eligibility of identified properties. In addition, we request your assistance in identifying additional NHOs and interested parties interested in joining this consultation.

We look forward to hearing from you no later than April 19, 2013 regarding identifying additional properties and NHOs and/or if you have any questions or comments. Please contact Dr. Jeff Walters, our Marine Mammal Branch Chief, regarding this matter at (808) 944-2235, or via email at jeff.walters@noaa.gov.

Sincerely,

Michael D. Tosatto
Regional Administrator

Similar letters, all dated March 27, 2013, were sent to:

Ms. Hinaleimoana Wong Kalu, Chair
Oahu Island Burial Council
c/o Mr. Hinano Rodriques
History and Culture Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
DLNR Maui Office Annex
130 Mahalani Street
Wailuku, HI 96793

Ms. Jersula L. Manaba, Chair
Molokai Island Burial Council
c/o Mr. Hinano Rodriques
History and Culture Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
DLNR Maui Office Annex
130 Mahalani Street
Wailuku, HI 96793

Mr. Kimo Lee, Chair
Hawaii Island Burial Council
c/o Mr. Hinano Rodriques
History and Culture Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
DLNR Maui Office Annex
130 Mahalani Street
Wailuku, HI 96793

Mr. Keeaumoku Kapu, Chair
Maui/Lāna`i Island Burial Council
c/o Mr. Hinano Rodriques
History and Culture Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
DLNR Maui Office Annex
130 Mahalani Street
Wailuku, HI 96793

Mr. Edward Halealoha Ayau
Hui Mālama I Nā Kūpuna O Hawaiʻi Nei
622 Wainaku Ave
Hilo, HI 96720
Mr. Soulee Stroud

President
Association of Hawaiian Civic Clubs
P.O. Box 1135
Honolulu, HI 96807

Mr. Kamana'opono Crabbe
CEO
Office of Hawaiian Affairs
711 Kapiolani Blvd., Suite 500
Honolulu, HI 96813

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APPENDIX E

Section 106 Consultation Invitation Letters – Dated April 9, 2013

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 • Fax (808) 973-2941

... 0 9 2013

Mr. Soulee LKO Stroud
Association of Hawaiian Civic Clubs
P.O. Box 1135
Honolulu, HI 96807

Dear Mr. Stroud:

The National Marine Fisheries Service (NMFS), Pacific Islands Region has submitted a permit application for authorization under the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) to conduct recovery actions to improve survival of Hawaiian monk seals (*Monachus schauinslandi*) in the Northwestern and main Hawaiian Islands. The Hawaiian monk seal is currently listed as an endangered species under the ESA. NMFS believes the research and management actions included in the permit application will increase understanding of the threats facing monk seals and ensure the long-term viability of Hawaiian monk seals in the wild. The Hawaiian monk seal population has experienced a prolonged decline and currently less than 1,200 monk seals remain in the world.

Section 106 of the National Historic Preservation Act (NHPA) requires that federal agencies identify historic properties that may be impacted by a federal undertaking, and seek to protect those properties that are eligible for listing in the National Register of Historic Places. NHPA regulations in 36 CFR Part 800 identify a consultation process to determine site eligibility, to evaluate potential impacts, and to identify impact avoidance or mitigation actions. Consultation parties are typically the State Historic Preservation Officer and any Native Hawaiian organization (NHO) that attaches religious or cultural significance to historic properties that may be affected by an undertaking. NMFS has identified this action identified in the ESA-MMPA permit application as an "undertaking" as defined in 36 CFR Part 800.

In October 2012, NMFS initiated a NHPA Section 106 process with the State Historic Preservation Division and reached out to the following NHOs: Office of Hawaiian Affairs, Association of Hawaiian Civic Clubs, Hui Mālama I Na Kūpuna O Hawai'i Nei, and the Burial Councils for Kaua'i/Ni'ihau, O'ahu, Maui/Lāna'i, Moloka'i and Hawai'i Islands. We invite your organization to consult with NMFS under NHPA Section 106, including identifying those properties (or types of properties) found within the Area of Potential Effect (APE) that may be eligible for National Register listing, and providing relevant information regarding potential impacts to those properties.

The APE for this project encompasses the range where Hawaiian monk seals are found throughout the Hawaiian Archipelago and Johnston Atoll, including the main Hawaiian Islands and the Northwestern Hawaiian Islands. More specifically, the APE includes portions of the open ocean and near shore environment where monk seals may be found, as well as the shore zone of the islands, islets, and atolls that make up the Hawaiian Archipelago and Johnston Atoll. For the purposes of this project, the shore zone includes terrestrial habitat 25 meters inland from the upper reaches of the wash of the waves, at high tide during the season in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth or the upper limit of debris. In addition, secondary use areas, such as research field camps in the Northwestern Hawaiian Islands, are also considered for inclusion in the APE. Known shipwrecks or navigational hazards within 300 meters from shore will also be evaluated.

In addition to NHPA compliance, NMFS is preparing a "Final Programmatic Environmental Impact Statement (PEIS) for Hawaiian Monk Seal Recovery Actions" in compliance with the National Environmental Policy Act (NEPA). The intent of the PEIS is to evaluate the potential direct, indirect, and cumulative impacts on the human environment of the alternative approaches to implementing Hawaiian monk seal recovery actions, including the actions specified in the ESA-MMPA permit application mentioned above.

We would like to point out that the recovery actions specified in the ESA-MMPA permit application no longer include temporarily moving seals from the Northwestern Hawaiian Islands (NWHI) to the main Hawaiian Islands (MHI) as part of the two-stage translocation program described in the "Draft PEIS for Hawaiian Monk Seal Recovery Actions." NMFS is not currently pursuing this specific type of two-stage translocation recovery action, pending further development of associated monk seal monitoring and management capacity. Since NMFS is not currently pursuing this specific recovery action and it is not included in the current ESA-MMPA permit application, the two-stage translocation action (i.e., moving seals from the NWHI for temporarily release in the MHI) is not be part of the "undertaking" under consideration during the current ongoing NHPA Section 106 consultation process.

Regarding the NHPA Section 106 process thus far, we have completed a round of public meetings to discuss the proposed recovery actions, identified potentially affected historic properties, and invited participation by NHOs and other interested parties in the Section 106 consultation process. NMFS held eleven public meetings on the islands of Kaua'i, O'ahu, Lāna'i, Maui, Moloka'i, and Hawai'i Islands from October through early December 2012. The public was notified of these meetings via newspaper ads placed in major local newspapers, posting on a NMFS website, and e-mail announcements sent to various group lists on file. At these public meetings, the proposed actions associated with the undertaking were described and input was received from the public regarding the nature and extent of historic and cultural properties, resources, and practices that were expected to be located within, and/or associated, with the APE. Examples of the proposed actions discussed include capture, veterinary treatment, transportation, and release of monk seals on shorelines throughout the Hawaiian archipelago. Potential mitigation measures were also discussed at the meetings, including providing cultural and historical awareness training for program staff, and developing and maintaining close relationships with cultural practitioners in areas in which the proposed actions would be conducted. While meeting participants expressed comments and concerns about Hawaiian monk seals in general (e.g., concerns about impacts that may arise from the growing monk seal population in the main Hawaiian Islands), we heard very few concerns specifically regarding potential effects to historic properties or traditional cultural properties as defined in the NHPA. Furthermore, to date, only one NHO representative has expressed interest in participating in the Section 106 consultation.

At this time, we have identified the following types of historic properties of religious and cultural significance to NHO's within the APE that may be affected by the proposed undertaking. Areas included in the APE are coastal house sites and other habitation structures, buried cultural deposits, canoe landings and canoe sheds, fishing shrines and other religious sites, human burials, fishing related features, rock art, saltpans, and ceremonial sites. We note that none of the proposed actions associated with the undertaking entail alteration or destruction of any structure, land, shoreline or seafloor substrate. However, we recognize that your organization may have special expertise in assessing the eligibility of properties of religious and cultural significance to NHO's, as well as in applying the criteria of adverse effects under 36 CFR Part 800. Accordingly, before we conclude the identification process, we invite you to assist us in carrying out identification efforts and evaluating National Register eligibility of identified properties. We further request your assistance in identifying additional properties that could be affected by the proposed actions, and NHOs and interested parties interested in joining this consultation. While the NHPA Section 106 consultation process does not have a specific deadline, the 45-day public comment period for the ESA-MMPA permit application itself closes on April 15, 2013. The application, related documents, and guidance on submitting public comments may be viewed online at: http://www.nmfs.noaa.gov/pr/permits/monkseal16632.htm.

We look forward to hearing from you no later than April 23, 2013 regarding your wish to consult under NHPA Section 106, identifying additional properties and NHOs, and/or if you have any other questions or comments. Should you be interested in participating as a consulting party, please submit your request in writing. We are enclosing a brochure that provides an overview of Hawaiian monk seal biology and conservation for your reference. Please contact Dr. Jeff Walters, our Marine Mammal Branch Chief, regarding this matter at (808) 944-2235, or via email at jeff.walters@noaa.gov.

Sincerely,

Michael D. Tosatto
Regional Administrator

Enclosure

cc: Dr. Pua Aiu, State Historic Preservation Division

(This is an example letter, for additional recipients, please see attached list)

3

Organization Name	Contact Prefix	Contact First Name	Contact Last Name
ʻAhahui Siwila Hawaiʻi O Kapōlei	Mr.	Lance	Holden
ʻAha Kāne	Mr.	G.	Kai
Aha Moku O Kahikinui	Ms.	Donna	Sterling
Aha Moku o Maui Inc.	Mr.	Keʻeaumoku	Kapu
Aha Wahine	Ms.	Linda	Paik
Ahupuaʻa o Molokaʻi	Ms.	Kammy	Purdy
Aloha First	Mr.	Dennis	Kanahele
Association of Hawaiian Civic Clubs	Mr.	Soulee	Stroud
Association of Hawaiians for Homestead Lands	Ms.	Blossom	Feiteira
Au Puni O Hawaii	Mr.	Samson	Brown
Brian Kaniela Naeʻole Naauao	Mr.	Brian	Naeʻole Naauao
Charles Pelenui Mahi Ohana	Ms.	Maydean	Bowman
Council for Native Hawaiian Advancement	Ms.	Robin	Danner
Four Points Global Services, Corp.	Mr.	Howard	Joy
Friends of ʻIolani Palace	Mr.	Kippen	de Alba Chu
Friends of Mokuʻula, Inc.	Ms.	Shirley	Kahai
George K. Cypher ʻOhana	Ms.	Mahealani	Cypher
God's Country Waimanalo	Ms.	Ilima	Ho-Lastimosa
Hauʻouiwi Homestead Association on Lānaʻi	Ms.	Winifred	Basques
Hawaiʻi Maoli	Mr.	Henry	Gomes
Hawaiian Civic Club of Hilo	Ms.	Antoinette	Mallow
Ho Ohana	Ms.	Ilima	Ho-Lastimosa
Hoʻokano Family Land Trust	Ms.	Dawn	Chang
Hui Hoʻoniho	Mr.	Edward	Ayau
Hui Huliau	Mr.	Adrian	Silva
Hui Kākoʻo ʻĀina Hoʻopulapula	Ms.	Kaipo	Kincaid
Hui Kaleleiki Ohana	Ms.	Jaynie	Stone
Hui Mālama I Na Kūpuna O Hawaiʻi	Mr.	Edward	Ayau

1

Nei			
Kāko'o 'Ōiwi	Ms.	Mahealani	Cypher
Kalaeloa Heritage and Legacy Foundation	Ms.	Melissa	Lyman
Kalama'ula Mauka Homestead Association	Ms.	Victoria	Kapuni
Kamealoha	Mr.	Thomas	Kamealoha
Kamehameha Schools - Community Relations and Communications Group, Government Relations	Ms.	Piilani	Hanohano
Kamiloloa One Alii Homestead Association	Ms.	Vivian	Ainoa
Kanu o ka 'Āina Learning 'Ohana	Ms.	Taffi	Wise
Kapolei Community Development Corporation	Ms.	Shirley	Swinney
Kawaihapai Ohana	Mr.	Thomas	Shirai
Keoni Kealoha Alvarez	Mr.	Keoni	Alvarez
Ko'olau Foundation	Ms.	Mahealani	Cypher
Ko'olaupoko Hawaiian Civic Club	Ms.	Mahealani	Cypher
La'i 'Ōpua 2020	Mr.	Craig	Kahui
Lahui Kaka'ikahi	Mr.	Kaleo	Keeno
Ma'a 'Ohana c/o Lani Ma'a Lapilio	Ms.	Lani	Lapilio
Machado-Akana-Aona-Namakaeha Ohana	Ms.	Brenda	Lee
Mahu Ohana	Ms.	Keona	Mark
Makaha Hawaiian Civic Club	Ms.	Lu	Faborito
Maku'u Farmers Association	Ms.	Paula	Kekahuna
Malu'ōhai Residents Association	Ms.	Homelani	Schaedel
Meleana Kawaiaea, LLC	Mr.	Paul	Richards
Moku o Kaupo	Ms.	Jade	Smith
Na Aikane O Maui	Ms.	Uilani	Kapu
Na Ku'auhau 'o Kahiwakaneikopolei	Ms.	H.	Cheek
Na Ohana o Puaoi a me Hanawahine	Ms.	Roxanne	Hanawahine
Nanakuli Housing Corporation	Ms.	Paige	Barber
Native Hawaiian Church	Mr.	Kaleo	Patterson

Native Hawaiian Economic Alliance	Mr.	Austin	Nakoa
Native Hawaiian Education Council	Ms.	Michelle	Balutski
Nekaifes Ohana	Ms.	Maraea	Nekaifes
Office of Hawaiian Affairs	Dr.	Kamana'opono	Crabbe
Pacific American Foundation	Mr.	Herb	Lee
Pacific Justice & Reconciliation Center	Mr.	Kaleo	Patterson
Papa Ola Lokahi	Mr.	Hardy	Spoehr
Papakōlea Community Development Corporation	Ms.	B.	Kekauoha
Paukukalo Hawaiian Homes Community Association	Ms.	Olinda	Aiwohi
Peahi Ohana	Mr.	Apela	Peahi
Piihonua Hawaiian Homestead Community Association	Mr.	Kaleo	Aki
Royal Hawaiian Academy of Traditional Arts	Mr.	L.	Suganuma
The Friends of Hokule'a and Hawai'iloa	Mr.	William	Richards
The I Mua Group	Mr.	Melvin	Soong
Wai'anae Hawaiian Civic Club	Ms.	Gege	Kawelo
Waiehu Kou Phase 3 Association	Mr.	Roy	Oliveira
Waimānalo Hawaiian Homes Association	Mr.	Paul	Richards
Honua Consulting	Mr.	Matthew	Sproat

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APPENDIX F

Letters to Responding NHO's Regarding Consultation Meetings

Pacific Legacy Historic Preservation

Pacific Basin — O'ahu
30 Aulike Street, Suite 301
Kailua, HI 96734

Phone: 808.263.4800
Fax: 808.263.4300
www.pacificlegacy.com

3 May 2013

Ms. Winifred Basques, Jr.
Ha'ouiwi Homestead Assn on Lanai
PO Box 63052
Lanai City, HI 97675

Re: Section 106 consultation for the Hawaiian monk seal recovery actions

Dear Ms. Basques:

Thank you for your interest in participating in the consultation on historic properties pursuant to Section 106 of the National Historic Preservation Act (NHPA) regarding the Hawaiian monk seal recovery actions described in the April 9, 2013, letter sent to you by Michael D. Tosatto, Regional Administrator for the National Marine Fisheries Service (NMFS), Pacific Islands Regional Office. We are now ready to begin consulting with the parties who have expressed interest. I will be contacting you within two weeks to schedule a telephone conference to discuss the undertaking, answer any questions, and conduct the consultation. Participating in this conference call will be Drs. Jeff Waters and Rachel Sprague of NMFS, and me.

Enclosed are some documents that may help as reference materials before and during the consultation. The enclosed documents include:

1. A copy of the ESA-MMPA permit application. Issuance of the ESA-MMPA permit would be the "undertaking" that is triggering the NHPA 106 consultation process.
2. A short article summarizing the activities included (and not included) in the permit application (undertaking).
3. A fact sheet regarding the NHPA.
4. A draft document describing potential measures intended to mitigate (reduce or prevent) potential adverse impacts (or effects) on historic and cultural properties.

Please note that these consultations will be focused solely on potential effects to historic properties as specified in the NHPA and will not be addressing potential effects to cultural practices and other cultural resources as these effects are being evaluated by NMFS through a separate process under the National Environmental Policy Act (NEPA). Information on this NEPA process is available online at:
http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonkseal.htm

Pacific Basin - Hawai'i Island
900 Kamukoa Street
Hilo, HI 96720
808.351.9560 Ph.
808.263.4300 Fax

Business Office
2641 Hwy 4
PO Box 6050
Arnold, CA 95223
209.795.4481 Ph.
209.795.1967 Fax

Bay Area
900 Modoc Street
Berkeley, CA 94707
510.524.3991 Ph.
510.524.4419 Fax

Sierra/Central Valley
4919 Windplay Drive, Ste. 4
El Dorado Hills, CA 95762
916.358.5156 Ph.
916.358.5161 Fax

Inland Empire/Mojave Desert
44702 10th Street West
Lancaster, CA 93534
661.729.9395 Ph.
661.729.9417 Fax

Southern California
PO Box 421282
San Diego, CA 92142
858.900.8024 Ph.
510.524.4419 Fax

We will be contacting you soon in hopes of moving forward on the consultation. In the meantime, if you have any questions or desire more information, please feel free to contact me at 808-263-4800, or via email at cleghorn@pacificlegacy.com.

Sincerely,

Paul L. Cleghorn, Ph.D.
Principal and Senior Archaeologist

Enclosures

Pacific Legacy Historic Preservation

Pacific Basin — O'ahu
30 Aulike Street, Suite 301
Kailua, HI 96734

Phone: 808.263.4800
Fax: 808.263.4300
www.pacificlegacy.com

3 May 2013

Lu Ann Faborito
P O Box 1783
Wai'anae, HI 96792 3

Re: Section 106 consultation for the Hawaiian monk seal recovery actions

Dear Ms. Faborito:

Thank you for your interest in participating in the consultation on historic properties pursuant to Section 106 of the National Historic Preservation Act (NHPA) regarding the Hawaiian monk seal recovery actions described in the April 9, 2013, letter sent to you by Michael D. Tosatto, Regional Administrator for the National Marine Fisheries Service (NMFS), Pacific Islands Regional Office. We are now ready to begin consulting with the parties who have expressed interest. I will be contacting you within two weeks to schedule a telephone conference to discuss the undertaking, answer any questions, and conduct the consultation. Participating in this conference call will be Drs. Jeff Waters and Rachel Sprague of NMFS, and me.

Enclosed are some documents that may help as reference materials before and during the consultation. The enclosed documents include:

1. A copy of the ESA-MMPA permit application. Issuance of the ESA-MMPA permit would be the "undertaking" that is triggering the NHPA 106 consultation process.
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4. A draft document describing potential measures intended to mitigate (reduce or prevent) potential adverse impacts (or effects) on historic and cultural properties.

Please note that these consultations will be focused solely on potential effects to historic properties as specified in the NHPA and will not be addressing potential effects to cultural practices and other cultural resources as these effects are being evaluated by NMFS through a separate process under the National Environmental Policy Act (NEPA). Information on this NEPA process is available online at:
http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonkseal.htm

Pacific Basin - Hawai'i Island
900 Kumukoa Street
Hilo, HI 96720
808.351.9560 Ph.
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916.358.5161 Fax

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PO Box 421282
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510.524.4419 Fax

We will be contacting you soon in hopes of moving forward on the consultation. In the meantime, if you have any questions or desire more information, please feel free to contact me at 808-263-4800, or via email at cleghorn@pacificlegacy.com.

Sincerely,

Paul L. Cleghorn, Ph.D.
Principal and Senior Archaeologist

Enclosures

Pacific Legacy Historic Preservation

Pacific Basin — O'ahu
30 Aulike Street, Suite 301
Kailua, HI 96734

Phone: 808.263.4800
Fax: 808.263.4300
www.pacificlegacy.com

3 May 2013

Mr. Roy Oliveira
49 Kaulana Na Pua Circle
Wailuku, HI 96793

Re: Section 106 consultation for the Hawaiian monk seal recovery actions

Dear Mr. Olivera:

Thank you for your interest in participating in the consultation on historic properties pursuant to Section 106 of the National Historic Preservation Act (NHPA) regarding the Hawaiian monk seal recovery actions described in the April 9, 2013, letter sent to you by Michael D. Tosatto, Regional Administrator for the National Marine Fisheries Service (NMFS), Pacific Islands Regional Office. We are now ready to begin consulting with the parties who have expressed interest. I will be contacting you within two weeks to schedule a telephone conference to discuss the undertaking, answer any questions, and conduct the consultation. Participating in this conference call will be Drs. Jeff Waters and Rachel Sprague of NMFS, and me.

Enclosed are some documents that may help as reference materials before and during the consultation. The enclosed documents include:

1. A copy of the ESA-MMPA permit application. Issuance of the ESA-MMPA permit would be the "undertaking" that is triggering the NHPA 106 consultation process.
2. A short article summarizing the activities included (and not included) in the permit application (undertaking).
3. A fact sheet regarding the NHPA.
4. A draft document describing potential measures intended to mitigate (reduce or prevent) potential adverse impacts (or effects) on historic and cultural properties.

Please note that these consultations will be focused solely on potential effects to historic properties as specified in the NHPA and will not be addressing potential effects to cultural practices and other cultural resources as these effects are being evaluated by NMFS through a separate process under the National Environmental Policy Act (NEPA). Information on this NEPA process is available online at:
http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonkseal.htm

Pacific Basin - Hawai'i Island	Business Office	Bay Area	Sierra/Central Valley	Inland Empire/Mojave Desert	Southern California
900 Kumukoa Street	2641 Hwy 4	900 Modoc Street	4919 Windplay Drive, Ste. 4	44702 10th Street West	PO Box 421282
Hilo, HI 96720	PO Box 6050	Berkeley, CA 94707	El Dorado Hills, CA 95762	Lancaster, CA 93534	San Diego, CA 92142
808.351.9560 Ph.	Arnold, CA 95223	510.524.3991 Ph.	916.358.5156 Ph.	661.729.9395 Ph.	858.900.8024 Ph.
808.263.4300 Fax	209.795.4481 Ph.	510.524.4419 Fax	916.358.5161 Fax	661.729.9417 Fax	510.524.4419 Fax
	209.795.1967 Fax				

We will be contacting you soon in hopes of moving forward on the consultation. In the meantime, if you have any questions or desire more information, please feel free to contact me at 808-263-4800, or via email at cleghorn@pacificlegacy.com.

Sincerely,

Paul L. Cleghorn, Ph.D.
Principal and Senior Archaeologist

Enclosures

Pacific Legacy Historic Preservation

Pacific Basin — O'ahu
30 Aulike Street, Suite 301
Kailua, HI 96734

Phone: 808.263.4800
Fax: 808.263.4300
www.pacificlegacy.com

3 May 2013

Hardy Spoehr, executive director
Papa Ola Lokahi (Native Hawaiian Health Board)
894 Queen Street
Honolulu, HI 96813

Re: Section 106 consultation for the Hawaiian monk seal recovery actions

Dear Mr. Spoehr: Hardy

Thank you for your interest in participating in the consultation on historic properties pursuant to Section 106 of the National Historic Preservation Act (NHPA) regarding the Hawaiian monk seal recovery actions described in the April 9, 2013, letter sent to you by Michael D. Tosatto, Regional Administrator for the National Marine Fisheries Service (NMFS), Pacific Islands Regional Office. We are now ready to begin consulting with the parties who have expressed interest. I will be contacting you within two weeks to schedule a telephone conference to discuss the undertaking, answer any questions, and conduct the consultation. Participating in this conference call will be Drs. Jeff Waters and Rachel Sprague of NMFS, and me.

Enclosed are some documents that may help as reference materials before and during the consultation. The enclosed documents include:

1. A copy of the ESA-MMPA permit application. Issuance of the ESA-MMPA permit would be the "undertaking" that is triggering the NHPA 106 consultation process.
2. A short article summarizing the activities included (and not included) in the permit application (undertaking).
3. A fact sheet regarding the NHPA.
4. A draft document describing potential measures intended to mitigate (reduce or prevent) potential adverse impacts (or effects) on historic and cultural properties.

Please note that these consultations will be focused solely on potential effects to historic properties as specified in the NHPA and will not be addressing potential effects to cultural practices and other cultural resources as these effects are being evaluated by NMFS through a separate process under the National Environmental Policy Act (NEPA). Information on this NEPA process is available online at:
http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonkseal.htm

Pacific Basin - Hawai'i Island
900 Kamukoa Street
Hilo, HI 96720
808.351.9560 Ph.
808.263.4300 Fax

Business Office
2641 Hwy 4
PO Box 6050
Arnold, CA 95223
209.795.4481 Ph.
209.795.1967 Fax

Bay Area
900 Modoc Street
Berkeley, CA 94707
510.524.3991 Ph.
510.524.4419 Fax

Sierra/Central Valley
4919 Windplay Drive, Ste. 4
El Dorado Hills, CA 95762
916.358.5156 Ph.
916.358.5161 Fax

Inland Empire/Mojave Desert
44702 10th Street West
Lancaster, CA 93534
661.729.9395 Ph.
661.729.9417 Fax

Southern California
PO Box 421282
San Diego, CA 92142
858.900.8024 Ph.
510.524.4419 Fax

We will be contacting you soon in hopes of moving forward on the consultation. In the meantime, if you have any questions or desire more information, please feel free to contact me at 808-263-4800, or via email at cleghorn@pacificlegacy.com.

Sincerely,

Paul L. Cleghorn, Ph.D.
Principal and Senior Archaeologist

Enclosures

Pacific Legacy
Historic Preservation

Pacific Basin — O'ahu
30 Aulike Street, Suite 301
Kailua, HI 96734

Phone: 808.263.4800
Fax: 808.263.4300
www.pacificlegacy.com

3 May 2013

Matt Sproat
Honua Consulting
4348 Wai`alae Ave. #254
Honolulu, Hawai`i 96816

Re: Section 106 consultation for the Hawaiian monk seal recovery actions

Dear Mr. Sproat:

Thank you for your interest in participating in the consultation on historic properties pursuant to Section 106 of the National Historic Preservation Act (NHPA) regarding the Hawaiian monk seal recovery actions described in the April 9, 2013, letter sent to you by Michael D. Tosatto, Regional Administrator for the National Marine Fisheries Service (NMFS), Pacific Islands Regional Office. We are now ready to begin consulting with the parties who have expressed interest. I will be contacting you within two weeks to schedule a telephone conference to discuss the undertaking, answer any questions, and conduct the consultation. Participating in this conference call will be Drs. Jeff Waters and Rachel Sprague of NMFS, and me.

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900 Kumukoa Street Hilo, HI 96720 808.351.9560 Ph. 808.263.4300 Fax	2641 Hwy 4 PO Box 6050 Arnold, CA 95223 209.795.4481 Ph. 209.795.1967 Fax	900 Modoc Street Berkeley, CA 94707 510.524.3991 Ph. 510.524.4419 Fax	4919 Windplay Drive, Ste. 4 El Dorado Hills, CA 95762 916.358.5156 Ph. 916.358.5161 Fax	44702 10th Street West Lancaster, CA 93534 661.729.9395 Ph. 661.729.9417 Fax	PO Box 421282 San Diego, CA 92142 858.900.8024 Ph. 510.524.4419 Fax

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Sincerely,

Paul L. Cleghorn, Ph.D.
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Pacific Basin — O'ahu
30 Aulike Street, Suite 301
Kailua, HI 96734

Phone: 808.263.4800
Fax: 808.263.4300
www.pacificlegacy.com

3 May 2013

Jade Alohalani Smith
Moku o Kaupo Representative
Phone:(808) 870-2820
www.ahamoku.org

Re: Section 106 consultation for the Hawaiian monk seal recovery actions

Dear Ms. Smith:

Thank you for your interest in participating in the consultation on historic properties pursuant to Section 106 of the National Historic Preservation Act (NHPA) regarding the Hawaiian monk seal recovery actions described in the April 9, 2013, letter sent to you by Michael D. Tosatto, Regional Administrator for the National Marine Fisheries Service (NMFS), Pacific Islands Regional Office. We are now ready to begin consulting with the parties who have expressed interest. I will be contacting you within two weeks to schedule a telephone conference to discuss the undertaking, answer any questions, and conduct the consultation. Participating in this conference call will be Drs. Jeff Waters and Rachel Sprague of NMFS, and me.

