Type of Statement: Final Programmatic Environmental Assessment

Lead Agency: U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Pacific Islands Fisheries Science Center

Responsible Official: Charles Littnan, Ph.D., Director
Pacific Islands Fisheries Science Center
National Marine Fisheries Service

For Further Information: Summer L. Martin, Ph.D.
Marine Turtle Biology and Assessment Program
Protected Species Division
National Marine Fisheries Service
Pacific Islands Fisheries Science Center
1845 Wasp Blvd., Building 176
Honolulu, HI 96818

Location: Pacific Islands Region

Abstract: This final Programmatic Environmental Assessment analyzes the environmental impacts of the National Marine Fisheries Service, Pacific Islands Fisheries Science Center, Protected Species Division, Marine Turtle Biology and Assessment Program proposal to continue its long-standing research activities on sea turtle populations throughout the Pacific Islands Region (PIR).

DATE: April 2024

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

List of Acronyms

Abbreviation	Definition
CEQ	Council on Environmental Quality
CI	Cook Islands
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNMI	Commonwealth of the Northern Mariana Islands
DAWR	Guam Department of Agriculture, Division of Aquatic & Wildlife Resources
DFW	CNMI DLNR Division of Fish and Wildlife
DLNR	State of Hawai'i, Department of Land and Natural Resources
DOI	Department of the Interior
DPS	Distinct Population Segment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EFP	Exempted Fishing Permit
EO	Executive Order
ESA	Endangered Species Act of 1973
FAA	Federal Aviation Administration
FSM	Federated States of Micronesia
HAPC	Habitat Areas of Particular Concern
IACUC	Institutional Animal Care and Use Committee
IUCN	International Union for Conservation of Nature and Natural Resources
JIMAR	Joint Institute for Marine and Atmospheric Research
MHI	Main Hawaiian Islands
MMPA	Marine Mammal Protection Act
MNM	Marine National Monument
MPA	Marine Protected Area
MTAP	Marine Turtle Assessment Program
MTRP	Marine Turtle Research Program

Abbreviation	Definition
MTBAP	Marine Turtle Biology and Assessment Program of PIFSC
MTMCP	Marine Turtle Management and Conservation Program of PIRO
MTMNM	Marianas Trench Marine National Monument
NEPA	National Environmental Policy Act of 1969
NGO	Non-Governmental Organization
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
OMAO	NOAA’s Office of Marine and Aviation Operations
PEA	Programmatic Environmental Assessment
PIFSC	NMFS Pacific Islands Fisheries Science Center
PIR	Pacific Islands Region
PIRO	NMFS Pacific Islands Regional Office
PIT	Passive Integrated Transponder
PMNM	Papahānaumokuākea Marine National Monument
PNG	Papua New Guinea
PRIA	Pacific Remote Islands Areas
RAMNM	Rose Atoll Marine National Monument
RMI	Republic of the Marshall Islands
SPREP	South Pacific Regional Environmental Program
T&E	Threatened and Endangered
UAS	Uncrewed Aerial System
USFWS	United States Fish and Wildlife Service
WPRFMC	Western Pacific Regional Fishery Management Council

Chapter 1 Introduction and Purpose and Need

1.1. Background

Under the Endangered Species Act (ESA), the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) share responsibility in the U.S. for the conservation and recovery of marine turtles, more commonly referred to as sea turtles. NMFS and the USFWS work cooperatively on conservation and recovery of sea turtle efforts in the Pacific Islands Region (PIR), which includes the marine environment and nesting beaches in the State of Hawai'i, U.S. jurisdictions including American Sāmoa, Guam, the Commonwealth of the Northern Marianas Islands (CNMI), and the Pacific Remote Islands Area (PRIA). There are five species of sea turtles that occur in the PIR: green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*), and olive ridley (*Lepidochelys olivacea*). All species of sea turtles are listed and protected under the ESA.

Within the PIR, NMFS's ESA mandated sea turtle recovery efforts are carried out by two independent offices: Pacific Islands Fisheries Science Center (PIFSC) and the Pacific Islands Regional Office (PIRO). At PIFSC, the Marine Turtle Biology and Assessment Program (MTBAP) is responsible for the collection of data to support recovery actions as outlined in U.S. Sea Turtle Recovery Plans (NMFS and USFWS 1998a-e). With continuous data collection since 1973, MTBAP, building from the work of its predecessors and alongside many collaborators, provides technical insight, logistical advice, and shares its experiences with other U.S. and international sea turtle research programs. At PIRO, the Marine Turtle Management and Conservation Program (MTMCP) is responsible for evaluating and mitigating the impacts of proposed federal actions to sea turtles, and implementing recovery actions as outlined in species-specific U.S. Sea Turtle Recovery Plans (NMFS and USFWS 1998a-e).

Two Programmatic Environmental Assessments (PEA) were previously published for sea turtle research activities in the PIR (see Appendix 7 and 8). At the time of publication, the PIFSC Protected Species Division had two turtle programs (the Marine Turtle Research Program (MTRP) and the Marine Turtle Assessment Program (MTAP), and the activities in each program were covered under their respective PEAs (see Appendix 7 and 8). The two turtle programs were combined into one program around 2014, which is now called the MTBAP. In 2015, an external review of the research completed in the PIFSC Protected Species Division - in which MTBAP belongs - was conducted. A copy of the results of the review can be found online at *https://media.fisheries.noaa.gov/2021-05/2015%20PIFSC_External%20Review%20Response_FINAL%204Nov15.pdf*. MTBAP research publications can be found at the PIFSC staff publications website at *https://apps-pifsc.fisheries.noaa.gov/library/staff_publications.php*. Since the publication of the 2011 and 2012 PEAs, MTBAP leadership changed, thus, research foci were adjusted requiring the addition of new research methods and an update to the PEA. This PEA provides a detailed framework for operating the MTBAP, including analysis of potential environmental impacts associated with implementation of the research program activities. Section 1 of this PEA provides background information to understand the program, a description of the proposed action, and the purpose and need for action. The proposed alternatives are described in Section 2. The affected environment and analyses of the potential impacts on the human environment are in Sections 3 and 4, respectively. The list of preparers is included in Section 5 and references cited are listed in Section 6.

1.2. Proposed Action

The proposed action is the continued research activities by the MTBAP that directly support the priority actions as described in the five U.S. Sea Turtle Recovery Plans (NMFS and USFWS 1998a-e). The objectives of the program, pursuant to U.S. Sea Turtle Recovery Plans for sea turtles are:

- Monitor population trends at nesting beaches, basking beaches, and foraging areas, and identify new areas to monitor as appropriate, while continuing to explore the use of advanced technologies for research and monitoring.
- Long-term population monitoring and modeling. Continue the development and application of simulation modeling of sea turtle population dynamics using long-term datasets for the assessment of the status of the various stocks of sea turtles in the PIR.
- Conduct sea turtle stranding response and research, in addition to rescue, rehabilitation, and return to the wild within the PIR.
- Capacity building through training of NMFS and international observer personnel in Pacific Ocean fisheries, as well as research personnel within the PIR and in foreign nations that share sea turtle populations.
- Public education, outreach, community science projects, and scientific publishing in an effort to build public support for sea turtle research and provide timely publication of results/findings.

To meet these objectives, the MTBAP conducts both field and laboratory-based research activities. The primary MTBAP field research activities are: (1) nesting and basking beach monitoring; (2) in-water monitoring; and (3) stranding response and research. The primary laboratory-based research and analytical activities include: (1) statistical analysis and population modeling; (2) training and outreach; (3) laboratory and molecular analysis; and (4) standard operating procedures and research techniques. A complete description of the current research activities is provided in Section 2.1.1.

In addition to the current research, the proposed action also includes site-specific nest relocations, which are currently not being conducted, and are described in detail in Section 2.2.2. All research will be performed in concert with local authorities and sea turtle programs [e.g., Guam Department of Agriculture, Division of Aquatic and Wildlife Resources (DAWR); CNMI Department of Land and Natural Resources (DLNR); Department of Environment and Natural

Resources Philippines; and USFWS, among others] to ensure compliance with all applicable laws and research efforts are not duplicative.

1.3. Purpose and Need

The purpose of the MTBAP and its associated research activities is to collect (or facilitate the collection of) scientific data on sea turtle stocks in collaboration with local partners; conduct recovery activities; and perform population assessments relevant to the recovery of these stocks throughout the PIR, associated high seas, and adjacent foreign Exclusive Economic Zones (EEZ). The need for this action is to improve our understanding of sea turtle threats (e.g., fishery bycatch, climate change) and other population influences to ensure the continued existence of sea turtles in the world's oceans.

1.4. Action Area

Research activities primarily occur in open ocean, near shore, and nesting areas, and may occur in water or on land, including beaches or other coastal adjacent areas. The geographic scope of the proposed action includes the PIR and international locations with aggregations of turtles that are connected to PIR populations. The USFWS permit TE-72088A-3 describes the locations in more detail for each turtle species and we refer the reader to this document for this detailed information (see Appendix 3). The international areas where MTBAP conducts sea turtle research include Papua New Guinea, Indonesia, the Solomon Islands, Japan, Philippines, Thailand, Vietnam, Malaysia, Federated States of Micronesia, Fiji, Cook Islands, French Polynesia, Palau, and Marshall Islands. These areas are described in depth in the PIRO EA for the MTMCP (NMFS 2014a), which describes the sea turtle management activities within the region, and we refer the reader to them for more information, including a description of the physical conditions, sea turtle use of the areas, the human use of the area, and the conservation and research activities found at each location (see supporting documents). Additional detailed description of the physical, chemical, and biological conditions of the PIR can be found in the Final Environmental Impact Statement *Toward an ecosystem approach for the western Pacific region: from species-based fishery management plans to place-based fishery ecosystem plans*, and is available at: https://repository.library.noaa.gov/view/noaa/3791.

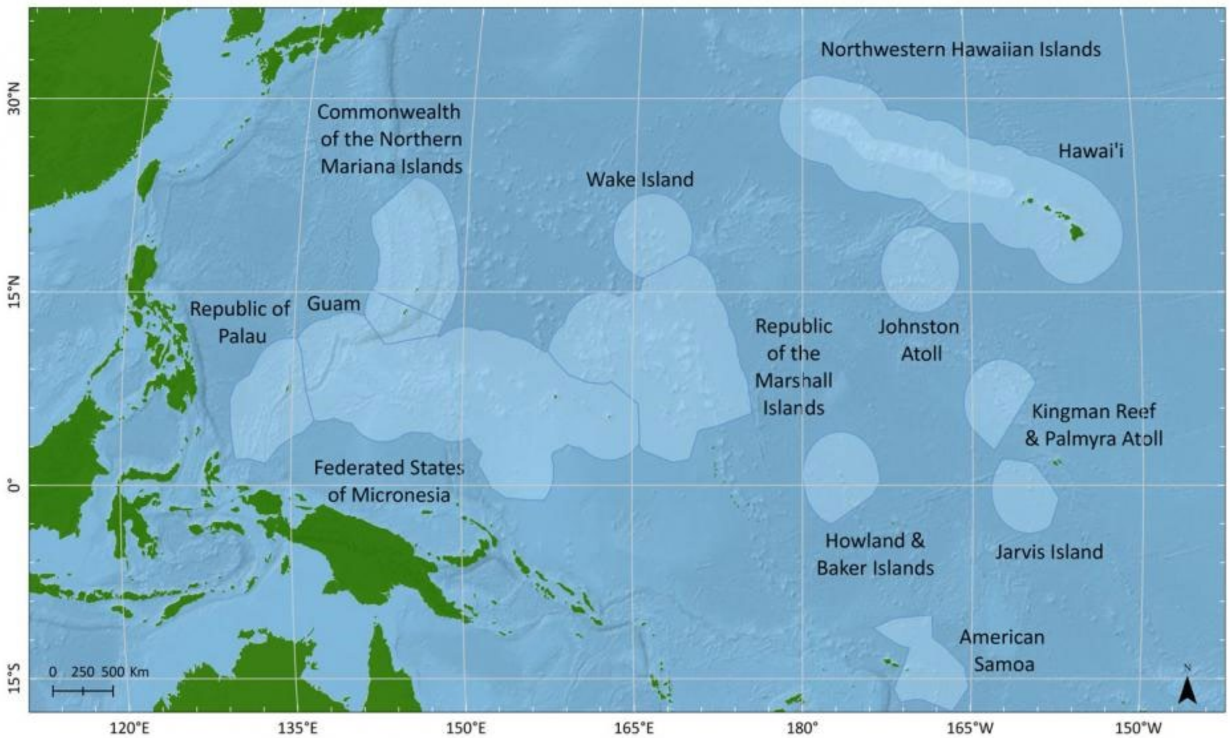

Figure 1. General area where the Marine Turtle Biology and Assessment Program sea turtle research activities will occur. Note: Research may occur in Papua New Guinea, Indonesia, the Solomon Islands, Fiji, Cook Islands, French Polynesia, Japan, Philippines, Thailand, Vietnam, and Malaysia, which are not labeled on the map. Source: NOAA NCEI.

1.4.1. Sea Turtles in the Action Area

Table 1 lists the sea turtles under NMFS and USFWS' jurisdictions that could inhabit the action area where MTBAP's research activities occur. In summary, there are 10 distinct population segments (DPS) from 5 sea turtle species with potential or confirmed occurrence in waters within the action area, all of which are listed under the ESA. Refer to Chapters 3 and 4 of this PEA, for detailed information about these sea turtles.

Table 1. Sea turtle species likely to occur in the PIR

Species	DPS	ESA* status	Abundance Estimate[1]	Occurrence in project area
Green	Central West Pacific	E	6,518[2]	Forage – waters surrounding Guam and CNMI Nest –relatively low numbers in Guam, CNMI, Federated States of Micronesia (FSM), Marshall Islands, Solomon Islands, Palau

Species	DPS	ESA* status	Abundance Estimate[1]	Occurrence in project area
Green	Central South Pacific	E	2,677[2]	Forage – French Polynesia, Fiji, American Samoa, Cook Islands Nest – low lying atolls; Rose atoll in American Sāmoa, Tongareva Atoll in the Cook Islands, Ringgold Isles in Fiji, Scilly Atoll in French Polynesia, Enderbury in Kiribati, Nukunonu in Tokelau, Tonga Funafuti in Tuvala, and Henderson in the UK
Green	Central North Pacific	T	3,846[2]	Forage – waters surrounding main Hawaiian islands (MHI), Johnston Atoll Nest – beaches in Northwest Hawaiian Islands/ Papahānaumokuākea Marine National Monument
Hawksbill	Global	E	22,004 to 29,035[3]	Forage – nearshore waters in MHI, West Pacific, South Pacific Nest – MHI, Ofu in American Sāmoa
Leatherback	Western Pacific	E	1,277[4]	Forage – North, Eastern, and Western Pacific Ocean Nest – Indonesia, Papua New Guinea, Solomon Islands, and the Philippines
Loggerhead	North Pacific	E	8,733[5]	Forage – throughout the Central and Eastern Pacific when immature; Western Pacific as adults Nest – Japan
Loggerhead	South Pacific	E	700[6]	Forage – Australia, New Caledonia, the Solomon Islands, Papua New Guinea, Indonesia, Peru, Chile, and Ecuador Nest – Eastern Australia, New Caledonia
Olive ridley	Global	T	1.39 million[7]	Forage – oceanic, throughout North Pacific Ocean Nest – No known nesting beaches within the PIR, but recent hatchling emergence observations in MHI and the Philippines

*Endangered Species Act. [1]Number of nesting females. [2]Seminoff et al. 2015. [3]NMFS and USFWS 2013. [4]NMFS and USFWS 2020a. [5]NMFS and USFWS 2020b. [6]NMFS and USFWS 2021. [7]NMFS and USFWS 2014

1.5. Environmental Permits and Regulatory Requirements

MTBAP has been authorized to conduct research activities within the PIR under various permits. For projects operating within the U.S. jurisdiction (i.e., the PIR), this would include permits authorized by NMFS for activities that may “take” sea turtles in the marine environment and permits authorized by USFWS for activities that may “take” sea turtles in the terrestrial environment (Table 2). The term “take” as defined in Section 3 of the ESA means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” USFWS authorizations are provided via cooperative agreement to U.S. jurisdiction governments (e.g., American Sāmoa). CITES export permits are also required for the shipping of samples (e.g., genetic or tissue) from any international location to the U.S. NMFS agencies (e.g., PIFSC or SWFSC) for analysis. For any research conducted outside of U.S. jurisdiction, MTBAP follows the other countries' laws.

Table 2. Permits under which MTBAP conducts activities within the proposed area.

File Number	Project Title	Location*	Expiration	Species
NMFS: 21260 (Appendix 1)	Permit to take protected species for scientific purposes	Pacific Islands Region	September 30, 2027	Green, hawksbill, leatherback, loggerhead, olive ridley
USFWS: TE-72088A-3 (Appendix 3)	U.S. Fish and Wildlife Service recovery permit issued	Beaches surrounding the islands, islets, atolls, and shoals in the Hawaiian Archipelago; Johnston Atoll, CNMI, Guam, American Sāmoa	November 18, 2025	Green, hawksbill, leatherback, loggerhead, olive ridley
DLNR DAR: 2025-01 (Appendix 4)	Special Activity Permit	Waters of the island(s) of Hawai'i, Oahu, Kauai, Maui, Molokai, Lanai, Niihau and Kaho’olawe*	January 5, 2024	Green, hawksbill, leatherback, loggerhead, olive ridley
PMNM: PMNM-2024-001 (Appendix 5)	Co-Trustee Conservation and Management Activities in Papahānaumokuākea Marine National Monument	Papahānaumokuākea Marine National Monument	December 31, 2024	Green

*See Appendix 1-6 for more information on specific requirements for each permit.

1.6.Public Involvement

NMFS solicited public comment on this proposed action for a 30-day period following the publication of the draft to the Pacific Island Region NEPA website at https://www.fisheries.noaa.gov/pacific-islands/laws-and-policies/national-environmental-policy-act-pacific-islands. More information about the public comment period can be found in section 1.8.1.

1.7. NEPA Compliance

This Programmatic Environmental Assessment (PEA) was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. §4321, et seq.), as implemented by the Council of Environmental Quality (CEQ) regulations (40 C.F.R. §1500-1508); NOAA Administrative Order Series (NAO) 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act, of May 20, 1999; and Executive Order (EO) 12114, as implemented by Department Administrative Order 216-12 with respect to potential impacts of the proposed action in foreign territorial waters. This PEA was prepared using the 2020 CEQ NEPA Regulations as modified by the Phase I 2022 revisions. The effective date of the 2022 revisions was May 20, 2022 and reviews begun after this date are required to apply the 2020 regulations as modified by the Phase I revisions unless there is a clear and fundamental conflict with an applicable statute. This PEA began after and accordingly proceeds under the 2020 regulations as modified by the Phase I revisions.

Any individual projects implemented within the described program and documented as consistent with this PEA and its associated decision can be implemented. However, any site-specific and/or project-specific action that would be added to the program long-term, not specifically covered by this PEA, or projects that would potentially have environmental considerations that are not evaluated in this PEA may need additional appropriate NEPA analysis.

1.8. Public Review and Comments

1.8.1. Summary of public review and comments

On April 13, 2023, NMFS published the draft PEA to the Pacific Islands Region NEPA website at *https://www.fisheries.noaa.gov/pacific-islands/laws-and-policies/national-environmental-policy-act-pacific-islands*, and provided a 30-day public review and commenting. The public comment period was April 13, 2023 – May 12, 2023. NMFS also notified the public of the availability of the draft PEA by the following methods:

- Posting to a publicly available website: *https://www.fisheries.noaa.gov/pacific-islands/laws-and-policies/national-environmental-policy-act-pacific-islands*
- Emails sent directly to over 80 relevant stakeholders, partners, and other interested parties. A list of the contacts can be found in Appendix 9

- Posting the announcement on the C-Turtle listserv, an email information network to improve communication and provide information on sea turtle biology and conservation around the world.
- An announcement on NMFS' Sea Turtle Updates webpage, a publicly available website that provides updates on all things related to sea turtles in the PIR when available: *https://www.fisheries.noaa.gov/pacific-islands/endangered-species-conservation/sea-turtles-pacific-islands-updates*.