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We will be contacting you soon in hopes of moving forward on the consultation. In the meantime, if you have any questions or desire more information, please feel free to contact me at 808-263-4800, or via email at cleghorn@pacificlegacy.com.

Sincerely,

Paul L. Cleghorn, Ph.D.
Principal and Senior Archaeologist

Enclosures

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APPENDIX G

State Historic Preservation Division Response Letter – Dated May 10, 2013

NEIL ABERCROMBIE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD STE 555
KAPOLEI HI 96707

May 10, 2013

Michael D. Tosatto
Regional Administrator
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, HI 96814-4700

Log# 2013.2530
Doc# 1305PA01

Dear Mr. Tosatto,

Re: NHPA Section 106 Consultation
Update to October 17, 2012 letter regarding consultation on proposed actions to promote recovery of the endangered Hawaiian Monk seal.
Request for additional information regarding NHOs and traditional cultural properties.
All islands

Thank you for your letter of March 27, 2013, which we received on April 4, 2013. We have been discussing this request with Dr. Jeff Walters and apologize for our delayed response.

Your request indicates the following:

1. A permit application for authorization to conduct Hawaiian monk seal recovery action has been submitted to the National Marine Fisheries Service.
2. The public comment period ends on April 15, 2013.
3. The recovery actions in the permit are considered an undertaking.

Therefore consultation under 106 has been initiated. The area of potential effect (APE) includes the entire Hawaiian Archipelago and Johnston Atoll. In addition to areas of open ocean, the shore zone includes terrestrial habitat 25 meters inland from the upper reach of the wash of the waves. Although unlikely that monk-seal recovery efforts would affect a historic property, potential exists for burials and registered and eligible sites within the APE to be affected, as well as not yet identified surface or subsurface historic properties.

The State Historic Preservation Division has the following comments:

The division recommends that you consult with the Island Burial Councils. In addition we are providing you with a list of families who have established protocols to deal with burials that erode regularly from certain areas of the main Hawaiian Islands. They may be helpful in drafting protocols for your program.

We will withhold further comment until we can review your recovery plan which should have specifics on possible impacts to historic properties. We believe that our office and Native Hawaiian Organizations will be better able to comment on a plan with more specifics.

Please feel free to contact me at 692-8040 or by e-mail at pua.aiu@hawaii.gov if you have further questions.

Sincerely,

Pua Aiu
Administrator

Appendix A
List of families to consult for the Monk Seal Recovery Permit

Kona Coast

Curtis Tyler
77-6399 Nalani St. #104
Kailua-Kona, HI 96740

Nicole Lui
76-6217 Lehua Road
Kailua-Kona, HI 96740

Mikiala Roy
P.O. Box 596
Kailua-Kona, HI 96745

Hannah Reeves
P.O. Box 844
Kailua-Kona, HI 96745

Mahealani Pai
P.O.Box 251
Kailua-Kona, HI 96745

Jimmy Medeiros
P.O. Box 166
Honaunau, HI 96726

Kualoa

Cy Bridges: bridgesc@polynesia.com
Gladys Pualoa-Ahuna: verlamoore@hawaii.rr.com
Dawn Wasson: laiekupuna@yahoo.com
Kekela Miller: millerk010@hawaii.rr.com
Calvin Hoe: chhoe_hic@yahoo.com
Keoni Fox: fox@aliiwireless.com
Kealoha Domingo: hawaiianstyle@rocketmail.com

APPENDIX M
CULTURAL IMPACT ASSESSMENT
FOR THE
HAWAIIAN MONK SEAL
PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Pacific Island Regional Office

Portions prepared under contract by:
Pacific Legacy, Inc

September 2013

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TABLE OF CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

This Cultural Impact Assessment has been prepared as part of efforts undertaking by National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Pacific Islands Regional Office (PIRO), Protected Resources Division (PRD) to comply with National Environmental Policy Act of 1969 (NEPA). This document is intended to inform the cultural impact analysis section of the Hawaiian Monk Seal Programmatic Environmental Impact Statement (PEIS). It will assist NMFS in the identification and mitigation of potential adverse impacts of monk seal recovery actions, as detailed in the PEIS, on Native Hawaiian traditional and cultural practices and resources.

This Cultural Impact Assessment was prepared in compliance with the statutory requirements of NEPA. To the maximum practicable extent the document also follows the specifications of the State of Hawaiʻi Revised Statute (HRS) Chapter 343 Environmental Impact Statements law, as laid out in the State of Hawaiʻi Department of Health's Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawaiʻi, on 19 November 1997.

1.2 RELEVANT STATUTES AND AGENCY REGULATIONS

Under relevant national statutes and regulations, federal agencies have the responsibility to ensure effective stewardship of the cultural resources that may be impacted by their actions. The Code of Federal Regulations (Federal Code) implements these federal statutes. Prior to implementing the monk seal recovery actions proposed in the PEIS, NMFS is required to comply with both NEPA and the National Historic Preservation Act (NHPA). This Cultural Impact Assessment addresses the cultural requirements of NEPA. The requirements for NHPA Section 106 consultation as stipulated in the NHPA are addressed in a separate document presented in Appendix L of the PEIS.

1.2.1 National Environmental Policy Act

NEPA, as codified in 42 U.S.C. §§ 4321 et seq., § 4331(a)(4) (2012), requires, in part, the consideration, discussion, and analysis of possible impacts to cultural resources as part of the human environment. It enjoins federal agencies to use all practicable means to preserve important historic, cultural, and natural aspects of our national heritage (NEPA 42 USC § 4331 Sec. 101). For this PEIS, the NEPA requirement is implemented though the Federal Code provisions for environmental impact statements, 40 C.F.R. §§ 1502, § 1502.16(g) (2012).

According the Federal Code, the PEIS is required to discuss the potential impacts that all of the proposed alternatives may have on cultural resources, including analysis of the proposed actions, any unavoidable adverse impacts if the proposals are implemented, the relationship of the short-term uses of the environment to the maintenance and enhancement of long-term use, and any irreversible or irretrievable commitment of resources involved in the proposals if they are implemented.

2.0 PROJECT BACKGROUND

2.1 HAWAIIAN MONK SEAL RECOVERY PROGRAM

NMFS is the federal agency responsible for management of Hawaiian monk seals, under the Endangered Species Act (ESA) (16 United States Code [U.S.C.] 1531 et seq.) and the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 et seq.). NMFS funds, permits, and conducts research and enhancement activities on Hawaiian monk seals in the Northwestern Hawaiian Islands (NWHI) and main Hawaiian Islands (MHI).

Populations of the Hawaiian monk seal (*Monachus schauinslandi*) have experienced a prolonged decline. In 1976, NMFS listed Hawaiian monk seals as "endangered" under the ESA (41 Federal Register [FR] 51611) and "depleted" under the MMPA. NMFS implements recovery activities (research and enhancement) for Hawaiian monk seals to promote the conservation and recovery of the species population to levels at which ESA protection is no longer needed. NMFS has proposed new research and enhancement activities for Hawaiian monk seals and analyzed a reasonable range of alternatives in a draft Programmatic Environmental Impact Statement (PEIS), published in August 2011. These activities include monitoring, tagging, limited on-site medical treatment and the temporary translocation of seals between islands to enhance juvenile survival. This Cultural Impact Assessment will help to inform the final PEIS and will be included as an appendix.

The intent of the PEIS is to evaluate, in compliance with NEPA (42 U.S.C. 4321 et seq.) and the NOAA Administrative Order (NAO) 216-6, the potential direct, indirect, and cumulative impacts on the human environment of the alternative approaches to implementing recovery actions, including research and enhancement activities and the subset of actions requiring permits, under the Hawaiian monk seal recovery program. The intent of this Cultural Impact Assessment is to assess the potential impacts of the actions proposed in the PEIS on cultural resources, practices, and beliefs, and to identify measures to minimize the adverse impacts of the proposed alternatives.

Several actions in the PEIS may have the potential to affect cultural resources and traditional practices within the Hawaiian archipelago. Cultural resources and the traditional practices associated with their use may be located both along the shoreline and within inshore waters. The present project focuses on identifying Native Hawaiian concerns regarding the potential impacts of the NMFS Hawaiian monk seal recovery actions on cultural resources and traditional practices significant to Native Hawaiians.

2.2 HAWAIIAN MONK SEAL

The Hawaiian monk seal is among the rarest of all marine mammals. It is endemic to the islands of the Hawaiian chain and found nowhere else on earth. Hunted to the brink of extinction in the late 19th century, Hawaiian monk seals have been declining in population since the late 1950s. The monk seal population is currently declining overall. While the larger monk seal population in the NWHI is shrinking, the population within the MHI is growing. At present, the majority of monk seals live in six main breeding subpopulations located within the NWHI on Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island, and French Frigate Shoals. Smaller breeding sub-populations also occur on Mokumanamana (Necker) and Nihoa Islands. Monk seals have also been observed at Gardner Pinnacles and Maro Reef. Monk seals are also found within the MHI where births have occurred on many of the major islands. As a general rule, Hawaiian monk seals are relatively solitary and do not congregate in large groups as do other seal species such as sea lions and harbor seals. Monk seals occupy a range of marine and coastal habitats. They frequent the waters surrounding atolls, islands, and areas farther offshore on reefs and submerged banks. Monk seals are also found using deepwater coral beds as foraging habitats. They often haul-out on land to rest during the day, and prefer sandy, protected beaches surrounded by shallow waters when pupping.

Hawaiian monk seals are apex predators within the coral reef environment. They are primarily benthic foragers, feeding along the sea bottom on a variety of prey including fish, cephalopods, and crustaceans, although their diet varies depending upon location, sex, and age. Recent research undertaken by NMFS has attempted to estimate the food consumption of the current population of Hawaiian monk seals within the MHI and to compare the families of fish found in the monk seal diet and those targeted by recreational and subsistence fisheries (Sprague et al., 2013). The findings of the study indicate that although monk seals consume some of the same fish species as traditional subsistence fishers, the amount of these resources consumed is minimal when compared with that consumed by apex predatory fish.

2.3 PROJECT AREA

The Project Area for the PEIS encompasses the range where Hawaiian monk seals are found throughout the Hawaiian Archipelago, including the MHI, the NWHI, and Johnston Atoll (Figure 1). It includes portions of the open-ocean and near-shore environment where monk seals may be found, as well as the shore zone of the islands, islets and atolls that make up the Hawaiian Archipelago and Johnston Atoll. For the purposes of NEPA, the shore zone generally includes those terrestrial areas 5 meters inland from the line where the shore meets the sea. In addition, secondary use areas, such as research field camps in the NWHI, are also considered for inclusion.

2.3.1 Main Hawaiian Islands

The eight main islands of the Hawaiian chain include the high volcanic islands of Hawaiʻi, Maui, Kahoʻolawe, Lānaʻi, Molokaʻi, Oʻahu, Kauaʻi and Niʻihau, which rest at the southeastern end of the archipelago. The areas within these MHI potentially affected by the monk seal recovery actions address in the PEIS include the shoreline areas and the immediate offshore zone.

2.3.2 Northwestern Hawaiian Islands

The NWHI consist of those islands, atolls, rocks, reefs and shoals that lie to the northwest of the MHI. Also known as the Leeward Islands, the NWHI extend approximately 1,240 miles (2,000 kilometers) from the island of Nihoa in the southeast to Kure Atoll in the northwest (Figure 2).

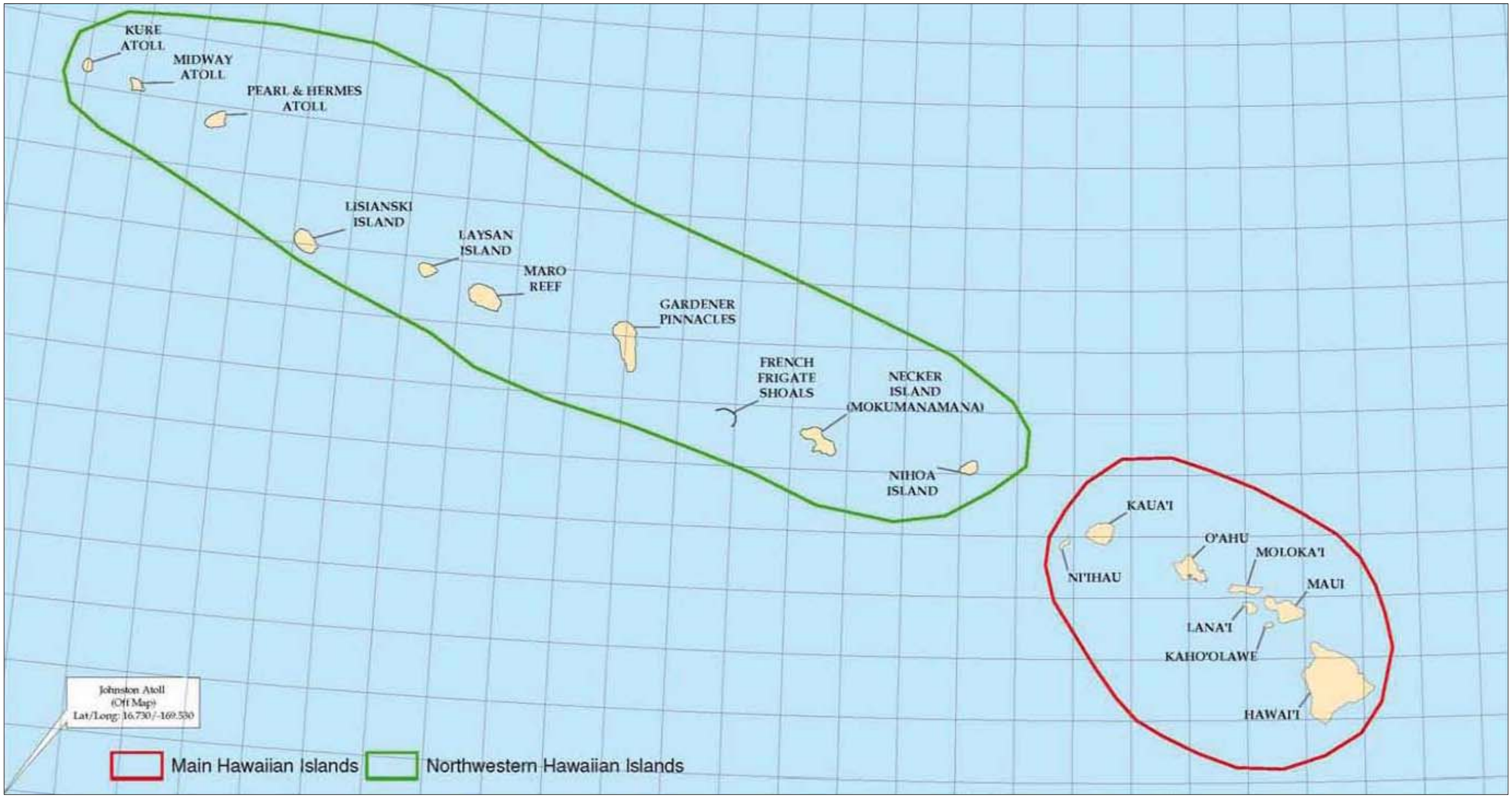

Figure 1. Project area for the Monk Seal Programmatic Environmental Impact Statement (map courtesy NOAA).

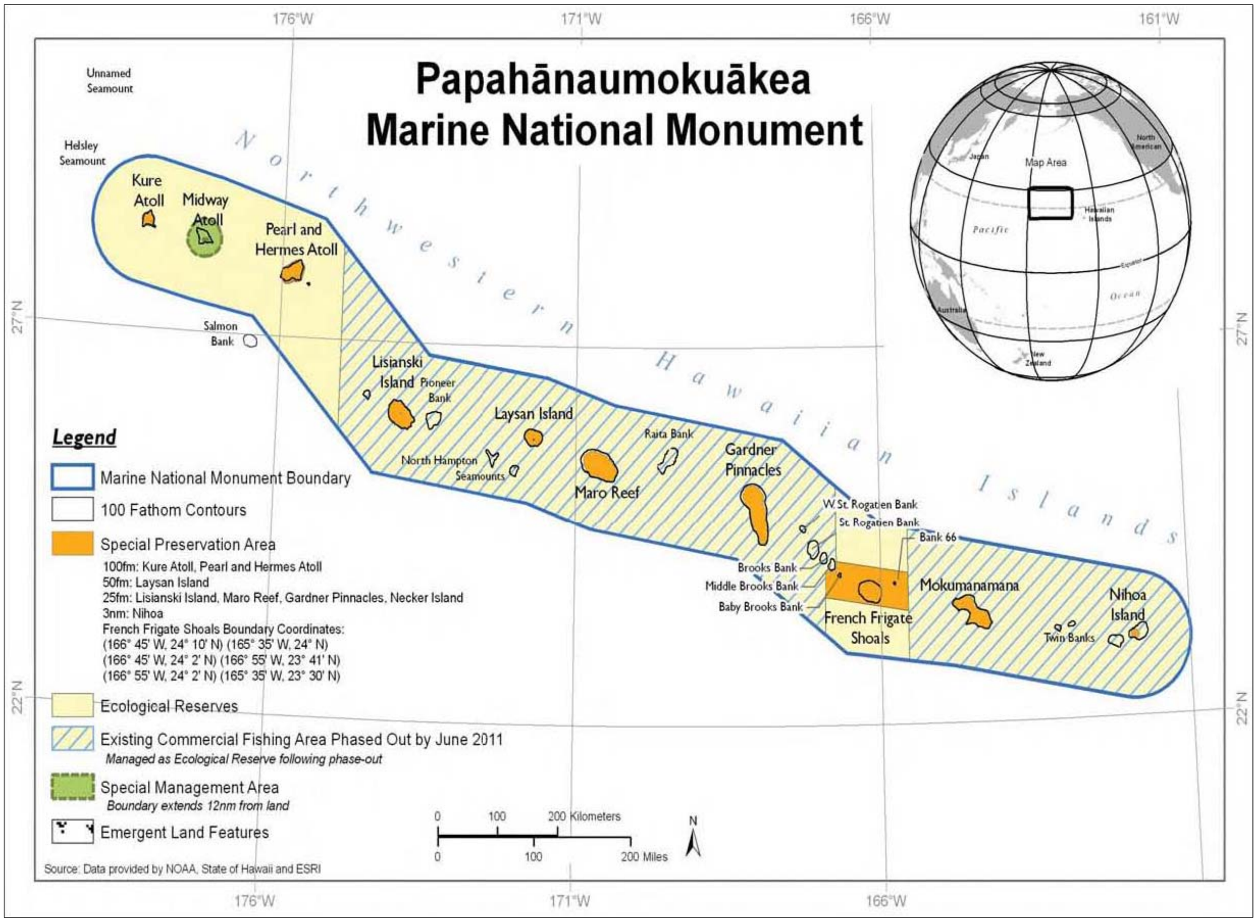

Figure 2. Northwestern Hawaiian Islands (map courtesy NOAA).

In 2006, the entire NWHI were included within the Papahānaumokuākea Marine National Monument, which was created by Presidential Proclamation 8031 on June 15, 2006 under the authority of the Antiquities Act of 1906 (16 U.S.C. §§ 431-433). The Monument, which encompasses an area of approximately 142,948 square miles (370,234 square kilometers), includes the ten main islands and atolls that make up NWHI and the surrounding waters. Its boundaries begin 125 miles west of the main Hawaiian Island of Kaua‘i. Papahānaumokuākea Marine National Monument is the largest protected area in the United States, as well as the world's largest fully protected marine area. On 30 June 2010, the World Heritage Committee of the United Nations Educational, Scientific and Cultural Organization (UNESCO) unanimously inscribed Papahānaumokuākea as a mixed (i.e., cultural and natural) site. The management of the Monument is under the co-trusteeship of the NOAA, the U. S. Fish and Wildlife Service and the State of Hawai‘i.

2.4 Previous Studies

Several previously existing studies were taken into consideration in preparing this Cultural Impact Assessment. The two studies described below were particularly significant.

2.4.1 Cultural Significance Report and Previous PEIS Cultural Impact Analysis
As part of ongoing efforts to understand cultural knowledge and concerns regarding Hawaiian monk seals, NMFS funded a report under contract, entitled *Historic and Contemporary Significance of the Endangered Hawaiian Monk Seal in Native Hawaiian Culture*, 2011. The report was prepared by John Kittinger, Trisann Māhealani Bambico, Trisha Kehaulani Watson, and Edward W. Glazier (Kittinger et al. 2011; the results of this research were also published in Kittinger et al. 2011 and Watson et al. 2011). This report is included as Appendix K of the final PEIS, and served as a reference for the section of the draft PEIS analyzing potential cultural impacts.

2.4.2 Relevant Associated Cultural Impact Assessments
In 2008, the State of Hawaiʻi Department of Land and Natural Resources (DLNR), Division of Aquatic Resources prepared a Cultural Impact Assessment associated with the proposed implementation of the Papahānaumokuākea Marine National Monument Management Plan (MMP), and the Environmental Assessment (EA) for proposed MMP activities. The development of the draft sanctuary management plan for the NWHI involved extensive consultation with the Native Hawaiian community and Native Hawaiian cultural practitioners (State of Hawaiʻi 2008:22). This Cultural Impact Assessment has relevance for the present study as it outlines many of the Hawaiian cultural resources, beliefs and practices associated with the NWHI. Elements of this study have therefore been incorporated in the present report.

2.5 SCOPE OF WORK AND OBJECTIVES

The objectives of the present Cultural Impact Assessment were to assist NMFS in revising relevant sections of the draft PEIS to produce the final PEIS. This was undertaken, in part, to fulfill statutory obligations under NEPA to assess potential impacts to cultural resources during the planning and implementation of the Hawaiian Monk Seal Recovery Program. This report focuses on identifying Native Hawaiian concerns regarding the potential impacts of NMFS Hawaiian monk seal recovery actions on traditional cultural resources, beliefs and practices. Potential effects on historic properties and traditional cultural properties have been dealt with in a separate document (final PEIS Appendix L) detailing the NHPA Section 106 consultation carried out in association with the monk seal recovery action PEIS.

The preparation of this Cultural Impact Assessment involved extensive research into the historic interactions between monk seals and Native Hawaiians, and the cultural significance that monk seals may have held within traditional Hawaiian society. Research was also undertaken to identify traditional Hawaiian activities that may be affected by monk seal recovery actions. A series of public meetings were conducted to elicit input from Native Hawaiian individuals and organizations and other concerned parties regarding the cultural resources, practices and beliefs potentially affected by the proposed actions.

Several sections of the final PEIS reflect revisiosn to the draft PEIS based upon the findings of this Cultural Impact Assessment. These sections include:

Section 3.0 Affected Environment
3.4 Social and Economic Environment

3.4.6 Cultural Environment
Section 5.0 NEPA Compliance, Implementation, and Adaptive Management of the Preferred Alternative
5.6 Recommendations for Coordination with Stakeholders and Communities
5.6.1 Native Hawaiian and Community-Based Programs

Additional sections have been added to the final PEIS to address the impacts of the proposed actions on cultural resources and traditional cultural practices. These include:

Section 4.0 Environmental Consequences
4.4 Steps for Determining Level of Impact
4.4.3 Impact Criteria for Socioeconomic Resources
Impact Criteria for Cultural Resources and Traditional Cultural Practices
4.9 Social and Economic Environment
4.9.4 Cultural Resources and Traditional Cultural Practices
Section 5.0
5.5 Mitigating Potential Impacts to Cultural Resources and Historical Properties
5.5.2 Training in the Recognition and Avoidance of Cultural Resources and Historic Properties
5.5.4 Northwestern Hawaiian Islands

3.0 METHODOLOGY

The intent of this Cultural Impact Assessment is to identify cultural resources, and religious and/or traditional practices that may be affected by the actions proposed in the PEIS for Hawaiian monk seal recovery actions, to determine the potential adverse impacts of these actions, and to develop acceptable mitigation measures to avoid, offset, or minimize these impacts. Preparation of the Cultural Impact Assessment involved a combination of scholarly research and analysis, public consultation, and collaboration with various agencies, organizations and individuals.

3.1 ARCHIVAL RESEARCH

Archival research undertaken as part of this study involved a detailed examination of a variety of available resources. These resources included transcribed traditional *oli* (chants), *mele* (songs), *mo*ʻ*olelo* (stories, legends, and traditional history), ʻ*ōlelo no*ʻ*eau* (proverbs and traditional sayings), traditional place names, accounts from early visitors to the islands, Hawaiian language newspaper articles, historic documents, maps and photos, archaeological reports, and other previous research reports.

Research was conducted at a range of relevant institutions as well as in the personal collections of the researchers. Sources Institutions and sources used include:

- State Historic Preservation Division Library — Archaeological reports and maps;
- Bishop Museum Library and Archives —Hawaiian Ethnographic Notes including Mary K. Pukui translations of Hawaiian newspaper articles of 1800s, photos, tape recordings, interviews, maps;
- University of Hawaiʻi at Hilo Esther Moʻokini Library Hawaiian Collection — Journals, books, maps, reports; and
- Online sources of Hawaiian Language Newspapers including Ulukau Hawaiian Electronic Library, Ka Paʻa Moʻolelo, University of Hawaiʻi Archives Digital Archives Collection — Land use, place names, *mo*ʻ*olelo.*

The purpose of the research was to attempt to trace the historic interactions between monk seals and Native Hawaiians through time and to determine the cultural significance that monk seals held in traditional Hawaiian culture. The findings of this research are summarized briefly in Section 6.3 and presented in detail in Appendix B of this document.

3.2 PUBLIC CONSULTATION

As part of the consultation for this Cultural Impact Assessment, a series of community meetings were held at various venues on the islands of Molokaʻi, Lānaʻi, Maui, Hawaiʻi, and Oʻahu. The purpose of these meeting was to provide the public with the opportunity to offer information on the cultural resources and traditional practices that may be affected by the recovery actions outlined in the monk seal PEIS and to enable Native Hawaiian organizations and other interested parties to assist in developing strategies for the mitigation of impacts resulting from these proposed actions. The results of these community meetings are discussed in Section 5.0.

4.0 ACTIVITIES RELATED TO HAWAIIAN MONK SEAL RECOVERY

4.1 CURRENT ACTIVITIES

The existing permit issued to the NMFS Pacific Islands Fisheries Science Center (PIFSC) under the Marine Mammal Protection Act (MMPA-ESA Permit No. 10137-05) authorizes research and enhancement activities on Hawaiian monk seals. These activities, which include aerial, vessel, and ground surveys, sample collection, medical treatment, marking of animals, attachment of telemetry instruments, translocation and temporary captivity are listed in Table 2.10-1 of the PEIS. The PIFSC is authorized to undertake these activities each year through June of 2014, at which time the existing permit will expire.

4.2 ACTIVITIES PROPOSED IN PEIS

The proposed alternatives for Hawaiian monk seal recovery actions are addressed in detail in Sections 3.7 to 3.10 of the PEIS and in Table 2.10-1. They are briefly summarized below.

Proposed Alternatives

Alternative 1 involves the continuation of currently authorized activities past 2014. Research and enhancement activities allowed under this alternative are listed in Table 2.10-1 of the PEIS. No new activities or expanded scope of existing activities would occur under this status quo alternative. Under Alternative 1 the translocation of seals would only take place within the MHI or within the NWHI. There would be no translocation of seals from the NWHI to the MHI or from the MHI to the NWHI. Activities conducted under Alternative 1 include aerial, vessel and land-based surveys, and some handling and transportation of Hawaiian monk seals. Boats and land vehicles will be used to transport researchers and possibly animals. Researchers will cross beach and dune areas on foot to reach monk seal locations. Recovery activities will be conducted throughout the APE, in the MHI, NWHI, and on Johnston Atoll. Researchers will seasonally (typically April or May through August) occupy existing camp sites in the NWHI.

Alternative 2: Under Alternative 2, presently authorized activities as permitted under the existing permit (10137) will continue until 2014. However, once the present permit expires the only research and enhancement activities carried out would be those that either do not require a new permit or are allowed under the provisions of the MMPA's MMHSRP (Title IV, 16 U.S.C. 1421) and the permit held by the MMHSRP. No new permit would be issued to replace 10137 when it expires

Alternative 3: Alternative 3 is the preferred alternative and encompasses the range of actions considered most promising for fostering monk seal recovery in the next several years. Under Alternative 3, all activities currently permitted would continue, and new permissions would be granted with expanded scope and methods, with restrictions and mitigation. Additional actions would include increased handling of Hawaiian monk seals.