During the public comment period, NMFS received comments from two parties. Comments were received from (1) the U.S. Fish and Wildlife Service's Texas Coastal Ecological Service (USFWS TX CES, Appendix 11), and (2) a former NOAA sea turtle biologist, George Balazs (Appendix 10). These comments, and NMFS' responses, are summarized below.

This Final PEA will be available to the public on the same website where the draft PEA was published (*https://www.fisheries.noaa.gov/pacific-islands/laws-and-policies/national-environmental-policy-act-pacific-islands*). In addition, NMFS will notify the public of the completion and publication of this Final PEA in the same ways we notified the public for the draft PEA, listed above.

1.8.2. Highlights of changes made in the final PEA

Comments from USFWS Texas Coastal Ecological Service:

The USFWS TX CES gave their support for NMFS' preferred alternative and provided several additional references related to nest relocations and nest probing activities in section 2.2.2, activities which they have experience conducting for several decades (see Appendix 11 for USFWS TX CES's public comment letter).

NMFS Response: We thank the USFWS TX CES for their comments, support, and approval of our preferred alternative. The additional citations they provided improved our understanding of nest probing and nest relocations. We included the citations they provided, which strengthens these sections within this document.

Comments from George Balazs:

Balazs reviewed the draft PEA and provided suggested edits throughout. These edits included incorporating new citations, clarifying data, considering a new action, and questions requesting clarification of some information (see Appendix 10 for a copy of Balazs's public comment letter).

NMFS Response: We thank Balazs for their thorough review of the draft PEA and the comments they provided to improve the document. We particularly appreciate the historical perspective Balazs provided as a past NMFS PIFSC turtle program lead and their extensive history with sea turtles in the region. Applicable comments and suggestions were incorporated, which are described below. See Appendix 10 for a copy of Balazs's comment letter.

Specific changes and additions were made to the Final PEA based on public comments received. Additional citations regarding nest probing and assisted migrations provided by the USFWS TX CES were included in section 2.2.2. In addition to making editorial updates and clarifications of MTBAP's current research provided by Balazs's comment letter, additional citations were provided by Balazs and incorporated into this document in section 3.2.1.1. Balazs also provided a comment for clarification of the need for nest probing. We clarified the need and intention for use of this technique in section 2.2.2. In section 2.3, we describe the current status of ongoing discussions about the restoration efforts at Lalo, which is in response to another comment by Balazs.

Additional NMFS internal reviews of the draft PEA yielded updated information on species life history, recent population trends, citations, and general editorial improvements. More substantial edits included creating a more inclusive list of the countries within the action area instead of a subset of example countries in Sections 1.4, 3.1, and 3.2.2 and Table 4, which does not increase or expand our action area, but further clarifies what countries are included within the bounds of the action area. NMFS also clarified the species and locations in Sections 2.1.1.1-2.1.1.6 and Table 3; the authorized activities in our USFWS and NMFS permits in section 4.1.2.1; updated information on the critical habitat designation status for corals in Section 3.2.2.4.2, 3.2.3.2, and 4.1.4, which occurred after publication of the draft PEA; and additional information on Essential Fish Habitat. These changes did not modify any effects analysis contained in Chapter 4.

Chapter 2 Alternatives

2.1. Introduction

With continuous data collection since 1973, the MTBAP, building from the work of its predecessors and alongside many collaborators, provides technical insight and logistical advice, and shares its experiences with other U.S. and international sea turtle research programs. As described in Chapter 1, NMFS is proposing the continuation and possible expansion of the MTBAP activities. In accordance with the NEPA and the CEQ Regulations, NMFS is required to consider alternatives to the proposed action. This includes the no action alternative and other reasonable courses of action associated with authorizing incidental take of protected species. To warrant detailed evaluation under NEPA, an alternative must be reasonable along with meeting the stated purpose and need for the proposed action. Based on this evaluation, only two alternatives were identified as reasonable, along with the no action alternative, and are evaluated in this PEA. Alternative 1 represents the status quo and would maintain the current research program. Alternative 2 would add nest relocation (i.e. assisted migration) to and maintain the current research program. Alternative 3 represents the no action alternative.

2.1.1. Description of Current Research Activities

The following research activities are approved under USFWS Recovery Permit TE72088A-3, NMFS Permit 21260, NMFS Institutional Animal Care and Use Committee (IACUC) Protocol 2019-03M, and University of Hawai'i IACUC Protocol 18-2782-4. (Appendix 6). They are also analyzed under NMFS programmatic biological opinion (NMFS 2017). MTBAP incorporates those descriptions by reference in this PEA and briefly summarizes them here. Tables 3 and 4 summarize the proposed research categories and general project locations..

2.1.1.1. Statistical Analysis and Population Modeling

1. Continue the development and application of simulation modeling of sea turtle population dynamics using MTBAP long-term datasets for the assessment of the status of the various stocks of sea turtles occurring within the PIR and those with connections to the PIR
2. Fisheries bycatch modeling and development of bycatch mitigation strategies within the PIR and internationally

2.1.1.2. Training and Outreach

1. Training of NMFS and international observer personnel in Pacific Ocean fisheries
2. Training of and capacity building for research partners
3. Public outreach, education, and citizen/community science within the PIR
4. Continue to publish research findings in a timely manner in peer-reviewed journals to increase the knowledge base of sea turtle biology and population dynamics worldwide

2.1.1.3. Stranding Response and Research

1. Co-manage and participate in stranding response activities within the stranding and salvage network within the PIR in collaboration with PIRO and manage resulting data

2. Provide veterinary care, coordinate rehabilitation with partners, and return rehabilitated turtles to the wild
3. Perform necropsies (for carcass disposal information, refer to Appendix 1 and 3) to identify primary threats to sea turtles in the PIR

2.1.1.4. **Laboratory and Molecular Analysis**

1. Conduct stable isotope analysis of sea turtle bio-samples to investigate foraging ecology strategies of different populations
2. Conduct skeletochronology of sea turtle humerus tissue for growth and age estimates for sea turtle populations
3. Use genetic/genomic analyses to determine stock structure, stock boundaries, population structure, demographic connectivity, relatedness, and/or kinship of sea turtles
4. Use endocrine analyses of bio-samples to determine sea turtle sex, sex ratios, reproductive status, sexual maturity, sex-based survivorship, and/or stress response for sea turtle populations

2.1.1.5. **Nesting and Basking Beach Monitoring**

1. Identification and monitoring of critical nesting beaches and basking beaches
2. Estimate abundance at nesting and basking beaches for population size estimates
3. Determine factors impacting nest success and hatchling survival
4. Relocate doomed nests to locations that promote viability of the clutch
5. Conduct basic investigations of the biology, life history, and ecology of sea turtles at nesting and basking beaches to establish and continue long term databases
6. Investigate the impacts of climate change on population dynamics for sea turtle populations within the PIR

2.1.1.6. **In-water Monitoring**

1. Identification of sea turtle habitat use, migratory corridors, and population abundance of all sea turtle species using turtle-borne telemetry packages (satellite telemetry, ultrasonic telemetry, time-depth recorders, underwater cameras), ship-/small boat-/snorkel-based-line transects, and/or crewed (e.g. fixed wing aircraft) and uncrewed (UAS) aerial surveys
2. Conduct basic investigations of the biology, life history, and ecology of sea turtles in their near shore and benthic habitats to establish and continue long-term datasets
3. Conduct fishery bycatch reduction research through international collaboration, leading to increased knowledge of the pelagic ecology and movements of sea turtles

2.1.1.7. **Standard Operating Procedures and Research Techniques**

The MTBAP ensures the safety of research and technician personnel first and foremost in all Program activities, and conducts regular training of all personnel in the implementation of techniques and methods, both in the laboratory and in the field.

All research techniques and methods are consistent with accepted standards within the international sea turtle research community (Eckert et al. 1999) based on efficacy and the experience gained by MTBAP, building from the work of its predecessors and alongside many collaborators since 1973. All standard operating procedures and research techniques are detailed in MTBAP's permits included in the Appendices of this document.

Table 3. Overview of sea turtle species in the PIR and the corresponding research techniques, which are currently and are proposed to be applied for each species.

Research Technique	Green	Hawksbill	Leatherback	Loggerhead	Olive Ridley
Capture	X	X	X	X	X
External Inspection, Attach Tags	X	X	X	X	X
Blood and Tissue Collection	X	X	X	X	X
Lavage	X	X		X	X
Transmitter Attachment	X	X	X	X	X
Ultrasound	X	X	X	X	X
Laparoscopy	X	X		X	X
Monitor Nesting Beach	X	X	X	X	X
Monitor Basking Beach	X	X[1]	X[1]	X[1]	X[1]
Hatchling Sampling	X	X	X	X	X
UAS Surveys	X	X	X	X	X
Doomed Nest Relocation	X	X	X	X	X
Nest Relocation of any nest for conservation/management purposes[2]	X	X	X	X	X
Nest Probing[2]	X	X	X	X	X

[1]Currently only green sea turtles bask in our region; however, other species bask in other regions, and basking by these other species may occur in our region in the future.
[2]Pending approval to be included in our USFWS permit.

Table 4. Summary of research project locations by category.

Research Category	Research Location
Statistical Analysis and Population Modeling	Not Applicable (conducted at PIFSC or other laboratory setting)
Training and Outreach	Hawai'i, Guam, CNMI, American Sāmoa, PRIA, Southeast Asia
Stranding Response and Research	Activities conducted in Hawai'i, Guam, CNMI, American Sāmoa, and from commercial fishing vessels in the PIR
Laboratory and Molecular Analysis	Samples collected in Hawai'i, Guam, CNMI, American Sāmoa, PRIA, and from commercial fishing vessels in the PIR
Nesting and Basking (where applicable) Beach Monitoring	Hawai'i, Guam, CNMI, American Sāmoa, PRIA, and internationally

Research Category	Research Location
In-water Monitoring	Hawai'i, Guam, CNMI, American Sāmoa, PRIA, and internationally

2.2.Description of Alternatives

2.2.1. Alternative 1 – Continuation of Current Research Activities (Status Quo)

Under this alternative, PIFSC MTBAP would conduct all research activities listed above in Sections 2.1.1, and described in the issued permits NMFS 21260 and USFWS TE-72088A-3 (see Appendix 1 and 3). These research activities will involve take, under the ESA, of the five sea turtle species within the PIR. As noted in Section 2.1.1.7, the MTBAP ensures the safety of research personnel first and foremost in all Program activities, and conducts training of all personnel in the implementation of techniques and methods, both in the laboratory and in the field. In addition, all research techniques and methods are conducted according to accepted standards within the international sea turtle research community based on efficacy and the experience gained by MTBAP, building from the work of its predecessors and alongside many collaborators, since 1973. All standard operating procedures and research techniques are detailed in MTBAP's permits included in the Appendices of this document.

2.2.2. Alternative 2 - Continuation of Current Research Activities with the Addition of Nest Relocations of Non-Doomed Nests and Nest Probing (*Preferred Alternative*)

The Proposed Action constitutes Alternative 2 and is the Preferred Alternative. This alternative would include all activities listed in Alternative 1 and described in sections 2.1.1 and 2.2, plus site-specific nest relocations (i.e., assisted migration) and nest probing, which are described below. The MTAP PEA (2012a) included the capture of hatchlings and collection of eggs, either in the nest or on the beach, and MTBAP is currently permitted to only relocate nests that are doomed. Under Alternative 2, MTBAP will request to amend our USFWS permit to include the ability to relocate any nest (doomed or not doomed), should the need arise, and to conduct nest probing.

Relocation of nests is a conservation measure utilized across many international sea turtle nesting populations (Buskale & Kaska 2005; Caillouet et al. 2015; Frey et al. 2014; Gallaway et al. 2016; Shaver 2007; Shaver et al. 2016, 2020; Ware & Fuentes 2018; Wyneken et al. 1988). The purpose of relocating a nest is to increase the likelihood of survival for a nest that is considered doomed due to its location relative to the high tide line or potential for wash out due to beach erosion, water inundation, etc., which would destroy or suffocate the nest. In this alternative, MTBAP proposes to continue to perform nest relocations for a "doomed" nest (i.e., when a nest was laid in an area that is at risk of erosion or inundation), but would add nest relocations for any nest (doomed or not doomed) to any location in the PIR if the relocation was deemed necessary for management/conservation purposes (e.g., the nest may need to be relocated to maintain population abundance). Nest relocation will follow the protocol/s outlined in the Research and Management Techniques for the Conservation of Sea Turtles (Eckert et al. 1999) publication. In summary, eggs laid in a natural nest will be gently gathered during deposition (if researcher is present) or the nest will be gently excavated and eggs carefully removed while minimizing the amount of sand gathered with the eggs to avoid abrasion of the eggs. Once collected, eggs will be covered to reduce moisture loss during transport. Nest depth and diameter of the neck of the original nest will be recorded and a new nest will be excavated according to the nest depth and diameter recordings and located sufficiently above the high tide line and conform with species-specific parameters. Reburial will occur as quickly as possible to minimize movement-induced injury to embryos, eggs will be placed carefully into the nest chamber and counted, then the nest will be covered by replacing the damp subsurface sand removed from the hole during excavation and firmly tamping the damp sand in place in layers of 8-12 cm. Coordinates of the new nest will be recorded and/or nest marker placed, and finally the nest will be disguised by distributing surface sand evenly.

Both green turtles and hawksbill turtles nest on islands in Hawai`i and across the PIR. Rarely, olive ridley and loggerhead sea turtles conduct nesting activities in the Hawaiian Islands.

Oftentimes, signs of nesting (e.g., tracks and body pits) are encountered, but the actual nesting activity is not observed. In such cases, it is often impossible to confirm whether a nest was successfully deposited or identify the exact location of the clutch. Even the most experienced beach monitors cannot always tell whether or not a turtle has successfully laid a clutch.

Confirming nest deposition is important to accurately quantify nesting across the PIR as these data are central to population assessments and modeling. Similarly, confirming the exact location of nests is necessary to conduct post-hatching nest excavations, which also provide data (such as hatching success) that are central to population modeling activities.

Often, researchers attempt to confirm and locate sea turtle nests via digging by hand. However, given that sea turtle body pits are often large, digging by hand can be extremely time consuming and is often unsuccessful. A probe stick can be used as a tool to more efficiently locate a nest cavity, decreasing the time and labor needed to do so (Brig 2014). A probe typically consists of a straight or tapered, T-handled rod constructed of either wood or metal.

Nest probing is a technique used by numerous sea turtle monitoring programs in the U.S. east coast and globally (e.g. TCOT 2003; Henson and Boettcher 2006; KITP 2017). This method is not intended to be the initial method for identifying nests. Instead, it may be used when digging for a nest has proven unsuccessful (e.g., digging for more than 45 minutes). Probing would be used to locate nests that were not observed being laid during the night, instead they would be found during surveys after being laid (e.g., during the day). Before probing within the body pit, researchers would probe outside the body pit to get a feel for the density of the sand and determine how far the probe goes down in sand that has not been dug previously (by the nesting female turtle). This will serve as a reference for when the probe does enter the egg chamber. When possible, we will avoid stepping directly on the nesting pit area as it may be necessary to do multiple probing passes to locate the nest. In such cases, leaving the pit area as undisturbed as possible will facilitate where to start and end additional passes. Identifying the most likely spot to begin probing is a skill that improves with experience.

Probing shall begin in the area where the nest is most likely to be located. Nesting turtles typically create an initial body pit, in which they excavate a nest chamber and deposit their eggs, then proceed to widen the body pit by throwing sand to cover or "camouflage" the nest.

The compacted layer of sand directly over an egg chamber is relatively thin and thus can be easily penetrated by a probe stick. The person conducting the probing will apply initial weight on the probe using arms and shoulders. The rod will give way when it perforates the compacted layer and enters the chamber. In other words, the probe will sink quickly once perforating the compacted layer of sand and entering the nest cavity, compared to the surrounding sand. The distinct feel of the rod perforating the compacted layer and entering a nest chamber is learned with practice. Enough pressure should be applied on the rod to ensure that it will break through the surface layer, but with care being taken to minimize the possibility of breakage of any of the eggs within the nest chamber. Once the potential egg chamber has been identified, the person will dig by hand to locate the eggs.

If the egg chamber has not been located after having probed in the most likely locations, a systematic grid approach will be used to probe the entire body pit until the egg chamber is located or it has been determined that additional probing is no longer warranted. Inexperienced use of a probe can result in one or more eggs along the top layer of the nest being punctured and thus should only be conducted by trained personnel.

2.2.3. Alternative 3 – No Action Alternative

The No Action Alternative is for the PIFSC to not operate the MTBAP related research activities in the proposed area as described.

Alternative 3 would not meet the purpose of the MTBAP and would not fulfill the requirements of NMFS and/or USFWS ESA mandates, as the agencies responsible for sea turtle recovery. Additionally, the No Action Alternative would not meet the purpose and need for the action. However, this alternative would alleviate the potential incidental take of marine mammals and seabirds under certain conditions. The CEQ's regulations require consideration and analysis of a No Action Alternative for the purposes of presenting a comparative analysis to the action alternatives.

2.3. Alternatives Considered but Eliminated from Further Consideration

NMFS considered whether other alternatives could meet the purpose and need for the action. Other potential alternatives that do not satisfy the agency's purpose and need, or would not meet minimum environmental standards, are not considered reasonable and need not be carried forward for evaluation in an EA. The following alternatives were considered but not included for further consideration:

- MTBAP ceases green sea turtle nesting/basking research specifically in the Papahānaumokuākea Marine National Monument (PMNM) such that MTBAP does not disturb listed species (see Section 3.2.2) within the monument. MTBAP rejects this alternative because it creates an inability for MTBAP to assess abundance, trends, and threats to the Hawaiian green sea turtle, and the benefits to other listed species (e.g., Hawaiian monk seals and seabirds) do not outweigh the loss of data needed to manage/conserve the target species (i.e., Hawaiian green sea turtles). This alternative would rank lower than Alternative 1 and was eliminated from further consideration.
- During the public comment period, one commenter suggested that NMFS consider experimentally restoring sand to one or more of the islets at Lalo/French Frigate Shoals (henceforth in this document, French Frigate Shoals will be referred to by its Hawaiian name, Lalo) through pumping of submerged sand in areas where corals and other living bottom habitat would not be adversely impacted. This action does not meet the purpose and need of this PEA, which is to collect scientific data on sea turtle populations in the PIR, conduct assessments on sea turtles, and evaluate the effectiveness of recovery actions. This suggested action is a management action to help support green sea turtle habitat and conservation of the population. It is currently being considered by numerous organizations and co-managers of the Papahānaumokuākea Marine National Monument.

Chapter 3 Affected Environment

NMFS reviewed all possible environmental, cultural, historical, social, and economic resources based on the geographic location associated with the proposed action and alternatives. Based on this review, this chapter describes the affected environment and existing (baseline) conditions for select resource categories. Chapter 4 provides an analysis and description of environmental impacts associated with the affected environment.

3.1.Physical Environment

The area where research activities occur is primarily in open ocean, near shore, and nesting areas of the PIR and international areas, and may occur in water or on land. A detailed description of the physical, chemical, and biological conditions of the PIR can be found in the (1) 2014 PIRO Environmental Assessment (EA; NMFS 2014a, NMFS 2019), which describes the sea turtle management activities within the PIR and internationally; (2) the Hawaiian Monk Seal Recovery Actions Environmental Impact Statement (NMFS 2014b), which describes the impact of monk seal research and recovery activities on the habitat, including some beaches that are also used for turtle nesting and basking; (3) EA for Annual Catch Limits and Accountability Measures for Main Hawaiian Islands Kona Crab 2020-2023 (85 FR 79928, 12/11/2020), which includes descriptions of habitat and species that sea turtles may use or interact with, and (4) Pacific Islands Fisheries Science Center Programmatic Environmental Assessment for Fisheries and Ecosystem Research (NMFS 2023), which describes all activities and areas of PIFSC's research within the PIR. We refer the reader to these documents (see supporting documents) for more detailed information. The non-US areas where MTBAP conducts sea turtle research include Papua New Guinea, Indonesia, the Solomon Islands, Japan, Philippines, Thailand, Vietnam, Malaysia, Federated States of Micronesia, Fiji, Cook Islands, French Polynesia, Palau, and Marshall Islands. These areas and their conditions are described in depth in the PIRO EA (NMFS 2014a).