Alternative 3 would also include a seal behavior modification program intended to prevent or reduce human-monk seal interactions. Also under Alternative 3 the scope and number of seal translocations would also be expanded (see PEIS Section 3.9). This would include the translocation of Hawaiian monk seals within the MHI or within the NWHI, as well as the translocation of a limited numbers of seals from the MHI to the NWHI. As a result, boat and land vehicle activity, as well as shoreline activities, would be greater under Alternative 3 than under Alternatives 1 or 2.

Alternative 4: This alternative would encompass all of the activities permitted under Alternative 3 with the addition of the option for temporary translocation of weaned pups from the NWHI to the MHI as described in Section 3.10 of the PEIS. The increased capture and transport of the seals under Alternative 4 would result in increased boat and land vehicle traffic, as well as pedestrian traffic to and from the capture site.

4.3 Tasks Associated With Proposed Alternatives

1. Translocation

This activity involves the temporary or permanent translocation of weaned pups, juveniles and sub-adults, and adult males within or between subpopulations within the species range. For Alternatives 1 and 2, this includes translocations within the NWHI and within the MHI, but not between the NWHI and the MHI. Alternative 3 also includes translocations from the MHI to the NWHI. Under Alternative 4 this also includes temporary translocations from the NWHI to the MHI.

Tasks Involved: Translocation within the NWHI and (under Alternative 4) from the NWHI to the MHI

Capture of the seal:

Seals are captured by manual physical restraint, herding (sometimes with plywood boards), and placed in nets or cages for transport. The removal cage (for adults) or net (for pups) is transported to the capture site by boat and is hand-carried from the boat to the seal's location on the beach. Depending on the size of the seal, two to four NOAA staff will be present to carry the cage or carrier and to monitor the seal. There is no large-scale movement of sand or digging.

Transport to the release site:

The captive seal is then hand-carried to the release site or to the waiting boat for transport to the release site.

Release of the seal:

The capture process is reversed at the release site, whether from a net or cage. The captive seal is hand-carried from the boat to the release site. Pups are typically released on the beach above the water-line. Depending on the size of the seal, two to four NOAA staff will be present to carry the cage or net and to monitor the seal.

Translocation within the MHI and (under Alternative 4) from the MHI to the NWHI

Capture of the seal:
Seal cages are typically transported to the capture site by truck. As a seal is usually translocated from an area of human population to a more remote locale, the capture site is likely to have nearby vehicle parking for the truck, as in the case of a beach park, or at least nearby access to a paved road. No off-road vehicle access is involved. The cage (for adults) or net (for pups) is hand-carried from the truck to the seal's location on the beach. Depending on the size of the seal, two to four NOAA staff will be present to carry the cage or carrier and to monitor the seal. There is no large-scale movement of sand or digging.

Transport to the release site:
The captive seal is hand-carried to the waiting truck or boat for transport to the release site. The cage is typically not carried a long distance due to its weight. As the release site is usually remote, seals are often transported by boat.

Release of the seal:
The capture process is reversed at the release site, whether from a net or cage. The captive seal is hand-carried from the boat to the release site. Pups are typically released on the beach above the water-line. Depending on the size of the seal, two to four NOAA staff will be present to carry the cage or net and to monitor the seal.

2. Carcass Removal
Removal of a deceased animal in the MHI involves collection of the carcass and its transport to a necropsy facility. The site is accessed according to the same process outlined above for translocation via truck for a populated area or boat for a remote area. When the site is remote, two to four NOAA staff may be required to hike from the road, producing cross-country pedestrian traffic.

This activity in the NWHI involves access to the site and carcass removal by boat or on foot. Some necropsies are conducted where carcasses are found in the NWHI (without transporting the carcass).

3. Other Activities
Other activities proposed in the Alternatives (see Chapter 2 of the PEIS), including disentanglement, health assessment, etc., may involve pedestrian traffic or boat traffic to access the seals. The sites would be accessed according to the same process outlined above for translocation via truck for a populated area or boat for a remote area. When the site is remote, two to five NOAA staff may be required to hike from the road, producing cross-country pedestrian traffic.

This activity in the NWHI involves access to the site by boat.

5.0 NATIVE HAWAIIAN AND COMMUNITY CONSULTATION

5.1 THE CONSULTATION PROCESS

The community consultation for this Cultural Impact Assessment consisted primarily of a series of public meetings held on various islands. These meetings were intended to provide the public with the opportunity to offer information and raise concerns regarding the cultural resources and traditional practices that may be affected by the proposed Hawaiian monk seal recovery actions. The results of these meetings were combined with the results of interviews and consultations undertaken as part of the original draft PEIS.

5.2 FINDINGS FROM PREVIOUS CONSULTATIONS

As has been mentioned (Section 2.4.1), a series of unstructured ethnographic and oral history interviews were conducted with thirty Native Hawaiian community members, cultural practitioners and *kūpuna* to gather information on the role that monk seals played in traditional Hawaiian culture and to document the views of these informants regarding the potential impacts of monk seal recovery actions. The results of these interviews were presented and discussed in the report included as Appendix K of the final PEIS (Kittinger et al. 2011).

The authors of this study found substantial differences in the views of the various individuals interviewed. "While some Native Hawaiian community members hold positive views about the monk seal, others view the monk seal negatively and do not associate any cultural significance to the species historically or in modern times" (Kittinger et al. 2011:17). Their conclusion was that, "Respondents exhibited a plurality of views regarding the monk seal, ranging from hostility or ambivalence to strong feelings of conservation and stewardship. This suggests lack of a consensus in the Native Hawaiian community regarding the monk seal and heterogeneity in perceptions and socio-cultural values associated with the species" (Kittinger et al. 2011:16).

5.2.1 Concerns Expressed

A number of concerns were expressed by individuals consulted during this previous study. While the most commonly expressed concern was the impacts of monk seal presence on traditional subsistence fishing, there were other concerns raised as well.

Traditional Subsistence Fishing

The authors of the 2011 study (Kittinger et al. 2011) found that the most commonly mentioned conflicts between humans and Hawaiian monk seals centered on traditional subsistence fishing practices. The report mentions that, "Monk seals are viewed by Native Hawaiian fishers and their families as direct competitors, in that they preferentially take fish specifically targeted by fishers. Many respondents believe that when interactions occur, they inhibit the ability of fishers to provide food for the household. Other fishers cite the aggressive behavior of monk seals as a major problem. Common interactions include seals taking fish off of lines or out of fishers' nets, but increasingly seals are interacting with boats and fishermen directly – in some cases fishers have been bitten by monk seals. These interactions are viewed by some as impacting cultural fishing practices, and are further compounded by existing regulations that restrict fishing and the depleted condition of fisheries resources in the MHI" (Kittinger et al. 2011:18).

Cultural Integration

Another source of concern raised during informant interviews was the restrictive nature of Federal regulations regarding Hawaiian monk seals. Several of those interviewed felt that Federal regulations restricted the ability of Native Hawaiians to interact with monk seals as part of their natural environment. It was expressed that only through direct interaction could monk seals be integrated into contemporary Hawaiian culture. "Among respondents who view the species negatively, the belief that the monk seal is not endemic is exacerbated by the prohibitions against interacting with the seal. Some respondents state the perspective that modern cultural knowledge cannot be generated because the monk seal "cannot be touched and used for anything." Restrictions on use have precluded indigenous communities from perpetuating cultural traditions for other protected species such as sea turtles. Ancient cultural knowledge is believed to be nonexistent due to the recent arrival of the monk seal in the MHI, but respondents also suggested that modern knowledge of the seal will accrue with the current generation that is interacting with the monk seal. A key question among this group is how seals will be integrated into Hawaiian culture and what will the cultural exchange be with the species in the modern context" (Kittinger et al. 2011:18).

5.2.2 The Question of Stewardship

The authors of the study found that positive reactions to monk seal presence were more common in relatively isolated rural communities. They note some communities have taken on themselves the role of stewards, looking after the health and wellbeing of their resident monk seal population. The report notes that, "In a few unique places in the archipelago monk seals are regarded as a natural part of the ecosystem and human-monk seal conflicts appear to be minimal. These areas tend to be rural and fairly isolated communities that are characterized by a higher degree of self-sufficiency, and where familial traditions and local decision-making processes are preserved. On Ni'ihau Island, for example, monk seals became established in the 1970s. Community members discussed the social impacts associated with monk seal colonization (e.g., increased presence of sharks), and ultimately decided to act as stewards of the animals. As a result, a sub-population has become established and residents have developed a stewardship ethic towards the species. A similar situation is occurring in the isolated Kalaupapa community on Moloka'i Island, where another sub-population is thriving in the MHI, and where community residents largely leave seals alone. In these communities, fishers and other ocean users will move away from areas where seals are visible in order to minimize interactions" (Kittinger et al. 2011:18).

5.3 COMMUNITY MEETINGS

As part of the preparation of the present Cultural Impact Assessment, a series of community meetings were announced and held on six of the eight MHI (the exceptions were Ni'ihau and Kaho'olawe). The purpose of these meetings was to seek community input on the proposed

Hawaiian monk seal recovery actions as presented in the draft PEIS. Information sought included potential adverse effects to historic properties and/or traditional cultural properties, as well as information on potential impacts to cultural resources and practices that might result from implementation of Hawaiian monk seal recovery actions. The press release announcing these meetings is included in Appendix A of this document.

These meetings were planned, convened, and facilitated by Dr. Paul Cleghorn from Pacific Legacy. Members of NMFS staff participated in each meeting, providing information and responding to concerns expressed by those attending.

5.3.1 Meeting Schedule

All meetings were held at public venues (elementary, middle or high schools) between 6:00 and 8:00 pm to allow them to be attended by individuals who worked or attended school during the day. The meetings were held at eleven venues on six islands.

Molokaʻi	
Kaunakakai (29 October 2012)	Molokaʻi High School
Lānaʻi	
Lānaʻi City (30 October 2012)	Lānaʻi High and Elementary School
Kauaʻi	
Waimea (7 November 2012)	Waimea High School
Kapaʻa (8 November 2012)	Kapaʻa Middle School
Maui	
Hāna (14 November 2012)	Hāna High School
Lāhainā (15 November 2012)	Lāhaināluna High School
Hawaiʻi	
Hilo (27 November 2012)	Hilo High School
Kona (28 November 2012)	Kealakehe Elementary
Oʻahu	
Waiʻanae (11 December 2012)	Waiʻanae High School
Waialua (12 December 2012)	Waialua High and Intermediate School
Waimānalo (13 December 2012)	Waimānalo Elementary and Intermediate School

5.3.2 Summary of Community Meetings

It was found that each meeting possessed its own tenor, and often its own particular area of interest, depending upon the individuals attending. The greatest number of concerns and the strongest opposition to the actions proposed in the DPEIS were expressed at meetings in Kapaʻa, Hāna, and Lāhainā.

Molokaʻi (Kaunakakai, 29 October 2012)

Only three members of the public attended the Molokaʻi meeting. NMFS staff provided the background information on the project, as well as information on seal behavior, especially as it relates to seal movement and seal observations on Molokaʻi. No concerns were expressed or issues raised.

<u>Lāna'i (Lāna'i City, 30 October 2012)</u>

A total of four members of the public attended the Lāna'i meeting. Numerous concerns were raised, and NMFS staff spent time answering questions and addressing concerns.

<u>Kaua'i (Waimea, 7 November 2012)</u>

A total of four members of the public attended the Waimea, Kaua'i meeting. The meeting was lively and productive. The group was more interested in discussing traditional activities than historic resources.

<u>Kaua'i (Kapa'a, 8 November 2012)</u>

A total of 16 members of the public attended the Kapa'a, Kaua'i meeting. The meeting started out with several attendees expressing displeasure regarding the poor advertising of the meeting. They felt it should have been on all of the radio stations and in the newspaper. A tape recording was made of the meeting because NOAA had been informed that some of the people intended to present their views in '*olelo Hawai*'*i* (the Hawaiian language), and the tape was made so that these presentations could later be translated by Pacific Legacy staff. Only one young boy (approximately 10 to 12 years old) presented a statement in '*olelo Hawai*'*i*. There was a great deal of anger and frustration expressed at the meeting, but the attendees would not allow NMFS staff to provide them any numbers or information. They accused NOAA of not listening to the people. The main sentiment brought away from the meeting was that the meeting participants strongly feel that the translocation of seals will alter their lifestyle and they are adamantly opposed to any activity that would increase the number of seals in their area.

<u>Maui (Hāna, 14 November 2012)</u>

A total of 18 members of the public attended the Hāna, Maui meeting. Some participants expressed their frustration that this was the third or fourth meeting held on Maui regarding monk seals, and it does not seem that NOAA is listening to the feelings of the community. They felt that repeatedly coming into the community and asking the same questions, without addressing their answers, was insulting to the community. There is deep frustration that NOAA keeps coming back asking the same questions and wanting to do the same things without acknowledging that the community is opposed to these actions. This sense of a federal agency not listening permeated the meeting.

The community is adamant that they do not want any new seals brought into the area and are not happy about the seals that are already here. The overriding sentiment appeared to be that the community wants seals to be taken from the MHI to the NWHI. This point, with slight variations (relocate seals anywhere but here) was repeated many times. It is their sincere belief that monk seals are not native to the area and are causing adverse impact to their lives. Minimally they would like to see no actions taken regarding existing seal populations -- let nature run its course. If the seals survive, ok if they perish, ok.

There is a strong sense by a least some members of the community that the seal recovery program is a means for the U.S. Federal Government to exert greater control over the people of Hawai'i. There is a strong lack of trust and a strong sense of suspicion. The overriding sentiment was that the community objects to a federal agency coming into their home telling them what to do.

<u>Maui (Lāhainā, 15 November 2012)</u>

A total of six members of the public attended the Lāhainā, Maui meeting. The general feeling of the attendees was that monk seals should not be translocated into the MHI. There was concern that an increase in Hawaiian monk seal populations would result in an increase in sharks and shark attacks. As one attendee expressed it, "We understand that seals are having survival problems and we are sorry for this. BUT, we need to be more concerned with the survival and quality of life of Hawaiians."

<u>Hawai'i (Hilo, 27 November 2012)</u>

A total of seven members of the public attended the Hilo, Hawai'i Island meeting. The initial emphasis of public questions was on seal biology and seal populations. This discussion focused mainly on the management of species. There were a number of questions regarding carrying capacity and concern that by attempting to increase the monk seal population within the MHI NOAA was placing the interests of seals before the interests of fishermen. It seemed to be a productive meeting with many participants satisfied with the answers to their questions and concerns. Many useful suggestions were made by participants regarding what NOAA could do to educate and involve the public.

<u>Hawai'i (Kona, 28 November 2012)</u>

A total of four members of the public attended the Kona, Hawai'i Island meeting. The meeting consisted of about an hour long conversation about possible scenarios of human - seal interactions at the time of the first Polynesian settlement. Also, other general aspects about Hawaiian prehistory and adaptation to the land were discussed. All very interesting topics, but none of them pertained to the issues at hand.

<u>O'ahu (Wai'anae, 11 December 2012)</u>

A total of six members of the public attended the Wai'anae, O'ahu meeting. There was some discussion regarding the impact of seals on traditional fishing practices, and fishermen indicated that they had seen seals go after some of the same fish as subsistence fishers using hook and line.

<u>O'ahu (Waialua, 12 December 2012)</u>

A total of three members of the public attended the Waialua, O'ahu meeting. One attendee was a NOAA staffer unassociated with the project, while the remaining two were a Hawai'i State staffer and a State Representative. The meeting consisted of an informal discussion about the NOAA program with the State Official's representative. No issues were raised.

<u>O'ahu (Waimānalo, 13 December 2012)</u>

A total of five members of the public attended the Waimānalo, O'ahu meeting. Most of the concerns expressed in the meeting related to seals interfering with subsistence and commercial fishing activities. It was pointed out by one of the participants that commercial fishing grew out of traditional subsistence fishing practices.

5.4 Identified Cultural Resources and Customary Practices

Participants attending the public meetings identified several cultural resources and customary practices that they felt would be affected by the proposed Hawaiian monk seal recovery actions.

5.4.1 Cultural Resources
Participants in the community meetings identified a number of types of cultural properties that might be affected by the activities proposed in the PEIS. These included:

Coastal *heiau* (religious sites)
*Ko*ʻ*a* (fishing shrines)
Traditional stacked stone walls
Sand dunes containing buried cultural deposits
Iwi kāhiko (ancient human remains)
Fishponds
Fishing Villages

5.4.2 Cultural Practices
Participants in the community meetings also identified a number of cultural practices, and by inference cultural resource areas, that might be affected by the activities proposed in the PEIS. These included:

<u>Traditional Gathering Activities</u>
Limu (seaweed) collecting
ʻ*Opihi* (limpet) collecting
*Hau*ʻ*ukeuke* (an edible sea urchin) collecting
Wana (sea urchin) collecting
Crabbing
Ula (lobster) collecting

<u>Traditional Gathering Resource Areas</u>
Limu (seaweed) collecting sites
ʻ*Opihi* (limpet) collecting sites
*Hau*ʻ*ukeuke* (sea urchin) collecting sites
Wana (sea urchin) collecting sites
Crabbing sites
Ula (lobster) holes

<u>Traditional Fishing Activities</u>
Throwing net
Hook and line
Spear fishing
Trolling

<u>Traditional Fishing Resource Areas</u> (some individuals felt that these might be threatened by the increased presence of seals)
Moi holes
Āholehole fishing areas
Menpache fishing areas

One fisherman on O‘ahu said that he has seen monk seals go after red and pink snapper (*Ōpakapaka* and Onaga). With the Onaga, he said that the seal would repeatedly toss the fish into the air and hit it again and again. Once the fish is pretty pulverized it is swallowed whole. Another fisherman has witnessed seals consuming puffer fish, trigger fish, and *Ōpakapaka*/Onaga.

They also noted that a detailed study of traditional fishing practices within the Hawaiian Islands has been undertaken by Kepā and Onaona Maly. The report of this study, Ka Hana Lawai‘a a me Nā Ko‘a o Nā Kai ‘Ewalu (A History of Fishing Practices and Marine Fisheries of the Hawaiian Islands Compiled From Native Hawaiian Traditions), includes information obtained through archival research into Native Hawaiian traditions, historical accounts, government communications, *kama*‘*āina* testimony and ethnography (Volume I), as well as oral history interviews with *kūpuna* and *kama*‘*āina (*Volume II) (Maly and Maly 2003). It was suggested that NOAA use this report as a reference in understanding and mitigating for subsistence gathering and fishing.

In addition to traditional marine resource use, there are traditional activities related to the gathering of terrestrial plants that live near the shore for medicinal and other uses. Two examples that were raised during community meetings are:

Heialoa, a vine or creeper that has a yellow flower used for the treatment of a variety of ailments including cancer.

Name unknown, possibly *koko*‘*olau*, a woody bush with a yellow flower, the root of which is used to treat sore throats.

5.5 Issues Raised During Community Meetings

The community meeting held throughout the islands elicited a wide range of public comments and concerns. A number of the concerns expressed did not deal directly with cultural or historic resource issues, but were more informational questions regarding human and monk seals interactions. The following concerns were expressed during the various community meetings. During the meetings, NMFS staff engaged in dialogue regarding the concerns and offered additional perspectives and information. Many of these concerns/questions are addressed in responses to comments of the draft PEIS provided in the final PEIS. It is important to note that some of the concerns outlined here involve assumptions based in incorrect information, or state information as fact that is not supported by any evidence. The meeting(s) at which each concern was raised has been noted in parenthesis. Different individuals attending different meetings sometimes expressed similar concerns. In these cases the concerns have been synthesized into one.

5.5.1 Concerns Not Directly Related To Cultural Resources or Practices

(*Note: A comprehensive Comments Analysis Report is provided in Appendix B of the final PEIS. The report provides a summary of all public comments NMFS received regarding the draft PEIS and provides responses to those comments. Many of the concerns presented below are addressed in the Comments Analysis Report.*)

General Concerns

Concern: What are NOAA's goals for monk seal recovery? (Hilo)

Concern: We do not know enough about the impact that the translocation of monk seals from the NWHI to the MHI will have. (Lāhainā)

Concern: What impact is the present population of the MHI having on fish populations and the natural environment? (Hāna)

Concern: Will coral reefs be impacted by monk seal translocations to the MHI? (Hāna)

Concern: Brackish water estuaries are nutrient/algae rich, which provide food for small fish, which are eaten by larger fish and so on. A seal coming into this area will have a tremendous impact on this fragile system. (Hāna)

Concern: A fisherman stated that he had been at a meeting where there was proposed a bag limit of two menpache (squirrel fish) per certain period. He felt that this was being proposed to leave more menpache for seals. He wants to know what the carrying capacity for seals is in the MHI. (Hilo)

Concern: One participant asked what is monk seals' feeding behavior at night? Fish sleep at night, so it is easier hem to be for caught by seals at night. Seals haul out onto the shore during the day. (Lāhainā)

Concern: If a large population of seals congregates on one island, say Niʻihau, and they become a problem for the owner, there would be a serious problem. What would NOAA do about this? (Hilo)

Concern: If NOAA's target is to ultimately have a monk seal population of 500 seals in the MHI (20 years out) we will need an extensive educational program for locals as well as tourists for everyone's safety. (Lāhainā)

Concern: In 1994, 21 aggressive male seals were translocated from Laysan Island in the NWHI to the MHI. Did the federal agency responsible for this action have the appropriate permits for this action? When NOAA has been asked this question before, there was no response. (Hilo)

Concern: The individual asking the previous question also wanted to know what impact these 21 make seals have on the local seal population? (Hilo)

Concern: What is the proposed ratio of males to females for the translocations proposed in the DPEIS? (Hilo)

Concern: Concern was expressed that adult seals who grew up in the MHI, after translocation to the NWHI will return to the MHI. (Hilo)

Concerns Regarding the Specifics of the PEIS

Concern: The DPEIS does not directly address the cumulative impacts of its proposed actions. (Lānaʻi)

Concern: A concern was raised regarding the designation of critical habitat. The question was, once a critical habitat is identified, how does this affect traditional practices such as fishing? (Lānaʻi)

Concern: Concern was expressed that the community really does not know what kind of numbers are be considered for Monk seal relocation. How many seals make up the resident populations within the MHI? How many are being considered for relocation? Why is relocation necessary -- most think that "being in the wild out in the NWHI" would be preferable to being in areas where there is human activity. (Lānaʻi)

Concern: The draft PEIS needs to consider and evaluate economic, social, and cultural aspects of the project. What is the status of these considerations? (Hilo)

Concerns Regarding Seal Survival

Concern: If seals are translocated into the MHI from the NWHI and raised without the danger of shark predations, when they are taken back to the NWHI they will not have the survival skills to handle sharks. They will quickly become shark bait and be killed. (Lāhainā)

Concern: With larger numbers of seals being brought into the MHI there will be a greater risk of barges and other vessels hitting seals. Shipping companies should be required to obtain inadvertent take permits. (Hilo)

Concerns Regarding Public Safety

Concern: If more seals are brought to the MHI, will this will attract more sharks, which in turn could cause a greater number of shark attacks, posing a safety issue for humans. There was also the suggestion that there are a growing number of sharks and shark attacks. (Waimea, Kapaʻa, Hāna, Lāhainā)

Concern: The increase in the number of seals in the MHI will result in an increase in interactions between humans and seals with a resulting increase in the risk to public safety (e.g., seals biting humans). (Lāhainā, Hilo)

Concerns Regarding Monk Seal/Human Interaction

Concern: There was an instance where a family group went to the beach of a day of activities and someone came forward waving their arms and telling them that there was a seal present and that the group would have to leave. (Waimea)

Concern: Seals can and have hauled themselves out on boat launch sites, and vessels on trailers had to leave without launching. The seals need to be herded away. (Waimea)

Concern: If at the beach, a seal bites a child, then the father gets a gun and kills the seal, is the father liable for prosecution? (Kapaʻa)

Concern: A few participants expressed the concern that monk seals are becoming more aggressive towards fishers and divers, stealing fish and intimidating people. (Waimānalo)

Concern: Fishers are afraid to report hooking of seals, as there is a general conception that fishers are bad and that their nets and hooks harm seals. This fear is being fostered by NOAA. (Waimānalo)

5.5.2 Concerns Regarding Cultural Resources and Practices

(*Note: A comprehensive Comments Analysis Report is provided in Appendix B of the final PEIS. The report provides a summary of all public comments NMFS received regarding the draft PEIS and provides responses to those comments. Many of the concerns presented below are addressed in the Comments Analysis Report.*)

Concerns include that the increased number of seals in the MHI may impact traditional fishing practices, reduce catches, and attract monk seals to fishponds.

Concerns Regarding Traditional Fishing

Concern: The increase in monk seal populations resulting from the translocation of seals to the MHI will adversely impact subsistence fishing resources, including ocean and reef fish, ʻ*opihi* (limpets), lobster, *he*ʻ*e* (octopus), crab, and *limu* (seaweed). Part of the concern is with long term impacts, which the individuals concerned were not confident are fully known. (Kapaʻa, Hāna, Waimānalo)

Concern: Another question raised was whether, if a monk seal is translocated to a specific beach or shore line area, does this prevent fishers from carrying on the traditional practice of fishing (including hook and line fishing as well as throw-net fishing) at that locale? This concern was brought up on more than one occasion during community meetings. (Lānaʻi)

Concern: A similar question was, if a seal approaches a fisher's camp (fishing and camping being considered cultural practices), does the fisher need to move his camp or can the fisher stay because it is the seal that is approaching him? (Hilo)

Concern: Monk seals will patrol a beach area (swimming back and forth opposite the beach) before landing. Fishers are convinced that this patrolling scares off fish, so that people fishing there will haul in their lines and leave. (Waimea)

Concern: The fishing of *akule* in Hāna Bay by surround them is a traditional practice unique to Hāna. This is not practiced every year and the numbers of *akule* have dwindled. There is a concern that greater numbers of monk seals will impact this practice. (Hāna)

Concern: Monk seals can take fish off lines and off diver's strings. (Waiʻanae)

Concern: There have been occasions where a group of commercial fishers was conducting surround catches when a couple of large monk seals come into the area and scare the fish away. The current changes and the catch opportunities are lost. (Waimānalo)

Concerns Regarding Historic Properties

Concern: One participant asked that if a fishpond is on the National Register of Historic Places and a monk seal enters the pond, where does the jurisdiction lie, with the NHPA and the protection of the historic property or with the Endangered Species legislation and the protection of the seal? A variation to this was the question of, if a monk seal enters a fishpond what is the best way to remove the seal and minimize impact to the pond. It was suggested that NMFS staff and volunteers be trained in removing seals from fishponds. (Hāna, Lāhainā)

Concern: What happens when a seal arrives at a Traditional Cultural Property, such as Moʻokini or Moku Ula, and becomes a problem. (Lāhainā)

5.5.3 General Comments Made During the Community Meetings
Among the general comments made by individuals attending the community meeting were the following.

A mother with several children did not want the seals translocated to the MHI, nor does she want any interference with the natural behavior of seals -- no moving, herding, harassing. Some participants expressed the sentiment that we should leave the seals alone and not intervene. Let nature take its course. There was concern expressed that the proposed action was a form of animal husbandry that used methods to manage a species rather that allowing nature to take its course.

A fisherman from Kauaʻi stated his feeling that NOAA was putting the welfare of seals above the welfare of people. Other participants questioned whether NOAA was placing a higher priority on seals than on fishermen.

Some individuals expressed a strong feeling that the translocation of seals will have an impact on the total lifestyle of Native Hawaiians.

An elderly man from Kauaʻi (born 1926) expressed his strong opposition to relocating seals from NWHI to the MHI. He said that this will deplete the fish populations. He suggested that seals translocated to islands in the south. There was a very strong feeling among some participants in the community meetings that if translocation is needed, the seals should be translocated elsewhere. Some of the possibilities suggested included Christmas Island, the Line Islands, Palmyra, Johnson, and Micronesia.

It was expressed by some individuals that while NOAA may consider the monks seals to be endangered, Hawaiians may see them as invasive. That monk seals are not native to the MHI, that they will destroy marine resources, and do not belong here.

Some participants stated that monk seals are not a part of the Hawaiian's cultural heritage.

One participant said that, we understand that seals are having survival problems and we are sorry for this. But, we need to be more concerned with the survival and quality of life of Hawaiians. There seems to be more effort to protect seals (and tourists) than there are to protect Hawaiians.

There seemed to be a general feeling among many participants in the community meetings that the public was unaware of the rules governing monk seal and human interactions.

Many individuals felt that NOAA needed to make a greater effort to communicate and explain these rules to the general public.

It was also felt that misinformation is the biggest problem. Various number have been heard about how many seals are present in the MHI; how many are to be translocated there; what is the target number of seals in the MHI; people having to move or not use an area because of a seal's presence. People need proper information and meeting participants felt that it is NOAA's responsibility to furnish that information.