3.2.Biological Environment

3.2.1 Target Species - Sea Turtles and Sea Turtle Habitat

The sea turtles most likely to be encountered as part of PIFSC's MTBAP research activities include green, hawksbill, loggerhead, leatherback, and olive ridley sea turtles (Table 1). The latest abundance and life history information about each species/stock was collected from the most recent and best available science. MTBAP provided information on the distribution, population size, and conservation status for each species in the NMFS permit 21260 application, and MTBAP incorporates those descriptions by reference. MTBAP briefly summarizes this information here.

Green, hawksbill, loggerhead, leatherback, and olive ridley sea turtles are protected throughout United States waters under the ESA. Inclusion of these species into the Convention on

International Trade in Endangered Species of Wild Fauna and Flora (CITES) has made it illegal to trade any products made from these species among the U.S. and 169 other countries. Recovery plans for all U.S. Pacific populations of sea turtles were finalized in 1998 and serve as guidance in actions to recover these stocks (NMFS and USFWS 1998a-e). Sea turtle critical habitat has not been designated in the proposed area.

3.2.1.1. **Green Turtle**

In 2016, the green turtle was listed as threatened or endangered under the ESA throughout its Pacific Range with delineated DPSs based on genetic differentiation (Seminoff et al. 2015). MTBAP conducts research on three DPSs of green turtles: (1) Central North Pacific (CNP) – threatened, (2) Central South Pacific (CSP) – endangered, (3) Central West Pacific (CWP) – endangered. Additionally, MTBAP may interact with the East Pacific, East Indian/West Pacific, and Southwest Pacific DPSs at foraging grounds within the PIR – threatened.

In 1998, critical habitat was designated for the green sea turtle off Puerto Rico (50 CFR 226; September 2, 2014). This critical habitat is outside of the study area for MTBAP research activities; however, following the listing of 11 DPS for the green sea turtles in 2016, NMFS and USFWS proposed critical habitat designation in 2023 for green sea turtles in the PIR (88 FR 46572), but have not yet finalized the designation.

Central North Pacific DPS

The CNP green sea turtle population includes the Hawaiian Archipelago and Johnston Atoll. It is a genetically distinct stock from others within the Pacific and there is no genetic differentiation between the main nesting site, Lalo, and Laysan Island, both located in the PMNM (Dutton et al. 2008, Dutton et al. 2014). Additionally, scattered nesting in the MHI is likely due to nesting activity of a few founding females (now captive and whose progeny is released into the wild) which originated from Lalo (Frey et al. 2013). Seminoff et al. (2015) estimated that the CNP DPS has a total of 3,346 nesting females which has increased approximately 4.8 to 5.4 % over the past 40 years (Balazs and Chaloupka 2004, Balazs and Chaloupka 2006, Chaloupka and Balazs 2007, NMFS PIFSC unpublished data). The sex ratio determined by stranded turtles (n = 2,411, not a random sampling) in the MHI from 1983-2013 was not biased (Balazs et al. 2015). However, recent preliminary results (n = 35, a random sampling) show a female bias (3.4F:1M) in immature green sea turtles captured at three foraging grounds within the MHI between 2011-2015 (Allen et al. 2017).

Green turtles forage and nest within the CNP DPS areas. Foraging grounds are primarily located in the waters surrounding the MHI, whereas nesting primarily occurs on sandy beaches 500 miles to the northwest of Honolulu in the PMNM, with 96% of all nesting occurring at Lalo (Seminoff et al. 2015). Nesting females have been tracked by satellite telemetry to foraging grounds within the DPS at the MHI and Johnston Atoll (Balazs et al., 2017; Balazs and Ellis 2000; NMFS PIFSC unpublished data). In addition to nesting and foraging, green turtles in Hawai'i haul out on beaches to bask.

Threats to green sea turtles in the CNP DPS include incidental capture in commercial and recreational fishing gear, boat collisions, shark attack, and the tumor disease fibropapillomatosis (NMFS and USFWS 1998a, Chaloupka et al. 2008a, NMFS PIFSC unpublished data). Climatic changes and sea level rise have also been identified as a significant threat to this population as the nesting habitat in the PMNM is comprised of low-lying atoll islets (Baker et al. 2006). Whale-Skate Island in the PMNM was historically densely nested; however this island subsided and never reformed (Kittinger et al. 2013). In October 2018, East Island (the most densely nested island in the atoll) was completely washed away by Hurricane Walaka and has yet to reform to its previous size.

Central South Pacific DPS

The CSP DPS extends 7,500 km longitudinally from Fiji in the West to Easter Island, Chile in the East. Low to moderate nesting activity is dispersed throughout the geographic distribution of the CSP DPS. There is a lack of consistent monitoring of green sea turtle nesting in the DPS because most nesting occurs on low-lying atolls, which are remote and difficult to access. The main rookeries include Rose Atoll in American Sāmoa (Maison et al. 2010); Tongareva Atoll in the Cook Islands (White et al. 2014); Ringgold Isles in Fiji (Sharma-Gounder and Veeran 2010); Scilly Atoll in French Polynesia (Balazs et al. 1995); Enderbury in Kiribati (Obura and Stone 2002); Nukunonu in Tokelau (Balazs 1983); Tonga (Bell et al. 2009); Funafuti in Tuvala (Alefaio And Alefaio 2006); and Henderson in the UK (Brooke 1995). Seminoff et al. (2015) estimated approximately 3,000 nesting females in the DPS. Hatchlings disburse throughout the region and post-nesting migrations have stayed within (Fiji; Piovano 2018, Balazs et al. 1995; French Polynesia, Craig et al. 2004; Tonga, the Cook Islands, and Wallis, Balazs et al. 1995) or travelled outside (western South Pacific, Tuato'o-Bartley et al., 1993; New Caledonia and Vanuatu, Balazs et al. 1995) of the DPS' geographic range. In-water data are limited, but green sea turtles have been found in coastal waters of American Sāmoa (M. MacDonald personal communication, June 2021), Cook Islands (White et al. 2014, White and Galbraith 2013) and French Polynesia (Petit et al. 2012) as well as at two major foraging grounds in Fiji (Piovano et al. 2020). When examining the genetics of nesting females in the CSP DPS, Dutton et al. (2014) found that American Sāmoa and French Polynesia are two different genetic stocks. Additionally when examining green turtle nesting sites across the Pacific Islands the authors found that neighboring rookeries (within 500 km) were genetically similar, however, rookeries more than 1,000 km apart were genetically different from each other (Dutton et al., 2014). The DPS has unique haplotypes not found elsewhere with a moderate level of diversity (P. Dutton personal communication cited in Seminoff et al. 2015). Considering that this DPS extends longitudinally over 7,500 km it is possible that there are more than just these two genetic stocks within the CSP DPS. For turtles encountered in water, preliminary genetic results show that immature green turtles captured in Tongareva Atoll, French Polynesia share haplotypes with American Sāmoa, the Marshall Islands, Federated States of Micronesia, and the Eastern Pacific; with one additional novel/unknown haplotype found (White 2016). Despite there being two key foraging grounds in Fiji, Piovano et al. (2020) have not encountered a single turtle hatched in Fiji.

Central West Pacific DPS

Within the CWP DPS, green turtle nesting occurs in relatively low numbers in the FSM, Marshall Islands, Solomon Islands, Palau, Guam, and CNMI (Maison et al. 2010, Martin et al. 2015, Summers et al. 2018a). The nesting female abundance for this DPS is estimated to be 6,518 individuals, with the majority of nesting females occurring in Ulithi Atoll, Yap, FSM and Ogasawara, Japan (Seminoff et al. 2015). The majority of the nesting populations in this DPS have insufficient long-term monitoring information to adequately assess the abundance and trends. Limited data suggest population decreases in the Marshall Islands, increases in the CNMI, and unknown trends in Palau, Papua New Guinea (PNG), Solomon Islands, and FSM (Maison et al. 2010, Seminoff et al. 2015, Summers et al. 2018a). Chichijima, Japan is estimated to be increasing at approximately 5% per year (Balazs et al. 2015, Seminoff et al. 2015).

Direct take and trade are significant threats to this DPS (Seminoff et al. 2015, Summers et al. 2018b, Miller et al. 2019). Harvest of nesting females and their eggs occurs in CNMI, Guam, FSM, Kiribati, Marshall Islands, Palau, PNG, Malaysia, Phillippines, and Indonesia (summarized by Seminoff et al. 2015; Humber et al. 2014; Lam et al. 2011; Martin et al. 2019; Summers et al. 2018a, Summers et al. 2018b; Tapilatu et al. 2017). In addition to direct take, land predators consume large numbers of eggs on nesting beaches throughout the DPS (Seminoff et al. 2015). Incidental take in artisanal and commercial fisheries is also a significant threat to sea turtles in this DPS.

Green sea turtles account for 85% of turtles captured in-water in Guam (Martin et al. 2016) and 93% of turtles captured in-water in CNMI (Summers et al. 2018b), and five decades of aerial surveys around Guam suggest that sea turtle numbers increased an order of magnitude since the 1960s (Martin et al. 2016). An 11-year study of CNMI nesting activity suggests an annual increase in nesting females of 7.4% per year (Summers et al., 2018a). Genetic analysis of females from nesting sites in the region has identified Guam/CNMI as a management unit along with Palau, PNG, Yap, and the Marshall Islands (Seminoff et al. 2015).

3.2.1.2. **Hawksbill**

The hawksbill turtle (*Eretmochelys imbricata)* is listed under the ESA as endangered throughout its range. Hawksbill populations have declined dramatically in the Pacific (Mortimer and Donnelly 2008), and the species is rapidly approaching extinction due to a number of factors. The most recent abundance estimate for this species in the Pacific Ocean is a total of 10,194 to 12,770 nesting females each season among 88 sites evaluated, which is a rough estimate of total annual reproductive effort in the Pacific (NMFS and USFWS 2013). In the PIR, Hawai'i hosts the largest population of hawksbills with 10 to 25 females nesting annually (NMFS and USFWS 2013). The intentional harvest of this species for meat and eggs, and the illegal international trade of tortoiseshell are the greatest threats to its survival. Other threats to the continued existence of this species include beach erosion, coastal construction, habitat loss, capture in fishing nets, and boat collisions (NMFS and USFWS 1998b, NMFS 2013).

In Hawai'i, hawksbill turtles nest in small numbers (<15 females annually) in the MHI (i.e., Hawai'i, Maui, and Moloka'i; Gaos et al., 2021). Historically, the majority of monitoring occurred on the islands of Hawai'i and Maui. Hawksbill turtles migrate through, rest, and forage in the nearshore waters in the MHI (Parker et al. 2009, Van Houtan et al. 2016). They also occur in the PMNM and likely nested there historically (Van Houtan et al. 2012). An increasing trend in the hawksbill turtle population started in 2006, largely due to protection efforts (Gaos et al., 2021). Genetic analyses indicate that Hawaiian hawksbills are a distinct genetic stock, and that most individuals remain in or close to the archipelago throughout their lives; however there is evidence of potential dispersal to foraging grounds in the West Pacific (Gaos et al. 2020). The population appears to be strongly female-biased based on stranding data and in-water surveys (Brunson et al. 2022, King and McLeish 2016).

Nesting is not regularly monitored (Grant et al. 1997, Hutchinson et al. 2008) throughout the PIR, but a few hawksbill turtles nest on the island of Ofu in American Sāmoa (M. MacDonald personal communication, December 2019). Surveys for hawksbill nesting occur on Guam and in CNMI but there have been no documented nesting of hawksbills in recent years (T. Summers and C. Cayanan Personal Communication, August 2022; Summers et al. 2018b).

Hawksbill sea turtles are found in nearshore waters throughout the PIR, with hawksbills accounting for 15% of turtles captured in-water in Guam (Martin et al. 2016), 7% of turtles captured in-water in CNMI (Summers et al. 2017), and many were sighted by aerial surveys conducted over five decades (Martin et al. 2016). Their occurrence and distribution in the PRIA is not well understood. Immature and mature hawksbills occasionally strand in the MHI and American Sāmoa, which are documented through stranding research programs.

In 1998, critical habitat was designated for the hawksbill sea turtle off Puerto Rico (50 CFR 226; September 2, 2014). This critical habitat is outside of the study area for MTBAP research activities.

3.2.1.3. **Leatherback**

The leatherback turtle (*Dermochelys coriacea*) is listed as endangered throughout its range (85 FR 48332, August 10, 2020). Leatherback populations in the Pacific are in severe decline (Tapilatu et al. 2013) and, in some cases, on the verge of extinction. The decline has been attributed to incidental take in coastal and high seas fisheries, the killing of nesting females by humans for meat, and the collecting of eggs at nesting beaches (Benson et al. 2015; Fahy 2011; Martin et al. 2020). There are three distinct genetic stocks in the Pacific: eastern Pacific, western Pacific, and the functionally extinct Malaysian stock (Benson et al. 2015). The Western Pacific leatherback stock is made up of three rookeries (1) Papua-Barat, Indonesia, (2) PNG, and (3) Solomon Islands (Dutton and Shanker 2015). The most recent population status review recognizes two Pacific distinct populations: western Pacific and eastern Pacific (NMFS and

USFWS 2020). Leatherbacks encountered in Hawai'i represent individuals in transit between nesting beaches in the western Pacific and foraging grounds (Benson et al. 2015). The number of nesting females for the West Pacific DPS is estimated at 1,277 individuals (NMFS and USFWS 2020). Leatherbacks nesting in the western Pacific migrate through the EEZs of at least 32 nations, and spend between 45 and 78% of the year on the high seas including in the U.S. EEZs of California and Hawai'i (Harrison et al. 2018). Some individuals forage in the Eastern Pacific Ocean, such as Peru, Chile, and California (Dutton et al. 2000; Donoso and Dutton 2010, Seminoff et al. 2012). Some of the largest nesting populations of leatherback turtles in the world border the Pacific Ocean, but no nesting occurs on beaches under U.S. jurisdiction (NMFS and USFWS 1998c).

Critical habitat for leatherback turtles was originally designated in 1978 (43 FR 43688; September 26, 1978), and was revised in 2012 to include more areas within the Pacific Ocean (77 FR 4169; January 26, 2012). This designation occurs along the U.S. west coast and comprises approximately 41,914 square miles (108,558 square km) of marine habitat and includes waters from the ocean surface down to a maximum depth of 262 feet (80 m). This critical habitat is outside of the study area for MTBAP research activities.

3.2.1.4. **Loggerhead**

The loggerhead turtle (*Caretta caretta*) is listed in the North and South Pacific as DPSs with an endangered status (75 FR 58868). Loggerheads in the North Pacific are derived primarily from nesting beaches in Japan (Bowen et al. 1995, Kamezaki et al. 2003); whereas, loggerheads in the South Pacific are derived primarily from nesting beaches in eastern Australia and New Caledonia (Limpus and Limpus 2003, Boyle et al. 2009). The North Pacific nesting female population is estimated at 3,652 individuals and is modeled to have a slightly increasing population trend (Martin et al. 2020). North Pacific loggerheads spend their immature years foraging throughout the Central and Eastern Pacific, but return to the Western Pacific for the duration of their adult lives (Abecassis et al. 2013, Seminoff et al. 2014, Briscoe et al. 2016).

These stocks are threatened primarily by incidental capture in commercial fishing gear (i.e., longline gear and gillnets) and loss or degradation of nesting habitat (NMFS and USFWS 1998d, Polovina et al. 2000, Polovina et al. 2003, Polovina et al. 2004, Polovina et al. 2006, Peckham et al. 2007, Howell et al. 2008, Howell et al. 2010, Kobayashi et al. 2008, Chaloupka et al. 2008b, NMFS and USFWS 2009, Martin et al. 2020). Other threats include egg harvest and predation as well as nesting beach alteration.

Critical habitat was designated for the loggerhead sea turtle Northwest Atlantic Ocean DPS in 2014 (79 FR 39855; July 10, 2014). This critical habitat is outside of the study area for MTBAP research activities.

3.2.1.5. **Olive Ridley**

The olive ridley turtle (*Lepidochelys olivacea*) is listed as threatened globally in the Pacific, except for the Mexican breeding population, which is classified as endangered. The olive ridley is widely regarded as the most abundant sea turtle in the world (NMFS and USFWS 2014); however, their occurrence is rare in the central Pacific because there are no nesting beaches in the PIR. Occasionally, a wayward female is found nesting or attempting to nest in the Hawaiian Islands, most recently in 2019 on the Island of Oahu (NMFS unpublished data). Individuals also occasionally strand in the MHI and are incidentally captured in western and central Pacific longline fisheries more frequently than the other species (Fahy 2011). The primary threats to this species throughout the Pacific are incidental take in fisheries and harvest of eggs and adults on Mexican and Central American nesting beaches (NMFS and USFWS 2014).

3.2.2. Protected Species

This section identifies the non-target protected species that may be encountered during research activities in the proposed area. These include marine mammals, birds, fish, other reptiles, corals, and plants. More information about the species that may be potentially encountered can be found in the NMFS (2022b) PIFSC research biological opinion. The MTBAP activities have been evaluated for impacts on protected resources and are managed in compliance with the requirements of the Marine Mammal Protection Act, the ESA, the Migratory Bird Treaty Act, and other applicable statutes. The biology of these species is described in greater detail within several documents, and we refer the reader to them for more in-depth information (see supporting documents): (1) the Pacific Islands Regional Office (PIRO) Environmental Assessment for the Marine Turtle Management and Conservation Program (NMFS 2014a, NMFS 2019), which describes the sea turtle management activities within the PIR and internationally; (2) the Hawaiian Monk Seal Recovery Actions Environmental Impact Statement (NMFS 2014b), which describes the impact of monk seal research and recovery activities on the habitat, including some beaches that are also used for turtle nesting and basking; (3) EA for Annual Catch Limits and Accountability Measures for Main Hawaiian Islands Kona Crab 2020-2023 (85 FR 79928, 12/11/2020), which includes descriptions of habitat and species that sea turtles may use or interact with, and (4) Pacific Islands Fisheries Science Center Programmatic Environmental Assessment for Fisheries and Ecosystem Research (NMFS 2023), which describes all activities and areas of PIFSC's research within the PIR.

3.2.2.1. **Marine Mammals**

3.2.2.1.1. Cetaceans

Over 30 species of cetaceans inhabit the waters of the PIR. MTBAP activities would rarely encounter any of these species, but may potentially overlap with cetaceans during in-water monitoring (e.g., UAS surveys, boat surveys). A list of the cetacean species found in the Hawaiian archipelago, American Sāmoa, Guam and CNMI can be found in Table 5.

Table 5. Cetaceans found in the Hawaiian archipelago, American Sāmoa, Guam and CNMI.

Common Name	***Scientific Name***
Common bottlenose dolphin	*Tursiops truncatus*
Common dolphin	*Delphinus delphis*
Fraser's dolphin	*Lagenodelphis hosei*
Northern right whale dolphin	*Lissodelphis borealis*
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*
Indo-Pacific bottlenose dolphin	*Tursiops aduncus*
Pantropical spotted dolphin	*Stenella attenuata*
Risso's dolphin	*Grampus griseus*
Rough-toothed dolphin	*Steno bredanensis*
Spinner dolphin	*Stenella longirostris*
Striped dolphin	*Stenella coruleoalba*
Baird's beaked whale	*Berardius bairdii*
Blainville's beaked whale	*Mesoplodon densirostris*
Blue whale*	*Balaenoptera musculus*
Bryde's whale	*Balaenoptera edeni*
Cuvier's beaked whale	*Ziphius cavirostris*
Deraniyagala's beaked whale	*Mesoplodon hotaula*
Dwarf sperm whale	*Kogia sima*
False killer whale*	*Pseudorca crassidens*
Fin whale*	*Balaenoptera physalus*
Ginko-toothed beaked whale	*Mesoplodon ginkgodens*
Humpback whale*	*Megaptera novaeangliae*
Killer whale	*Orcinus orca*
Longman's beaked whale	*Indopacetus pacificus*
Melon-headed whale	*Peponocephala electra*
Minke whale	*Balaenoptera acutorostrata*
Short-finned pilot whale	*Globicephala macrorhyncus*
Pygmy killer whale	*Feresa attenuata*
Pygmy sperm whale	*Kogia breviceps*
North Pacific right whale	*Eubalaena japonica*
Sei whale*	*Balaenoptera borealis*
Sperm whale*	*Physeter macrocephalus*
Stejneger's beaked whale	*Mesoplodon stejnegeri*

* Species or a Distinct Population Segment listed under the ESA

3.2.2.1.2. Hawaiian Monk Seal

Hawaiian monk seals (*Neomonachus schauinslandi*) are found in the Hawaiian archipelago and have been reported at Johnston atoll within the action area. While Hawaiian monk seals spend most of their time in the water, they also use the terrestrial environment to haul-out on beaches, shores, and reefs. A detailed description of the status and biology of Hawaiian monk seals can be found in the Hawaiian Monk Seal Recovery Actions Environmental Impact Statement[1] (NMFS 2014b), which describes the impact of monk seal research and recovery activities on the habitat, including some beaches that are also used for turtle nesting and basking; and we refer the reader to that document for more detailed information (see footnote). Since the publication of the Hawaiian Monk Seal Recovery Actions Environmental Impact Statement in 2014, ten areas within the Hawaiian Archipelago were designated as Hawaiian monk seal critical (80 FR 50925; August 21, 2015) – described in greater detail in Section 3.2.3.2 below.

3.2.2.2. **Birds**

There are many seabird species that are considered residents or visitors within the action area. Of the presented species, four are listed under the ESA. However, all species likely to occur in the U.S. EEZ are protected by the Migratory Bird Treaty Act (MBTA).

There are also numerous terrestrial birds located within the action area. Terrestrial birds that are protected and likely to be found within the expected locations where research actions may take place are also included in Table 6.

---

[1] https://www.fisheries.noaa.gov/resource/document/final-programmatic-environmental-impact-statement-hawaiian-monk-seal-recovery

Table 6. Birds protected under ESA or MBTA within the action area.

Common Name	***Scientific Name***
Newell's shearwater*	*(Puffinus auricularis newelli)*
Hawaiian petrel*	*(Pterodroma phaeopygia)*
Band-rumped storm-petrel*	*(Oceanodroma castro)*
Short-tailed albatross*	*(Phoebastria albatrus)*
Wedge-tailed shearwater	*Puffinus pacificus*
Audubon's shearwater	*Puffinus lherminieri*
Short-tailed shearwater	*Puffinus tenuirostris*
Leach's storm-petrel	*Oceanodroma leucorhoa*
Matsudaira's storm-petrel	*Oceanodroma matsudairae*
Red-footed booby	*Sula sula*
Brown booby	*Sula leucogaster*
Masked booby	*Sula dactylatra*
White-tailed tropicbird	*Phaethon lepturus*
Red-tailed tropicbird	*Phaethon rubricauda*
Great frigate bird	*Fregata minor*
Sooty tern	*Sterna fuscata*
Brown noddy	*Anous stolidus*
Black noddy	*Anous minutus*
White tern/Common fairy-tern	*Gygis alba*
Hawaiian goose	*Branta sandvicensis*
Hawaiian coot	*Fulica alai*
Hawaiian duck*	*Anas wyvilliana*
Hawaiian stilt*	*Himantopus mexicanus knudseni*
Laysan duck*	*Anas laysanensis*
Laysan finch	*Telespiza cantans*
Guam rail	*Gallirallus owstoni*
Mao	*Gymnomyza samoaensis*
Tongan ground dove	*Gallicolumba stairi*

* listed under the ESA

3.2.2.3. **ESA-listed plants**

The proposed activities would mainly be located in coastal waters on the beach or within 5 m inland of the splash zone where vegetation occurs. Field research camps in the PMNM are located further inland than this immediate shoreline area. Some listed plants may occur near field camps or trail paths leading to beaches where research activities may be conducted. These species may be impacted by human disturbance and are known to exist in areas where humans access beaches. MTBAP research and associated activities may be conducted in areas where these species occur; however, the impact to these species is expected to be minor. +

3.2.2.4. **Invertebrates**

3.2.2.4.1. Yellow-faced bees

There are 63 species in the bee genus *Hylaeus*, which occur on all the MHI and Nihoa (within PMNM). Native Hawaiian yellow-faced bees in the genus *Hylaeus* (Hymenoptera: Colletidae) have adapted to a wide array of habitat types ranging from coastal strand to high elevation wet forests. They nest in hollow stems, holes in trees, under bark, in crevices, or in burrows in soil. MTBAP activities may occur near areas where these bees nest and forage.

3.2.2.4.2. ESA-listed Corals

Executive Order 13089 requires federal agencies to identify actions that may affect coral reefs, protect and enhance the condition of coral reef ecosystems through existing projects, and ensure their actions do not degrade the conditions of coral reef ecosystems. On September 10, 2014, NMFS issued a final rule to list 20 species of corals as threatened under the ESA (79 FR 53851). Fifteen of the newly listed species occur in the Indo-Pacific, and five in the Caribbean. Of those that occur in the Indo-Pacific, NMFS assumes only eight occur in waters under U.S. jurisdiction (79 FR 53851). Six of these species occur in the waters around American Sāmoa, three of the species occur in the waters around the Mariana Archipelago, and three listed species are confirmed in the PRIA (Table 7). None of the species has a common name. Species-specific information on the exact location of these ESA-listed coral is unavailable. Critical habitat has been proposed for five species: (11/30/2023; 88FR 83644) but has not been designated at this time. See Section 3.2.3.2 below.

Table 7. ESA-listed corals within the action area.

Species Name	Location
Acropora globiceps	American Sāmoa, Mariana archipelago, PRIA
Acropora retusa	American Sāmoa, Mariana archipelago, PRIA
Acropora speciosa	American Sāmoa, PRIA
Acropora jacquelineae	American Sāmoa
Euphyllia paradivisa	American Sāmoa
Isopora crateriformis	American Sāmoa
Seriatopora aculeata	Mariana archipelago

3.2.3. Habitats and Vulnerable Ecosystems

3.2.3.1. **Marine Protected Areas**

Marine Protected Areas (MPAs) and protected areas are numerous in the PIR. These include Marine National Monuments, Sanctuaries, Refuges, and Parks and other designated conservation areas. The MPAs that occur within the action area and where MTBAP sea turtle research activities or associated actions could take place include:

- Papahānaumokuākea Marine National Monument
- Rose Atoll Marine National Monument
- National Marine Sanctuary of American Sāmoa
- Marianas Trench Marine National Monument
- Pacific Remote Islands Marine National Monument
- Hawaiian Islands Humpback Whale National Marine Sanctuary
- Fagatele Bay National Marine Sanctuary
- Hanauma Nature Preserve

These areas have been described in detail previously within (1) the PIRO Environmental Assessment for the Marine Turtle Management and Conservation Program (NMFS 2014a), which describes the sea turtle management activities within the PIR; (2) the Hawaiian Monk Seal Recovery Actions Environmental Impact Statement (NMFS 2014b), which describes the impact of monk seal research and recovery activities on the habitat, including some beaches that are also used for turtle nesting and basking; (3) EA for Annual Catch Limits and Accountability Measures for Main Hawaiian Islands Kona Crab 2020-2023 (85 FR 79928, 12/11/2020), which includes descriptions of habitat and species that sea turtles may use or interact with, and (4) Pacific Islands Fisheries Science Center Programmatic Environmental Assessment for Fisheries and Ecosystem Research (NMFS 2023), which describes all activities and areas of PIFSC's research within the PIR. We refer the reader to these documents for more detailed information (see supporting documents). Executive Order 13158 requires federal agencies to avoid harm to MPAs.

In addition, several other MPAs that occur within the action area and where MTBAP sea turtle research activities or associated actions could take place, but have not been described in detail in other documents are listed below. We describe those briefly here. These include:

- James Campbell National Wildlife Refuge
- Pearl Harbor National Wildlife Refuge
- Hawaii Volcanoes National Park

3.2.3.1.1. James Campbell National Wildlife Refuge

James Campbell NWR is a remnant wetland located in Kahuku, Koʻolauloa on the island of Oʻahu. The Refuge was established in 1976 for the purpose of providing habitat for endangered Hawaiian waterbirds, and was further expanded in 2005 for the purposes of providing additional habitat for endangered waterbirds, migratory shorebirds, waterfowl, seabirds, endangered and native plant species, endangered Hawaiian monk seal, and threatened Hawaiian green sea turtle; providing increased wildlife-dependent public uses; and assisting with flood damage reduction in the local area. JCNWR is typically a closed refuge; however, bird tours during the nonbreeding season of the endangered Hawaiian waterbirds may be offered to the public. In addition, a few beaches within the NWR are a sanctuary for nesting green sea turtles.

3.2.3.1.2. Hawai'i Volcanoes National Park

Hawai'i Volcanoes National Park was established as a Hawai'i National Park in 1916 and protects native plants and animals, and cultural sites. Many land and marine wildlife are protected within the HVNP, including hawksbill and green sea turtles. Important hawksbill sea turtle nesting beaches are protected under the jurisdiction of the Hawai'i Volcanoes National Park.

3.2.3.1.3. Pearl Harbor National Wildlife Refuge

Pearl Harbor NWR was established in 1972 as mitigation for construction of the Honolulu International Airport Reef Runway. The Kalaeloa Unit, once part of the former Barber's Point Naval Air Station, was established during military base closure proceedings in 2001 to protect native plants. Pearl Harbor NWR is managed as part of the O'ahu NWR Complex. Pearl Harbor is a sanctuary for many species that are native and endemic to the Hawaiian Islands, including green and hawksbill sea turtles.

3.2.3.2. Critical Habitats

The ESA requires the designation of critical habitat for a listed species when it is “prudent and determinable.” There are two species for which critical habitat has been designated within the project area, and green sea turtles and seven coral species for which critical habitat designation has been proposed. These are briefly described below.

Hawaiian monk seal critical habitat includes sixteen occupied areas within the range of the species: ten areas in the PMNM and six in the MHI (80 FR 50925; August 21, 2015). These areas contain one or a combination of habitat types: preferred pupping and nursing areas, significant haul-out areas, and/or marine foraging areas, that will support conservation for the species. Specific areas in the PMNM include all beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reef waters, and including marine habitat through the water's edge, including the seafloor and all subsurface waters and marine habitat within 10 meters of the seafloor, out to the 200-m depth contour line around the following 10 areas: Holaniku (Kure Atoll), Kuaihelani (Midway Islands), Manawai (Pearl and Hermes Reef), Kapou (Lisianski Island), Kamole (Laysan Island), Kamokuokamohoali`i (Maro Reef), `Ōnūnui ` Ōnūiki (Gardner Pinnacles), Lalo (French Frigate Shoals), Mokumanamana Island, and Nihoa Island. Specific areas in the MHI include marine habitat from the 200-m depth contour line, including the seafloor and all subsurface waters and marine habitat within 10 m of the seafloor, through the water's edge 5 m into the terrestrial environment from the shoreline between identified boundary points on the islands of: Kaula, Niihau, Kauai, O'ahu, Maui Nui (which includes Kahoolawe, Lanai, Maui, and Molokai), and Hawai'i.

Insular false killer whale (*Pseudorca crassidens*) critical habitat includes areas that contain any of four features that are essential to the population: Island-associated habitat, prey, water quality, and sound. 83 FR 35062 (July 24, 2018). The critical habitat was designated in approximately 45,504 km2 (17,564 mi2) of marine habitat in waters from the 45-meter depth contour to the 3,200-meter depth contour around the main Hawaiian Islands from Ni'ihau east to Hawai'i. There are 14 areas that were excluded from critical habitat designation based on military use and public safety concerns.

The designation of coral critical habitat within the PIR has been proposed by NMFS for five threatened coral species (*Acropora globiceps, A. retusa, A. speciosa, Euphyllia paradivisa,* and *Isopora crateriformis*) pursuant to section 4 of the ESA (November 30, 2023; 88 FR 83644). This replaces a proposal published on November 27, 2020 (85 FR 83899) of listing seven coral species, based on comments received during the public comment period. Sixteen specific occupied areas containing physical features essential to the conservation of these coral species are being proposed for designation as critical habitat; these areas contain approximately 251 square kilometers (97 square miles) of marine habitat.

The designation of green sea turtle critical habitat has been proposed by NMFS and the USFWS for six DPSs, three of which occur in the PIR (Central North Pacific, Central South Pacific, and Central West Pacific DPSs), pursuant to section 4 of the ESA (July 19, 2023; 88 FR 46572). Within the PIR, the proposed marine critical habitat would include nearshore waters (from the mean high water line to 20 meters depth) off the coasts of Hawai'i, Guam, Commonwealth of Northern Mariana Islands, American Samoa, and the Pacific Remote Island Areas. These areas contain the reproductive and foraging/resting essential features for this species.

3.2.3.3. **Essential Fish Habitat**

PIFSC established a programmatic Essential Fish Habitat (EFH) agreement with NMFS PIRO (Dated February 24, 2020). Under the programmatic agreement PIFSC will notify PIRO using a standard reporting form of proposed research actions as they arise (including MTBAP's activities that may impact EFH (i.e. small boat operations)) and any relevant conservation recommendations in the agreement that will be followed to mitigate impacts to EFH.

Chapter 4 Environmental Effects

This section describes the potential effects of each alternative on the components of the affected environment identified in Section 3.0 above. Table 8 provides a summary of the potential effects of the proposed alternatives. These impacts will be compared to the existing baseline conditions by rating them as negligible (no measurable effect), minor (effect may be perceptible (positive or negative) but may not be measurable), or major (having a measurable effect (positive or negative)). These ratings are made by taking into consideration the context, intensity, and likelihood of the impact.

Table 8. Summary of the affected environment and potential effects of the proposed alternatives

	Alternative 1 Status Quo	**Alternative 2 preferred**	**Alternative 3 No action**
Description	Continuation of Current Research Activities	Continuation of Current Research Activities with the Addition of Nest Relocations of any nest and Nest Probing	No Research
Impact to Target Stock	Negligible impact	Minor impact	Major impact
Impact to non-target species	Minor impact[1]	Same as Alternative 1	No impact
Habitat Impact	Minor impact[1]	Same as Alternative 1	No impact

[1]Impacts to non-target species and habitat are considered to range from negligible to minor.

4.1. Effects of Alternative 1 and 2 – Continuation of Current Research Activities

Alternative 1 is the continuation of current research activities conducted by PIFSC MTBAP, which may involve activities that range from computer analyses and outreach, to collection of blood and tissue samples or attaching tags and transmitters to sea turtles in the field. MTBAP standard operating procedures would continue to incorporate research techniques as described in section 2.1.1.7 of this PEA, which are specifically designed to minimize the impacts of these research techniques on turtles and the surrounding marine environment. Additional information is briefly summarized or supplemented in the following subsections. Alternative 2 involves the continuation of all activities described under Alternative 1 plus the addition of nest relocation and nest probing. Therefore, the effects described under this section will apply to both alternatives 1 and 2 and only the effects of the proposed nest relocation and probing activities are described under Section 4.2. Impacts from Alternative 1 and 2 would have minor impacts to non-target species and the environment/habitat. Alternative 1 would have a negligible impact to sea turtles, while Alternative 2 would have minor impacts to sea turtles. These minor impacts may be positive or negative. Some effects may negatively impact individuals, but ultimately the population would benefit and increase over time.

MTBAP's current research activities are not known to affect air quality, noise, water quality, view planes, or other associated physical resources given the limited time and intensity of the activities. Additionally, Alternatives 1 and 2 do not have the potential to affect public health or safety due to the standard operating procedures (as described in Section 2.1.1.7) which ensures the safety of research and technician personnel through regular training of all personnel in the implementation of techniques and methods, both in the laboratory and in the field. Lastly, Alternatives 1 and 2 are not expected to have a disproportionately high and adverse effect on the health or the environment of minority or low-income communities, compared to the impacts on other communities.

4.1.1. Effects to Sea Turtle Habitat

MTBAP activities in the PIR under Alternatives 1 and 2 would not result in permanent negative impacts to habitats used directly by sea turtles. The main impact issue associated with the activities described in Alternative 1, would be the short term disturbance to beach and marine habitat for the duration of the research activities. These disturbances are minimal, intermittent, short term, and of low frequency, and would not have any long-term impacts to habitat, and are therefore considered minor (i.e., may be perceptible (positive or negative) to population trend).

4.1.2. Effects to Sea Turtles

Even under the best circumstances with experienced research personnel and well-planned research methodologies, the potential for accidental mortality or serious injury does exist. To address this issue, there are mitigation protocols in place such that researchers are required to cease research activities and contact permit officials at NMFS and USFWS immediately should a sea turtle mortality event or a serious injury occur. This would allow for a careful review of the circumstances and, where needed, consultation with others to determine if the research methodology or qualifications of personnel are likely to lead to further incidents. Nonetheless, when searching MTBAP's database and using institutional knowledge obtained since 1992 to confirm the findings in the database, zero serious injuries or accidental mortalities of sea turtles have occurred in over 94,000 capture, 50,000 tagging, or 17,000 bio-sampling events of nesting, basking, in-water, and hatchling sea turtles. In 1994, one sea turtle became entangled in a capture net and was found unconscious, and the turtle was resuscitated and released alive; this type of net is no longer used by the MTBAP.

Possible impacts to sea turtles for various proposed research techniques are described in detail in the following sections. The expected number of turtles by species to be handled annually for each research technique is depicted in Tables 10 and 11. As shown, there are no deaths expected to result from implementation of the techniques as described. Based on current and past research, there are minimal levels of discomfort to individual animals expected to result from the proposed research methods. There are no other feasible research methods available to collect the data necessary to address research questions and recovery plan goals. Indirectly, impacts on sea turtle populations as a result of the proposed action are expected to be positive in that collection of data will assist researchers and conservation managers worldwide in monitoring the overall health status in order to inform conservation and management actions designed to maintain and increase these endangered and threatened populations. We therefore consider the impacts to sea turtles to be negligible, having no measurable effect on the population trend.

Table 9. Descriptions of the activities in Alternative 1 and how they relate to MTBAP's research activities.

Alternative 1 Activity	Section 2 Research Activities	Effect on sea turtles (y/n)
4.1.2.1 Crewed and Uncrewed Aerial survey	2.1.1.1 2.1.1.5 2.1.1.6	N Y Y
4.1.2.2 Nesting and basking surveys	2.1.1.1 2.1.1.5	N Y
4.2.2.3 Capturing and handling sea turtles in-water	2.1.1.1 2.1.1.2 2.1.1.4 2.1.1.6 2.1.1.7	N Y N Y N
4.2.2.4 Capturing and biosampling hatchlings	2.1.1.1 2.1.1.2 2.1.1.4 2.1.1.5 2.1.1.7	N Y N Y N
4.2.2.5 Procedures such as tissue sampling, tagging, and transmitter attachment	2.1.1.1 2.1.1.2 2.1.1.3 2.1.1.4 2.1.1.5 2.1.1.6 2.1.1.7	N Y Y N Y Y N
4.2.2.6	2.1.1.1	N

Alternative 1 Activity	Section 2 Research Activities	Effect on sea turtles (y/n)
Stranding response and research	2.1.1.2 2.1.1.3 2.1.1.4 2.1.1.7	Y Y N N

Table 10. Number of takes for in-water work under NMFS permit 21260 for each turtle species by activity type.