5.6 Mitigation Measures Recommended During Community Meetings

A number of possible mitigation measures were recommended by individuals attending the community meetings. These included:

Education of NOAA Staff and Volunteers
It was recommended that all personnel associated with the undertaking go through an orientation program that would include training in:

- Recognition and identification of cultural sites.
- Proper behavior around identified sites.
- How to report the presence of newly discovered sites.
- Getting seals out of fishponds.

This training may need to be repeated every so many years.

Public Education and Involvement
It was suggested that there is a need for a series of presentations by NOAA regarding what is allowed in terms of human/ monk seal interactions. This would include the restrictions on approach to seals, both in the water and hauled out, people's rights of access to beaches occupied by monk seals, and use of marine resources when monk seals are present. There was a general feeling that NOAA needed to create an educational process to inform the local public. This could also extend to education of *malahini* (visitors), which might include a video on airplanes for tourists coming to Hawaiʻi regarding proper behavior around whales, seals, etc.

It was recommended that NOAA work with local fishers and other beach users to determine and clarify the proper behavior around seals. It should empower ocean users to take care of seals through an educational program. NOAA also needs to provide clarification to the public of all laws and regulations governing seals and other endangered species. Education is the key. NOAA needs to determine and then communicate what impact seals (and other species such as turtles) have on the ecosystem. We need to look at the entire ecosystem and the role of the seals in this. Are there benefits from the seals? Maybe seals go after and consume invasive species. We need more community education. We need to foster a community management system.

5.6.1 Consultation
It was suggested that NOAA have a cultural representative for each *moku* (district) on each island. Input should be sought from each *moku* individually.

It was also suggested that if a seal needs to be removed from a sensitive cultural area, such as a fishpond, that NOAA contact the *kahu* (caretaker) of that site or a community contact/expert to get direction about such things as the best way to access the site, where to stage activities, where to place the cage for the seal, etc. A protocol should be developed to govern this community consultation prior to an activity, and a list of community contacts should be developed.

Change in Fishing Rules
Upon learning that one of the reasons why monk seals are not surviving well in the NWHI is over-competition from *ulua* (jacks), it was suggested that fishing for *ulua* in the NWHI be allowed to lower the numbers of this predictor fish. The feeling was that this would solve many problems; more fish for Hawaiians, better habitat for seals in the NWHI, and finally the possible resettling of seals away from the MHI.

Measures Not Directly Related to Cultural Concerns
During the community meeting a number of suggestions and recommendations were made that did not directly relate to the protection of historic properties or cultural practices. These included:

NOAA needs to follow up with people who call NOAA to report a seal issue.

NOAA needs to provide greater public involvement in working with seals (tagging, vaccinating, etc.) and in the initial viewing of critter cam footage to include more than just High School students.

6.0 ASSESSMENT OF CULTURAL IMPACTS

The NEPA requires NMFS, as part of its PEIS, to consider the potential impacts that the proposed Hawaiian monk seal recovery actions may have on cultural resources. This includes consideration of any unavoidable adverse impacts to cultural resources or traditional cultural practices should the proposals put forward in the PEIS are implemented.

A range of cultural resources and traditional cultural practices have the potential to be affected by monk seal recovery actions proposed under the PEIS. These potential impacts can take two forms: 1) impacts resulting directly from the conduct of the recovery actions themselves, and 2) impacts resulting from the activities of seals influenced by the recovery actions, for example, seals that have been translocated or seals that have been intervened with using seal behavior modification techniques.

Three categories of activities under the proposed Hawaiian monk seal recovery plan have the potential to affect cultural resources and traditional practices:

1. Increased off-road land pedestrian traffic in remote areas to access the seals.
2. Increased vessel traffic to access the seals on remote beaches.
3. Increased human-seal interactions due to the translocation of seals (particularly from the NWHI to the MHI under Alternative 4).

6.1 POTENTIAL EFFECTS TO CULTURAL RESOURCES

Cultural resources that may be affected by activities associated with Hawaiian monk seal recovery are present in both shoreline areas (these include coastal plants and seaweeds traditionally gathered for their edible and medicinal properties), and offshore areas (these include marine fauna traditionally fished or gathered).

Among the resources located within the shoreline portion of the APE (25 meters inland from the line where the shore meets the sea) are native strand plants that are traditionally gathered for their medicinal properties. These fragile shoreline plants (such as *hinahina*, *pa*ʻ*u o Hi*ʻ*iaka*, and *kauna*ʻ*oa*) could be accidentally damaged by pedestrian activities associated with monk seal observation, handling and translocation.

Cultural resources present within the inshore portion of the project area (waters up to 300 meters off from the shoreline) include fish, shell fish, and other marine organisms traditionally collected for food. These resources are much less likely to be directly affected by monk seal recovery activities, though it is possible that patches of edible *limu* (seaweed) could be disturbed during boat landings.

The increased presence of Hawaiian monk seals within the MHI as a result of translocation (particularly translocation from the NWHI to the MHI as proposed under Alternative 4) or other recovery actions has the potential to affect marine resources. Monk seals feed on some of the fish and shellfish species that were traditionally collected by Hawaiian fishers (Sprague et al., 2013). There has been public concern that increased Hawaiian monk seal presence within the MHI could result in a depletion of fish stocks, directly impacting the livelihood of those practicing traditional subsistence fishing. A detailed analysis of the impacts of all PEIS alternatives on subsistence fishing is presented in Section 4.9.2 of the PEIS. The analysis concluded that all alternatives, including Alternative 4, were likely to have negligible impact on subsistence fishing.

6.2 Potential Effects to Traditional Cultural Practices

Due to the temporary and transient nature of the physical activities associated with Hawaiian monk seal recovery as proposed in the PEIS, it is unlikely that customary practices such as fishing, gathering, swimming, or surfing will be significantly affected by recovery activities themselves.

Some concern has been expressed that an increase in Hawaiian monk seal populations due to the translocation of seals (primarily the temporary translocation of seals from the NWHI to the MHI under Alternative 4) and other recovery actions will adversely affect traditional subsistence fishing activities. There has also been concern that subsistence fishers would have their activities disrupted by the presence of federally protected monk seals occupying the shorelines of their chosen fishing grounds. Again, these concerns were considered in a detailed analysis of the impacts of all PEIS alternatives on subsistence fishing (Section 4.9.2 of the PEIS). The analysis concluded that all alternatives, including Alternative 4, were likely to have negligible impact on subsistence fishing.

6.3 The Hawaiian Monk Seal as a Cultural Resource

Considering the research and analysis presented by Reeve et al. in Appendix B of this document, available archaeological evidence indicates that for much of the period from the arrival of the first Polynesian voyagers up until Western contact, the Hawaiian monk seal was not abundant within the MHI, and there was little direct contact between monk seal populations and human populations. Extensive ethnohistoric research also presented in Appendix B supports this supposition regarding monk seal presence and human interaction in the MHI, and asserts that traditional cultural significance of Hawaiian monk seals was minimal as a result. Kittinger et al. (2011, 2012) ascribe a greater level of cultural significance than that indicated by the authors of Appendix B. However, Kittinger and co-authors also conclude traditional cultural significance varied extensively from place to place in the MHI, and in general, the significance of Hawaiian monk seals was very limited compared to that of other living marine resources, such as sharks or sea turtles.

With relatively limited research on the subject conducted to date, it is likely that researchers and Hawaiian cultural practitioners will continue to explore the traditional and contemporary cultural significance of Hawaiian monk seals. However, considering the information available at present, including the available research and input from the community meetings described in Section 5, NMFS has assumed that the cultural significance of Hawaiian monk seals was, and is, relatively limited for the purposes of this impact assessment. As a result of this apparent limited significance, assessing potential impacts on monk seals as a cultural resource was not prioritized in preparation of this Cultural Impact Assessment. Rather, priority was placed on assessing the potential impacts on the wide variety of cultural resources and practices that are well known and broadly accepted to have strong cultural significance.

6.4 Effects of Proposed Alternatives

Alternative 1 – Status Quo
Alternative 1 involves the continuation of currently authorized monk seal recovery activities past 2014. These include activities, such as monitoring and some sample collection that do not involve the capture and handling of seals, as well as activities that do involve the capture and handling of seals, such as marking, measuring, sample collection, de-worming, disentanglement, removal, and translocation. Under this alternative, the translocation of seals only takes place within the MHI or within the NWHI. There is no translocation of seals from the NWHI to the MHI or from the MHI to the NWHI.

Activities conducted under Alternative 1 (as described in Section 4.2) include aerial, vessel, and land-based surveys, and some handling and transportation of Hawaiian monk seals. Boats and land vehicles will be used to transport researchers and possibly animals. Researchers will cross beach and dune areas on foot to reach monk seal locations. Recovery activities will be conducted throughout the APE, in the MHI, NWHI, and on Johnston Atoll. Researchers will seasonally (typically April or May through August) occupy existing camp sites in the NWHI.

Direct impacts to cultural resources that could occur under Alternative 1 within the MHI include the disturbance, damage, or destruction of coastal plants (such as *hinahina*, *pa*‘*u o Hi*‘*iaka*, and *kauna*‘*oa*) that are used in *lā*‘*au lapa*‘*au* (traditional medicine). This could occur if researchers drive over or walk through areas where these plants grow. Training of researchers and volunteers to recognize and avoid native strand flora should serve to mitigate these potential impacts.

Activities involved in the observation or translocation of monk seals, as conducted under Alternative 1 are unlikely to directly impact marine resources (fish, shellfish and other marine organisms) that are traditionally gathered for food. The only exception is the possibility that boat landings could disturb beds of *limu kohu* (*Asparagopsis sanfordiana*), *limu loloa* (*Gelindium spp.*), and other edible sea weeds that were traditionally gathered along the shoreline. Again, this potential impact can be mitigated by training researchers and volunteers to recognize and avoid these resources.

As part of its Hawaiian monk seal recovery program and other community coordination efforts, NMFS has developed a network of Hawaiian cultural practitioners and *kūpuna* (elders) to advise NMFS on cultural matters and to conduct cultural protocols during Hawaiian monk seal response and other monk seal management and recovery-related activities. This network of culturally knowledgeable individuals can assist in developing a cultural awareness training program for monk seal researchers and volunteers.

Permits are presently required for access to conduct Hawaiian monk seal research and enhancement activities within the limits of the Papahānaumokuākea Marine National

Monument. Any activities associated with monk seal recovery actions undertaken within the NWHI must comply with Monument regulations and the terms and conditions of Presidential Proclamation 8031. Monument regulations state that "permittees [must] attend a cultural briefing on the significance of Monument resources to Native Hawaiians" and that there are "prohibitions against the disturbance of any cultural or historic property" (NOAA 2008b). Under the terms of the Monument permit, researchers and volunteers involved in monk seal recovery actions are required to coordinate their activities with Monument staff to insure that they do not adversely impact any of the Monument's cultural resources. Within the NWHI, existing camp sites will be used and established cultural protocols put in place by the Monument will be followed.

As noted above, impacts of Alternative 1 on subsistence fishing are expected to be negligible (see Section 4.9.2 of the PEIS).

Alternative 2 – No Action
Under Alternative 2, presently authorized activities as permitted under the existing permit (10137) will continue until 2014. After 2014 there would be no permitted field research to monitor Hawaiian monk seal populations, implement de-worming, conduct translocation, etc. During the execution of the current permit through 2014, the potential impacts to cultural resources and traditional practices would be the same as for Alternative 1, and the same precautions are would be adopted. After the current permit expires, activities would be limited to remote observation and some collection of samples from materials left by monk seals. No monk seal translocation or handling would occur. Therefore, after 2014, Alternative 2 would involve less boat and land vehicle traffic, and less shoreline activity. The likelihood that shoreline resources would be directly impacted would be greatly reduced. Cultural awareness training for researchers and volunteers involved in monk seal recovery actions would still be conducted to help mitigate potential direct impacts. As noted above, impacts of Alternative 2 on subsistence fishing are expected to be negligible (see Section 4.9.2 of the PEIS).

Alternative 3 – Limited Translocation (Preferred Alternative)
Under Alternative 3 currently authorized activities under Alternative 1 would be continued and additional activities would be conducted. These additional actions would include increased handling of Hawaiian monk seals for vaccination, deworming, and other activities. Alternative 3 would also include a seal behavior modification program intended to prevent or reduce human-monk seal interactions. This program would serve to mitigate some of the potential impacts of translocation and other recovery actions on cultural resources and customary practices by reducing interactions between seals and people engaged in cultural practices such as subsistence fishing and other ocean use activities. Also under Alternative 3 the scope and number of translocations would be expanded. This would include the translocation of monk seals within the MHI or within the NWHI, as well as the translocation of a limited numbers of seals from the MHI to the NWHI. As a result, boat and land vehicle activity, as well as shoreline activities, would be greater under Alternative 3 than under Alternatives 1 or 2. The direct impacts of this increased activity on cultural resources could be successfully mitigated through the implementation of the training program described under Alternative 1. As noted above, impacts of Alternative 3 on subsistence fishing are expected to be negligible (see Section 4.9.2 of the PEIS).

Alternative 4 – Enhanced Implementation
Alternative 4 would encompass all of the activities permitted under Alternative 3, as well as two-stage translocation of Hawaiian monk seal pups from NWHI to MHI, and then back to the NWHI when the seals reach the age of two to three years. This project would be implement using a decision framework described in Appendix E of the PEIS. The increased capture and transport of the seals under Alternative 4 would result in increased boat and land vehicle traffic, as well as pedestrian traffic to and from capture sites. The mitigation measures indicated under Alternatives 1 and 3 should ensure that impacts to cultural resources remain minimal to negligible. As noted above, impacts of Alternative 4 on subsistence fishing are expected to be negligible (see Section 4.9.2 of the PEIS).

6.5 Summary of Impacts

As described above, the research and enhancement activities proposed under Alternatives 1, 2, 3, and 4 could result in minor direct and indirect impacts on cultural resources and traditional cultural practices within the affected environment. Current and proposed research and enhancement activities would occur infrequently in limited areas along the shorelines of both the MHI and the NWHI. Due to the restricted nature of these activities, the direct impacts would also be limited and considered minor adverse at most. The mitigation measures mentioned above and described in Section 7 would serve to further minimize these potential impacts.

Impacts of all alternatives on subsistence fishing are expected to be negligible (see Section 4.9.2 of the PEIS).

7.0 MITIGATION MEASURES

The potential impacts to cultural resources and customary practices from Hawaiian monk seal recovery actions proposed in the PEIS prepared by NOAA NMFS were found to be minimally adverse (see Table 4.10-10 of the PEIS). These potential impacts are expected to be significantly mitigated by the implementation of a series of measures outlined below.

7.1 TRAINING IN THE RECOGNITION AND AVOIDANCE OF CULTURAL RESOURCES

At least one NMFS staff and volunteer trained in recognition and avoidance of cultural resources will accompany every team conducting monk seal recovery activities in the field. These personnel will receive training in the recognition of shoreline cultural resources such as strand dwelling plants utilized in traditional medicine or edible sea weeds that were traditionally gathered along the shoreline. Such resources could be minimally impacted by pedestrian or boat traffic associated with monk seal recovery related activities. Personnel on hand with knowledge of these resources would allow NMFS teams to recognize and avoid impacting them. Participants in this training would include selected NMFS staff involved in the planning and carrying out of monk seal recovery actions as well as specific trained volunteers and NMFS-funded coordinators participating in the Marine Mammal Response Network. This training may be conducted in conjunction with training in the recognition and avoidance of historic properties, presented in the report of the NHPA Section 106 consultation, which is included as Appendix L of the final PEIS.

7.2 COORDINATION WITH STAKEHOLDERS AND COMMUNITIES

NMFS intends to further develop and maintain close coordination with fishers, Native Hawaiians and other stakeholders to facilitate implementation of the proposed Hawaiian monk seal recovery actions. Ocean-oriented stakeholders and community members, such as fishers, surfers, Native Hawaiian practitioners, coastal property managers, etc., are among those most likely to encounter monk seals or most likely to have unique knowledge or experience that would be useful for successful implementation of the proposed activities in the MHI. This community collaboration will serve to foster consideration of traditional Hawaiian conservation and management practices, and enhanced incorporation of Native Hawaiian cultural practices and protocols in the NMFS Hawaiian monk seal recovery program. Native Hawaiian cultural practitioners may be included in the Hawaiian Monk Seal Recovery Team (see Section 5.6.2 of the PEIS) and will be involved in both the Main Hawaiian Islands Hawaiian Monk Seal Management Plan (see Section 6.6.3 of the PEIS) and in Partnership Grants (see Section 5.6.5 of the PEIS) as available funding allows.

7.3 OUTREACH AND COLLABORATION WITH SUBSISTENCE FISHERS

NMFS has a tradition of working with fishers in Hawai‘i on a variety issues related to fisheries management and conservation, and has recently begun partnering with government agencies, non-government organizations, and individual fishers to develop collaborative efforts supporting monk seal recovery in the MHI. Through its Protected Species Cooperative Conservation program, NMFS has awarded a grant (under Section 6 of the Endangered Species Act) to the Hawaiʻi Department of Land and Natural Resources (DLNR) to support Hawaiian monk seal (and sea turtle) conservation activities, including outreach and response coordination activities with local fishers.

NMFS has also recently developed a set of guidelines and recommendations for fishers to help prevent and mitigate monk seal interactions with fisheries. As a result of recent meetings and correspondences with individual fishers based on Kauaʻi, Molokaʻi and Maui, NMFS has plans to enhance its collaboration with fishers to protect seals from hooking and entanglement as well as to reduce seal depredation and other adverse impacts on fishing gear and catch. One initiative under consideration is a pilot program intended to partner with a small group of boat and shore-based fishers to document and mitigate fishery-seal interactions associated with the various types of fishing gear and methods used extensively in the MHI.

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APPENDIX A
ANNOUNCEMENT OF COMMUNITY MEETINGS

COMMUNITY INPUT SOUGHT ON NOAA'S PROPOSED HAWAIIAN MONK SEAL RECOVERY ACTIONS*

NOAA Fisheries and Pacific Legacy, Inc., are holding a series of community meetings seeking community input on proposed Hawaiian Monk Seal Recovery actions. Specifically, we are seeking information on potential adverse effects to historic properties and/or traditional cultural properties (e.g., archaeological sites), as well as information on potential impacts to cultural resources and practices (e.g., fish ponds and fish pond operation) that may result from implementation of actions proposed in the Draft Programmatic Environmental Impact Statement (PEIS) for Hawaiian Monk Seal Recovery. Examples of the proposed actions include capture, veterinary treatment, transportation, and release of monk seals on shorelines throughout the Hawaiian archipelago. Input from community meetings around the State will be incorporated into a revised Cultural Impact Assessment for the PEIS and will form an important component of NOAA's compliance with the National Historic Preservation Act Section 106. The Draft PEIS is available for review at:
http://www.nmfs.noaa.gov/pr/permits/eis/hawaiianmonkseal.htm

MEETING SCHEDULE
(all meetings to be held between 6:00 – 8:00 pm)

Moloka'i

Kaunakakai (29 October 2012)	Moloka'i High School

Lāna'i

Lāna'i City (30 October 2012)	Lāna'i High and Elementary School

Kaua'i

Waimea (7 November 2012)	Waimea High School
Kapa'a (8 November 2012)	Kapa'a Middle School

Maui

Hāna (14 November 2012)	Hāna High School
Lāhainā (15 November 2012)	Lāhaināluna High School

Hawai'i

Hilo (27 November 2012)	Hilo High School
Kona (28 November 2012)	Kealakehe Elementary

O'ahu

Wai'anae (11 December 2012)	Wai'anae High School
Waialua (12 December 2012)	Waialua High and Intermediate School
Waimānalo (13 December 2012)	Waimānalo Elementary and Intermediate School

* THE PURPOSE OF THESE MEETINGS IS TO GATHER INPUT AND CONSULT WITH INTEREST PARTIES FOR THE PREPARATION OF A CULTURAL IMPACT ASSESSMENT (CIA) AND COMPLIANCE WITH THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 FOR THE HAWAIIAN MONK SEAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT.

For further information or to request sign language interpretation or other auxiliary aids, please contact Paul Cleghorn at cleghorn@pacificlegacy.com, (808) 263-4800 (phone), or (808) 263-4300 (fax). These meetings are accessible to people with disabilities.

Contact: Paul L. Cleghorn
Pacific Legacy
Phone: (808) 263-4800
Fax: (808) 263-4300

30 Aulike Street, Suite 301
Kailua, HI 96734
cleghorn@pacificlegacy.com

NOAA FISHERIES

PRESS RELEASE

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APPENDIX B
THE HAWAIIAN MONK SEAL IN TRADITIONAL HAWAIIAN CULTURE

THE HAWAIIAN MONK SEAL IN TRADITIONAL HAWAIIAN CULTURE

Prepared by:
Lora L. Nordtvedt Reeve, J.D., M.S., M.B.A.
Rowland B. Reeve, M.A.
and
Paul L. Cleghorn, Ph.D.

Pacific Legacy, Inc.
30 Aulike Street, Suite 301
Kailua, HI 96734
(808) 263-4800

Prepared for:
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Pacific Island Regional Office

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1.0 INTRODUCTION

To support the National Marine Fisheries Service (NMFS) in preparation of a Cultural Impact Assessment for the Hawaiian Monk Seal PEIS, extensive research and analysis was undertaken to better understand the role that monk seals may have played in traditional Hawaiian society. As part of this research, a thorough examination was made of both archaeological and archival resources. The evidence of seal remains recovered from archaeological excavations conducted within the Hawaiian Islands was examined. Dictionaries and other references were scoured to identify the various Hawaiian language terms used for the Hawaiian monk seal, as well as for other types of seals. A search was made of references to seals in traditional oli (chants) and mo'olelo (stories, legends, and traditional histories), as well as in the accounts of early Western visitors, articles in Hawaiian language newspapers, and other historic documents. A review of more contemporary references to Hawaiian monk seals and their significance was also conducted. The results of this research and analysis are presented below.

2.0 THE EARLY PRESENCE OF MONK SEALS IN THE HAWAIIAN ISLANDS

The Hawaiian monk seal (*Monachus schauinslandi*) is among the most evolutionarily ancient of the living members of the Phocidae family of true seals (Culliney 2006:108). They appeared in the eastern North Atlantic approximately 15 million years ago and then dispersed westward to the Caribbean and Central America (Lowry et al. 2011:397, Fyler et l. 2005:1276). Biologists continue to debate when monk seals may have reached the Hawaiian Islands, with estimates ranging from 15 million to 3.5 million years ago (Lavigne 1998:1, Fyler et l. 2005:1276). One of the closest relatives to the Hawaiian monk seal was the now-extinct Caribbean monk seal. It is likely that the ancestors of the Hawaiian monk seal moved from the Caribbean Sea into the Pacific Ocean through the Central American Seaway, which was located near the present Isthmus of Panama, and which closed approximately 3 million years ago (Lavigne 1998:1, Fyler et l. 2005:1276). At some time following their entry into the Pacific, a founder population of monk seals established itself in Hawai‘i (Culliney 2006:109).

While the prevailing opinion among marine mammal scientists and the National Marine Fisheries Service is that monk seals have occupied the entire Hawaiian archipelago since the time of their initial arrival, direct physical evidence of their presence within the MHI is limited (Ragen 1999:184). This limited evidence has led to some debate as to whether monk seal populations occupied the waters of the MHI at the time of the arrival of the first Polynesian voyagers (Ragen 2003:1).

Bishop Museum zoologist Alan Ziegler, who analyzed the faunal remains recovered from numerous archaeological excavations conducted within the MHI (with the exception of Lāna‘i, Kaho‘olawe and Ni‘ihau) between 1986 and 1999, found no monk seal bones in any of the midden assemblages he examined (one exception, the upland Lapakahi site, is noted below; Sara Collins, pers. comm.). This led him to state, in his 2002 book *Hawaiian Natural History, Ecology, and Evolution* (2002) that, "The absence of skeletal material from both paleontological and archaeological sites on the MHI suggests that, for obscure reasons, the species [Hawaiian monk seals] may always have been scarce in the vicinity of large young islands of the

archipelago, preferring instead the small sandy atolls" (Zeigler 2002:244).
There exists no biological reason why monk seals would prefer the "small sandy atolls" of the NWHI to the "larger young islands" of the MHI. Both the NWHI and the MHI posses a somewhat similar range of marine habitats including beaches on which to haul out and sheltered reefs in which to hunt for food (Ragen 1999:184 and Ragen 2003:1). It has been estimated that if monk seals were distributed throughout the Hawaiian archipelago prior to the arrival of the first Polynesians, "they may have comprised a metapopulation of perhaps 13, 14, or more colonies" (Ragen 1999:184). Given these estimates, how do we account for the scarcity of monk seal remains in paleontological and archaeological assemblages as noted by Zeigler?

The lack of paleontological evidence for the presence Hawaiian monk seals within the MHI is not surprising. Given their aquatic nature, and the fact that they seldom haul out further inland than the high tide line, it seems unlikely that the skeletal remains of Hawaiian monk seals would have been naturally incorporated into the terrestrial fossil assemblage. Monk seal carcasses are more likely to have been carried by the tide back into the sea where they would have been consumed by predators and their bones scattered over the sea bottom to be ground to sand by the action of the waves or incorporated into the bottom sediments (Ragen 1999:184).

The relative scarcity of monk seal bones in archaeological assemblages is more problematic and requires more detailed investigation. If monk seal populations were relatively abundant within the MHI at the time of the arrival of the first Polynesians, the animals would have offered a readily available food source that would be expected to be exploited by these early settlers, as well as by their descendants. One would therefore expect to find monk seal remains among the food debris excavated at traditional Hawaiian residence structures, particularly at those sites dating from the early settlement period. To date, monk seal remains have only been recovered from two confirmed traditional archaeological contexts. As discussed below (and summarized in the conclusions presented in Section 8), more detailed analysis reveals factors and considerations that may in part account for the relative absence of documented archeological evidence of monk seal presence within the MHI at the time of first Polynesian arrival.

3.0 EVIDENCE OF MONK SEAL REMAINS IN ARCHAEOLOGICAL DEPOSITS

In the preparation of this report, an effort was made to identify all of the instances in which Hawaiian monk seal remains have been recovered from archaeological excavations within the MHI. As has already been mentioned, Dr. Alan Zeigler, the staff zoologist at the Bernice Pauahi Bishop Museum, made identifications of faunal assemblages from a number of archaeological excavations conducted in the MHI (with the exception of Lāna‘i, Kaho‘olawe and Ni‘ihau) between 1986 and 1999. The faunal remains were from archaeological sites excavated by researchers from the Bernice Pauahi Bishop Museum, Cultural Surveys Hawai‘i, Inc., the International Archaeological Research Institute, Inc., and Paul H. Rosendahl, Inc. None of the assemblages examined by Dr. Zeigler (with the exception of the upland Lapakahi site discussed below) was found to contain any seal bone or bone that could be identified as marine mammal (Sara Collins, pers. comm.).

The authors of this study also consulted Dr. Sara Collins, an archaeologist and authority on human and faunal osteology who has examined and identified the remains from numerous archaeological excavations in Hawaiʻi. Dr. Collins indicated that she had never come across any seal bone in any of the collections she has examined. She noted, however, that it is possible that seal bone could be present among the literally millions of bone fragments identified as "medium mammal" or "large mammal" recovered from excavations over the decades since attempts were first made to identify faunal remains in archaeological assemblages.

Dr. Marshall Weisler has conducted analyses of excavated faunal material from early deposits at all archaeological sites on the western third of Molokaʻi Island (which now possesses a small but viable Hawaiian monk seal population) and has found no seal remains (Weisler 2013, pers. comm.). He is of the opinion that if monk seals were present when Hawaiians resided along the shoreline of West Molokai, then the bones of monk seals should be present within the archaeological deposits, but they are not. Although the monk seal population within the MHI may never have been very large, one would still expect to find a bone or two in the early deposits which were extensively excavated on West Molokaʻi (Weisler 2013, pers. comm.).

After extensive inquiry, which included a search of the available literature and consultation with various members of the archaeological community in Hawaiʻi, a total of four instances were found in which identified seal bones are known to have been recovered from archaeological deposits.

- A single seal rib bone was reported from a pre-Contact house site in upland North Kohala (Lapakahi) on the island of Hawaiʻi.
- A single sternum was excavated from the site of Nuʻalolo Kai on the island of Kauaʻi.
- Seal phalanges were recovered from a post-Contact deposit at a Hawaiian house site in coastal North Kohala.
- A complete seal carcass was found in a pit during excavation of a subsurface cultural deposit in Wailuku on the island of Maui.

<u>Lapakahi</u>
Excavations conducted by Dr. Paul Rosendahl at Site 7402, a large earthen residential platform in upland Lapakahi in the district of North Kohala on the island of Hawaiʻi yielded a portion of a single rib bone identified as belonging to a Hawaiian monk seal. The site is situated in the midst of upland agricultural fields traditionally used for the cultivation of dryland crops. It consisted of an earthen platform with an L-shaped windbreak wall along its rear. The entire structure measures approximately 15 by 6 meters. Excavations into the interior of the platform revealed the presence of multiple fire hearths and yielded an abundance of cultural material suggesting that the platform served as the foundation for a pole and thatch occupation structure (Rosendahl 1972:247-263). The single seal bone was recovered from one of the wall trenches. Also recovered from the site were bones of the Polynesian rat (*Rattus exulans*), dog (*Canus familiaris*), pig (*Sus scrofa*), numerous unidentified medium-sized mammal bones, and the bones of domestic chicken (*Gallus, gallus*) and medium sized duck (Rosendahl 1972: 257-258). A single radiocarbon date recovered from 10 to 15 centimeters below ground surface yielded a range at one standard deviation of A. D. 1418 to 1618, 1466 to 1666 and 1538 to 1738, placing the occupation of the structure within the pre-Contact period somewhere between A. D. 1418 and 1738.

The excavations in upland Lapakahi were undertaken in association with the University of

Hawai‘i. In Chapter V of his dissertation (Rosendahl 1972: 325), Rosendahl indicates that Dr. Alan Ziegler identified the mammal and bird remains from the Lapakahi midden. Some of the mammal bone recovered from the site appeared to represent debitage (wastage) from the manufacture of bone artifacts. Given this evidence of bone tool manufacture, it is possible that the single seal rib bone was brought onto the site to serve as raw material for tool making rather than as food. Seal bone is denser than that of land mammals such as dog and pig, but not as dense as other marine mammals like whales or dolphins (Sara Collins 2013, pers. comm.). It can be used in the manufacture of bone fishhooks or similar items.

Nu‘alolo Kai

The valley of Nu‘alolo Kai is located on the remote Na Pali coast of the island of Kaua‘i. In 1958, 1959, 1960, and 1964 researchers from the Bernice Pauahi Bishop Museum under the direction of Dr. Kenneth Emory conducted excavations at Site 50-30-01-196, set of stone faced terraces located beneath the sheltering overhang of the valley's eastern cliffs. Due to its location, in the rain shadow of these cliffs, excavators found the site to possess excellent preservation conditions, and managed to recover perishable objects such as wood and textiles. Their excavations encountered buried structural floors, fire hearths and other subsurface features, as well as numerous traditional artifacts. The cultural deposit at Site 196 extended to a depth of nearly 2 meters below the ground surface (Graves et al. 2005:1). In the early 1990s, archaeologists from the University of Hawai‘i compiled a comprehensive computerized inventory of the cultural materials recovered from the site, including many objects not previously documented (Graves et al. 2005:1). Radiocarbon dates suggest that the earliest occupation of the site may have taken place around A.D. 1290 to 1450 (Graves et al. 2005:37). The presence of historic artifacts in the upper most levels indicates that the site continued in use up into the post-Contact period.

The Site 196 complex was originally divided during excavation into four major architectural features (K2, K3, K4 and K5). The bulk of the Bishop Museum excavations were conducted in K3, a complex located toward the center of the site that consists of at least two and possibly four terraces separated by stone faced retaining walls (Graves et al. 2005:4). During the excavation, soil was sifted through ¼ inch screens so as to recover artifacts and faunal remains (Graves et al. 2005:6). Recent analysis of the faunal material excavated by both the Bishop Museum and later by the University of Hawai‘i conducted by Dr. Julie Field identified a single monk seal bone from the site. This bone, an adult sternum, was recovered from somewhere between the surface and 29 inches depth in unit H5 of site K3. The sternum was unmodified. Existing dates associated with this level of the deposit puts it very late, at or after A.D. 1700 (Field 2013:pers. comm.).

The upland Lapakahi site and Site 196-K3 at Nualolo Kai appear to be the only known archaeological sites within the MHI dating from the period prior to Western contact at which seal remains have been found.

North Kohala

Hawaiian monk seal bones were also recovered by archaeologist Dr. Robert Rechtman at a Hawaiian household in coastal North Kohala that appears to date from the historic period (1850s to 1860s). The identification of the remains was made with the assistance of several pinniped experts, including Thomas Wake. Rechtman notes that, "A single front right intermediate phalanges of a juvenile monk seal was found during data recovery excavations at SIHP [State Inventory of Historic Places] Site 25006, a mid-nineteenth century house site situated along the North Kohala coastline in Kukuipahu Ahupuaʻa. This site appears to have been a Hawaiian household based on design and cultural material present. The bone was recovered near a hearth feature, but does not appear to represent dietary remains. Rather, this item seems to have been used in conjunction with ritual or ceremonial activity as it has been modified with the incision of a stick-figure image on its flat ventral side (Rechtman in prep.). Any interpretation of this incised image and its possible significance must await further analysis and investigation by Rechtman.

<u>Wailuku</u>
An entire articulated monk seal carcass was discovered during data recovery excavations of a buried cultural deposit (State Inventory of Historic Places site number 50-50-04-4127) conducted in 1996 prior to road improvements along Lower Main Street in Wailuku on the island of Maui. The work was conducted by Eric M. Fredericksen and Demaris L. Fredericksen (Fredericksen and Fredericksen 1996). These excavations uncovered two cultural layers that were overlaid by one to two meters of imported fill soil associated with the historic Kahului Railroad and the paving of Lower Main. The articulated skeleton of a juvenile Hawaiian monk seal was found within an elongated basin-shaped excavated pit (Test Unit 2A, Feature 8). The fill of the pit consisted of clean sand and did not contain any cultural material. The skull of the seal appeared to have been severely fractured, perhaps by a blow to the head. "There was no evidence that indicated that the seal had been collected for food. Rather, it appears that the seal had been laid on its back or left side and intentionally buried" (Fredericksen and Fredericksen 1996:21, 50).

The pit in which the remains of the seal rested appeared to have been dug down from the lower levels of Layer I, a 15 to 19 centimeter deep disturbed soil layer containing a mix of pre-Contact and historic material, and into Layer II, an undisturbed pre-Contact deposit dated to between AD 1570 and 1780 (Fredericksen and Fredericksen 1996:19,49). In the area of the feature, the upper 8 to 12 centimeters of Layer I contained pieces of coal and fragments of early 20th century bottle glass. Food debris and indigenous artifacts (a basalt abrader and a fragment of volcanic glass) were also found in Layer I (Fredericksen and Fredericksen 1996:19). It is not clear from the archaeological evidence exactly when the pit containing the seal remains was dug, but it seems probable that it may have been excavated some time in the early historic period. The juvenile monk seal, its skull crushed, appears to have been placed in the hole and buried over. Whether any meat was removed from the carcass prior to its deposition is also uncertain.

3.1 Analysis
Confirmed archaeological evidence of Hawaiian monk seal presence within the MHI prior to Western contact is limited. It consists of a single monk seal rib bone excavated at an upland house site and a sternum recovered from a coastal occupation deposit. Neither of these bones was recovered from particularly early contexts. The inland Lapakahi site may date to somewhere between A.D. 1418 and 1738, while the Nuʻalolo Kai deposit appears to date at or after A.D. 1700. The monk seal remains recovered could derive from individuals belonging to a resident population within the MHI or they could represent stray animals that found their way down to the MHI from the NWHI. The Nuʻalolo Kai sternum could alternately be from an animal caught by Kauaʻi residents fishing up in the NWHI.

The question of butchery adds another complication to the archaeological equation, and may in part account for the scarcity of Hawaiian monk seal remains in traditional archaeological contexts. An adult Hawaiian monk seal measures from approximately 6 to 7 feet in length and can weigh between 300 to 500 pounds. Even a juvenile seal would be difficult to carry for any distance. It seems unlikely therefore, given its size and weight, that a seal killed for food would be transported from the shoreline where it was killed to the hunter's place of residence for butchering. It is more likely that the seal carcass would be butchered on the beach and only the meat carried to the consumption site. Alternately, an *imu* (earth oven) could have been dug into the sand and the entire carcass cooked in situ. It is unlikely, given wave disturbance and other natural factors, that such a preparation site would survive archaeologically. This butchering strategy may help to account for the scarcity of monk seal remains at traditional occupation sites.

In contrast to the relative scarcity of seal remains from Hawaiian sites, seal bones have been found at 174 archaeological sites in Aotearoa (New Zealand), the only other Polynesian island group where seals are endemic (Smith 1989:78). Seal populations are presently (and appear in the past to have been) much more abundant in Aotearoa than in the Hawaiian archipelago, and thus would be more common in the archaeological record. Ethnographic data and archaeological reconstructions of pre-Contact butchering methods in Aotearoa suggest that seal flesh was commonly separated from the bones at kill sites prior to transportation or preservation (Smith 1985:11-15). Seal bones would therefore not be expected to be found at consumption sites located at a considerable distance from the kill site, though fresh seal meat on the bone was apparently transported over shorter distances (Smith 1989:81). There are also indications that certain seal species had a much greater geographic distribution in the pre-Contact period than at present. It has been suggested that human predation was a contributing factor to this shrinkage of their natural ranges (Smith 1989:100-101).

Direct human predation appears to be a major factor in observed changes in the distribution of seal populations in Aotearoa. Seals of various ages were actively hunted, particularly juveniles and subadults. This appears to have led to the extirpation of local populations in several areas (Smith 1989:101). A similar scenario may have occurred with monk seals in the MHI. It seems probable that on their arrival in Hawai'i, the early Polynesian voyagers found a native population of Hawaiian monk seals occupying the MHI. This resident population of seals would have offered a ready source of easily obtainable protein. As suggested by Timothy Ragen (Ragen 1999:185), intensive hunting by humans, as well as disturbance by other recently introduced land mammals (such as the Polynesian dog), may have led to a dramatic drop in seal numbers and the eventual local extirpation of the resident seal population in the MHI. A somewhat similar scenario has been offered to explain the extinction of the various species of native ground birds that were present within the MHI prior to human arrival.

Given the estimated small size of any such an indigenous seal population, it appears possible that intensive hunting over a period of one or two generation might have killed off, or driven away, any pre-existing native population of Hawaiian monk seals. The archaeological evidence of this extirpation would be limited to sites dating to the very early period of human occupation of the archipelago.

Up until recently it was the general opinion of the archaeological community that the initial Polynesian settlement of the Hawaiian Islands took place some time between approximately 300 and 750 AD (Kirch 2011;3). This estimation was based upon radiocarbon dates recovered from what were considered to be early colonization period layers present within a small number of coastal sites. Recent refinements to the radiocarbon chronology have led to the reevaluation of this estimate. It is presently believed that the initial Polynesian discovery and colonization of the archipelago may have occurred between approximately 1000 and 1200 AD (Kirch 2011;3). The only identified archaeological sites within the MHI which may date to this early colonization period are the Bellows dune site (O18) at Waimānalo, Oʻahu (Pearson 1971); the Puʻu Aliʻi (H1) sand dune site at South Point, Hawaiʻi Island, and the nearby Waiahukini Shelter (H8) at Waiahukini, Hawaiʻi Island (Emory and Sinoto 1969). None of these sites have been found to contain monk seal remains.

4.0 TRADITIONAL PERSPECTIVES ON THE HAWAIIAN MONK SEAL

The archaeological evidence would seem to indicate that for much of the period from the arrival of the first Polynesian voyagers up until Western contact the Hawaiian monk seal was not abundant within the MHI, and there was little direct contact between monk seal populations and human populations. This conclusion seems to be supported by the ethnohistorical evidence.

The consumption of seal meat is not mentioned in either traditional or early historic accounts of Hawaiian cultural practices, suggesting that it did not form a significant component of the Hawaiian diet. While traditional *kapu* (prohibitions) restricted the consumption of certain food items at certain times of the year or by certain segments of the population (pork and some varieties of bananas were among the foods prohibited to women: Malo 1951:29), there is no evidence in the traditional literature to suggest that seal meat was considered *kapu*. Monk seal remains do not appear in Hawaiian material culture as raw materials for tools or other objects. There are no traditional artifacts that are known to have been made from seal bone, skin or teeth. While dog tooth ornaments were fairly common (Buck 1964:553-561) and both porpoise (Buck 1964:546) and whale (Buck 1964:535-538) teeth are known to have been made into neck ornaments, there are no recorded instances of seal teeth being worn as ornamentation. Seal bone may have been used in the manufacture of fishhooks and other bone tools (as was dog, pig, whale and even human bone), but if so, no such tools have been directly identified.

The absence of images of monk seals in traditional Hawaiian petroglyphs can not necessarily be taken as an indicator of their physical absence from the MHI. Although certain animals, such as dogs, turtles and, to a lesser extent, chickens, appear commonly as motifs in Hawaiian rock art, other domestic animals, such as pigs, appear only rarely, if at all (Cox and Stasack 1970:19). There are no known petroglyph depictions of dolphins or whales, and only one possible symbol representing a shark (Cox and Stasack 1970:68), and yet these animals, particularly the shark, appear commonly in the traditional literature, and are known to have been both hunted and revered by traditional Hawaiian society (Reeve 1991).

Even if a local population of Hawaiian monk seals did not exist within the MHI during the pre-Contact period, it would be reasonable to expect that the existence of monk seals would have been known to the early Hawaiians. Archaeological evidence for an early Polynesian presence on the islands of Nihoa and Mokumanamana (Necker) in the NWHI suggests that the early voyagers explored (and settled) at least a portion of the Leeward Chain and would have come in contact with the resident population of monk seals. The occupation of the higher of the Leeward Islands appears, however, to have taken place relatively early in the Polynesian settlement of the Hawaiian Archipelago and not to have been very prolonged. Following this initial period, contact with monk seals may have been restricted to a relatively small number of fishermen visiting the fishing grounds of the NWHI from Kaua‘i and Ni‘ihau.

To further investigate the role (if any) that monk seals may have played in traditional Hawaiian culture prior to Western contact, an examination was made of Hawaiian language sources.

4.1 Hawaiian Terms for Monk Seal

If the existence of the Hawaiian monk seal was generally known to the pre-Contact human population of the MHI then one would expect there to be one relatively standardized name used to refer to these marine mammals. This does not appear to have been the case. Instead, when one examines the range of Hawaiian dictionaries and other language sources one finds a variety of words used to refer to seals. Since, however, all of these written sources date to the post-Contact period, after the traditionally oral language was transformed into a written one, it becomes even more difficult to determine which terms may have been traditional and which came into use after Western contact when Hawaiian sailors were introduced to seals resident in the NWHI and on the western coast of America.

In attempting to determine the common term(s) used in the Hawaiian language to refer to the Hawaiian monk seal, it is important to look at the earliest published Hawaiian texts, as well as the range of words and definitions presented in the various dictionaries prepared since the early years of Western contact.

In its traditional form ‘*ōlelo* Hawai‘i is a spoken, rather than a written, language. Although various early Western explorers, beginning with Captain Cook, compiled rough vocabularies of Hawaiian words, it was not until the arrival of the Protestant missionaries in the early 1800s that any systematic attempt was made to translate the rich complexities of the spoken language onto a written page. The earliest Hawaiian dictionaries were prepared at Lāhaināluna Seminary which was founded in 1831 for the Christian education for young Hawaiian men. In 1845 the press at Lāhaināluna published Joseph S. Emerson and Artemis Bishop’s *He Hoakaolelo No Na Huaolelo Beritania I Me Kokua I Na Kanaka Hawaii E Ao Ana Ia Olelo*, a collection of English words and phrases with definitions in Hawaiian (Emerson and Bishop 1845).

In their book, Emerson and Bishop provide two definitions for the English word “seal”. The first of these, which appears to refer to the marine mammal, is “he ilio o ke kai” (Emerson and Bishop 1845:141). The Hawaiian *he* is the demonstrative used at the beginning of a phrase (Pukui and Elbert 1971:58), ‘*īlio* is the word for dog (Pukui and Elbert 1971:92), *o* can be translated as “of” (Pukui and Elbert 1971:252), *ke* is the demonstrative often translated as “the” (Pukui and Elbert 1971:130), and *kai* means the sea (Pukui and Elbert 1971:107). Thus the term *he* ‘*īlio o ke kai* could roughly be translated as ‘the dog of the sea’.

The second definition given by Emerson and Bishop is "he wepa kapili palapala". This term, which can be translated literally as 'the wafer joining together paper", appears to refer to the wafer of wax (seal) affixed to official documents. The Hawaiian word *wepa* is a transliteration of the English word wafer (Emerson and Bishop 1845:179). The definition given by Emerson and Bishop for the verb seal is "e hoopaa i ka wepa" (the making fast by means of the wafer), while the noun for sealing wax is "he kepau kapili palapala me he wepa la" (the resin that joins together paper with the wafer) (Emerson and Bishop 1845:141). The secondary usage of the word seal in the English language to refer to a wax or printed seal affixed to a document can result in confusion for unwary individuals seeking early definitions for the Hawaiian names given to monk seals.

The most comprehensive of the early dictionaries published at Lāhaināluna was *A Dictionary of the Hawaiian Language*, compiled by Lorrin Andrews' in 1865. In preparing his dictionary of roughly 15,000 words, Andrews, who was head of Lāhaināluna at the time, drew primarily on the writings of native Hawaiian speakers, as well as word lists and vocabularies compile by his fellow missionaries and native scholars such as Samuel Kamakau (Andrews 1895:iv-v).

In its section of "English-Hawaiian Vocabulary", Andrews' dictionary gives the definition of seal as "he ilio o ke kai" (Andrews 1865:546), using the same term employed by Emerson and Bishop. The term "he ilio o ke kai", however, does not appear in the "Dictionary of the Hawaiian Language" section of Andrews' work, nor is there any reference to seal under any form of the Hawaiian word "ilio".

As with Emerson and Bishop, Andrews lists the word "Seal" twice. The first definition, "he ilio o ke kai", appears to refer to the marine mammal, while the second, "e hoopaa i ka wefa" (*e ho*ʻ*opa*ʻ*a ka wefa*), literally 'to make fast by means of the wafer', refers to a wax or paper seal placed or printed on a document (Andrews 1865:546).

In 1887, *An English-Hawaiian Dictionary* was prepared by Howard R. Hitchcock (who also served as Principal of the Lāhaināluna Seminary) at the request of the Board of Education of the Kingdom of Hawaiʻi for use in the public schools. This dictionary gives the primary definition of the noun seal as "Ilio o ke kai", echoing both Emerson and Bishop, and Andrews (Hitchcock 1968:182). Secondary definitions listed include the terms "He sila" (literally "the seal", with *sila* being a Hawaiian adaptation of the English word seal) and "hoailona pai" (Hitchcock 1968:182). The Hawaiian word *hō*ʻ*ailona* or ʻ*ailona* means a sign, symbol, emblem, or token of recognition (Pukui and Elbert 1971:10), while the word *pa*ʻ*i* means to slap, clap or to print (Pukui and Elbert 1971:278). This would suggest that the term *hō*ʻ*ailona pa*ʻ*i* refers to printing a symbol or affixing a seal. The verb seal is translated by Hitchcock as "E sila" (Hitchcock 1968:182), which suggests that, at least in this case, the post-Contact word *sila* refers to a wax or paper seal, not to the animal. Hitchcock's is the first dictionary in which the term *kila* or *sila* occurs. Neither word appears in the original 1865 versions of Lorrin Andrews' *A Dictionary of the Hawaiian Language*.

In 1922, Lorrin Andrew's original dictionary was revised by the Reverend Henry Hodges Parker and republished under the direction of the Board of Commissioners of Public Archives of the Territory of Hawaiʻi. This new version incorporated definitions prepared by the missionary Lorenzo Lyons (1807-1886) and various other sources into the body of the original Andrews Dictionary. It also included the revision of many definitions and the inclusion of diacritical marks (Andrews 1922:iii-iv). This revised dictionary no longer contains an "English-Hawaiian Vocabulary", so there is no direct definition provided for the English word seal. As with Andrews' original dictionary, the term "he ilio o ke kai" does not appear among the Hawaiian words, nor is there any reference to seal under any form of the word "ilio".

In 1940, Henry P. Judd published *The Hawaiian Language*, which contained a Hawaiian-English Vocabulary (Judd 1940). This vocabulary included neither *he ʻīlio o ke kai*, *ʻīlio o ke kai*, nor any term beginning with *ʻīlio* other than simply "ilio" meaning dog (Judd 1940:97).

Five years later, a English-Hawaiian, Hawaiian-English vocabulary was compiled by Henry P. Judd, Mary Kawena Pukui and John F. G. Stokes. In the English-Hawaiian vocabulary the authors differentiate seal "mammal" from seal "die". They provide two definitions for the word seal (mammal), "ʻiliʻo hoʻlo i Kauaua" and "uwaʻlo" (Judd et al. 1945:167). In their Hawaiian-English vocabulary, Judd, Pukui and Stokes translate "uwalo" as "to cry out" (Judd et al. 1945:311). They do not include "ʻiliʻo hoʻlo i Kauaua" in the Hawaiian-English vocabulary. In the English-Hawaiian vocabulary the terms given for seal (die) are "kiʻla" and "hōailōʻna paʻi", while to seal is given as "kiʻla" (Judd et al. 1945:311).

In their *Hawaiian Dictionary*, first completed in 1957, Hawaiian language scholars Mary Kawena Pukui and Samuel Elbert give the term for both seal "1. Emblem" and "2. Mammal". The term for seal (emblem) is given as "Kila" (Pukui and Elbert 1971:135), which is translated in the Hawaiian-English portion of the dictionary as "also Sila. Seal, deed, patent; sealed; to fix a seal" (Pukui and Elbert 1971:139). Alternate terms are "uwepa", "hoʻopaʻa", "kuni", and "hulu" (Pukui and Elbert 1971:135).

The term for seal (mammal) is given as "ʻĪlio-holo-i-kauaua" (Pukui and Elbert 1971:135). In the Hawaiian-English portion of the dictionary this is translated as "seal", literally "dog running in the toughness" (Pukui and Elbert 1971:93). The term, as they translate it, appears to be a combination of *ʻīlio*, the word for dog (Pukui and Elbert 1971:92); *holo* meaning "to run, sail, ride, go" (Pukui and Elbert 1971:72); *i* the participle "to, at, in, on, by, because of, due to, by means of" (Pukui and Elbert 1971:87); and *kauaua*, a term not directly found in the dictionary, but possibly a combining of *ka*, "the one" or "of" and *uaua*, "tough, sinewy, glutinous, viscid" (Pukui and Elbert 1971:335).

ʻĪlio-holo-i-kauaua is today the most common term in contemporary *ʻōlelo* Hawaiʻi used to refer to the monk seal. It is often translated as "the dog that runs in the rough seas" (Watson et a. 2011:390), though there is nothing in Pukui and Elbert's original translation to suggest that *kauaua* should be rendered as either rough or rough seas. This translation seems to derive more from a desire to explicate the somewhat confusing original translation, than from any linguistic reality. In their *Hawaiian Dictionary*, Pukui and Elbert provide the following Hawaiian terms for rough sea, "kai koʻo" and "ʻōkaikai" (Pukui and Elbert 1971:130). Under the term rough, "as sea or wind", they give "pikipikiʻō", "ʻāloʻaloʻa", "loʻaloʻa", "laʻolaʻo", "hāloʻaloʻa", "āulu", "olohiʻa", "pūkalakī", "kūʻulukū", "nalunalu", "ʻōnalunalu", "puleileho", and "maleuwō" (Pukui and Elbert 1971:130). None of these terms appear related to *kauaua*.

Pukui and Elbert's *Hawaiian Dictionary* is the first instance in which the term *ʻīlio-holo-i-kauaua* occurs in a Hawaiian language dictionary. It appears possible that Mary Kawena Pukui encountered the term when translating articles in Hawaiian language newspapers (see Section 4.1.4). The Hawaiian texts of these newspaper articles would not have included diacritical marks indicating how the words were to be pronounced. The word would have appeared in print simply as "ilioholoikauaua". The word *uaua* can be pronounced one of four ways; as *uaua*, meaning either "tough, sinewy, glutinous" or "a variety of taro" (Pukui and Elbert 1971:335); as *u*ʻ*au*ʻ*a*, meaning "a tapa dyed with ʻ*ōlena* (turmeric) or *noni*" (Pukui and Elbert 1971:335); as ʻ*ua*ʻ*ua*, a variant spelling of ʻ*uwā*ʻ*uwā*, which itself is an intensification of ʻ*uwā*, which means "to shout, cry out, sound loud" (Pukui and Elbert 1971:346); or ʻ*u*ʻ*a*ʻ*u*ʻ*a* an intensification of ʻ*u*ʻ*a*, which means "useless, vain, to no profit" or "a coarse mat or tapa" (Pukui and Elbert 1971:334).

It is intriguing to recall that a slightly earlier Hawaiian vocabulary also prepared with the help of Mary Kawena Pukui (Judd et al. 1945) gives as an alternate name for the monk seal the word *uwalo*. This word it then translates as "to cry out" (Judd et al. 1945:311). The definition for *uwalo* (also given as *ualo*) provided by Pukui and Elbert is "to call out, as for help; to resound" (Pukui and Elbert 1971:346). This is very similar to the translation of word ʻ*ua*ʻ*ua*, which is an intensification of the word ʻ*uwā*, "to shout, cry out, sound loud" (Pukui and Elbert 1971:346). Given the sonorous bark for which the monk seal is well known, it seems possible that an alternate interpretation of *kauaua* is *ka*-ʻ*ua*ʻ*ua*, the one that cries out.

The historian Abraham Fornander, who was fluent in Hawaiian and married to a chiefess of Oʻahu, translates the phrase "holo i ka uaua" as "running at the voice" (see Section 5.4.3). It appears that he is interpreting the word used in the phrase as ʻ*ua*ʻ*ua*, rather than *uaua*. His translation also suggests that "ka-uaua" might be translated as "the voice". It is possible that this same version of the word appears in the name ʻ*īlioholoikauaua*, and that this name for the Hawaiian monk seal might be translated as "the dog running (to, at, in, on, or by) the voice".

Although the terms mentioned above are the only ones that appear in the English-Hawaiian section of Pukui and Elbert's *Hawaiian Dictionary*, Another term that appears in the Hawaiian-English section is "hulu". Among the ten possible definitions given for this word is "8. Seal, named for its valuable fur. *Rare*" (Pukui and Elbert 1971:84). One of the more common definitions of *hulu* is "fur, wool, fleece, human body hair" (Pukui and Elbert 1971:84). This is the first appearance of the definition of seal for the word *hulu*. In his 1865 dictionary, Lorrin Andrews defines *hulu* as "a feather of a bird", "a bristle of a hog", "the hair of the body", "wool"(Andrews 1865:225). Parker's revision of Andrews' dictionary translates it as "a feather or feathers", "every kind of hair excepting the hair of the head", "wool", and "fleece" (Andrews 1922:214). Judd translates *hulu* as "feather, wool" (Judd 1940:96), while Judd, Pukui and Stokes translate *hulu* as "feathers, wool, hair in general" (Judd et al. 1945:244). Hitchcock gives as the Hawaiian term for fur, "Hulu palupalu" (Hitchcock 1968:93), (*palupalu* meaning soft) (Pukui and Elbert 1971:288).

In explaining the use of this evidently rare term, Pukui and Elbert suggest that the word *hulu* was used to refer to the seal due to "its valuable fur". This might suggest that the use of *hulu* to refer to seals developed during the early historic period, and that the word was used in reference to arctic fur seals that were being hunted at that time for their pelts. Sealing vessels often stopped in the Islands to re-provision, and Hawaiians were taken on as sailors on many of these vessels. It seems unlikely that the term *hulu* is a traditional name for the Hawaiian Monk seal, which, being a resident of the tropics, does not possess the dense under-fur that characterizes its arctic cousins.

Some possible support for this suggestion can be found in Rev. Henry Hodges Parker's 1922 revision of Lorrin Andrews 1865 dictionary, which defines the noun "Ohulu (ō'-hū'-lu)" as meaning "A seal hunter", "O, to spear, and hulu, fur or feathers" (Andrews 1922:478). Pukui and Elbert provide a similar translation for "'ō hulu", "Seal hunter; to spear seals. *Lit*., spear fur" Pukui and Elbert 1971:256). In contrast, Andrews' original 1865 dictionary defines "Ohulu" as "a person that sails or goes on the ocean; he kanaka *ohulu* no ka moana" (Andrews 1865:82). There is no mention in this earlier version of seal hunting. This definition seems to have been added to the dictionary by Parker, though it is not clear what his source was.