Activities include: Collect tumors; Count/survey; Tag attachment with epoxy; Laparoscopy; Gastric lavage; Mark, carapace (temporary); Flipper and PIT tag; Measure; Photograph/ Video; Sample blood; Cloacal swab; Fecal sample; Oral swab; Scute scraping; Tissue sample; Transport; Ultrasound; Weigh

Species	"Take" action	Observe/Collect Method	Anticipated # of takes	Expected # of mortalities
green	Capture/ Handle/ Release	Hand and/or Dip Net	250	0
hawksbill	Capture/ Handle/ Release	Hand and/or Dip Net	150	0
olive ridley	Capture/ Handle/ Release	Hand and/or Dip Net	100	0
loggerhead	Capture/ Handle/ Release	Hand and/or Dip Net	100	0
leatherback	Capture/ Handle/ Release	Net, breakaway hoopnet	100	0

Table 11. Number of takes for terrestrial work under USFWS permit TE-72088A-3 for each turtle species by activity type.

Activity Type	green (CNP[1])	green (CSP[2])	green (CWP[3])	hawksbill	olive ridley	loggerhead	leatherback
captured, held, handled, and measured.	5000	250	300	500	10	10	10
flipper and PIT tagged and have their	5000	250	300	500	10	10	10

Activity Type	green (CNP[1])	green (CSP[2])	green (CWP[3])	hawksbill	olive ridley	loggerhead	leatherback
carapace marked.							
located, monitored, excavated, and salvaged.	500	100	100	300	10	10	10
data-loggers inserted.	300	100	100	300	10	10	10
biotelemetry transmitter tags and archival TDR attached.	250	20	20	50	10	10	10
tissue (blood, flipper tissue) samples collected.	5000	250	300	500	10	10	10
tumor biopsy samples collected	5000	100	100	100	10	10	10
Ultrasound and Laparoscopy	200	100	100	100	0	0	0
Oxytetracycline Injection	500	250	100	500	0	0	0
Esophageal lavage	100	50	50	50	0	0	0
Mortality	0	0	0	0	0	0	0

[1] Central North Pacific Distinct Population Segment

[2] Central South Pacific Distinct Population Segment

[3] Central West Pacific Distinct Population Segment

4.1.2.1. **Effects of Aerial Surveys**

Aerial surveys over open ocean areas are expected to be transient in time and space. Both crewed and uncrewed aerial systems (UAS) may be used. Aerial research surveys (i.e., crewed and uncrewed) of sea turtle populations are not known to have significant impacts on sea turtles due to methodologies used to prevent disturbance (e.g., Bevan et al. 2018). The approach of a research vessel or aircraft (from which the UAS could be deployed) and associated noise may cause temporary disturbance to the target sea turtles and non-target species, and may temporarily interrupt normal activities such as feeding, resting, or mating. However, while sea turtles and non-target species may exhibit these temporary startle and evasive behaviors in response to the activities of researchers, the impact to individual animals or populations as a whole would not be likely to be significant because the reactions would be non-invasive and short-lived.

In order to mitigate the impacts to sea turtles during aerial surveys, MTBAP will limit the time over sea turtles (both on land and in the water) to one hour. MTBAP also has altitude restrictions put in place to minimize disturbance. On land, MTBAP will maintain a minimum distance of 20 ft from turtles using a rotary UAS, and 50 ft using fixed-wing aircraft, since fixed-wing UAS platforms generally produce more noise than rotary platforms. In water, MTBAP will maintain a minimum distance of 75 ft from turtles and will take off and land vertically. During any aerial survey, MTBAP will cease operations if turtles show signs of disturbance.

As of 2022, MTBAP does not conduct turtle research via aerial surveys. However, MTBAP is permitted to conduct aerial surveys and intends to conduct sea turtle aerial research survey activities in the PIR. For more detailed descriptions of UAS use during research activities, see MTBAP permits (Appendix 1-6).

DOI secretarial order 3379, issued on January 29th 2020, temporarily ceased all UAS flights "which take off or land on FWS lands and waters" including those within the PMNM. However, FWS has allowed for some limited UAS for activities under the co-managers permit that directly support conservation and management objectives of the Monument and do not result in any education/outreach material to be gathered or published from the UAS. MTBAP could not conduct UAS operations under any other type of permit. To operate under the co-manager PMNM permit, MTBAP will submit the standard memo-to-file or other documentation required by PMNM, prior to the start of each field season to describe how UAS would be used within the PMNM. In addition, MTBAP will coordinate with NMFS for ESA/MMPA permit requirements prior to the action occurring.

In summary, given the altitude the UAS operates and the short duration of operation, the operation of UAS under Alternatives 1 and 2 are not expected to have any impact on sea turtles or other wildlife, and we therefore consider the impacts to be negligible. However, if UAS operations are in danger of creating a disturbance to seabirds, marine mammals, or other natural resources, the aircraft would increase altitude to a non-threatening distance or leave the vicinity per permit requirements. Researchers would conduct research so as to avoid harassment of any sea turtles or other target or non-target species. There have been significant developments in UAS technology in recent years, such that protocols may evolve, and newer platforms may be used once approved by the Federal Aviation Administration (FAA) and NOAA's Office of Marine and Aviation Operations (OMAO). Close communication with the UAS experts from PIFSC will be maintained to adjust operational parameters according to the current technology capabilities with minimal animal disturbance. All UAS operations will be conducted in coordination with and approved by OMAO.

4.1.2.2. **Effects of Nesting and Basking Surveys**

During nesting surveys, researchers walk the beach to record data, including: identification of the female, date of encounter or nest deposition, date of nest hatching, location of nest, and nest density. When conducting night surveys for nesting activity, nesting females can become skittish or disturbed if a light is shined on their face during egg deposition, or if they see the researcher or the researcher's shadow. To reduce the likelihood of disturbance, red lights are used and researchers always approach a nesting turtle slowly from the rear. Before contact is made with the turtle, the nesting activity is noted, and an attempt to identify her by shell etching or tag is made. Based on the observed activity, the researcher decides if it is the appropriate time to safely tag and sample (if necessary) the turtle without disrupting the nesting process. The best time for the researcher to interact with the turtle is during and immediately after egg laying is complete to minimize adverse impacts. The presence of researchers conducting the nesting surveys has a negligible impact on turtles while they rest on the beach prior, during, and after nesting as a result of these avoidance and minimization measures.

For Alternatives 1 and 2, conducting nesting surveys would have short-term temporary direct minor adverse impacts to any sea turtle that is studied. These impacts would be in the form of non-lethal stress to the wild animal (Eckert et al., 1999), but as described above would be mitigated through the use of red lights and approaching the animal from the rear. The indirect adverse impacts would be negligible because the nesting surveys would be conducted within a matter of minutes. The long-term, minor, beneficial, indirect impact of surveys of sea turtles would be the increased understanding of the sea turtle populations though additional data collection.

4.1.2.3. **Effects of capturing and handling sea turtles in-water**

As with any wildlife capture, there is a possibility that captured turtles could experience short- and long-term adverse impacts. These adverse impacts range from near-drowning to actual drowning by entanglement. To minimize the potential for adverse impacts, when nets are in the water to capture turtles, they are constantly monitored and turtles are immediately retrieved from the net (Ehrhart and Ogren 1999). Additionally, several field personnel are in the water during all capture activities to ensure that stress to the animal is minimized. A veterinarian is on call during capture activities in the event consultation is required. If a turtle is encountered during capture activities in a comatose state, resuscitation is attempted. Handling time is minimized to reduce the potential for additional stress. Turtles are only handled for the amount of time necessary to complete sampling, measuring, examination, and tagging. Capture and handling generally takes a matter of minutes, but sometimes up to one or two hours (e.g., when satellite tags are being attached).

For the Alternatives 1 and 2, capturing sea turtles would have short-term, temporary, direct, minor, adverse impacts to any sea turtle that is captured. These impacts would be in the form of non-lethal stress to the wild animal (Eckert et al.1999). The risk of adverse impacts is mitigated by completing the procedures as quickly as possible by trained personnel, then releasing the turtle on-site. The long-term minor beneficial indirect impact of capturing sea turtles would be the increased understanding of the sea turtle populations though additional data collection, and we therefore consider the impacts to be negligible.

4.1.2.4. **Effects of capturing and bio-sampling hatchlings**

Collecting data and biological samples from hatchling turtles can provide important information about population structure, genetic relatedness, sex ratio, and embryonic development. Handling of hatchling turtles requires care, as they are smaller and more delicate than immature or adult turtles. Hatchlings are collected during emergence from the nest and are kept in cool storage containers with damp sand. Standard morphometric data, tissue samples, and blood samples may be collected, depending on the needs for a particular study. All data and sample collection techniques are performed by trained individuals and follow peer-reviewed procedures. Biological samples are only collected from live hatchlings that appear healthy and lively and have occurred without serious injury or death by sampling techniques on over 1,000+ live hatchlings.

For Alternatives 1 and 2, it is anticipated that collecting biological samples from hatchlings would have short-term, temporary, direct, minor, adverse impacts to the handled turtles. These impacts would be in the form of non-lethal stress (Eckert et al.1999). The indirect adverse impacts would be negligible because the sea turtles are captured, handled, sampled, and then released on-site in a short period of time (see references by Balazs and colleagues in the references section). The long-term minor beneficial indirect impact of capturing sea turtles would be the increased understanding of the sea turtle populations though additional data collection, and we therefore consider the impacts to be negligible.

4.1.2.5. **Effects of procedures such as tissue sampling, tagging, and transmitter attachment**

For a complete understanding of sea turtle population dynamics and life history, it is necessary to identify individuals and obtain biological samples for genetics, diet, disease, and habitat use. Tagging and biological sampling includes:

- Turtles are flipper tagged with metal inconel tags and/or PIT tags using standard techniques (Balazs 1999).
- Blood samples are collected using a medical grade needle and syringe (Bolten 1999, Owens 1999).

- Diet samples are obtained by esophageal lavage (Forbes and Limpus 1993, Forbes 1999, NMFS Southeast Fisheries Science Center (SEFSC, 2008).
- Tissue biopsies are taken using a biopsy punch or scalpel/razor blade (Dutton and Balazs 1996).
- Satellite telemetry tags are attached following standard protocols (Hart et al. 2015).
- Ultrasound and laparoscopy are conducted following standard techniques (SFSC 2008; Pease et al. 2010; Blanvillain et al. 2011).

All procedures are performed by trained personnel and have been peer-reviewed and used by sea turtle researchers worldwide (Eckert et al.1999). The MTBAP does not perform unnecessary sampling on sick or injured animals unless the animal is determined to be sufficiently healthy for tagging or collection of bio-samples. No mortality is expected from tagging or bio-sampling. Tagging, blood sampling, biopsies, ultrasound, and laparoscopy are expected to have negligible long-term adverse impacts to the turtle. Esophageal lavage, when implemented following standard protocol, will have no long-term adverse impacts to the turtle. The lavage technique to obtain diet items has been performed on 200+ individual turtles without any known detrimental effect (NMFS unpublished data 2022). For one specific study, additional diet samples were collected from 10 turtles (out of the 181 total in the study) without incident (Arthur and Balazs 2008). Sea turtle anatomy prevents researchers from inadvertently introducing fluid into the lungs and the lavage procedure is kept short to allow for typical sea turtle respiration rate. Individuals have been recaptured from the day after the procedure up to many years later and appear to be healthy and feeding (Forbes and Limpus 1993).

Certain transmitters, if improperly attached, because of their size, position, and weight, may increase drag and may substantially interfere with normal migration patterns, and disrupt mating (Jones et al. 2011). Despite these potential interferences, members of MTBAP have seen males mating with females that have been satellite tagged, and since 2019, MTBAP has satellite tagged five females prior to their breeding migration and these turtles successfully migrated to nesting grounds. Post-hatching nest inventories indicated these nests contained fertilized eggs from which live hatchlings emerged (MTBAP unpublished data 2022) thus, no reproductive impacts were suspected. Additionally, reproductively active adult males and females satellite tagged at breeding grounds have successfully migrated back to their foraging grounds (NMFS unpublished data 2022). To avoid adverse indirect impacts, the MTBAP implemented the recommendations of Jones et al. (2011) including: use an array of smaller transmitters rather than one large instrument and apply recommended attachment methods to reduce additional drag. Satellite tags remain on a turtle for a maximum of three years, but most often for only several months.

For the Alternatives 1 and 2, it is anticipated that collecting biological samples would have short-term, temporary, direct, minor adverse impacts to the sampled turtles. These impacts would be in the form of non-lethal stress or injury. The indirect adverse impacts would be negligible because the sea turtles are captured, handled, sampled, and then released on-site in a short period of time. The long-term minor beneficial indirect impact of collecting biological samples from sea turtles would be the increased understanding of the sea turtle populations of the PIR though additional data collection.

4.1.2.6. **Effects of stranding response and research**

Handling and transport of live stranded sea turtles is essential for diagnosis and treatment. For Alternatives 1 and 2, the majority of transported individuals would occur within the MHI. However it is anticipated that a limited number (e.g., < 20) of stranded sea turtles would be handled and transported per year at locations in the proposed area other than the MHI. All live stranded sea turtles – other than individuals that are lightly entangled (i.e., not injured) in fishing gear and can be disentangled and released on site – are captured by trained and permit-approved team members and, when logistically possible, transported to a facility for diagnosis and treatment by a licensed veterinarian. Given the remote and uninhabited nature of many of our proposed study sites, such access to facilities is not always possible. In these instances, the highest level of treatment possible would be administered on-site, with consultation from a veterinarian when possible, and the sea turtle would not be transported. Whenever possible, turtles are rehabilitated and ultimately released back into their natural environment.

Handling and transporting sea turtles will have a minor, short-term, temporary, direct, adverse impact on the animal's condition in the form of non-lethal stress because they are wild animals not accustomed to being restrained by humans. Direct minor adverse impacts of transporting sea turtles, such as over-heating, are minimized through a variety of techniques, such as covering the turtle with a wet towel during transport. The long-term minor beneficial indirect impacts of handling and transporting stranded turtles would be the enhanced survival of individual sea turtles that would have succumbed to treatable injuries (e.g., entangled in fishing line), and analytical or predictive models for sea turtle stranding, and we therefore consider the impacts to be negligible.

Humane euthanasia is only performed by a licensed veterinarian if they determine that an individual cannot survive or function in the wild. These animals are typically in extremely poor health and in a condition beyond treatment. Examples of such cases include animals severely afflicted with fibropapillomatosis for which there is no cure, or animals with severe physical trauma beyond repair, or with low likelihood of recovery, because of fishing gear entanglement, shark attack, or boat strike. In such cases, humane euthanasia is performed and the animal is necropsied to advance scientific understanding of sea turtle disease, threats, and basic biology. For the Alternatives 1 and 2, the impacts of humanely euthanizing sea turtles that are beyond treatments and incapable of surviving in the wild is negligible.

4.1.3. Effects to Non-Target Species

Researchers conduct sea turtle terrestrial nesting/basking research on all MHI and most islands in the PMNM, conduct sea turtle in-water research within the MHI, and sometimes use small boats to conduct research within the MHI and PMNM. Mitigation includes:

- Traveling on marked trails to minimize impact to terrestrial plants
- Selection of boat operators that are highly skilled and can safely operate boats in/around coral reef and sea grass beds; and
- Selection of boat operators that are familiar with the area and where to anchor (e.g., sandy bottoms, away from coral and seagrass beds)

4.1.3.1. **Cetaceans**

Researchers conduct sea turtle research around all islands/islets within the study area and use small boats to make transits between islets within atolls. However, activities will rarely overlap with cetaceans within their habitat; cetaceans are more commonly offshore, or are only encountered during boat transits, not during research activities. Therefore, effects from MTBAP activities are considered negligible.

4.1.3.2. **Hawaiian Monk Seal**

Researchers conduct sea turtle terrestrial nesting/basking research on all islands/islets within the PMNM and use small boats to transit between islets within atolls. Currently, field researchers may be deployed within the PMNM for up to 6 months during the summer. These research activities often occur around Hawaiian monk seals resting on the beach, and have the potential to disturb them. However, the MTBAP has conducted nesting/basking research without incident within Lalo almost every year since 1973. Standard operating procedures (see Appendices) aim to minimize disturbance to other species that inhabit the islands and surrounding ocean, especially Hawaiian monk seals, while conducting sea turtle research. Prior to deployment, each MTBAP researcher must undergo training (provided by PIFSC's Hawaiian Monk Seal Research Program) in standard operating procedures for avoiding impacts to monk seals during MTBAP activities. Any sea turtle monitoring activities that would directly adversely affect sensitive monk seals (e.g. nursing pups, molters) are halted until a later time when those activities would no longer impact monk seals.

Through the implementation of the standardized avoidance and minimization measures, the direct adverse short-term impacts to Hawaiian monk seals from Alternatives 1 and 2 are minor. The majority of potential interactions would occur at Lalo.

In summary, research activities have the potential to disturb Hawaiian monk seals that are using the same beaches as turtles to haul out. We anticipate potential temporary disturbance or flushing of individuals or groups of hauled-out monk seals as a result of our activities. This temporary disturbance is expected to be of short duration, and have a negligible impact to individuals, the population, and the habitat. No long-term effects on disturbed seals are expected, and there is no anticipated negative impact on marine mammal habitat. Every effort is made to avoid disturbing seals, and a set of mitigating measures will be established prior to any turtle research activities. Incidental take of monk seals during turtle research activities is analyzed in the biological opinion for PIFSC's Fishery and Ecosystem Research Activities in the Western and Central Pacific Ocean, which resulted in a finding that the sea turtle research activities were not likely to adversely affect Hawaiian monk seals (NMFS 2022).

4.1.3.3. **Birds**

The actions proposed for Alternatives 1 and 2 would occur along the coast and in the ocean in the PIR where seabirds would be encountered (Table 6). However, the proposed action does not involve killing, capturing, or intentionally disturbing any birds. Birds may be indirectly and temporarily adversely affected by researchers conducting sea turtle survey activities. Generally, these activities include researchers walking along a beach or conducting sea turtle nest excavations in an area where birds may be roosting or nesting, or during small boat activities. These indirect adverse impacts would be limited to reactions from the bird moving from one area of the beach, or water surface, to another several meters away, which is considered negligible. Potential impacts to bird nests likely to be encountered during turtle research activities are mitigated by researchers avoiding these areas when they are identified. If nests/burrows were unintentionally disturbed (i.e., stepped on) researchers would dig it out immediately to mitigate potential impacts to eggs/chicks. Research activities would avoid bird nests to the maximum extent practicable. Mitigation includes:

- Looking for nests or for adults flushing from inconspicuous nests when approaching seabird colonies, including burrows;
- Not disturbing any bird colonies 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 shorebird ground nests if they are stepped on (PMNM 2008).

Overall, the effects of Alternatives 1 and 2 would result in minor, short-term adverse effects because any bird flushed by such activities would either return to the site after the researcher has passed, or the bird would occupy another section of beach. MTBAP would not conduct any activities in the U.S. Insular Areas of the PIR, hence there would be no direct or indirect adverse impacts to these resources in those areas. MTBAP research activities in Alternative 1 are expected to have only a minor impact on birds.

4.1.3.4. **Invertebrates**

4.1.3.4.1. Yellow-faced bees

The actions proposed for Alternatives 1 and 2 would occur along the coast in the PIR where yellow-faced bees would be encountered in flowering plants on these beaches. However, the proposed action does not involve killing, capturing, or intentionally disturbing any bees. Bees may be indirectly and temporarily adversely affected by researchers conducting sea turtle survey activities. Generally, these activities include researchers walking along a beach or conducting sea turtle nest excavations in an area where bees may be foraging or socializing. These indirect adverse impacts would be limited to reactions from the bee moving from one area of the beach, to another several meters away, which is considered negligible. Research activities would avoid bees to the maximum extent practicable.

4.1.3.4.2. Coral Reefs

Alternatives 1 and 2 may include in-water work in the vicinity of coral reefs. However, these actions are not expected to directly impact coral reefs. In the marine environment, sea turtles depend upon algae, sea grass, and coral reef habitats for food and refuge. The degradation of these habitats poses a serious threat to the recovery of sea turtle stocks. Surveys and stranding response activities will attempt to avoid corals, but potential impacts from MTBAP activities is considered to be minor. Additional mitigation measures to reduce impacts to coral reefs includes:

- Ensuring boat operators are trained and can safely operate boats in/around coral reef and sea grass beds; and
- Selection of boat operators that are familiar with the area and where to anchor (e.g., sandy bottoms, away from coral and seagrass beds) whenever possible.

4.1.3.5. **ESA-Listed Plants**

Monument Permit PMNM 2024-001 (Appendix 5) 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 PMNM). 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. Therefore, it would be highly unlikely that research biologists would encounter coastal ESA-listed plant species, or they would be easily avoidable; however if they are encountered, impacts would be minimal due to the low likelihood of exposure, short duration, and MTBAP's implementation of mitigation measures and best management practices that are designed to reduce impacts to plants (see Appendix 12). For more information about the threatened and endangered plants within the PIR, see the USFWS website (*https://www.fws.gov/office/pacific-islands-fish-and-wildlife/species*), which we incorporate here by reference.

4.1.4. Effects on Marine Protected Areas and Critical Habitat

There are numerous protected areas within the action area, as described in Section 3.2.3. Research activities which could impact these habitats include:

- Stranding Response and Research
- In-water Monitoring ship-/small boat-/snorkel-based- line transects, and/or aerial surveys
- Nesting and Basking Beach monitoring: Conduct basic investigations of the biology, life history, and ecology of sea turtles at nesting and basking beaches to establish and continue long term databases
- Training and Outreach: training new biologists in the field, and doing outreach on the beaches

All proposed activities are short-term in nature and will not permanently alter any habitat. While research is occurring inside a sanctuary or monument, MTBAP follows all applicable rules, guidelines, and best practices, and MTBAP has developed an extensive protocol to minimize disturbance while in the PMNM with the co-managers (see Appendix 12). Therefore, no National Marine Sanctuaries, World Heritage Sites, or other marine conservation areas within the action area where research would take place would be adversely impacted by Alternatives 1 and 2. Additionally, there are no known National Register of Historic Places or archeological, cultural, religious resources located where research would take place within the action area. PMNM and the wildlife (e.g. sea turtles) within, are culturally important resources to the native Hawaiian community and MTBAP works closely with PMNM cultural practitioners to have annual cultural briefings prior to each field season to understand how to best respect the cultural significance of the place and it's wildlife in tandem with conducting our research activities.

MTBAP research activities may occur in proposed designated critical habitat for five coral species and two marine mammal species (see section 3.2.3.2). When these areas are encountered, MTBAP will not adversely modify the critical habitat and any impacts are expected to be minor, short-term, and sporadic in time (NMFS 2022). Any specified regulations in these areas would be adhered to during any research activities conducted in this critical habitat. MTBAP activities generally do not occur within the Hawaiian Islands insular false killer whale critical habitat and, therefore, would not destroy or adversely modify this habitat (NMFS 2022b). MTBAP activities would not destroy or adversely modify Hawaiian monk seal critical habitat (NMFS 2017). If the sixteen areas are designated as coral critical habitat, MTBAP activities would not destroy or adversely modify coral critical habitat, and would consult with NMFS to fulfill this requirement

(NMFS 2022). Alternatives 1 and 2 would also not affect EFH or HAPC. Lastly, Alternatives 1 and 2 are not expected to contribute to the introduction, continued existence, or spread of noxious weeds or nonnative invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of the species. Mitigation includes:

- Traveling on marked trails to minimize impact to terrestrial plants
- Minimizing disturbance to sand dunes, and
- Minimizing pollution (e.g., marine debris, light, noise)

Based on this information, MTBAP expects that Alternatives 1 and 2 would not result in adverse modification in behavior and/or habitat disruption. MTBAP expects these impacts to be negligible because MTBAP does not anticipate measurable changes to the population or impacts to rookeries, feeding grounds, and other areas of similar significance. MTBAP expects no long-term or substantial adverse effects on sea turtles, their habitats, or their role in the environment.

4.2. Effects of Alternative 2 – Continuation of Current Research Activities with the Addition of Nest Relocations of Non-Doomed Nests and Nest Probing (*Preferred Alternative*)

The environmental impacts of the Proposed Action include the impacts assessed and described above for Alternative 1 (including impacts from aerial surveys; terrestrial nesting/basking and in-water surveys; capturing and handling of hatchling, immature, and adult sea turtles; procedures such as sampling, tagging, and transmitter attachment; stranding response and research; impacts to sea turtle habitat, non-target species, and habitats and vulnerable ecosystems), with the addition of impacts from nest relocations and nest probing, which are described below.

4.2.1. Effects of Nest Relocations (i.e. assisted migration)

Under this alternative, MTBAP will request to amend our USFWS permit to include the ability to translocate any nest (including those that are not doomed), should the need arise. MTBAP is currently permitted to only translocate nests that are doomed (e.g., sand erosion, water inundation, etc. that would destroy or suffocate the nest). Doomed nest relocation is a conservation action intended to increase survival of sea turtle clutches that are located where they almost certainly will die. In addition, the need for a nest relocation of any nest, not just doomed nests would only occur if deemed necessary for other management and/or conservation purposes (e.g., the nest may need to be relocated to maintain population abundance). In all nest relocation situations, nests would be moved to safe microhabitats similar to the original nest that provides adequate moisture, temperature, and gas exchange to support the developing embryos (Miller 1997). Nests would also be placed in a similar environment as the original nest (meaning similar temperature or substrate regime, but above the high tide line in an area where they are not as likely to be inundated). Relocation of nests would take place in parallel with nesting beach monitoring activities and would occur where non-target species can be identified and avoided, therefore this activity would only cause minimal additional disturbance to habitat and non-target species by the potential increase in the amount of time research is conducted in an area.

Although the relocation of nests may lower hatch success rates compared to in-situ nests (Mortimer 1999), if a nest must be moved due to environmental factors, this impact is negligible compared to total (100 percent) mortality of a doomed nest (Mortimer 1999; WPFMC 2005), and would therefore be considered a positive impact on the sea turtle population. For non-doomed nests (and doomed nests), the environmental impact to the new location of the relocated nest would be minimal and considered minor, and may not be greater than the impact of a sea turtle laying a clutch of eggs in that same location. The only additional impact would be human presence at this location. However, any adverse impacts will be minimized through the stringent protocols described above, which are designed to reduce the impact to the nest and the clutch.

4.2.2. Effects of Nest Probing

Confirming nest deposition is important to accurately quantify sea turtle nesting across the PIR as these data are central to population assessments and modeling. Similarly, confirming the exact location of nests is necessary to conduct post-hatching nest excavations, which also provide data (such as hatching success) that are central to population modeling activities.

Often, researchers attempt to confirm and locate sea turtle nests via digging by hand, which can be extremely time consuming and is often unsuccessful. A probe stick can be used as a tool to more efficiently locate a nest cavity, decreasing the time and labor needed to do so; however, there is an increased risk of puncturing the eggs with the probe. Along the U.S. east coast, Brig (2014) found a strong correlation between loggerhead turtle nests that had been probed and presence of broken eggs throughout the clutch, and the lack of eggs broken in nests that had been located by hand digging. While an increase in broken eggs was found in probed nests, the use of the probe as a tool to locate the nest cavity (and subsequently relocated) did not significantly impact the hatching success of the nests compared to those located by hand digging (Brig 2014). The author concluded that using the probe as a tool to locate loggerhead clutches is more time efficient and less labor intensive than the alternative method of hand digging and that although a significantly higher number of eggs were found broken in nests located with the probe, hatching success did not significantly vary based on nest location method, suggesting that the probe is an appropriate tool to aid in the location of nest cavities and its use is not detrimental to overall loggerhead hatchling success (Brig 2014). Sea turtle survival from egg stage to the reproductive adult stage is extremely low (e.g., 1 in 1,000 to 1 in 10,000); therefore, the impact to any of the populations would be negligible.

The holes that pierce the egg chamber from the use of the probe may also indirectly affect sea turtle survival due to incidentally creating a pathway for predators or an opportunity for bacterial or fungal invasion. However, we do not expect the potential for this impact to be any more likely than what may naturally occur. Because of the small diameter of the probe (e.g., 1-2 cm), sand immediately fills in the holes as the probe is extracted. In addition, researchers will take care to cover holes on the surface of the sand once the presence of a nest has been determined with the probe. We therefore determine that nest probing activities will have a minor impact to sea turtle populations.

4.3. Effects of Alternative 3 – No Action Alternative

Under the No Action Alternative, no sea turtle research or recovery activity would be conducted within the PIR by MBTAP. The no action alternative would result in a short-term reduction in minor adverse impacts to the environment (i.e., turtles and similarly affected species) because researchers would not be actively working in the field handling turtles and collecting data. The long-term impact of this alternative would be a lack of data necessary to analyze population trends and make management decisions to recover these species (i.e., remove them from the list of threatened and endangered species). This would have major (i.e., measurable contribution) direct and indirect adverse ramifications on the cultural identity and practices of native peoples, tourism, the fishing industry, and ecological services (e.g., food-web maintenance) in the PIR by, for example, potentially reducing sea turtle abundance from lack of stranding response and conservation efforts, and ecosystem viability changes from reduction of sea turtle grazing.

Under Alternative 3, it is anticipated that governmental agencies and non-governmental agencies (NGOs) would take over some of MTBAP's sea turtle research and data collection activities, but the extent to which these agencies could fill the role of the MTBAP is difficult to predict due to the time and costs associated with funding these activities; however, the benefits of our research would cease. Therefore, the impacts to elements of the human environment resulting from the No Action alternative (Alternative 3) would be greater than those impacts resulting from Alternatives 1 and 2, and would be considered major.

Because the No Action alternative would result in ceasing all MTBAP research activities, the minor adverse impacts to the habitat and non-target species from these activities (under Alternatives 1 and 2) would cease; therefore, we expect no impact to the habitat and non-target species under Alternative 3.

4.4. Cumulative Effects

CEQ defines cumulative effects as "effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR §1508.1. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

This cumulative effects analysis focuses on activities that may temporally or geographically overlap with MTBAP's research activities and would most likely impact the sea turtles present in the proposed areas. Other activities that may occur in the area include marine mammal research and response activities, fisheries research, research and conservation actions of other protected species (e.g., plants, animals) along the shoreline, marine debris removal activities, military training and testing activities, commercial fishing activities, shoreline construction activities, and human recreation in water and on shore.

Though difficult to accurately quantify, the incremental impact of the effects of the MTBAP activities when added to other past, present, and reasonably foreseeable future actions is likely to be positive in nature. The proposed project would add more, albeit short-term and sporadic, mandated research activities in the PIR, including in-water activities such as capturing turtles for health assessments, and on-land activities such as surveys and tagging activities that allow us to monitor the health and success of individuals within the population. While MTBAP's activities will increase human presence in the areas of sea turtle nesting and basking activities, where other activities may also occur (e.g., other endangered species monitoring, marine debris removal), the activities are directly related to the conservation and recovery of sea turtle species, and as such are considered to have a positive impact on the populations. As detailed previously, the direct and indirect environmental consequences of the proposed research programs are expected to be minimal, as research design, methodologies, and standard operating procedures for working with endangered species in sensitive habitats are specifically formulated to minimize any negative impacts on the environment and sea turtles in particular.

With respect to field research techniques as discussed in Chapter 2, research designs, research approaches, and standard operating research procedures are crafted to minimize the impact on the environment and sea turtles in particular. Section 4.1.2 provides details on potential environmental impacts that could result from implementation of the research on sea turtles and the surrounding terrestrial and marine environment. These risks include adverse impacts to sea turtles from invasive research procedures and potential for injury or mortality during research activities. However, MTBAP's research activities to understand sea turtle ecology and the impacts to sea turtles from sources of risk will result in a net benefit for the species in that they: a) support current sea turtle monitoring programs throughout the world; b) increase our knowledge of sea turtle ecology and how to apply this information to management and conservation efforts, c) establish positive partnerships with national and foreign governmental agencies and non-governmental organizations to encourage a sense of environmental stewardship; and d) are highly likely to inform strategies to help reduce sea turtle interactions and incidental mortality.

In summary, the proposed research programs support ESA mandates for the conservation and recovery of sea turtles. The role of the proposed research does not include making management decisions that may affect population recovery. Rather, the research and monitoring activities obtain scientific information in support of achieving the biological recovery and sound management of Pacific sea turtle populations.

4.4.1. Climate Change

Climate change is a long-term, sustained trend of change in the climate. Human-emitted greenhouse gases have resulted in long-term warming of the planet, with much of the excess heat (>90%) stored within the world's oceans. The past five years (i.e., 2015–2019) are the warmest in the ocean since the mid-1950s, according to measurements using modern instruments (e.g., measuring ocean heat content), and the past ten years are also the warmest years on record (Cheng *et al.* 2020). The effects of warming waters have impacted marine ecosystems and are likely to continue in the future. These impacts include changes in circulation, ocean stratification, upwelling, acidification, nutrient input, oxygen content, primary production, species distribution, phenology, food webs, sea-level rise, extreme weather events, and ecosystem functions (NOAA 2013).

Climate change is projected to have substantial direct and indirect effects on individuals, populations, species, and the community structure and function of marine, coastal, and terrestrial ecosystems in the near future (IPCC 2007; IPCC 2013; McCarty 2001). Direct effects of climate change include increases in atmospheric temperatures, decreases in sea ice, and changes in sea surface temperatures, ocean acidity, patterns of precipitation, and sea level rise. Indirect effects of climate change include altered reproductive seasons/locations, shifts in migration patterns, reduced distribution and abundance of prey, and changes in the abundance of competitors and/or predators. There is a high degree of variability in the vulnerability and response of marine organisms to the impacts of climate change, but climate change will most likely have the most pronounced effects on vulnerable species whose populations are already in tenuous positions (Williams et al. 2008). Species with more plastic life histories and/or higher physiological tolerance for changes in environmental conditions will likely experience fewer impacts related to climate change (NOAA 2013). Increasing atmospheric temperatures have already contributed to changes in the quality of freshwater, coastal, and marine ecosystems and to the decline of endangered and threatened species populations (Karl 2009; Mantua et al. 1997).

Although the effects of climate change on sea turtles have not been fully analyzed, either globally or specific to PIR, it is generally understood that a changing climate may significantly influence sea turtle populations. Sea turtles occupy a wide range of terrestrial and marine habitats, and many aspects of their life history have been demonstrated to be closely tied to climatic variables such as ambient temperature and storminess (Hawkes et al. 2009). Sea turtles have temperature-dependent sex determination, and many populations produce highly female-biased offspring sex ratios, a skew likely to increase further with global warming (Patrício et al. 2017). In addition to altering sex ratios, increased temperatures in sea turtle nests can result in reduced incubation times (producing smaller hatchling), reduced clutch size, and reduced nesting success due to exceeded thermal tolerances (Azanza-Ricardo et al. 2017; Fuentes et al. 2010; Fuentes et al. 2011; Fuentes et al. 2009).

Other climatic aspects, such as extreme weather events, precipitation, ocean acidification and sea level rise also have potential to affect sea turtle populations. Changes in global climatic patterns will likely have profound effects on the coastlines of every continent, thus directly impacting sea turtle nesting habitat (Wilkinson and Souter 2008). In some areas, increases in sea level alone may be sufficient to inundate turtle nests and reduce hatching success by creating hypoxic conditions within inundated eggs (Caut et al. 2009; Pike et al. 2015). Flatter beaches, preferred by smaller sea turtle species, would likely be inundated sooner than would steeper beaches preferred by larger species (Hawkes et al. 2014). Relatively small increases in sea level can result in the loss of a large proportion of nesting beaches in some locations. Baker et al. (2006) predicted that up to 40 percent of green turtle nesting beaches in the PMNM could be flooded with 0.9 m of sea level rise by the year 2100 (Baker et al. 2006). However, habitat loss at Lalo has already occurred far more rapidly than predicted, highlighting the challenges turtles face in this declining habitat, especially when in competition with other animals (e.g., Hawaiian monk seals, seabirds) for beach space (Baker et al., 2020). The loss of nesting beaches would have catastrophic effects on sea turtle populations globally if they are unable to colonize new beaches that form, or if the newly formed beaches do not provide the habitat attributes (sand depth, temperature regimes, refuge) necessary for egg survival.

Changing patterns of coastal erosion and sand accretion, combined with an anticipated increase in the number and severity of extreme weather events, may further exacerbate the effects of sea level rise on turtle nesting beaches (Wilkinson and Souter 2008). Extreme weather events may directly harm sea turtles, causing “mass” strandings and mortality (Poloczanska et al. 2009). Studies examining the spatio-temporal coincidence of sea turtle nesting with hurricanes, cyclones, and storms suggest that cyclical loss of nesting beaches, decreased hatching success, and hatchling emergence success could occur with greater frequency in the future due to global climate change (Hawkes et al. 2009).

While changes in climate or sea level may affect sea turtles, sea turtle research projects are not expected to exacerbate climate change, in fact, in many cases conservation efforts supported by the MTBAP are designed to reduce or mitigate locally-based impacts that may be associated with or related to changing environmental conditions.

Chapter 5 List of Preparers

Prepared By:

Camryn D. Allen, Ph.D.
Research Marine Biologist, Marine Turtle Biology and Assessment Program
Protected Species Division
National Marine Fisheries Service
Pacific Islands Fisheries Science Center
Camryn.Allen@noaa.gov

Laura McCue, M.S.
Marine Biologist, Protected Species Services and Support Program
Protected Species Division
National Marine Fisheries Service
Pacific Islands Fisheries Science Center
Laura.McCue@noaa.gov

Christina M. Coppenrath, M.S.
JIMAR Field Research Assistant, Marine Turtle Biology and Assessment Program
Protected Species Division
National Marine Fisheries Service
Pacific Islands Fisheries Science Center

Reviewed By:
Justin Rivera
Environmental Scientist
National Marine Fisheries Service
Pacific Islands Fisheries Science Center

Kate Taylor
Pacific Islands Region NEPA Coordinator
National Marine Fisheries Service
Pacific Islands Regional Office

Chapter 6 References

Abecassis, M., I. Senina, P. Lehodey, P. Gaspar, D. Parker, G. Balazs, and J. Polovina. 2013. A model of loggerhead sea turtle (*Caretta caretta*) habitat and movement in the oceanic North Pacific. PLoS ONE, 8, 000.

Alefaio, S., T. Alefaio, and A. Resture. 2006. Turtle monitoring on Funafuti, Tuvalu December 4th-14th 2006. Report of Survey administered by the Institute of Marine Resources, the University of the South Pacific, Suva, Fiji. 8pp.

Allen C.D., S.L. Martin, J.M. Lynch, T.M. Summers, J. Hapdei, M. Rice, J.A. Seminoff, and T.T Jones. 2017. How many males are enough? Feminization of green sea turtle foraging aggregations in the Pacific. In: 37th Annual Symposium on Sea Turtle Biology and Conservation. April 18 - 20, 2017, Las Vegas, NV.

Arthur K.E. and G.H. Balazs. 2008. A Comparison of Immature Green Turtle (*Chelonia mydas*) Diets among Seven Sites in the Main Hawaiian Islands 1. Pacific Science 62:205–217.

Azanza-Ricardo, J., M.E.I. Martín, G.G. Sansón, E. Harrison, Y.M. Cruz,and F. Bretos 2017. Possible effect of global climate change on Caretta caretta (Testudines, Cheloniidae) nesting ecology at Guanahacabibes Peninsula, Cuba. *Chelonian conservation and Biology*, *16*(1), pp.12-19.