In recent years the Hawaiian Lexicon Committee has attempted to compile a list of Hawaiian words that have been created, collected, and approved by the Committee from 1987 through 2000. Their *Māmaka Kaiao: A Modern Hawaiian Vocabulary*, gives the Hawaiian word for seal as "Sila" (Kōmike Hua'ōlelo, 2003:349). The fur seal is identified as "Sila pūhuluhulu", while the monk seal is identified as "Sila Hawai'i". As with a number of words in the *Māmaka Kaiao*, these appear to be recent creations derived in part from their English equivalents.

In comparing the various words found in Hawaiian vocabularies and dictionaries since 1845, it appears that the earliest documented terms used to refer to monk seals are *he 'īlio o ke kai* and *'īlio o ke kai* (**Error! Reference source not found.**). Later alternate names include *uwalo*, *'īlioholoikauaua*, and *hulu*.

Table 1. Terms for Seal Found in Hawaiian Dictionaries and Vocabularies

Year	Source	Term	Possible Translation
1845	Emerson and Bishop, *He Hoakaolelo No Na Huaolelo Beritania*	he ilio o ke kai	the dog of the sea
1865	Lorrin Andrews, *A Dictionary of the Hawaiian Language*	he ilio o ke kai	the dog of the sea
1887	Howard R. Hitchcock, *An English-Hawaiian Dictionary*	ilio o ke kai	dog of the sea
1922	Lorrin Andrews, *A Dictionary of the Hawaiian Language* revised by Henry Parker	none	none
1945	Judd, Pukui and Stokes, *Introduction to the Hawaiian Language*	'ili'o ho'lo i Kauaua	uncertain
1945	Judd, Pukui and Stokes, *Introduction to the Hawaiian Language*	uwa'lo	"to cry out"
1957	Pukui and Elbert, *Hawaiian Dictionary*	'īlio-holo-i-kauaua	"dog running in the toughness"
1957	Pukui and Elbert, *Hawaiian Dictionary*	hulu	"seal, named for its valuable fur"
2003	Hawaiian Lexicon Committee, *Māmaka Kaiao*	sila	"seal (Sila pūhuluhulu, fur seal; Sila Hawai'i, monk seal)"

4.2 Place Names

In their various publications related to monk seals (Kittinger et al. 2011, Kittinger et al. 2012, Watson et al. 2012), Kittinger and his fellow authors identify a number of place names that they suggest are in some way associated with Hawaiian monk seals (**Error! Reference source not found.**). Many of these names include the word *'īlio*. In most cases, however, it seems more reasonable to suggest that the names refer to or are in some way associated with dogs rather than seals.

Table 2. Place Names Identified by Kittinger et al. as Referring to Monk Seals

Place Name	Physical Feature	Location	Possible Translation	Association with Hawaiian Monk Seals
ʻĪlio-piʻi	Cape and bay	Kalaupapa, Molokai	"climbing dog" (Pūkui et al., 1974;56)	Modern observation of seals in the area
Lae o Ka ʻĪlio	Cape	Hāʻena, Kauaʻi	Cape of the dog	Modern observation of seals in the area
Ka-lae-o-ka-ʻīlio	Cape	Northwest Molokaʻi	The cape of the dog	Similarity to name of cape at Hāʻena, Kauaʻi
Ka-lae-o-ka-ʻīlio	Cape	Kaupō, Maui	The cape of the dog	No known association
Kāneʻīlio	Cape	Waianae, Oʻahu	"dog Kāne"	No known association
Puʻuanahulu	Hill	Kona, Hawaiʻi Island	"ten-day hill"	No known association
Holoikauaua	Atoll	Pearl and Hermes Atoll	running in the roughness	Modern name given to the island

ʻĪlio-piʻi

The name of this small cape and associated bay on the Kalaupapa peninsula of Molokaʻi can be translated as meaning literally "climbing dog" (Pukui et al., 1974). It has been mention as possibly having been named for the Hawaiian monk seal (Kittinger et al. 2011:15). The suggested evidence for this is the contemporary presence of seals in the area. Kittinger and his fellow authors state that, "The historical name seems appropriate, as monk seals commonly pup on beaches in this area in modern times" (Kittinger et al. 2011:15). The fact that the formerly populous, but now lightly populated Kalaupapa Peninsula, which is also a Federally protected National Historic Park, has become a common birthing area for Hawaiian monk seals is not surprising. The contemporary presence of monk seals in this area, however, does not necessarily infer that monk seals were present there during the pre-Contact period or that the area was named after them.

Since the place name ʻĪlio-piʻi refers to a cape and bay, it might be suggested that the area is more likely to be associated with seals than dogs. The traditional origins of such place names, however, are not always so simply perceived. The name of such a *wahi pana* (storied place) may come from some legendary or mythological or poetic association. An example of an unrelated but perhaps similar poetic association can be found in a traditional *hula ala*ʻ*apapa* (a form of dramatic hula) that comes from the epic story of Hiʻiaka, sister of the volcano goddess Pele, and her journey to Kauai. In describing the windward side of the island of Oʻahu the *hula mele* states:

> Ua holo-wai na kaha-wai;
> Ua ko-ká wale na pali.
> Aia ka wai la i ka ilina, he ilio,
> He ilio hae, ke nahu nei e puka
>
> Full run the streams, a rushing flood;
> The mountain walls leap with the rain.
> See the water climbing its bounds like a dog,
> A raging dog, gnawing its way to pass out. (Emerson 1909:59)

Lae o Ka ʻĪlio

In his book *Hāʻena: Through the Eyes of the Ancestors*, Carlos Andrade identify a cape on the rural north shore of Kauaʻi Island near Hāʻena as being associated with the Hawaiian monk seal. The traditional name of this cape (*lae*) can be literally translated as "the cape of the dog". The place name is also known in its abbreviated form, Ka-ʻīlio, which translates as "the dog" (Pukui et al. 1974:69). Andrade writes that Lae o Ka ʻĪlio, which he translates as "the headland of the dog," "refers to the endangered Hawaiian monk seal known to Hawaiians as ʻīlio hele i ka uaua (dog running in the rough seas). Residents saw seals there even in the days before the federally established laws now protecting them caused a dramatic increase in their numbers in the main Hawaiian islands" (Andrade 2008). Here again the association of the place name with seals rather than dogs is related to the historically recent observation of monk seals in the area rather than any traditional association.

Kittinger and his follow authors state that, "ʻĪlio-piʻi on Molokaʻi and Lae o Ka ʻĪlio on Kauaʻi, are historical names that likely reference places where monk seals were common in historical times" (Kittinger et al. 2011:15). As has been pointed out, there appears to be no direct evidence for this association other than the fact that monk seals have been noted in these areas in modern times. They also note that various other places throughout the archipelago may warrant more research to determine whether they are associated with the Hawaiian monk seal. The locations of these "places with names that potentially reference monk seals" are shown on a map in their 2012 paper (Kittinger et al. 2012:Figure1). Among the place names included are Lae o Ka ʻĪlio on northwest Molokaʻi; Ka Lae o Ka ʻĪlio at Kaupō, Maui; Kaneʻīlio point on the Waiʻanae coast of Oʻahu; Kūʻilioloa, also in Waiʻanae; Kaʻōʻio point on the windward coast of Oʻahu; and Puʻuanahulu in North Kona on Hawaiʻi Island.

Ka Lae o Ka ʻĪlio

Also known as ʻĪlio and Ka-ʻīlio (Pūkui et al., 1974:72), ʻĪlio Point, Lae o Ka ʻĪlio is a headland on the northwestern coast of Molokaʻi. Its name can be translated as "the cape of the dog" (Pūkui et al., 1974:72). Kittinger and his co-authors suggest that it is "possible the site was named for the frequent presence of monk seals, like its counterpart on Kauaʻi" (Kittinger 2011:16). Molokaʻi *kupuna* (elder) Harriet Ne, however, has stated that the point gained its name for its association with an ancient legend of a red dog (Ne et al. 1992, DLNR 2009).

Ka Lae o Ka ʻĪlio

Another Lae o Ka ʻĪlio marked in the Kittinger map is located at Kau-pō on Maui. Here again there is no know association between this cape, whose name can be translated as "the cape of the dog" (Pūkui et al., 1974:72), with the Hawaiian monk seal.

Kāneʻīlio

Kāneʻīlio, a point on the Waianae coast of Oʻahu, also appears on the Kittinger map. The place name, which literally means "dog Kāne", is said to be the site of a *heiau* (temple) "dedicated to Kū-ʻīlio-loa, a legendary giant man-dog" (Pukui et al. 1974:84). Kittinger and his fellow authors state that, "moʻolelo about this site [the heiau, which is also shown on their map] reference a dog that would bark at the ocean when enemies were coming." They admit that, "Respondents that identified this site said that although the name has ʻīlio (dog) in it, it does not necessarily mean it was named after the monk seal" (Kittinger et al. 2011:15).

Kūʻīlioloa
Kūʻīlioloa is the name of the *heiau* located at the extreme tip of Kāneʻīlio point on the Waiʻanae coast of Oʻahu. The name also appears on Kittinger's map. The literally translation of the name of this *heiau* is "long dog of Kū" (Pukui et al. 1974:129). The *heiau* appears to be "named for a legendary dog who protected travelers: later the qualities of a bad dog were unfairly attributed to him" (Pukui et al. 1974:129). Located along the coast, the *heiau* is surrounded on three sides by water (McAllister 1933:113). According to Elspeth Sterling and Catherine Summers, authors of *Sites of Oahu*, Kūʻīlioloa Heiau was partially destroyed by the U. S. Army which constructed a concrete bunker on the site during World War II. Its remains were still visible in 1954 (Sterling and Summers 1978:69). In the late 1970s, the *heiau* was rebuilt by the Waiʻanae community.

Historian Samuel Mānaiakalani Kamakau notes that "Lonokaʻeho came from Kahiki with his big dog Kūʻīlioloa" (Kamakau 1991:111). There are many traditions concerning Kūʻīlioloa who is sometimes described as "a dog with a human body and supernatural powers" (Beckwith 1970:347).

Puʻuanahulu
The hill of Puʻuanahulu, located on the inland slopes of the North Kona district of Hawaiʻi Island, also appears on the Kittinger map. The hill, whose name means literally "ten-day hill," is "perhaps named for a supernatural dog of that name" (Pukui et al. 1974:195). "The body of Anahulu, a supernatural dog that was changed to stone by Pele" rests in a sea pool along the Kona coast near Ka Lae o Ka ʻĪlio (Pukui et al. 1974:72). The *puʻu* (hill) of the supernatural dog Anahulu does not appear to be associated with the Hawaiian monk seal.

Holoikauaua
Holoikauaua is a modern Hawaiian name for the Pearl and Hermes Atoll is mentioned by Kittinger et al. The name is not an ancient one, but it was given to the atoll following the establishment of the Papahānaumokuākea Marine National Monument, in reference to the Hawaiian monk seals that frequent the area. The Monument Management Plan states that, "The name Holoikauaua celebrates the Hawaiian monk seals that haul out and rest here (USFWS et al. 2008).

There appears to be no direct evidence to suggest that any of the place names identified by Kittinger and his fellow authors are associated with the Hawaiian monk seal. The present study has been unable to find any place name within the MHI that can be directly related to monk seal presence during the traditional period or to any tradition or legend related to the Hawaiian monk seal.

4.3 References to Monk Seals in Traditional Literature
If a resident population of Hawaiian monk seals was present in the MHI throughout the pre-Contact period, one might expect to find mention of monk seals in oral literature of ancient Hawaiʻi. Although much of this literature was lost in the transition of ʻ*ōlelo* Hawaii from a spoken to a written language, much of it survived. An examination of the surviving written *oli* (chants not for dancing), *hula* (chants for dancing) and *mo*ʻ*olelo* (stories, mythologies, legends and historical narratives) have yielded few definitive references seals. Only one *mo*ʻ*olelo* was found that mentions the Hawaiian monk seal (see below). Much of Hawaiian traditional literature was never written down and has been passed through the generations within

individual families. These stories remain to a large extend inaccessible to the general researcher. As Kittinger and his fellow authors discovered during their interviews, "several respondents also noted that much of the information we sought about monk seals was deliberately kept *hūnā*, or secret, in keeping with tradition and because such knowledge had been improperly used in the past" (Kittinger et al. 2011:10).

The Kumulipo

The *ko*ʻ*ihonua*, the great genealogical chants, trace back the ancestry of the *ali*ʻ*i* ʻ*ōhana* (chiefly families) of Hawaiʻi through the generations. The most well known of these genealogical chants is the Kumulipo, which begins at the creation of the world and enumerates many of the plants and animals that were part of the Hawaiian cosmos. The Kumulipo mentions both land and sea creatures, often linking a land plant or animal with one from the sea.

> Hanau ka ʻAʻalaʻula noho i kai
> Kiaʻi ia e ka ʻAlaʻala-wai-nui noho i uka (Beckwith 1972:188)
>
> Born was the ʻAlaʻala moss living in the sea
> Guarded by the ʻAlaʻala mint living on the land (Beckwith 1972:59)

Although the chant includes reference to other marine mammals, the *nai*ʻ*a* (porpoise) in line 138 and the *palaoa* (whale) in line 251, the monk seal does not appear in any of its known names among the animals mentioned in the Kumulipo. Kittinger and his fellow researchers, however, have suggested the seal is referred in the sixth stanza of the chant.

The Kalākaua text reads:

> He ʻiole ko uka, he ʻiole ko kai
> He ʻiole holo i ka uaua (Beckwith 1951:201)

The folklorist Martha Beckwith translated these lines as:

> A rat in the uplands, a rat by the sea
> A rat running beside the wave (Beckwith 1951:88)

The line "He ʻiole holo i ka uaua" has been taken to refer to monk seals due to its similarity to the term ʻ*īlioholoikauaua*. The word ʻ*iole*, which appears in this line refers not to the dog (ʻ*īlio*), but to the Polynesia rat (ʻ*iole*) (Pukui and Elbert 1971:125). Thus the line has been translated by Beckwith as "A rat running beside the wave" (Beckwith 1951:88). Kittinger, Bambico, Watson and Glazier suggest that, "the description of the *ioleholoikauaua* as "a rat running beside the wave," is reminiscent of monk seals and the description of the monk seal in this section of the Kumulipo is also consistent with other descriptions and perceptions of monk seal behavior found in Hawaiian language sources" (Kittinger et al. 2011:14).

An alternate translation of the line is given by Hawaiian scholar Rubelite Kawena Johnson.

> A rat for the upland, a rat for the shore,
> A determined rat running tough. (Johnson 2000:23)

This line of the chant is but one of a series metaphorical references to the nibbling of rats. As Beckwith explains it in her commentary to the poem, "Kupihea is probably right in interpreting the spread of the rat family from upland to shore and their nibbling habits as symbolic of the rise of new lines of chiefs under whom taboos multiplied. Especially it refers perhaps to the land to landlords and these again to subordinate overseers, each taking toll from the crops…" (Beckwith 1951:86). This interpretation would tend to suggest that it is the ‘*iole* (rat) with its attendant symbolic meaning that is referred to here rather than the monk seal. The line's apparent connection to the Hawaiian monk seal is simply due to a similarity in the use of words and not a deliberate reference.

The Kumu Honua
A similar confusion of words has led Kittinger and his fellow authors to suggest that the Hawaiian monk seal is also mentioned in the traditions associated with Hawai‘i-Loa and with the creation of the first man, Kumu Honua (there is some question as to whether this creation tradition was strongly influenced by Christian mythologies introduced in the years following Western contact; Barrera 1969). Judge Abraham Fornander, in his Collection of Hawaiian Antiquities and Folklore (traditional *mo*‘*olelo* gather from Hawaiian authors to be used as source material in the writing of his multi-volume Account of the Polynesia Race) includes the "Legend of Hawaii-loa" which was "compiled and condensed in English from Kepelino and S. M. Kamakau". As part of this *mo*‘*olelo* he refers to the tradition of Kumu Honua and describes the animals that were created to keep company with this first man in the Hawaiian Eden.

> Among the animals enumerated in the legend as dwelling in peace and comfort with Kumu Honua in Kalani i Hauola were:
>
> Ka puaa nui Hihimanu a Kane (the large Hihimanu hog of Kane); ka ilio nui niho oi a Kane (the large sharp-toothed dog of Kane); ka ilio holo i ka uaua a Lono (the dog running at the voice of Lono); ka puaa maoli (the common hog); ka ilio alii a Kane (the royal dog of Kane); na moo (lizards); na moo niho nui, niho oi, wawaka a Kane (the sharp, long toothed, iridescent lizard of Kane)… (Fornander 1919:273-274)

Fornander translates "ka ilio holo i ka uaua a Lono" as "the dog running at the voice of Lono." Although ‘*īlioholoikauaua* is one of the Hawaiian terms used for seal, its use here suggests that it appears in the legend as a descriptive of a dog rather than a seal. The god Lono is traditionally associated with lightning and the sound of rolling thunder (Beckwith 1970:41), thus the voice of Lono may be a poetic reference to thunder.

Interestingly, Fornander's early translation of the phrase "holo i ka uaua", "running at the voice", suggests that the word used in the phrase is ‘*ua*‘*ua*, rather than *uaua*, and that "ka-uaua" might be translated as "the voice". It is possible that this same version of the word appears in the term used to refer to the Hawaiian monk seal, ‘*īlioholoikauaua*.

Hi‘iaka
Another proposed reference to the Hawaiian monk seal in traditional *mo*‘*olelo*, as suggested by Kittinger, Bambico, Watson and Glazier, comes from The Epic Tale of Hi‘iakaikapoliopele as translated by Puakea Nogelmeier, professor of Hawaiian language at the University of Hawai‘i at Mānoa (Nogelmeier, 2006). This *mo*‘*olelo*, originally printed in the Hawaiian language newspaper *Hawai*‘*i Aloha* and then in the *Ka Na*‘*i Aupuni* between July 1905 and November 1906,

recounts the journey of Hiʻiakaikapoliopele, sister of the volcano goddess Pele, and her companion Wahineʻōmaʻo, from Hawaiʻi Island to Kauaʻi to find and bring back Pele's lover Lohiau. As Hiʻiaka and her companion are passing along the Koʻolau coast of the island of Oʻahu, she points out a rock formation, "shaped like an ʻ*īlio*, a dog, with the head, the body, and all the features of a dog?" (Nogelmeier 2006). Hiʻiaka explains that:

> That is no stone carved by man, but rather the rock form of one of our uncles, one I mentioned to you. That is Kauhikeʻīmakaolani. He is the ʻ*īlio hā* that Kane brought from Kahiki, and he is always seen yonder, at Kaʻōʻio Point [Ka lae o ka ʻōʻio, the point of the bone fish, which marks the boundary between the districts of Koʻolau Poko and Koʻolau Loa (Pukui et al. 1974:72)], that high spot before one reaches the flatlands on the way to Kāneʻohe. The third place where he's often seen is at the mouth of Nuʻuanu Valley, where one enters Kahaukomo (Nogelmeier, 2006).
>
> When Wahineʻōmaʻo asks what is an ʻ*īlio hā*, Hiʻiaka responds that, "ʻĪlio hā is like saying ʻ*īlio kāhā*, an oversized, hulking dog, the same way a pig can be oversized. It means it is huge, heavy, plump, and fleshy. But this dog-uncle of ours you see there has the body of a massive dog, and the largest expanse of his fur is on his head and neck …" (Nogelmeier 2006).

Kittinger and his fellow authors see this description of the ʻ*īlio kāhā* ("huge, heavy, plump, and fleshy ") as reminiscent of the physical appearance of the Hawaiian monk seal. In their *Hawaiian Dictionary*, Mary Kawena Pukui and Samuel Elbert define the word *kāhā* as "Large, fat, plump, as of a well-fed dog" (Pukui and Elbert 1970:103). This suggests that the term was used to refer to large dogs. There is nothing else in the *mo*ʻ*olelo* to suggest that the ʻ*īlio hā* was a monk seal rather than "a massive dog".

*Mo*ʻ*olelo* of Pinao and Kamālama

There is at least one extant *mo*ʻ*olelo* which does make mention of the Hawaiian monk seal. Unlike the previously mentioned *oli* and *mo*ʻ*olelo*, which were set down in writing during the early historic period, this tradition was passed down orally and only recorded relatively recently. Included in the Appendix to the *Historic and Contemporary Significance of the Endangered Hawaiian Monk Seal in Native Hawaiian Culture* is the partial transcript on an interview in which a *kupuna* from the district of Kaʻū on the island of Hawaiʻi relates a *mo*ʻ*olelo* regarding a seal that was told to her by her father-in-law (Kittinger et al. 2011:31).

The authors of the report indicate that, "The following is an oral tradition and story (*mo*ʻ*olelo*) from a *kupuna* interviewed on Hawaiʻi Island, near Ka Lae o ka ʻĪlio ("the cape of the dog"), about the monk seal. Names and some information have been withheld to protect the identity of the respondent" (Kittinger et al. 2011:31).

> I'm from Kaʻū [Hawaiʻi Island], but originally I come from Molokaʻi, from the area called Kalamaʻula. I relocated here [to Kaʻū] because of my husband. My husband was a cowboy by trade. Today I'm going to share with you a little *mo*ʻ*olelo*, a little story that comes from the opposite end called Ka Lae. A lot of people call this area South Point, but it's really Ka Lae. Now in this area, there was this young woman and her name was Kamālama. And Kamālama had a good friend who she loved dearly and his name was Pinao. Well Pinao and Kamālama were always happy together. They loved each other dearly. But one day, Kua, the Shark God, he's traveling the *moana*, the ocean. He sees

her [Kamālama] [heart fluttering motion]. Hū [oh] my goodness, he loves this young lady. No. She don't want him at all. Kua is very upset; and so Kua causes a *pō'ino*. He puts a curse on this young lady, Kamālama, and Pinao. And, Kamālama no longer stays as a woman; but she withdraws to the ocean and she becomes an '*aukai*, a sea-god or a seal. And poor Pinao. Pinao who stands so very tall; now begin to bear wings and he begin to flutter and fly. He becomes a dragonfly. Auē! They no longer can be together. And whenever Kamālama come up to the white sand, at this particular beach, she's not able to embrace her good friend Pinao. And Pinao, he comes and he flutters down upon her, and he is no longer able to hold her anymore. Well, the god Kū, finally comes to realize what is happening; and he feels love and compassion for this young couple, for this young man and this young lady. And so what happens: Kū decides that this should not happen, that Kua's jealousy gets in the way. And so, the god Kū decides to make a new rule, and he says: when Nā Huihui [reference to the star cluster Nā-Huihui-a-Makali'i, otherwise known as Pleiades, whose rise & fall in the Hawaiian night skies marks the start and end of the Makahiki Season, generally from end Oct/beg Nov to end Jan/beg Feb] all the stars shine during these particular months then this young man and this young lady will be able to have the… This young man and this young lady will be able to share this time to Kū, to take on their human forms again, so that they will no longer be this dragonfly, nor will she be this '*aukai*, this seadog or this seal of the ocean. And so from the months of October, November, December [until] part of February, they then take on this form, and they come back to who they really were; and they're able to enjoy each other's company, and to embrace each other once again. And so this is the short story of Pinao and Kamālama. I'm not sure if that's what you was looking for. I doubt if you're going to find it in any books, like you do [the *mo'olelo* of] Kauila because I heard this, again, from my father-in-law. When he was here, he was busy sharing things. And he was trying to recall things and I didn't realize what he was doing is recalling because he was going to go on his journey [pass away]. He was going to leave us. And so, um, most of the stories that I am sharing every now and then, I haven't seen it in any book. So, and, I haven't shared this, except for my own family. This is the first time I've shared it outside" (Kittinger et al. 2011:31-32).

The narrator of this *mo'olelo* states of Kamālama that after her transformation she "no longer stays as a woman; but she withdraws to the ocean and she becomes an '*aukai*, a sea-god or a seal." The word used, '*aukai*, means "to travel or swim by sea; seafaring; sailor" (Pukui and Elbert 1971:29, the word does not appear in Andrews 1865 dictionary, the term '*īlio* '*aukai* refers to a "sea dog, experienced sailor", or a "warship", Pukui and Elbert 1971:93). The term '*aukai*, "to travel or swim by sea; seafaring" seems an apt description for a seal, though whether it is being used in the tale as a poetic descriptor or as a true name is uncertain.

Pinao is the Hawaiian work for dragonfly, while the name *ka mālama* can be roughly translated as the one who cares for (Pukui and Elbert 1971:214). Kamalama without the diacritical mark over the ā is the name of a star and means literally "the light", (Pukui and Elbert 1971:116).

The shark god Kua, mentioned in the story of Pinao and Kamālama appears in the *mo'olelo* of Kaehuikimanoopuuloa (the little *ehu* colored shark of Pu'uloa) as related by Thomas G. Thrum in his *More Hawaiian Folk Tales*. Thrum translated and condensed the story from a version published in the Hawaiian language newspaper Au Okoa for November 24, 1870. Here he is described as "Kua, king-shark of Kona" (Thrum 1923:295). It is Kua who guides Kaehuikimanoopuuloa and his companions on their travels to distant Kahiki (Thrum 1923:303). A version of the same story is told by Padraic Colum in his *Legends of Hawaii* (Colum 1937:89).

5.0 HISTORICAL PERSPECTIVES ON THE HAWAIIAN MONK SEAL

There is little evidence to suggest that the Hawaiian monk seal formed an important component of traditional Hawaiian culture. The early Western visitors to the MHI make no direct reference to them, nor do they appear in the works of early Hawaiian historians. With increasing Western contact, however, Hawaiians became acquainted with seals, both in the NWHI and along the western coast of America. From the early historic period onward references to seals begin to appear in Hawaiian language newspapers.

5.1 Early Hawaiian Historians

None of the early Hawaiian historians working to document their traditional culture in the first generations following Western contact make any direct mention of the Hawaiian monk seal. In his book *Mo'olelo Hawai'i* (translated from the Hawaiian by Nathaniel B. Emerson in 1898) the Hawaiian historian David Malo lists and describes the various domestic and wild animals present within the Islands before Contact. In describing these creatures, both indigenous and Polynesian introduced, he makes mention of the pig, dog, wild and domestic fowls, other wild birds, the bat, and various insects (Malo 1951:46). In describing fish and other sea animals he mentions the sea turtle, the shark, dolphins and whales, but makes no reference to seals (Malo 1951:47).

5.2 Hawaiian Language Newspapers

A number of Hawaiian language newspapers were published from the 1830s to the early 1900s. These newspapers, printed in '*ōlelo* Hawai'i, provide a vast reservoir of information concerning Hawaiian culture. Since relatively few books, other than basic grammars and school texts, were published in the Hawaiian language at that time, the newspapers served as almost the sole outlet for any Hawaiian writing in his or her native tongue. As such, they functioned as repositories for traditional legends and cultural histories, venues for the discussion of current political issues, and resources on government laws and policies. Over the last decade, efforts have been undertaken by a number of organization and individuals to make the information contained in these newspapers available to the general public.

In order to determine how often and in what contexts references to seals appear in Hawaiian language newspapers, a search was made of the existing online databases of published newspapers. A list of articles found to contain references to seals is contained in **Error! Reference source not found.**.

Table 3. Articles From the Hawaiian Language Newspapers that Contain Any Reference to Seals, Listed in Chronological Order

Year	Source	Hawaiian Term	Possible Translation
1841, 3 August	Ka Nonanona	sila	seal
1859, 19 October	Ka Hae Hawaii	Iliokai, ilio o kai	seadog, dog of [the] sea
1864, 17 December	Ka Nupepa Kuokoa	ilioholoikauaua	dog running in the useless (not used to describe a seal)
1865, 25 May	Ka Nupepa Kuokoa	sila	seals
1865, 29 June	Ka Nupepa Kuokoa	ilioholoikauaua	dogs running in the rough seas
1867, 1 November	Ke Alaula	'īlio-holo-ika-uaua	dog-running-in-the-rough-seas

1876, 19 February	Ka Nupepa Kuokoa	ʻĪlioholoikauaua	dog-running-in-the-rough-seas
1876, 5 August	Ka Nupepa Kuokoa	ʻīlio holo-ikauaua	dog-running-in-the-rough-seas
1894, 19 March	Ka Makaainana	ilioholoikauaua	dog-running-in-the-rough-seas
1924, 25 September	Elua Nupepa Kuokoa	uwalo	to cry out

A search of Hawaiian language newspapers revealed several references to seals, which were referred to by various names. In most cases the articles that mention seals refer either to sealing voyages or describing an account of travels in the arctic (one reference is contained in a Hawaiian translation of Jules Verne's *Twenty Thousand Leagues Under the Sea*). There do not appear to be any articles that directly address seals in traditional Hawaiian culture or the presence of seals within the MHI.

Kittinger, Bambico, Watson and Glazier identify one article, published in the February 1834 issue of the paper *Ka Lama Hawai*ʻ*i* and entitled No Kekahi Aoao Kahiko (Concerning an Ancient Way of Life), which they propose, "suggests that monk seal furs were collected as part of customary tribute to the land managers (Konohiki)" (Kittinger et al 2011:12). The specific portion of the article that they cite for this interpretation reads:

> No kekahi aoao kahiko.
> Eia kekahi mea kupanaha a makou; o ke kukini. Ina i oleloia he mau kukini; apopo, holo; alaila, hele mai la kanaka he nui loa me ka waiwai, a pili a mau iho la, alaila, hele aku la ua mau kanaka la elua a hiki i ka Pahuku. Kukini mai la ua mau kanaka la, a hopu i ka pahu kekahi, alaila, eo ae la nana. Olioli iho la ka poe i ko. Aka, o ka poe i eo, mihi iho la lakou i ke eo ana. Ina e olelo ke Konohiki i na makaainana, apopo kakou koele a pau, a ahiahi iho, hoike i ka waiwai: Alaila, hana iho la lakou i ua mau mea nei a ke Konohiki i olelo mai ai, o ka puaa, o ka ilio, o ke kapa, o ke olona, o ka hulu, o ka upena, o kela mea keiamea a pau. Oia ka waiwai, a makou i hoike ai i ka wa kahiko.

It has been translated as:

> *Concerning an ancient way of life.*
> *Here is something wondrous for us: runners. If some runners said: tomorrow, is a race; and then a multitude of persons came with money, and continued to place bets down, and then, two of these persons then ran until they reached the goal. These people then raced, and grabbed the baton, and then, it was won for him. The people were then joyful for the triumph. But, as for the persons who lost, they apologized for losing. If the Konohiki said to the citizens, tomorrow we all walk until the evening to show the tribute: and then, they lay down these things the Konohiki requested: pig, dog, cloth, fiber, fur, fishing net, everything. These are the goods that we exhibited in ancient days.*
>
> (http://www.nupepa.org/gsdl2.5/cgi-bin/nupepa?e=q-0nupepa--00-0-0--010-TX--4--hulu+%22Eia+kekahi+mea+kupanaha%22---text---0-1l--1haw-Zz-1---20-about-%5bhulu+%22Eia+kekahi+mea+kupanaha%22%5d%3aTX--0013hulu+%22Eia+kekahi+mea+kupanaha%22-1-0000utfZz-8-00&a=d&c=nupepa&cl=search&d=HASH67c54d1f7df0e3ea4c2663.4)

A more appropriate translation of the list of offerings requested from the *maka*ʻ*āinana* (common people) by the *konohiki* (land manager) would be ʻ*o ka pua*ʻ*a* (pigs), ʻ*o ka* ʻ*īlio* (dogs), ʻ*o ke kapa* (bark cloth), ʻ*o ke olonā* (cord of *olonā* fiber), ʻ*o ka hulu* (feathers, these would have been the brightly colored feathers of forest birds woven into the cloaks and helmets of the chiefs), ʻ*o ka*ʻ*upena* (fishing nets). Bird feathers are known to have been part of the duty collected by chiefs. This seems more likely than the pelts of monk seals.

The earliest known article in a Hawaiian language newspaper to mention seals appears in an August 1841 issue of the paper *Ka Nonanona* in an article entitled No Ka Ulu Moku Imi Aina (About the Land Exploration Fleet). The article tells of the arrival in the Islands of the ships of the U.S. Exploring Expedition under Captain Wilkes, and of the Expedition's travels in the Antarctic, which the writer describes as "filled with ice, no people, just walruses and seals were the animals that belonged there". In this article the words used for the Antarctic seals is "sila".

The newspaper *Ka Nonanona* for 3 August 1841 has an article entitled:

> <u>No Ka Ulu Moku Imi Aina.</u>
> I ka malama o Okatoba 1841, hiki mai la ka ulu moku ini aina no Amerikahuipuia, ma Honolulu nei. Eha moku, o ka moku nui, (i ka Winisani, a me ka Pikaka) a elua hoi moku nuku iho, o ka Naia, a me ka Malolo a o Kali Wilika ko lakou alii nui. Ua imi aina na ulu moku nei ma ka huina loa, a ua ike lakou i ka aina nui malaila, i ka la 13 o Ianuari, 1840, ma ka latitu 65°20 lonitu 104°24. Popilikia i a ko lakou holo ana ma kela moana hema, no ka nui loa i ka hau; me he mau moku aina nui la, e lana wale ana, a e hui kau ana, ua hau paa nei ma kela wahi. Ili ka Pikaka i ka moku hau, a mai nahaha loa: ua pakela no nae no ke akamai loa o kona kapena o Hudesona. Holo kokoke i kela aina hema ka Winisani i 1700 mile a ike pinepine; lakou i ka aina; he aina pali, paupu i ka hau, aole kanaka, he mau walerusa, a me na <u>sila</u> wale no ko laila holoholona. Pau keia; Holo mai aku la keia ulu moku imi aina, a i keia mai la iho nei i ka la 15 o Iune, hoi hou mai la ka Pikaka, o Hudesona ke alii a me ka Pulolo. Ua huli lakou i kekahi pae aina; (Kinimila ka inoa ma ka olelo Enelani.) aia ma ka poaiwaena, ma ke komohana hema mai ia nei aku. He pae moku liilii kela, he haahaa, a he ano loa ka holo ana o na moku ma kela wahi, no ka ike ole ia o na wahi papau a me na moku liilii. Aka, ua pau i ka huliia a me ka palapalaia na wahi pilikia olaila e ko ka Pikaka a.
>
> *<u>About the Land Exploration Fleet.</u>*
> *In the month of October 1841, the land exploration fleet arrived from the United States of America, here in Honolulu. There were four ships, the large ships, (the Vincennes, and the Peacock) as well as two nose diving ships, the Dolphin, and the Flying Fish and Charles Wilkes was their high commander. The fleet explored land in it's entire length, and they saw great lands there, on the 13th day of January, 1840, in the latitude 65°30′ longitude 104°24′. Their progression was troubled upon that Anarctic [sic.] ocean, because of the expanse of the ice; like great big islets, just floating, haphazard, icelocked [sic.] in that place. The Pīkaka was run aground on an iceberg, and very nearly wrecked: we escaped because of the good judgment of his Captain Hudson. The Vincennes approached that arctic land which is 1700 miles and they frequently saw land; a precipice, filled with ice, no people, just walruses and seals were the animals that belonged there. This is done.*
>
> (http://ulukau.org/collect/nupepa/index/assoc/HASH41b7.dir/004_0_001_003_009_01_ful_18410803.pdf)

An article in an October 1859 issue of *Ka Hae Hawai*'*i*, entitled No Ke Kakau Hoike Ana I Na Moku (Regarding writing bonds for vessels) appears to be a discussion of government requirement for seagoing vessels, some of which are involved in the hunt for whales and seals ("a whaling vessel and a sea dog investigating vessel"). The two terms for seal used in this article are "iliokai" (literally sea dog) and "ilio o kai" (dog of [the] sea). This usage is similar to Emerson and Bishop's 1845 phrase "he ilio o ke kai" and Lorrin Andrews' 1865 dictionary's "he ilio o ke kai" (see Section 5.4.1). The article reads:

Haʻawina XXIV
<u>No Ke Kakau Hoike Ana I Na Moku</u>
…waia okohola, a no ka imi ana i na <u>iliokai</u>, ma ka moa o ka mea nona kekahi hapa o ia moku, ina he kanaka kupa ia a he kanaka kupa ole paha, a ina e noho paa aha oia iloko o keia Aupuni….

Pauku 636. Ma ke kakau hoike ana i kekahi moku, e Iike me ka olelo a ka pauku maluna ae nei, e koi aku ka Luna Dute Nui, i ka mea nana i noi mai ao ke kakau hoike ana, e haawi mai oia i palapala hoopaa me na hope kupono i ka manao o ka Luna Dute Nui, no na dala aole emi mai malalo o na haneri elua, aole hoi oi oku i elua tausani, e hoohalikeia e ka Luna Dute Nui me ka nui o na tona o ka moku; e olelo ana ia palapala hoopaa, e hanaia ka palapala hoike i ke kakau ana no ka moku, ana i haawiiaʻi wale no, aole hoi e kuaiia, a e haawi lilo ole ia, a e hoolilolia paha ma ke ano e ae, i kekahi kanaka; a ina e lilo ia moku a pau, a o kekahi hapa paha o ka moku, ina aole ia he moku okohola a moku imi <u>ilio o kai</u>, no kekahi haole a mau haole paha i kupa ole ma keia Aupuni, a ina paha e poino, a i lawe pioia paha e kekahi enemi, a i hoopauia i ke ahi, a i wawahiia ka moku paha,….

Article XXIV.
Regarding writing bonds for vessels
…disgraced whaling, and for searching for the <u>seadog</u>, in the ocean of the one for whom is half of the vessel, if a citizen or not a citizen, and if permanently residing in this Kingdom.

Paragraph 636. In bond writing for a vessel, similar to the language of the paragraph directly above, the Chief Customs Officer requires, of the one who request the bond writing, to give him an insurance policy with equitable legal surety as is the will of the Chief Customs Officer, for a sum not less than $200.00, and not too exceed $2,000.00, to be matched by the Chief Customs Officer with the larger part of the tonnage of the insurance policy shall be done in writing for the vessel, only for what he was awarded, not to be sold, and not to be granted absolutely, or conveyed in a different manner, to a person; and if the entire vessel is transferred, or half of the vessel, or if it is not a whaling vessel and a <u>sea dog [dog of (the) sea]</u> investigating vessel, for a foreigner or foreigners not citizens in this Kingdom, or if damaged, or if abducted by an enemy, and consumed in a fire, or ship-wrecked,....

(http://www.nupepa.org/gsdl2.5/cgi-bin/nupepa?e=q-0nupepa--00-0-0--010-TX--4--waia+okohola---text---0-1l--1haw-Zz-1---20-about-%5bwaia+okohola%5d%3aTX--0013waia+okohola-1-0000utfZz-8-00&a=d&c=nupepa&cl=search&d=HASH4055713b8bf3231b1dce80.3)

An article in a December 1864 issue of *Ka Nupepa Kuokoa* entitled Ka Lāʻau Ka-umaka e pau ai ka Niniaole O Nā Maka Hūʻalu Pepeʻekue O W.H. Kalae-O-Kaena (The Beloved Medicine that cured the waterlessness of the thick viscous membrane covering the eye of W.H. Kalae-O-Kaena (loose skin over the eyeball; slight viscous membrane covering the eye) is the first instance where we encounter the term "ʻīlioholoikauaua". Interestingly, this article does not directly refer to the Hawaiian monk seal, or any other kind of seal. Instead, the term "ʻīlioholoikauaua" appears to be a poetic or proverbial epithet referencing to a despised or ill thought of individual. The entire article is couched in a strongly poetic and allusive style (common to some forms of Hawaiian discourse). It is either saying that the individual is as despicable as a seal, or more likely, that he is like a dog running in *ka ʻuʻaʻuʻa*, where the word *ʻuʻaʻuʻa* is an intensification of *ʻuʻa*, which means "useless, vain, to no profit". It seems likely that the phrase is being used here do characterize the individual as useless. The article reads:

Ka Lāʻau Ka-umaka e pau ai ka Niniaole O Nā Maka Hūʻalu Pepeʻekue O W.H. Kalae-O-Kaena:
E Ka Nūpepa Kūʻokoʻa E; Aloha ʻoe: -- Ua ʻikea iho ma kou ʻaoʻao 3 o ke Kahua kaua o ka lā 27 o ʻOkatoba, Helu 44 o ka Buke III o ke "Kilohana Poʻokela o ka Lāhui Hawaiʻi." Aia ma laila ka pehina (throwing/pelting, as of rain) mai nei a W.H. Kalaeokaena, i nā pōhaku ʻelekū pukapuka o nā hekili kuʻi-pāmalō a ua ʻīlioholoikauaua lā, ʻaluʻalu pāpaʻi niho kekē o Koholāloa; e hāhā pōʻele lā i ua iʻa lā o ka ʻāina āna (W.H.K.) e noho lā; me he lhuanu lā e manaʻo ana e hina o ʻAiwohikupua, i ka hele wahi ʻana a kani ka pola o ka malo; ʻū! e olo hoʻi! Hina lā ana kei! A ʻo paha e olo ka hina o ke ʻAʻaliʻikūmakani o Kaʻū iā ʻoe, e nā lāʻauohala kumu Pūhala neʻineʻi.

The Beloved Medicine that cured the waterlessness of the thick viscous membrane covering the eye of W.H. Kalae-O-Kaena (loose skin over the eyeball; slight viscous membrane covering the eye)
Dear Independent Newspaper; Greetings to you: -- It was observed in your 3rd page of the war section on the 27th day of October, Number 44 of Book III of the "Foremost Champion for the Hawaiian Nation." There was W.H. Kalaeokaena's raining of the hole riddled basalt rocks [bullets] of the roaring thunder-with out rain [gun] upon this dog-running-in-the-rough-seas; the misshapen crab claw of Koholāloa, ignorantly groping for this fish on the land where he (W.H.K.) lives; like the Ihuanu wind thinking to topple over ʻAiwohikupua, going somewhere until the flap of the loincloth sounds; ʻū! resounding! glorious toppling! and perhaps resounding the steady blowing of the ʻAʻaliʻikūmakani wind of Kaʻū to you, the hala leaves of the grove of the low-lying hala trees.

(http://www.nupepa.org/gsdl2.5/cgi-bin/nupepa?e=q-0nupepa--00-0-0--010-TX--4--Kalaeokaena---text---0-1l--1haw-Zz-1---20-about-%5bKalaeokaena%5d%3aTX--0013Kalaeokaena-1-0000utfZz-8-00&a=d&c=nupepa&cl=search&d=HASHa71eb66cb3f9760b697503.1)

An 1865 article in *Ka Nupepa Kuokoa* entitled Ka Pepehi Kohola Ana Me Ka Mahu for which there is no present English translation appears to concern the hunting of whales. It refers to, "na kohola a me na sila", which very roughly translates as "the whales with the seals". Here again, the word for seal is "sila", a local adaptation of the original English word. The article reads:

Ua ike iho makou maloko o na nupepa Sekotia i ka nui o ka pomaikai i loaa i na kanaka nona na moku mahu huila mahope ma ka lawaia kohola ana. Ua ikeia ua holo aku mai ke aina aku o Dunedi (Dundee) eono moku mahu ma na wahi hau e alualu ai i na kohola a me na sila (seal). Ua hoi mai lakou me na tona aila 645, a 107 1/2 tona pakahi, o ka hiku o ka moku ua poholo ma ia holo ana; oiai he umikumamalua moku mahu a he umikumamaono moku pea i hoounaia mai Pitaheke (Peterhead) aku, ua hoi mai lakou me na tona aila 388, aneane 38 tona aila ka oi o na moku mahu pakahi mamua o na moku pea.

(http://www.nupepa.org/gsdl2.5/cgi-bin/nupepa?e=q-0nupepa--00-0-0--010-TX--4--Dundee+sila---text---0-1l--1haw-Zz-1---20-about-%5bDundee+sila%5d%3aTX--0013Dundee+sila-1-0000utfZz-8-00&a=d&c=nupepa&cl=search&d=HASHdaad27d6549274be043d7d.2)

A June 1865 article in *Ka Nupepa Kuokoa*is entitled He ʻAumoku hou, e holo ana ka Wēlau ʻĀkau (A new fleet, sailing to the North Pole) contains the first known instance in a Hawaiian language newspaper where seals are referred to as ʻīlioholoikauaua. The article discusses a British expedition to the North Pole and describes the arctic landscape. "Just snow is what is seen there, no plants; the polar bear is still important, with the dogs-running-in-the-rough-seas (seals), and the sea elephants". The article reads:

He ʻAumoku hou, e holo ana ka Wēlau ʻĀkau.
Ke hoʻomākaukau nei o Kapena Osbone (Osborne) o nā Moku manuwā o Beritania e holo i ka Wēlau ʻĀkau. Ua makemake ʻia i ʻelua mau moku māhu liʻiliʻi me nā kānaka he 120, a i ka Makahiki 1866 e hiki mai ana e holo ai ia. I loko o ke kau e holo aku lākou i ke Kaikūʻono o Bafine ma ke komohana o ʻĀinaʻōmaʻomaʻo, a hala loa aku i loko e like me ka lōʻihi o kahi e hiki ai ke hele aku. I loko o kēia mau makahiki aku ʻelua, e holo ana lākou me nā waʻapā a me nā koa na ka ʻīlio e kauō a hiki i ka Wēlau. ʻO kākou o ka poʻe hoʻi e noho nei i ka lā pumehana o Hawaiʻi nei, kai ʻike ʻole i ke anu o ia wahi. Ua ʻemi iho ka waidālā o ka hōʻailona māhu (thermometer) i kekahi manawa, i nā degere he 50 ma lalo o ka ʻole. He hau wale nō ka mea ʻike ʻia ma laila, ʻaʻole mea kanu; ʻo nā bea keʻokeʻo naʻe ka mea nui, me nā ʻīlioholoikauaua, a me nā ʻelepani o ke kai. I loko nā kānaka o nā hale hau e noho ai me nā lole hulu, a ʻo kā lākou ʻai o ka ʻiʻo momona me ka ʻaila a me kekahi mau mea ʻē aʻe. Ma laila e lilo ai ka bia a me kekahi mau wai ona ʻē aʻe i mea ʻoʻoleʻa me he pōhaka lā. I ka wā hoʻoilo, he pō lōʻihi ko lākou no nā mālama he nui wale, i ahona iki i ka mahina, no ka mea, he kōnane maikaʻi loa ka mahina ma laila, a me kekahi mālamalama ʻano ʻē ma laila ia kapa ʻia ka Aurora Borealisa (Aurora Borealis) a ʻo ka Mālamalama ʻĀkau. Ma ka Wēlau ma laila ka pō no nā mālama ʻeono, a me ka lā no nā mālama ʻeono. Inā e hiki ʻiʻo ʻo Kapena Osebone ma ia wahi, e kaulana nō kona inoa, no ka mea, ʻo ia ke kanaka mua i hiki ma laila.

A new fleet, sailing to the North Pole.
Captain Osborne is preparing the British battleships to sail to the North Pole. Two small steamships were wanted with 120 men, and in the coming year 1866 he will set sail. During the summer they will sail through Baffin Bay in the west of Greenland, and stay awhile in there like the length of one who comes and goes. Within these two years, they will go with sleds and guards for the dogs to tow until they arrive at the Pole. We are to be sure the ones living here in the warmth of Hawaiʻi, unacquainted with the chill of this place. The mercury of the thermometer lowered once to 50 degrees below zero. Just snow is what is seen there, no plants; the polar bear is still important, with the dogs-running-in-the-rough-seas, and the sea elephants. Inside, the people stay in igloos with fur clothing, and as for their food it is rich meat and oil and other things. There, beer and alcoholic drinks become as hard as stone. In the winter, they have a long night for many months; the moon is a little better, because, the moon there has very good clear, bright moonlight; and there is a kind of strange light there named the Aurora Borealis otherwise known as the Northern Lights. At the Pole it's night there for six months, and day for six months. If Captain Osborne actually goes there, his name will be truly famous, because, he will be the first man to go there.

(http://www.nupepa.org/gsdl2.5/cgi-bin/nupepa?e=q-0nupepa--00-0-0--010-TX--4--%22elepani+o+ke+kai%22---text---0-1l--1haw-Zz-1---20-about-%5b%22elepani+o+ke+kai%22%5d%3aTX--0013%22elepani+o+ke+kai%22-1-0000utfZz-8-00&a=d&c=nupepa&cl=search&d=HASH012b3f78fd6c3554bf830845.2)

An article in a November 1867 edition of the newspaper Ke Alaula, entitled Kokoke aku lākou i ka Wēlau ʻĀkau (They are approaching the North Pole) appears to concern another expedition to the North Pole. Once again the term "ʻīlio-holo-ika-uaua" is used to refer to arctic seals (in this case probably the fur seal). The article has two references to seals. "Their clothing to keep warm was the pelt of the dog-running-in-the-rough-seas and the other slippery, furry animals." "They catch on the seashore the dogs-running-in-the-rough-seas and the sea elephants. " The article reads:

<u>Kokoke aku lākou i ka Wēlau ʻĀkau.</u>
I ka noho ʻana o lākou i ka moku, holo aʻe kekahi poʻe o lākou i ka ʻākau ha[u] aku ma luna o nā holopapa i kauō ʻia e nā ʻīlio. Ke ʻike lā ʻoukou ma ke kiʻi ma luna aʻe nei i ke ʻano o ka hoʻokaulua ʻia o nā ʻīlio, a hoʻohui ʻia lākou e kauō i ka holopapa. Noho iho ke kanaka ma luna o ka papa, a kauō māmā loa ʻia ʻo ia e nā ʻīlio ma luna o ka hau paʻa. I kekahi manawa ʻelima a ʻeono ʻīlio kā i hoʻopaʻa ʻia i ka papa; i kekahi hoʻi he nui aku – he ʻumikūmāmāhā a ʻumikūmāmāono paha. Holo aku kekahi poʻe o lākou i ka ʻākau a hiki i ka latitu 82° 30′. I laila ʻike aku lākou i ka Moana Anu ʻĀkau. ʻAkahi nō a launa kokoke aku kekahi i ka wēlau ʻākau e like me kēia – 450 wale nō mile koe a loaʻa aku nō. Akā, ʻaʻole nō he kanaka i hiki aku i laila, no ke anu loa – make e maʻi nō i ke anu. ʻAʻole i loaʻa iā lākou he wahi meheu no Sir Ioane Feranekelina. Ma hope loa mai ua loaʻa ʻia i kekahi poʻe ʻē aʻe. ʻElua a ʻekolu paha o kēia poʻe a Kauka Kaina i loaʻa i ka maʻi a make; hoʻokahi i loaʻa i ke anu ma kekahi wāwae a ʻoki ʻia aku ka wāwae ; lilo hoʻi ʻelua manamana wāwae o kekahi. ʻO ko lākou kapa e mehana ai, ʻo ka ʻili o ka<u>ʻīlio-holo-ika-uaua</u> a me nā holoholona huluhulu paheʻe ʻē aʻe, e like me kā nā kānaka i hōʻikeʻike ʻia ma ke kiʻi ma luna aʻe nei.

<u>They are approaching the North Pole.</u>
When they were staying on the ship, a group of them went to the icy north on top of the sled dragged by the dogs. You see in the picture above the disposition of the harnessed dogs, and they are united to drag the sled. The people sit on top of the sled, and he is quickly sled by the dogs on top of the hard snow. One time five maybe six dogs were secured to the sled; another time more – fourteen maybe fifteen. Some of them went to the north until the latitude 82° 30′. There they saw Arctic Ocean. It was the first time someone approached the end of the north pole like this – just 450 miles left until the end. But, there was no person that could go there, because of the extreme cold – becoming deathly ill because of the cold. They didn't find a trace of Sir John Franklin. A long time afterward, it was reached by other people. Two maybe three of these groups and Doctor Kaina got sick and died; one got frostbite on a foot and the foot was cut off; and two toes of one was lost as well. Their clothing to keep warm was the pelt of the <u>dog-running-in-the-rough-seas</u> and the other slippery, furry animals, like the men shown in the picture directly above.

(http://www.nupepa.org/gsdl2.5/cgi-bin/nupepa?e=q-0nupepa--00-0-0--010-TX--4--%22ilio+holo%22---text---0-1l--1en-Zz-1---20-about-%5b%22ilio+holo%22%5d%3aTX--0013%22ilio+holo%22-1-0000utfZz-8-00&a=d&c=nupepa&cl=search&d=HASHea9612c97115b1ddea12bb.1)

It continues:

…kou holoholona i mālama loa ai. ʻAi nō hoʻi ʻo Kauka Kaina i ka ʻīlio a me nā ʻiole i loaʻa iā lākou ma luna o ka moku. Loaʻa iā lākou ma nā ʻae kai nā ʻ<u>īlio-holo-i-ka-uaua</u> a me nā ʻelepani kai. He makaʻu nā kamaʻāina Ekimo i kēia holoholona nui, akā make nō ia lākou i kekahi manawa. I ka hoʻi ʻana mai o Kauka Kalina i Piledelepia, hoʻopuka ʻo ia he buke moʻolelo o nā mea āna i ʻike ai ma ia ʻāina anu, a ua piha ia buke i nā kiʻi nani loa. Eia mai ke kiʻi o ka ʻelepani-kai.

...your animal to attend. Doctor Kaina also eats dogs and rats they found on the ship. They catch on the seashore the <u>dogs-running-in-the-rough-seas</u> and the sea elephants. The local Eskimo are afraid of this big animal, but they also sometimes kill it. When Doctor Kaina returned from Philadelphia, he published a story book of the things he saw in this frozen land, and this book was filled with very beautiful pictures. Here is the picture of the sea elephant.

(http://www.nupepa.org/gsdl2.5/cgi-bin/nupepa?e=q-0nupepa--00-0-0--010-TX--4--Ekimo+Piledelepia---text---0-1l--1haw-Zz-1---20-about-%5bEkimo+Piledelepia%5d%3aTX--0013Ekimo+Piledelepia-1-0000utfZz-8-00&a=d&c=nupepa&cl=search&d=HASHea9612c97115b1ddea12bb.2)

A February 1876 article in *Ka Nupepa Kuokoa* was one of a series that consisted of a Hawaiian translation of Jules Verne's book *Twenty Thousand Leagues Under the Sea*. In this section of the book, the harpooner Ned Land speaks with disgust of the food they eat on the *Nautilus*. One of these foods is broiled seal meat, "the broiled meat of the dog-running-in-the-rough-seas".