Baker, J.D., C.L. Littnan, and D.W. Johnston. 2006. Potential effects of sea level rise on the terrestrial habitats of endangered and endemic megafauna in the Northwestern Hawaiian Islands. Endangered Species Research 4:1-10.

Baker, J.D., Harting, A.L., Johanos, T.C., London, J.M., Barbieri, M.M. and Littnan, C.L., 2020. Terrestrial habitat loss and the long-term viability of the French Frigate Shoals Hawaiian monk seal subpopulation.

Balazs, G.H., 1980. Synopsis of biological data on the green turtle in the Hawaiian Islands. NOAA Technical Memo. NOAA-TM-NMFS-SWFC-7.

Balazs, G.H. 1983. Sea turtles and their traditional usage in Tokelau. Atoll Research Bulletin, No. 279.

Balazs, G.H. 1999. Factors to Consider in the Tagging of Sea Turtles. In: Eckert, K.L, K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly (Eds). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Balazs, G.H. and M. Chaloupka. 2004. Thirty-year recovery trend in the once depleted Hawaiian green sea turtle stock. Biological Conservation. 117(2004):491-498.

Balazs, G.H. and M. Chaloupka. 2006. Recovery trend over 32 years at the Hawaiian green sea turtle rookery of French Frigate Shoals. Atoll Research Bulletin 543:147-158.

Balazs, G.H. and D.M. Ellis. 2000. Satellite telemetry of migrant male and female green turtles breeding in the Hawaiian Islands. In: F.A. Abreu-Grobois, R. Briseno-Duenas, R. Marquez-Millan, and L. Sartimartinez (comps.), 16th Symp. Proc. Addendum in the Proc. Of the 18th International Sea Turtle Symposium, March 3-7, 1998, Mazatlan, Sinaloa, Mexico, p. 281-283. US Dept. of Commerce, NOAA Tech. Memop. NMFS-SEFSC-436.

Balazs, G.H., Pooley, S.G. and Murakawa, S.K., 1995. Guidelines for handling marine turtles hooked or entangled in the Hawai'i longline fishery: results of an expert workshop held in Honolulu, Hawai'i, March 15-17, 1995.

Balazs, G.H., P. Siu, J.P. Landret. 1995. Ecological aspects of green turtles nesting at Scilly Atoll in French Polynesia, in: Richardson, J.I., Richardson, T.H. (Eds.), Proceedings of the 12th Annual Workshop on Sea Turtle Biology and Conservation. U.S. Department of Commerce, NOAA Technical Memorandum NMFS, NMFS-SEFSC-361, pp. 7–10.

Balazs, G. H., K.S. Van Houtan, S.A. Hargrove, S.M. Brunson, and S.K. Murakawa. 2015. A review of the demographic features of Hawaiian green turtles (*Chelonia mydas*). Chelonian Conserv. Biol. 14, 119–129. doi: 10.2744/CCB-1172.1

Balazs, G.H., Parker, D.M. and Rice, M.R., 2017. Ocean pathways and residential foraging locations for satellite tracked green turtles breeding at French Frigate Shoals in the Hawaiian Islands. Micronesica, 4(1).

Bell, L.A.J., L. Matoto, and `U. Fa`anunu. 2009. Project Report: Marine Turtle Monitoring Programme in Tonga. Marine Turtle Conservation Act Project Report. 15 pp. plus appendices.

Bellagio Steering Committee. 2008. Sea Turtle Conservation Initiative: Strategic Planning for Long-term Financing of Pacific Leatherback Conservation and Recovery: Proceedings of the Bellagio Sea Turtle Conservation Initiative, Terengganu, Malaysia; July 2007. The WorldFish Center, Penang, Malaysia. 79 p.

Benson, S., R. Tapilatu, N. Pilcher, P. Tomillo, and L. Martínez. 2015. Leatherback Turtle

Populations in the Pacific Ocean. The Leatherback Turtle. Biology and Conservation. Pp.110-122. Baltimore, MD: Johns Hopkins University Press.

Bevan, E., S. Whiting, T. Tucker, M. Guinea, A. Raith, and R. Douglas. 2018. Measuring behavioral responses of sea turtles, saltwater crocodiles, and crested terns to drone disturbance to define ethical operating thresholds. PLoS ONE 13(3): e0194460.

Blanvillain, G., Owens, D.W., and G. Kuchling. 2011. Hormones and reproductive cycles in turtles. In: Hormones and Reproduction of Vertebrates, Volume 3-Reptiles. Elsevier Inc., pp 277–303.

Bolten, A.B. 1999. Techniques for Measuring Sea Turtles. In: Eckert, K.L, K.A. Bjorndal, F.A. Abreu- Grobois, and M. Donnelly (Editors). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Bowen, B.W., F.A. Abreugrobois, G.H. Balazs, N. Kamezaki, C.J. Limpus, and R.J. Ferl. 1995. Trans-Pacific migrations of the loggerhead turtle (*Caretta Caretta*) demonstrated with mitochondrial-DNA markers. Proceedings of the National Academy of Sciences of the United States of America 92:3731–3734.

Boyle, M.C. N.N. FitzSimmons, C.J. Limpus, S. Kelez, X. Velez-Zuazo, and M. Waycott. 2009. Evidence for transoceanic migrations by loggerhead sea turtles in the southern Pacific Ocean. Proc. Royal Soc. B. 276:1993-1999.

Brig, C.E., 2014. Assessment of loggerhead sea turtle (*Caretta caretta*) nest management tools in South Carolina.

Briscoe, D.K., D.M. Parker, G.H. Balazs, M. Kurita, T. Saito, H. Okamoto, M. Rice, J.J. Polovina, and L.B. Crowder. 2016. Active dispersal in loggerhead sea turtles (Caretta caretta) during the 'lost years'. Proceedings of the Royal Society B, 283, 20160690.

Brooke, M. de L. 1995. Seasonality and numbers of green turtles *Chelonia mydas* nesting on the Pitcairn Islands. Biological Journal of the Linnean Society 56:325-327.

Brunson, S., A.R. Gaos, I.K. Kelly, K.S. Van Houtan, Y. Swimmer, S. Hargrove, G.H. Balazs, T.M. Work, T.T. Jones. 2022. Three decades of stranding data reveal insights into endangered hawksbill sea turtles in Hawai'i. Endangered Species Research 47:109–118.

Caillouet Jr, C.W., Shaver, D.J. and Landry Jr, A.M., 2015. Kemp's ridley sea turtle (Lepidochelys kempii) head-start and reintroduction to Padre Island National Seashore, Texas. Herpetological Conservation and Biology, 10(1), pp.309-377.

Chaloupka, M. and G.H. Balazs. 2007. Using Bayesian state-space modelling to assess the recovery and harvest potential of the Hawaiian green sea turtle stock. Ecological Modelling; 2007, v. 205, no. 1-2, pp. 93-109.

Chaloupka, M., T.M. Work, G.H. Balazs, S.K.K. Murakawa, and R. Morris. 2008a. Cause-specific temporal and spatial trends in green sea turtle strandings in the Hawaiian Archipelago (1982-2003). Marine Biology 154(5):887-898.

Chaloupka, M., N. Kamezaki, and C.J. Limpus. 2008b. Is climate change affecting the population dynamics of the endangered Pacific loggerhead sea turtle? Journal of Experimental Marine Biology and Ecology 2008, v. 356, p.136-143.

Cheng, L., Abraham, J., Zhu, J., Trenberth, K.E., Fasullo, J., Boyer, T., Locarnini, R., Zhang, B., Yu, F., Wan, L., Chen, X., Song, X., Liu, Y., and M.E. Mann. 2020. Record-setting Ocean Warmth Continued in 2019. Advances in Atmospheric Sciences 37, 137-142.

Conant, T.A., Dutton, P.H., Eguchi, T., Epperly, S.P., Fahy, C.C., Godfrey, M.H., MacPherson, S.L., Possardt, E.E., Schroeder, B.A., Seminoff, J.A. and Snover, M.L., 2009. Loggerhead sea turtle (Caretta caretta) 2009 status review under the US Endangered Species Act. *Report of the loggerhead biological review Team to the National Marine Fisheries Service*, *222*, pp.5-2.

Craig, P., Parker, D., Brainard, R., Rice, M. and Balazs, G., 2004. Migrations of green turtles in the central South Pacific. *Biological Conservation*, *116*(3), pp.433-438.

Cruce, J. 2006. Yap State Marine Turtle Conservation Program Ulithi Tagging Project, Gielop and Iar Islands, Summer 2005. Marine Resources Management Division, Colonia, Yap, Federated States of Micronesia. Unpublished Annual Contract Report to NMFS PIRO. 22 pp.

Cruce, J. 2007. Yap State Marine Turtle Conservation Program Ulithi Tagging Project, Gielop Island Summer 2006. Yap Community Action Program, Colonia, Yap, Federated States of Micronesia. Unpublished Annual Contract Report to NMFS PIRO. 28 pp.

Cruce, J. 2008. Monitoring of nesting green turtles (Chelonia mydas) on Loosiep Island, Ulithi Atoll, Yap, FSM: 2007 field season. Final Contract Report Prepared for JIMAR and NMFS PIRO.20pp.

Cruce, J.A., 2009. Monitoring of nesting green turtles (Chelonia mydas) in Ulithi Atoll, Yap, Federated Sates of Micronesia. *British Chelonia Group*, *7.*

Donoso, M. and Dutton, P.H., 2010. Sea turtle bycatch in the Chilean pelagic longline fishery in the southeastern Pacific: opportunities for conservation. *Biological Conservation*, *143*(11), pp.2672-2684.

Dutton, P.H. and G.H. Balazs. 1996. Simple Biopsy Techniques for Sampling Skin for DNA Analysis of Sea Turtles. In: J.A. Keinath, D.E. Barnard, J.A. Musick, and B.A. Bell (compilers). Proc. 15th Annual Symp on Sea Turtle Biology and Conservation, Hilton Head, SC. NOAA Technical Memorandum NMFS-SEFSC-387. p.78-79.

Dutton, P.H., G.H. Balazs, R.A. LeRoux, S.K.K. Murakawa, P. Zarate, and L.S. Martinez. 2008. Composition of Hawaiian green turtle foraging aggregations: mtDNA evidence for a distinct regional population. Endangered Species Research 5(1): 37-44.

Dutton, PH., M.P. Jensen, K. Frutchey, A. Frey, E. LaCasella, G.H. Balazs, J. Cruce, A. Tagarino, R. Farman, and M. Tatarata. 2014. Genetic Stock Structure of Green Turtle (Chelonia mydas) Nesting Populations across the Pacific Islands. Pacific Science, vol. 68, no. 4:451 – 464.

Dutton, P., Balazs, G., Dizon, A. and Barragan, A., 2000. Genetic stock identification and distribution of leatherbacks in the Pacific: potential effects on declining populations. In *Eighteenth International Sea Turtle Symposium* (pp. 38-39).

Dutton, P.H., Hitipeuw, C., Zein, M., Benson, S.R., Petro, G., Pita, J., Rei, V., Ambio, L. and Bakarbessy, J., 2007. Status and genetic structure of nesting populations of leatherback turtles (Dermochelys coriacea) in the western Pacific. *Chelonian Conservation and Biology*, *6*(1), pp.47-53.

Dutton, P.H. and Shanker, K., 2015. Phylogeny, phylogeography, and populations of the leatherback turtle. The Leatherback Turtle, Johns Hopkins University Press, Baltimore, pp.8-20.

Eckert, K.L., K.A. Bjorndal, F.A. Abreu-Grobois, M. Donelly (Editors). 1999. Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4. 235pp. The following chapters are relevant to this PEA:

- L.M. Ehrhart and L.H. Ogren. Studies in Foraging Habitats: Capturing and Handling Turtles
- G.H. Balazs. Factors to Consider in the Tagging of Sea Turtles

- S.A. Eckert. Data Acquisition Systems for Monitoring Sea Turtle Behavior and Physiology
- A.B. Bolten. Techniques for Measuring Sea Turtles
- R.P. Van Dam. Measuring Sea Turtle Growth
- N. FitzSimmons, C. Moritz, and B.W. Bowen. Population Genetic Sampling and Identification
- J.D. Miller. Determining Clutch Size and Hatching Success
- E.R. Jacobsen. Tissue Sampling and Necropsy Techniques
- D. Owens. Reproductive Cycles and Endocrinology: Techniques for sampling blood
- D.J. Shaver and W.G. Teas. Stranding and Salvage Networks
- R.H. Boulon and J.A. Mortimer. Reducing Threats to Eggs and Hatchlings (in-situ and hatcheries): Relocation or protective measures
- B.E Witherington. Reducing Threats to Nesting Habitat
- J. Gibson and G. Smith. Reducing Threats to Foraging Habitats
- C.A. Oraveta. Reducing Incidental Catch in Fisheries

Eckert, K.L., Wallace, B.P., Frazier, J.G., Eckert, S.A. and Pritchard, P.C.H., 2012. Synopsis of the biological data on the leatherback sea turtle (Dermochelys coriacea). US Department of Interior Fish and Wildlife Service, Biological Technical Publication. *Biological Technical Publication*.

Fahy, C. C. 2011. Fisheries impacts on sea turtles in the Pacific Ocean. In: Dutton PH, Squires D, Ahmed M, eds. Conservation of Pacific Sea Turtles. University of Hawai'i Press, Honolulu, Hawai'i, pp 185–225.

Forbes, G.A. 1999. Diet Sampling and Diet Component Analysis in Research and Management Techniques for the Conservation of Sea Turtles. K.L. Eckert, K.A. Bjourndal, F.A. Abreu-Grobois and M. Donnelly (editors). IUCN/SSC Marine Turtle Specialist Group Publication No. 4. 235 pp.; 1999, p. 144-148.

Forbes, G. and C. Limpus. 1993. A non-lethal method for retrieving stomach contents from sea turtles. Wildlife Research. 20:339–343.

Frey, A., Dutton, P.H., and G.H. Balazs. 2013. Insights on the demography of cryptic nesting by green turtles (*Chelonia mydas*) in the main Hawaiian Islands from genetic relatedness analysis. J Exp Mar Bio Ecol 442: 80–87.

Frey, A., P.H. Dutton, D.J. Shaver, J. Shelby Walker, and C. Rubio. 2014. Kemp's ridley Lepidochelys kempii nesting abundance in Texas: a novel approach using genetics to improve population census. Endangered Species Research 23:63-71. doi.org/10.3354/esr00565.

Fuentes, M.M.P.B., M. Hamann, and C.J. Limpus. 2010. Past, current and future thermal profiles of green turtle nesting grounds: Implications from climate change. Journal of Experimental Marine Biology and Ecology 383:56-64.

Fuentes, M.M.P.B., C.J. Limpus, and M. Hamann. 2011. Vulnerability of sea turtle nesting grounds to climate change. Global Change Biology 17:140-153.

Fuentes, M.M.P.B., J.A. Maynard, M. Guinea, I.P. Bell, P.J. Werdell, and M. Hamann. 2009. Proxy indicators of sand temperature help project impacts of global warming on sea turtles in northern Australia. Endangered Species Research 9:33-40.Caut et al. 2009.

Gallaway, B.J., W.J. Gazey, C.W. Caillouet, Jr., P.T. Plotkin, F.A. Abreau Grobois, A.F. Amos, P.M. Burchfield, R.R. Carthy, M.A. Castro Martinez, J.G. Cole, A.T. Coleman, M. Cook, S. DiMarco, S.P. Epperly, M. Fujiwara, D. Gomez Gamez, G.L. Graham, W.L. Griffin, F. Illescas Martinez, M.M. Lamont, R.L. Lewison, K.J. Lohmann, J.M. Nance, J. Pitchford, N.F. Putman, S.W. Rayborn, J.K. Rester, J.J. Rudloe, L. Sarti Martinez, M. Schexnayder, J.R. Schmid, D.J. Shaver, C. Slay, A.D. Tucker, M. Tumlin, T. Wibbels, and B.M. Zapata Najera. 2016. Development of a Kemp's ridley sea turtle stock assessment model. Gulf of Mexico Science 33(2):138-157.

Gaos A.R., E.L. LaCasella, L. Kurpita, G. Balasz, S. Hargrove, C. King, H. Bernard, T.T. Jones, and P.H. Dutton. 2020. Hawaiian hawksbills: a distinct and isolated nesting colony in the Central North Pacifc Ocean revealed by mitochondrial DNA. Conservation Genetics. https://doi.org/10.1007/s10592-020-01287-1

Gilman, E., Bianchi, G. and Attwood, C., 2009. *Guidelines to reduce sea turtle mortality in fishing operations*. FAO.

Goby, G., Suka, M., Bero, A. and Paranga, J., 2010. Turtle Monitoring Program 2009/2010 Season. *Tetepare Descendants' Association*.

Grant, G. S., P. Craig, and G. H. Balazs. 1997. Notes on juvenile hawksbill and green turtles in American Samoa. Pacific Science 51:48-53.

Harrison, A.L., Costa, D.P., Winship, A.J., Benson, S.R., Bograd, S.J., Antolos, M., Carlisle, A.B., Dewar, H., Dutton, P.H., Jorgensen, S.J. and Kohin, S., 2018. The political biogeography of migratory marine predators. *Nature ecology & evolution*, *2*(10), pp.1571-1578.

Hart, K.M., Sartain, A.R., and Fujisaki, I., 2015. Bahamas connection: Residence areas selected by breeding female loggerheads tagged in Dry Tortugas National Park, USA. Animal Biotelemetry 3:3.

Hawkes, L.A., A.C. Broderick, H. Godfrey, B. Godley, and M.J. Witt. 2014. The impacts of climate change on marine turtle reproductoin success. Pages 287-310 *in* B. Maslo, and L. Lockwood, editors. Coastal Conservation. Cambridge University Press, Cambridge.

Hawkes, L.A., A.C. Broderick, M.H. Godfrey, and B.J. Godley. 2009. Climate change and marine turtles. Endangered Species Research 7(2):137-154

Henson, T., Boettcher, R. (2006). Handbook for sea turtle volunteers in North Carolina. North Carolina Wildlife Resources Commission. Coastal Faunal Diversity Program. 44 pp.

Hitipeuw, C., Dutton, P.H., Benson, S., Thebu, J. and Bakarbessy, J., 2007. Population status and internesting movement of leatherback turtles, Dermochelys coriacea, nesting on the northwest coast of Papua, Indonesia. Chelonian Conservation and Biology, 6(1), pp.28-36.

Howell, E.A., D.R. Kobayashi, D.M. Parker, G.H. Balazs, and J.J. Polovina. 2008. TurtleWatch: a tool to aid in the bycatch reduction of loggerhead turtles *Caretta caretta* in the Hawai'i-based pelagic longline fishery. Endangered Species Research 5:267–278.

Howell, E.A., P.H. Dutton, J.J. Polovina, H. Bailey, D.M. Parker, and G.H. Balazs. 2010. Oceanographic influences on the dive behavior of juvenile loggerhead turtles (*Caretta caretta*) in the North Pacific Ocean. Marine Biology 157(5):1011-1026.

Humber, F., Godley, B.J. and A.C. Broderick. 2014. So excellent a fishe: a global overview of legal marine turtle fisheries. Diversity and Distributions; DOI: 10.1111/ddi.12183

Hutchinson, A., B. J. Hutchinson, and K. Koenig. 2008. The global hawksbill nesting map. SWOT Report III: 11-13.

IPCC. 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

IPCC. 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

Ishihara, T., 2009, January. Status of Japanese Coastal Sea Turtle Bycatch. In *Proceedings of the Technical Workshop on Mitigating Sea Turtle Bycatch in Coastal Net Fisheries* (pp. 20-22).

Ishihara T. 2007. Japan coastal bycatch investigations. In: North Pacific Loggerhead Sea Turtle Expert Workshop December 19–20, 2007. Western Pacific Regional Fishery Management Council and US National Marine Fisheries Service, Honolulu, HI, p 21–22.