The newspaper *Ka Nupepa Kuokoa* (Buke XV, Helu 8, Feberuari 19, 1876) for 19 February 1876:

> "Ba," i uilani aʻe ai o Nede me nā ʻano huhū: "he aha kāu i manaʻo ai no nā mea a kākou e ai ai maʻanei? He ake honu, he lālā manō, a me nā ʻiʻo kōʻala ʻa o ka <u>ʻĪlioholoikauaua</u>."
>
> *"Ba," queried Ned in anger: "what are the things you think we eat here? Turtle liver, shark fin, and the broiled meat of the <u>dog-running-in-the-rough-seas</u>."*

An August 1876 article in *Ka Nupepa Kuokoa* consists of another chapter in the Hawaiian translation of Jules Verne's *Twenty Thousand Leagues Under the Sea*. Here Captain Nemo shoots "a large animal, a vicious otter, an animal somewhat like the dog-running-in-the-roughseas." The article reads:

> <u>He ʻIwakālua Tausani Legue Ma Lalo O Ke Kai! Nā Mea Kupanaha O Ka Moana! Ke Ala O Ka Mea Huna A ʻO Ka Mea Pohihihi O Ka 1866! Mahele 1, Mokuna XVI, He Ululāʻau Moana.</u>
> Aia ma kēia wahi, he mea e ka lehulehu o nā iʻa liʻiliʻi o kēlā me kēia ʻano, i kūpono ʻole no ke kī ʻana me nā pōkā. A no ka lelehu loa o nā iʻa liʻiliʻi, ua hiki pono ʻole iaʻu ke ʻike aku i nā mea nui; akā, ʻo Kapena Nimo, ua ʻike akula nō ia i kekahi holoholon[a] nui, he otera ka ʻino, he holohona ʻano like me ka <u>ʻīlio holo-ikauaua</u>; a ʻo ke kī koke akula nō ia no ia o ua Kapena Nimo, a mae ana ua holoholona nei. He ʻelima kapuaʻi kona loa, a he mea hoʻi i makemake nui ia, no ka nani o kona hulu. ʻO nā kapa i hana ʻia no loko mai o ia ʻano hulu, he $400.00 ke kumukūʻai. Ua ʻike nuai ia nā kapa o kēia ʻano ma nā mākeke o Rusia a me Kina. ʻO kahi noho nui o kēia ʻano holoholona, aia ma ka Moana Pakipika ʻĀkau.
>
> *<u>20,000 Leagues Under The Sea! The Wonders of the Ocean! The Path Of Secret And Mystery of 1866! Section 1, Chapter XVI, A Fleet At Sea.</u>*
> *In this place is something of a multitude, a variety of little fish, for which it is illegal to shoot with bullets. And because of the very duskiness of the little fish, I couldn't properly see the larger things; but, Captain Nimo then saw a large animal, a vicious otter, an animal somewhat like the <u>dog-running-in-the-roughseas</u> (seal); and Captain Nimo then shot it, and this animal slumped over. It is five foot long, and something for which it is greatly desired, is the beauty of its coat. Blankets made from this type of fur is a costly $400.00. Blankets of this type are largely seen in the markets of Russia and China. The place where this type of animal mainly inhabits is the North Pacific Ocean.*
>
> (http://www.nupepa.org/gsdl2.5/cgi-bin/nupepa?e=q-0nupepa--00-0-0--010-TX--4--%22ilio+holo%22---text---0-1l--1en-Zz-1---20-about-%5b%22ilio+holo%22%5d%3aTX--0013%22ilio+holo%22-1-0000utfZz-8-00&a=d&c=nupepa&cl=search&d=HASH01fba361bed4c4d8cd0da842.1)

In this article published in a March 1894 edition of *Ka Makaʻāinana* the term ʻīlio holo i ka uaua, which is used elsewhere to refer to directly to seals, is employed for its secondary meaning. The writer plays on meaning of the word ʻ*u*ʻ*a*ʻ*u*ʻ*a* (useless, vain, to no profit) and the word *holo* (run), as well as the physical image of the seal. "This is our time to demonstrate our unity, there is no time for us to run; else indeed the Kingdom officials and possibly the learned persons below them, truly without a nation, but, released to that group, will then slacken in their moral resolve like the dog-running-in-the-rough-seas. But, as for the nation, it will transform and separate; and then, truly be taken unto the depths of the ocean, and properly arranged there." The term *ʻīlio holo i ka uaua* is used as a poetic metaphor for someone lacking in moral resolve. The article reads:

> Mai Pūlama Aku.
> ʻO ia nō kēia mākou e uwalo aku nei i nā hoa makaʻāinana a pau, mai pūlama aku i nā hana a kēia poʻe no ka mea pili i ka pono koho balota no nā ʻelele i ka ʻaha hana kumukānāwai a lākou. Ua lohe ʻia mai aia kā nā poʻe o na Kona a me Kaʻū, Hawaiʻi, ke pīkokoi nui lā e kākau inoa ma lalo o ka hoʻohiki a ua poʻe pākaha nei, a mākou nō hoʻi i hōʻaiʻai aku ai ma ka helu i hala i ka waiwai ʻole o ko ka lāhui kumu hana aku pēlā, no ka mea, ke hoʻokō, ʻo ka ʻāpono ʻana nō ia iā lākou nei, a lilo kā lākou nei ʻino i hana mai ai iā kākou i mea maikaʻi. ʻO kā mākou hoʻi e makemake nei, ʻo ia nō ko kākou kū mai nō i ka wā, ʻoiai, aia iā Amerika Huipū ʻia ka hana. No ka mea, ua ʻoiaʻiʻo loa nō kā mākou i hoʻomahuʻi aku ai inā kākou e kōkua ʻole aku, ʻaʻale loa lākou e ʻike ʻia mai a huli ke ao nei. ʻO ko kākou wā kēia e hōʻike ai i ko kākou lōkahi, ʻaʻohe manawa e aku nō kākou; a inā nō ʻo nā poʻe lawelawe ʻoihana Aupuni a poʻe naʻaua[o] paha ma lalo o lākou, ʻaʻohe nō ia o ka lāhui, akā, e hoʻokuʻu aku nō i kēlā poʻe a ʻaluʻalu aku i ko lākou pono e like lā me nā ʻīlio holo i ka uaua. Aka, no ka lāhui hoʻi, e unuhi mai nō a kaʻawale; a laila, lawe aku nō a kai hohonu, hoʻokuene pono iho ʻana i laila.
>
> *Don't Bother.*
> *This is what we declare to all of the fellow residents, don't bother with the activities of this group because they are associated with the equal ballot election for the delegates in their constitutional labor convention. It was heard, there were the groups of Kona and Kaʻū, Hawaiʻi, largely gathering to register beneath the names of these crooks, and we also released in the list of offenses national concerns and such that are unbeneficial, because, when ratified, it will then be enforced by them, and their offenses will become worthless to our benefit. As for our needs, it's for us to rise to the time, while the United States is reasonable. Because, our impersonation was incredibly accurate, if we didn't render aid, they certainly wouldn't have been seen until the day was over. This is our time to demonstrate our unity, there is no time for us to run; else indeed the Kingdom officials and possibly the learned persons below them, truly without a nation, but, released to that group, will then slacken in their moral resolve like the dog-running-in-the-rough-seas. But, as for the nation, it will transform and separate; and then, truly be taken unto the depths of the ocean, and properly arranged there.*
>
> (http://www.nupepa.org/gsdl2.5/cgi-bin/nupepa?e=q-0nupepa--00-0-0--010-TX--4--%22ilio+holo%22---text---0-1l--1en-Zz-1---20-about-%5b%22ilio+holo%22%5d%3aTX--0013%22ilio+holo%22-1-0000utfZz-8-00&a=d&c=nupepa&cl=search&d=HASH01c635aa1500b0d8bd2ec677.4)

An article by T. H. Poaha in *Elua Nupepa Kuokoa*, September 1924, describes the coast of California and refers to the presence of seals by the famous Cliff House. Here, interestingly, the word used for seal is "uwalo", as given by Henry P. Judd, Mary Kawena Pukui and John F. G. Stokes in their 1945 English-Hawaiian vocabulary. The article reads:

> Ma kela huakai makaikai, ua hoea aku la oia no ke Cliff House, kekahi o na wahi makaikai nui ia e na malihini, nani no kela wahi i ka nana aku; o ka mea ano nui ma keia wahi, o ia no ka makaikai ana i Ka pii mai o na uwalo mailoko mai o ke kai a noho iluna o kekahi pohaku nui.

The place name ʻĪliopiʻi appears occasionally in the Hawaiian language newspaper, but in each case it refers to the cape on Kalaupapa, Molokaʻi, and there is no reference to Hawaiian monk seals.

Although less than 10% of Hawaiian language newspaper articles have been transcribed and made searchable, it is still possible to draw some tentative conclusions based on the use of the various terms for seal in the articles to which we have access. The earliest known reference to seals appears in an article from 1841, four years prior to Emerson and Bishop's vocabulary. The author of this article refers to seals by the Hawaiian version of their English name, "sila". This might suggest that there was no generally agreed upon Hawaiian name for seal at that time.

Later articles give various names for seal; "iliokai" and "ilio o kai" (1859), "sila" (1865), "ilioholoikauaua" (1865, 1867, 1876, 1894), "uwalo" (1924). Most of these terms (or combinations of words similar to them) appear in the various Hawaiian dictionaries. It is interesting to note that the term *ʻīlioholoikauaua*, which is generally accepted today as the name for the Hawaiian monk seal, does not appear in use until the mid 1860s. None of the Hawaiian language articles identified mention the Hawaiian monk seal, and most make reference to either the Arctic or Antarctic seals.

5.3 Western Visitors

Beginning with the journals of Captain James Cook, the accounts of the early Western voyagers who visited Hawaiʻi provide us with detailed descriptions of the natural and cultural landscape of the islands. Nowhere in of these accounts is there any mention of Hawaiian monk seals being either directly observed or reported in the MHI.

It was not until Western voyagers reached the NWHI that the first references to seals began to appear in their writings. In 1805 the Russian explorer Urey Lisiansky observed seals on a beach of the island that now bears his name, Lisianski Island near French Frigate Shoals (Lisiansky 1814). This appears to be the first record of the existence of the Hawaiian monk seal. Lisianski notes that four seals were killed and others were observed (Ragen 1999:186). In 1825 Benjamin Morrell, captain of the whaling ship *Tartar*, who provided the first detailed observations of most of the NWHI, reported what he thought were elephant seals on some of the islands (Morrell 1832:215-219; Ragen 1999:186). These were most likely monk seals. In 1827-28, the ship *Moller* documented seals on the newly discovered island of Laysan (Ragen 1999:186). The crews of ships wrecked in the NWHI, such as the *Parker* wrecked on Kure Atoll in 1842, the *Holder Borden* wrecked on Lisianski Island in 1844, and the *Signaw* wrecked on Kure Atoll in 1870, report taking seals for food, as did ships searching for guano deposits (the *Manuokawai* in 1857) or simply exploring the islands (the *Rodolph* in 1850) (Ragen 1999:186). The ship *General Siegel*, which was shark fishing in the NWHI in 1886 reports catching monk seals to use as bait (Ragen 1999:186).

5.4 Native Contact Between the MHI and the NWHI

While evidence appears to indicate that most of the native population of the MHI were not familiar with the Hawaiian monk seal prior to Western contact, the possibility exists that fishermen from some communities on Kauaʻi and Niʻihau may have encountered monk seals during fishing expeditions to the NWHI. That the knowledge of the existence of the NWHI was not widespread is evidenced by the reaction the small number of Hawaiians from the island of Kauaʻi who accompanied the Western exploring expedition that first "discovered" the islands. In 1788, Captain Colnett of the *Prince of Wales* became the first Westerner to chance upon the island of Nihoa, the closest of the NWHI to the main islands of the chain. Colnett had with him on board the *Prince of Wales*, "some natives of Attowai [Kauaʻi] who expressed great surprise that there should be land so near to these islands…of which not only themselves, but all their countrymen were totally ignorant" (Vancouver 1798:81-82).

According to the Robinson family who own the island of Niʻihau, the residents of that island had the capability to travel to Kaʻula and Nihoa Islands by canoe, and some people from Niʻihau would spend three months in the summer on Nihoa Island until the late 1800s (Iversen et al. 1990:23). However, analyses of 113 whalers' logs visiting the NWHI from 1791 to 1878 contain no reference to Native Hawaiian fishermen (Iversen et al. 1990:22).

In 1857, King Kamehameha IV sailed to the leeward island of Nihoa aboard the Schooner *Manuokawai*. The ship's log records that, "At 10 a.m. went ashore (got upset in the landing). The King and Governor [Kekūanaōʻa] landed at the same time in a canoe…About a dozen seal were found on the beach and the King shot several of them" (Emory 1928:9). The Captain of the vessel, Captain Paty, gave the following account of their visit to Nihoa on April 27, 1857, ". . . on the sand beach ten or twelve hair seals were found; they didn't take much notice of us until His Majesty [King Kamehameha IV] had shot several, when they became more scared" (Kenyon and Rice 1959:216). On the king's return to Honolulu, he instructed Captain John Paty to survey the remainder of the NWHI and claim them for the government of the Kingdom of Hawaiʻi. During that voyage, Paty noted that the beaches of the islands abounded with seals. On Nihoa he found a dozen seals hauled out on the single beach (Paty 1857:42-43).

5.5 Historic Hunting of Monk Seals in the NWHI

The earliest commercial hunting of seals in the NWHI appears to have occurred soon after they were first described by Lisiansky. In 1824, the brig *Aiona* returned to Honolulu following a sealing expedition to the NWHI (Bailey 1952:4). The taking of seals for their fur and oil had been begun as early as the mid-1700s along the Pacific Coast of the Americas. Various seals in North Pacific waters, including the Guadalupe fur seals, northern fur seals, California sea lions, and Stellar sea lions were slaughtered by the thousands for their fur, blubber and other body parts, while northern elephant seals were targeted for their thick blubber which was boiled down for oil (Ellis 2003:161-178). Like whale oil, the oil obtained from the blubber of seals was used for lamp fuel, lubricants, cooking oil, soap and innumerable other products.

In 1859, the bark 249 tons *Gambia* went sealing in the NWHI. She left Honolulu on April 26, and cruised among the Leeward Islands, returning on August 7. The *Gambia* is reported to have obtained 240 barrels of seal oil, 1,500 skins, a quantity of shark fins and oil (Anonymous 1859; Cobb 1902:496-497, Ragen 1999:186). How accurate these numbers are, and whether all of this cargo was obtained in the NWHI is still in question.

Within a relatively short span of years, the population of Hawaiian monk seals in the NWHI had been reduced so drastically that the seal grounds were deserted as the population was not large enough to make hunting the seals commercially viable. Guano diggers, bird hunters, and whalers further depleted the remnant seal population during the late 1800s and early 1900s (Kenyon and Rice 1959:215).

Historic Reports of Monk Seals in the MHI
It has been possible to find only one clearly documented early historic case of a Hawaiian monk seal being reported from the MHI. In 1900 a monk seal was seen at Hilo Bay on the island of Hawaiʻi. "A sick or helpless seal was caught by the natives in Hilo Bay, Hawaii, towed ashore, killed and eaten. Unfortunately I was too late to secure any part of the animal for identification, but the natives assured me that solitary seals occurred on the coast about once in 10 years or so. They were very curious and asked many questions as to the habitat of the animal, its nature, food, and habits, about which they knew nothing" (H. W. Henshaw as quoted in Bailey 1952:5). The results of this encounter between native Hawaiians and the indigenous Hawaiian monk seal readily suggest why, at the time of Western contact, there was no resident population of monk seals in the MHI.

6.0 Contemporary Perspectives on the Hawaiian Monk Seal

6.1 Contemporary Names
In his book *The Hawaiian Monk Seal*, Patrick Ching notes that, "on the island of Niʻihau, a privately owned island where Hawaiian is the primary language, there are at least two names for the seal. According to Keith Robinson, whose family owns the island, "one is *sila*, derived from the word seal, and the other is ʻ*īlio-holo-kai*, meaning 'the dog that runs in the sea'" (Ching 1994:7). While the term *sila* corresponds with the earliest documented name for seals found in the Hawaiian language newspapers, the latter term is similar to both the early dictionary term for monk seal, *he* ʻ*īlio o ke kai*, and the later ʻ*īlio-holo-i-kauaua* (see Section 4.1).

In their 2011 report on the *Historic and Contemporary Significance of the Endangered Hawaiian Monk Seal in Native Hawaiian Culture*, prepared for NOAA, John Kittinger, Trisann Māhealani Bambico, Trisha Kehaulani Watson and Edward W. Glazier mention that, "Moʻolelo (oral stories) with community elders (*kūpuna*) and native language speakers have confirmed" the use of the term *hulu* for the monk seal. Their informants also indicated "the use of the term *nā mea hulu* (the furry ones) for the monk seal species." They indicated that, "Some respondents knew of other names for the monk seal, but declined to provide the names because of worries about how the names would be used" (Kittinger et a. 2011:11).

6.2 Monk Seals as Family ʻ*Aumākua*
In their report of interviews conducted in 2011 under a grant from NOAA, Kittinger, Bambico, Watson and Glazier noted that; "Some interviewees described families on Hawaiʻi and Oʻahu islands that consider the species to be ʻ*aumākua*, the "family or personal gods, deified ancestors who might assume the shape of…[various animals]" (Pukui and Elbert, 1986 [1971]). ʻ*Aumākua* are traditionally protected by their associated families and various cultural protocols are followed to steward the relationships between the family and their spiritual guardian. Notably, the monk seal is not named as a common ʻ*aumākua* (Pukui and Elbert, 1986 [1971]), but this does not necessarily mean that the families have recently adopted this cultural association. ʻ*Aumakua* can be associated with families for many generations, reaching far back into history, or can be recent additions based on events that carry special cultural meaning and significance.

Additionally, some communities have conducted spiritual ceremonies for monk seals during which the monk seal is recognized as part of the ‘*ohana*, or family. Respondents have said that the details of such activities are deliberately kept *hūnā*, or secret" (Kittinger et al. 2011:16-17).

In further clarifying this, the authors indicate that it was difficult to obtain specific information on this aspect of human-monk seal relationships as one knowledgeable individual passed away before they could be interviewed while another refused to be interviewed.

6.3 Mythological Associations

Kittinger and his co-authors also reported that, "Some respondents shared *mo*‘*olelo* (oral traditions/stories) about monk seals that indicated a mythological association with the species. In one account from the island of Moloka‘i, a *kupuna* (community elder) told of a monk seal who appeared in the area in 1947 and washed up without a head. The *kupuna* indicated it was the work of Kauhuhu, the famed shark god of the area who patrolled the waters from Moananui to Pelekunu. Another *mo*‘*olelo* from Hawai‘i Island tells of a pair of lovers who suffered the wrath of the jealous shark god Kua [discussed in Section 4.3]. After his affections were spurned, he curses the woman, turning her into a monk seal and her male companion into a dragonfly so the two could not be together. The pair was later reunited in their human forms by the god Kū. These *mo*‘*olelo* indicate a historical cultural association with the monk seal, but appear to be limited to a few places where familial traditions have preserved the stories" (Kittinger et al. 2011:17).

6.4 Stewardship

The authors of the 2011 study go on to note that, "For some *kūpuna*, the specific origins of the animal [the Hawaiian monk seal] and its significance in Hawaiian culture are irrelevant, as the traditional Hawaiian sense of stewardship extends to all species and the environment. One respondent, for example, expressed, "whether they are *hānai* [adopted] or *hānau* [born of, as in a son or daughter], monk seals are part of the ocean and we, humans, have an obligation to protect them." This perspective has also been shared by other community elders interviewed about the monk seal" (Kittinger et al. 2011:17).

6.5 The Monk Seal as Invasive Species

In contrast to the apparently symbiotic relationship between Hawaiians and monk seals suggested by some informants during the 2011 study, other individuals interviewed expressed a strongly negative reaction to monk seal presence. "Among these respondents, the seal is viewed as endemic to the NWHI but not to the MHI. Some respondents view the seal as an invasive species in the MHI and believe the seal should remain in the NWHI only. Respondents commonly cite the lack of Hawaiian cultural references to the seal in traditional chants, *hula* [dance] and other knowledge forms. Other respondents pointed to the lack of evidence that the monk seal was ever used for food, tools, weapons, fabrics, medicine, or combustible material. One respondent emphasized that, "everything in Hawai‘i had a common use… since there was no [use], then it must not be native." Other respondents pointed to the lack of monk seal bones (*iwi*) found in archeological excavations or petroglyphs (*ki*‘*i pōhaku*) depicting monk seals. Respondents on Maui were not aware of any place names, sacred sites (*wahi pani*) or fishing shrines (*ko*‘*a*) named after the monk seal. They also mentioned that their *kūpuna* (elders) never mentioned the monk seal, and that they did not know of any families that regarded the monk seal as their ‘*aumakua* (spiritual family guardian) (Kittinger et al. 2011:17).

7.0 Implications of Traditional and Historic Data

7.1 Multiple Names

The multiplicity of terms found in Hawaiian dictionaries, traditional *mo*ʻ*olelo*, and Hawaiian language newspaper articles, would appear to suggest that there was not one generally accepted name for the Hawaiian monk seal. This, in turn, may indicate that monk seals were not widely or generally known to traditional populations.

The other marine and terrestrial mammals present within the archipelago prior to western contact are all generally identified by a single name. The domestic dog is known generally as ʻ*īlio*, with variations on the name (ʻ*īlio mākū*ʻ*e*, a native brown dog, ʻ*īlio pe*ʻ*elua*, a brindled dog, etc., Pukui and Elbert 1971:92-93) describing different types of dogs. The only traditional name for dog that does not include the word ʻ*īlio*, ʻ*apowai* also appears to relate to a specific type of dog ("a type of Hawaiian dog with solid grayish-brown body and nose tip and eyes of the same color, believed to love water and consequently offered as a sacrifice to *mo*ʻ*o* water spirits", Pukui and Elbert 1971:27) and is not a general name. The same is true for the other mammals that accompanied the early Polynesian voyagers who initially settled the Hawaiian Islands such as the pig (*pua*ʻ*a*; *pua*ʻ*a hiwa* meaning a solid black pig, *pua*ʻ*a* ʻ*ā*ʻ*aua* meaning a young female pig, etc., Pukui and Elbert 1971:114), and the Polynesia rat (ʻ*iole*; ʻ*iole nui* meaning a large rat, Pukui and Elbert 1971:125). The native bat, which the Polynesians found here on their arrival, was known alternately as ʻ*ōpe*ʻ*ape*ʻ*a*, *pe*ʻ*a*, or *pe*ʻ*ape*ʻ*a* (Pukui and Elbert 1971:11, the word *pe*ʻ*a* is also one of the names for a sail, Pukui and Elbert 1971:297).

Of the other marine mammals found in Hawaiian waters, the whale was known either as *koholā* or *palaoa* (Pukui and Elbert 1971:175). Forms of both of these terms are found throughout much of Polynesia and appear related to the proto-Polynesian word *tafura*ʻ*a* (Richards 2008:1) and the early Polynesian word *paraoa* (Richards 2008:2). The dolphin is referred to as *nai*ʻ*a* or *nu*ʻ*ao* (Pukui and Elbert 1971:117).

The voyagers who first encountered these islands would not have been likely to possess a traditional name for seals, as there are no seal populations native to the islands of southern Polynesian (though fur seals are known to visit Tonga on rare occasions, Richards 2008:5). The only other Polynesian group to encounter local seal populations, the Māori who settled Aotearoa (New Zealand), had various names for seal depending upon the species they belonged to (fur seals, elephant seals, leopard seals) and the locality. Rhys Richards notes that, "Different groups of Māori used different names for the same marine mammal from district to district. Moreover, this transference phenomenon has several parallels among fish and birds. Many inshore fishermen know that Māori names for some fish species change bewilderingly from coast to coast, and from place to place" (Richards 2008:5). It appears that as Māori populations spread along the coasts of the large islands of Aotearoa dialectic differences developed and names changed. None of the known Māori names (fur seals: *pakakē*, *pakakā*, *kekeno*, *kakerangi*, *kakeraki*, *karewaka*, *oioi*, *tūpoupou*, *puhina*, *mimiha*, *popoikore*, elephant seals: *whakāhao*, *whakāhau*, *whakāhu*, *kautakoa*, *pākahokaho*, *poutoko*, *kake*, *kaki*, *ihupuku*, leopard seals: leopard seals: *rāpoka*, *popoiangore*, *poipoiangori*, *popoikore*, Richards 2008:5), bear any similarity to the documented Hawaiian language terms for seal. The likelihood is that these names developed indigenously as the Māori encountered the various pinniped species. The same might be suggested for Hawaiian names.

Several of the Hawaiian terms documented identify seals by their resemblance to a more familiar animal, the ʻ*īlio* (the domestic dog), that had accompanied the early Polynesian voyagers who initially settled the Hawaiian Islands. It is interesting to note that several non-native mammals were given names based upon their rough similarity to the familiar dog. These include the skunk (ʻ*īlio hohono*, literally "bad-smelling dog" Pukui and Elbert 1971:93), the beaver (ʻ*īlio-hulu-pāpale*, literally "hat-fur dog" Pukui and Elbert 1971:93).

Though there is not enough existing evidence to conclusively determine whether monk seals were present within the MHI at the time of initial Polynesian settlement, the archaeological, linguistic and ethnographic evidence would seem to suggest that there was not a resident monk seal population extant within the MHI during the latter portion of the pre-Contact period. It is likely that contact between Native Hawaiians and monk seals during this period was limited to occasional encounters when far ranging individual would come down from the main population centers in the NWHI. Monk seals did not rise in the consciousness of Hawaiian culture until they were encountered in large numbers during the historic exploration of the NWHI.

8.0 CONCLUSIONS

Although monk seals appear to have been present within the Hawaiian archipelago as early as 3.5 million years ago, there is little direct evidence of human and monk seal interactions prior to Western contact, either in the archaeological record or the traditional literature.

Bones of Hawaiian monk seals are known to have been recovered from only four archaeological excavations conducted within the main Hawaiian Islands. Only two of these sites have been confirmed as dating from the period prior to Western contact. Although it has been suggested that this scarcity of seal remains from archaeological contexts may indicate that monk seals were not present within the MHI prior to the arrival of the first Polynesians (Zeigler 2002:244), it appears more likely that the Polynesian arrival itself resulted in a decrease in resident monk seal populations within the MHI (Ragen 1999:185).

Any tentative conclusions concerning monk seal presence in the MHI drawn from the archaeological evidence are complicated by several factors. Given its size and weight, if a monk seal was caught and butchered for food, it is most likely that the butchering would have taken place near to where the animal was killed, with the carcass being left on the beach and only the meat carried to the consumption site. Alternately, an *imu* (earth oven) could have been dug into the sand and the entire carcass cooked in situ. Either of these scenarios would have resulted in the bones of the animal not being transported to the occupation site and therefore not being incorporated into the archeological record.

Given the abundance of fragmentary and otherwise unidentified or unidentifiable medium mammal bones recovered from archaeological excavations conducted throughout the MHI, the possibility exists that seal bones recovered from some excavations have not been identified or categorized as such.

The scarcity of monk seal remains recovered from archaeological contexts may also simply reflect the relative abundance of monk seal populations. Given what we know of Hawaiian monk seal biology, seal populations present within the MHI at the time of first Polynesian contact would have consisted of only a few hundreds to no more than a few thousands of individuals. Their expected percentage represeantation within archaeological midden (food debris) assemblages would therefore be relatively small compared to the many thousands of individuals of other species of mammals, birds and fish that formed part of the early Hawaiian diet.

Identified archaeological sites dating from the early settlement period of Hawaiian prehistory, the time at which monk seals would be expected to be most numerous within the MHI, are relatively rare. The paucity of these sites would further decrease the sample size of potentially recovered monk seal remains.

While the archaeological evidence provides no definitive answer to the question of whether monk seals were present within the MHI at the time of Polynesian arrival, it does seem to indicate that they were not abundant within the MHI for much of period prior to Western contact. This conclusion is further supported by the ethnohistorical evidence.

The physical presence of monk seals within the MHI is not reflected in the material culture of Hawaiʻi at the time of contact. Neither the bones nor the teeth of the Hawaiian monk seal appear to have been used in the creation of traditional tools or ornaments.

Unlike the mammals that arrived in Hawaiʻi with the early Polynesian voyages, the dog (*ʻīlio*), pig (*pua*ʻ*a*), and rat (*iole*), all of which were identified by a single Hawaiian name, seals were found to be referred to in *ʻōlelo* Hawaiʻi (the Hawaiian language) by several different terms. Among there were *he* ʻ*īlio o ke kai* (the dog of the sea, also ʻ*īlio o ke kai*), ʻ*īlio-holo-kai* (the dog that runs in the sea), ʻ*īlio-holo-i-kauaua* (dog running in the toughness), *uwa*ʻ*lo* (to cry out), *hulu* (fur; possibly a historic usage to refer to arctic fur seals), and *kila* or *sila* (an adaptation of the English word seal). With their furred bodies and bark-like calls, it is easy to see how seals were identified as the dogs of the sea. The range of different names used to refer to these animals, however, some of which were derived from the English term seal, might suggest that seals were not frequently encountered by the Hawaiians of the pre-Contact period.

References to seals in the traditional literature are relatively rare, and it is not until the historic period, when Hawaiian sailors began to take part in voyages to the arctic to capture fur seals for the China trade, and local vessels began actively hunting the newly discovered monk seal populations within the NWHI, that mentions of seals begin to appear with any regularity in Hawaiian language sources. Although the early accounts of Western visitors to the islands are replete with detailed descriptions of the various plants and animals they encountered, there appear to be no references to the presence of Hawaiian monk seals within the MHI. It is not until Western ships began visiting the NWHI that we be begin to encounter descriptions of the monk seal. All of these archaeological, ethnographic and archival sources would appear to suggest that throughout most of the pre-Contact and into the early historic period monk seals were not common visitors to the MHI.

Although it has been suggested (Zeigler 2002:244, Ragen 2003:1) that the original range of the indigenous Hawaiian monk seal may not have extended down into the MHI, this does not seem reasonable given the similarity in the marine environments of the NWHI and the MHI. Both areas would have offered a similar range of suitable habitats, an abundance of available food resources, and a relative scarcity of predators, at least until the arrival of humans.

A more likely scenario is that, soon after the arrival for the first Polynesian voyagers, the seal population of the MHI became extinct, in much the same manner as many species of indigenous Hawaiian land birds, through a combination of human predation and the impacts of the terrestrial mammals (rats, pigs, and dogs) that accompanied the voyagers from their homeland in southern Polynesia (Ragen 1999:185). Monk seals hauled out onto the beaches of these newly discovered islands would have offered an easily obtainable food source for the first settlers. It is also well documented that, as its name might imply, the monk seal does not adapt well to disturbance from dogs or humans (Ragen 1999). Those monk seals resident within the MHI that were not killed for food would most likely have translocated themselves to the NWHI where they were much less likely to be threatened or disturbed. The relatively small monk seal population that occupied the MHI could have been extirpated within a few generations. While stray individuals undoubtedly occasionally found their way down from the NWHI, it appears probable that there was not a significant resident monk seal population in the MHI throughout much of the pre-Contact period.

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