Ishihara T., N. Kamezaki, Y. Matsuzawa, F. Iwamoto, T. Oshika, Y. Miyagata, C. Ebisui, and S. Yamashita. 2011. Reentery of juvenile and subadult loggerhead turtles into natal waters of Japan. Current Herpetology 30(1):63–68.

Jones T.T., B. Bostrom, M. Carey, B. Imlach, J. Mikkelsen, P. Ostafichuk, S. Eckert, P. Opay, Y. Swimmer, J.A. Seminoff, and D.R. Jones. 2011. Determining Transmitter Drag and Best Practice Attachment Procedures for Sea Turtle Biotelemetry Studies. NOAA Technical Memorandum NMFS-SWFSC-480.

Kamezaki, N., L. Matsuzawa, O. Abe, H. Asakawa, T. Fukii, and K. Goto. 2003. Loggerhead turtles nesting in Japan. In: Bolten, A. and Witherington, B. (Eds.). Loggerhead Sea Turtles. Smithsonian Institution Press, Washington, DC, USA, pp. 210–217.

Karl, T.R. 2009. Global climate change impacts in the United States. Cambridge University Press.

Kiawah Island Turtle Patrol – KITP (2017). Nesting patrol volunteer guide. Town of Kiawah Island. 29 pp.

King C.S. and D.A. McLeish. 2016. Through The Camera Lens: A Photo-Identification Catalog (1998-2015) That Superbly Captures the Lives of Critically Endangered Hawaiian Hawksbill Sea Turtles. Proceedings of the 36th Annual Symposium on Sea Turtle Biology and Conservation (Lima, Peru 2016).

Kittinger, J.N.,Van Houtan, K.S., McClenachan, L.E. and A.L. Lawrence. 2013. Using historical data to assess the biogeography of population recovery. Ecography 36: 1-5.

Kobayashi, D.R., J.J. Polovina, D.M. Parker, N. Kamezaki, I.J. Cheng, I. Uchida, P.H. Dutton, and G.H. Balazs. 2008. Pelagic habitat characterization of loggerhead sea turtles, *Caretta caretta*, in the North Pacific Ocean (1997-2006): Insights from satellite tag tracking and remotely sensed data. J. Exp. Mar. Biol. Ecol. 356(1-2):96-114.

Kolinski SP, J.A. Cruce, D.M. Parker, G.H. Balazs, R. Clarke. (2014). Migrations and Conservation Implications of Post-Nesting Green Turtles from Gielop Island, Ulithi Atoll, Federated States of Micronesia. Micronesica 1–9.

Kurpita, L. 2015. Hawai'i Island Hawksbill Turtle Recovery Project, Final Grant Report: 2010-2015. NOAA Fisheries Award No. NA10NMF4540137.

Lam, T., X. Ling, S. Takahashi, and E.A. Burgess. 2011. Market Forces: An Examination of Marine Turtle Trade in China and Japan. TRAFFIC East Asia, Hong Kong. 48pgs.

Lam, T., Xu Ling, Takahashi, S., and E.A. Burgess. 2012. Market Forces: An Examination of Marine Turtle Trade in China and Japan. TRAFFIC East Asia, Hong Kong.

Limpus, C. J. and D.J. Limpus. 2003. Loggerhead Turtle in the Equatorial and Southern Pacific Ocean: A Species in Decline. In: Bolten, A. B.,Witherington, B. E. Eds., Loggerhead Sea Turtles. Smithsonian Books, Washington, D.C. 319 pp. p. 199-209.

Lotze, H.K., H.S. Lenihan, B.J. Bourque, R.H. Bradbury, R.G. Cooke, M.C. Kay, S.M. Kidwell, M.X. Kirby, C.H. Peterson, and J.B.C. Jackson. 2006. Depletion, degradation, and recovery potential of estuaries and coastal seas. Science 312:1806-1809.

Maison K.A., Kinan-Kelly, I. and K.P. Frutchey. 2010. Green turtle nesting sites and sea turtle legislation throughout Oceania. NOAA Tech Memo NMFS-F/SPO-110.

Mantua, N.J., S.R. Hare, Y. Zhang, J.M. Wallace, and R.C. Francis. 1997. A Pacific interdecadal climate oscillation with impacts on salmon production. Bulletin of the American Meteorological Society 78(6):1069-1079.

Martin, S. L., Van Houtan, K. S., Jones, T. T., Aguon, C. F., Gutierrez, J. T., Tibbatts, R. B., et al. 2015. Five decades of marine megafauna surveys from Micronesia. Front. Mar. Sci. 2:116. doi: 10.3389/fmars.2015.00116

Martin, S.L., Gaos, A.R. and Jones, T.T., 2019. Sea turtle tagging in the Mariana Islands Training and Testing (MITT) study area.

Martin, S.L., Van Houtan, K.S., Jones, T.T., Aguon, C.F., Gutierrez, J.T., Tibbatts, R.B., Wusstig, S.B. and Bass, J.D., 2016. Five decades of marine megafauna surveys from Micronesia. *Frontiers in Marine Science*, *2*, p.116.

Martin S.L., Z. Siders, T. Eguchi, B. Langseth, A. Yau, J. Baker, R. Ahrens, and T.T. Jones. 2020. Assessing the population-level impacts of North Pacific loggerhead and western Pacific leatherback turtle interactions in the Hawai'i-based shallow-set longline fishery. U.S. Dept. of Commerce, NOAA Technical Memorandum NOAA-TM-NMFS-PIFSC-95, 183 p. doi:10.25923/ydp1-f891

Matsuzawa, Y., Ishihara, T. and Wang, J., March. H. Peckham. 2012. Poundnet escape devices (PEDs) can mitigate loggerhead bycatch in Japanese coastal fisheries. In *32nd Annual Symposium on Sea Turtle Biology and Conservation*.

McCarty, J.P. 2001. Ecological consequences of recent climate change. Conservation Biology 15(2):320-331.

McClenachan, L., J.B.C. Jackson, and M.J.H. Newman. 2006. Conservation implications of historic sea turtle nesting beach loss. Frontiers in Ecology and the Environment 4:290-296.

McKay. K. 2005. Leatherback turtles in Vanuatu. In: Proceedings of the Second Western Pacific Sea Turtle Cooperative Research and Management Workshop. Volume I: West Pacific Leatherback and Southwest Pacific Hawksbill Sea Turtles (Edited by I. Kinan). May 17-21, 2004, WPFMC, Honolulu, HI.

Miller DJ. 1997. Reproduction in sea turtles. In The Biology of Sea Turtles, Lutz PL, Musick JA (eds). CRC Publishing: Boca Raton; 51–81.

Miller, EA., L. McClenachan, Y. Uni, G. Phocas, ME. Hagemann, KS. Van Houtan. 2019. The historical development of complex global trafficking networks for marine wildlife. Sci. Adv. 2019; 5 : eaav5948.

Mortimer, J.A., 1999. Reducing threats to eggs and hatchlings: hatcheries. In Research and management techniques for the conservation of sea turtles (Vol. 4, pp. 175-178). Washington, DC: IUCN/SSC Marine Turtle Specialist Group Publication.

Mortimer, J. A. and M. Donnelly. 2008. *Eretmochelys imbricata*. IUCN Red List of Threatened Species 2011.1:www.iucnredlist.org.

National Marine Fisheries Service (NMFS) 2008. Biological Opinion on Proposed Management Modifications for the Hawai'i-based Shallow-set Longline Swordfish Fishery-Implementation of Amendment 18 to the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region. Pacific Islands Region, 91p.

NMFS. 2011. Programmatic Environmental Assessment: Marine Turtle Research Program. June 2011. Department of Commerce, 66p.

NMFS. 2012a. Programmatic Environmental Assessment: Marine Turtle Assessment Program. June 2012. Department of Commerce, 93p.

NMFS. 2012b. Biological opinion on continued operation of the Hawai'i-based Shallow-set Longline Swordfish Fishery – under Amendment 18 to the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region. Pacific Islands Region, 162p.

NMFS. 2013. Sea Turtle Assessment Status and Research Needs. U.S. Dept. of Commer., NOAA Technical Memorandum NMFS-F/SPO-131, 52 p.

NMFS. 2014a. Marine Turtle Management and Conservation Program (MTMCP) Environmental Assessment. Department of Commerce, National Marine Fisheries Service, Pacific Islands Regional Office, 119p.

NMFS. 2014b. Hawaiian monk seal recovery actions programmatic environmental impact statement. Department of Commerce, National Marine Fisheries Service, Pacific Islands Regional Office, 580p.

NMFS. 2017. Biological and Conference Opinion on the Proposed Implementation of a Program for the Issuance of Permits for Research and Enhancement Activities on Threatened and Endangered Sea Turtles Pursuant to Section l0(a) of the Endangered Species Act. National Marine Fisheries Service, Silver Spring, MD.

NMFS. 2023. Programmatic environmental assessment for Fisheries and Ecosystem Research conducted and funded by the Pacific Islands Fisheries Science Center.

NMFS. 2022. Pacific Islands Fisheries Science Center's Fishery and Ecosystem Research Activities in the Western and Central Pacific Ocean. Endangered Species Act – Section 7 Biological Opinion and Conference Report. PIRO-2021-03019.

NMFS Southeast Fisheries Science Center. 2008. Sea Turtle Research Techniques Manual. NOAA Technical Memorandum NMFS-SEFSC-579. Department of Commerce, National Marine Fisheries Service, Pacific Islands Regional Office, 422p.

NMFS and U.S. Fish and Wildlife Service (USFWS). 1998a. Recovery Plan for U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*). National Marine Fisheries Service, Silver Spring, MD.

NMFS and USFWS. 1998b. Recovery Plan for U.S. Pacific Populations of the Hawksbill Turtle (*Eretmochelys imbricata*). National Marine Fisheries Service, Silver Spring, MD.

NMFS and USFWS. 1998c. Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (*Dermochelys coriacea*). National Marine Fisheries Service, Silver Spring, MD.

NMFS and USFWS. 1998d. Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle (*Caretta caretta*). National Marine Fisheries Service, Silver Spring, MD.

NMFS and USFWS. 1998e. Recovery Plan for U.S. Pacific Populations of the Olive Ridley Turtle (*Lepidochelys olivacea*). National Marine Fisheries Service, Silver Spring, MD.

NMFS and USFWS. 2009. Loggerhead Turtle (*Caretta caretta*) 5-year review: Summary and Evaluation. National Marine Fisheries Service, Silver Spring, MD.

NMFS and USFWS. 2013. Hawksbill turtle (*Eretmochelys imbricata*) 5-Year Review: Summary and Evaluation. National Marine Fisheries Service, Silver Spring, MD.

NMFS and USFWS. 2014. Olive Ridley Turtle (*Lepidochelys olivacea*) 5-year review: Summary and Evaluation. National Marine Fisheries Service, Silver Spring, MD.

NMFS and USFWS. 2020a. Leatherback Turtle (*Dermochelys coriacea*) 5-Year Review: Summary and Evaluation. National Marine Fisheries Service, Silver Spring, MD.

NMFS and USFWS. 2020b. Loggerhead sea turtle (Caretta caretta) North Pacific Ocean DPS 5-year review: Summary and evaluation 2020. National Marine Fisheries Service, Silver Spring, MD.

NMFS and USFWS. 2021. Loggerhead Sea Turtle (*Caretta caretta*) North Indian Ocean DPS, Southwest Indian Ocean DPS, Southeast Indo-Pacific Ocean DPS, South Pacific Ocean DPS, South Atlantic Ocean DPS, Northeast Atlantic Ocean DPS, and Mediterranean Sea DPS 5-Year Review: Summary and Evaluation. 113pp.

National Oceanic and Atmospheric Administration (NOAA). 2013. Oceans and Marine Resources in a Changing Climate: Technical Input to the 2013 National Climate Assessment.

National Research Council (NRC). 2010. Sea Turtle Status and Trends: Integrating Demography and Abundance. National Academies Press, Washington, DC, 162p.

Obura, D. and G. Stone. 2002. Phoenix Islands Summary of Marine and Terrestrial Assessments Conducted in the Republic of Kiribati, June 5-July 10, 2002. Primal Ocean Project Technical Report, Boston, MA.

Okuyama, J., Ishii, H., Tanizaki, S., Suzuki, T., Abe, O., Nishizawa, H., Yano, A., Tsujimura, M., Ishigaki, T., Ishigaki, T. and Kobayashi, M., 2020. Quarter-Century (1993–2018) Nesting

Trends in the Peripheral Populations of Three Sea Turtle Species at Ishigakijima Island, Japan. Chelonian Conservation and Biology: Celebrating 25 Years as the World's Turtle and Tortoise Journal, 19(1), pp.101-110.

Owens, D.W. 1999. Reproductive Cycles and Endrocrinology. In: K.L. Eckert, K.A. Bjorndal, F.A. Abreu- Grobois, and M. Donelly (Editors). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4. p.119-123.

Pacific Leatherback Assessment Working Group (PLAWG). 2012. Meeting Report: 2nd Meeting of the PLAWG. San Diego, California 21-22 August 2012. NMFS SAIP unpublished report.

Parker, D.M., Balazs, G.H., Frutchey, K., Kabua, E. , Langidrik, M., and K. Boktok. (2015). Conservation considerations revealed by the movements of post-nesting green turtles from the Republic of the Marshall Islands. Micronesica 3: 1–9.

Parker, D.M., G.H. Balazs, C.S. King, L. Katahira, and W. Gilmartin. 2009. Short-range movements of hawksbill turtles (*Eretmochelys imbricata*) from nesting to foraging areas within the Hawaiian Islands. Pac. Sci. 63(3):371-382.

Patrício, A.R., A. Marques, C. Barbosa, A.C. Broderick, B.J. Godley, L.A. Hawkes, R. Rebelo, A. Regalla, and P. Catry. 2017. Balanced primary sex ratios and resilience to climate change in a major sea turtle population. Marine Ecology Progress Series 577:189-203.

Pease, A., Blanvillain, G., Rostal, D.C., Owens, D.W., and A. Segars (2010) Ultrasound imaging of the inguinal region of adult male loggerhead sea turtles (*Caretta caretta*). Journal of Zoology and Wildlife Medecine. 41: 69–76.

Peckham, S.H., D.M. Diaz, A. Walli, G. Ruiz, L.B. Crowder, and W.J. Nichols. 2007. Small-Scale Fisheries Bycatch Jeopardizes Endangered Pacific Loggerhead Turtles. PLoS ONE 2(10): e1041. doi:10.1371/journal.pone.0001041

Peckham, S.H., Maldonado-Diaz, D., Koch, V., Mancini, A., Gaos, A., Tinker, M.T. and Nichols, W.J., 2008. High mortality of loggerhead turtles due to bycatch, human consumption and strandings at Baja California Sur, Mexico, 2003 to 2007. Endangered Species Research, 5(2-3), pp.171-183.

Petit, M., Gaspar, C., Besson, M., and F. Bignon. 2012. Suivi Des Pontes de Tortues Vertes Sur l ’ Atoll de Tetiaroa (Saison 2011-2012) et Évaluation Des Populations de Tortues Marines Sur La Pente Externe de Moorea. Te mana o te moana.

Pilcher, N., 2010. Population structure and growth of immature green turtles at Mantanani, Sabah, Malaysia. *Journal of Herpetology*, *44*(1), pp.168-171.

Pilcher, N.J., Ramachandran, T., Dah, T.C., Ee, L.S., Beliku, J., Palaniveloo, K., Hin, L.K., Ling, L.S., Hui, L.C., Lewison, R. and Moore, J., 2009. Rapid gillnet bycatch assessment: Sabah, Malaysia 2007. Project GloBAL. 2009. In Workshop Proceedings: Tackling Fisheries Bycatch: Managing and reducing sea turtle bycatch in gillnets (pp. 38-41).

Pike, D.A., E.A. Roznik, and I. Bell. 2015. Nest inundation from sea-level rise threatens sea turtle population viability. Royal Society Open Science 2:150127.

Piovano S (2018) Conservation of American Samoa-Origin Stock of Green Turtles in a Key Foraging Ground in Fiji, with Cascade Effects on Management of Central South Pacific Sea Turtle Populations. School of Marine Studies, The University of the South Pacific.

Piovano, S., G.E. Lemons, A. Ciriwaya, A. Batibasaga, and J.A. Seminoff. 2020. Diet and recruitment of green turtles in Fiji, South Pacific, inferred from in-water capture and stable isotope analysis. MEPS 640: 201-213.

Pita, J., 2005. Leatherback turtles in the Solomon Islands. In *Proceedings of the Second Western Pacific Sea Turtle Cooperative Research and Management Workshop* (Vol. 1, pp. 67-68).

Poloczanska, E.S., C.J. Limpus, and G.C. Hays. 2009. Vulnerability of marine turtles in climate change. Pages 151-211 *in* D.W. Sims, editor. Advances in Marine Biology, volume 56. Academic Press, Burlington.

Polovina, J.J., D.R. Kobayashi, D.M. Ellis, D.M., Seki, and G.H. Balazs. 2000. Turtles on the edge: Movement of loggerhead turtles (*Caretta caretta*) along oceanic fronts in the central North Pacific, 1997-1998. Fisheries Oceanography 9(1):71-82.

Polovina, J.J., E.A. Howell, D.M. Parker, and G.H. Balazs. 2003. Dive-depth distribution of loggerhead (*Caretta caretta*) and olive ridley (*Lepidochelys olivacea*) sea turtles in the central North Pacific: Might deep longline sets catch fewer turtles? Fishery Bulletin 101(1): 189-193.

Polovina, J.J., G.H. Balazs, E.A. Howell, D.M. Parker, M.P. Seki, and P.H. Dutton. 2004. Forage and migration habitat of loggerhead (*Caretta caretta*) and olive ridley (*Lepidochelys olivacea*) sea turtles in the central North Pacific Ocean. Fisheries Oceanography 13(1):36-51.

Polovina, J., I. Uchida, G. Balazs, E.A. Howell, P. Parker, and P. Dutton. 2006. The Kuroshio Extension Bifurcation Region: A pelagic hotspot for juvenile loggerhead sea turtles. Deep-Sea Research II 53(3-4):326-339.

Ramohia, P.C., Pita, J. and da Wheya, N., 2001. Leatherback turtle (Dermochelys coriacea) tagging and nest monitoring survey, Sasakolo nesting beach, Isabel Province. *Apia, Samoa, South Pacific Regional Environmental Programme (SPREP)*.

Roe, J.H., Morreale, S.J., Paladino, F.V., Shillinger, G.L., Benson, S.R., Eckert, S.A., Bailey, H., Tomillo, P.S., Bograd, S.J., Eguchi, T. and Dutton, P.H., 2014. Predicting bycatch hotspots for endangered leatherback turtles on longlines in the Pacific Ocean. Proceedings of the Royal Society B: Biological Sciences, 281(1777), p.20132559.

Secretariat of the Pacific Regional Environment Program (SPREP). 2010. Turtle Research and Monitoring Database System (TREDS) 2009 Annual Report.

Seminoff JA, Benson SR, Arthur KE, Eguchi T, Dutton PH, et al. 2012. Stable Isotope Tracking of Endangered Sea Turtles: Validation with Satellite Telemetry and d15N Analysis of Amino Acids. PLoS ONE 7(5): e37403. doi:10.1371/journal.pone.0037403

Seminoff JA, Eguchi T, Carretta J, Allen CD, Prosperi D, Rangel R, Gilpatrick JW, Forney K, SH Peckham. 2014. Loggerhead sea turtle abundance at a foraging hotspot in the eastern Pacific Ocean: implications for at-sea conservation. Endang Species Res. Vol. 24:207–220

Seminoff, J. A., Allen, C. D., Balazs, G. H., Dutton, P. H., Eguchi, T., Haas, H., et al. (2015). Status Review of the Green Turtle (*Chelonia mydas*) Under the Endangered Species Act. La Jolla, CL: US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Seitz, W.A., Kagimoto, K.M., Luehrs, B., and L. Katahira. 2012. Twenty Years of Conservation and Research Findings of the Hawai'i Island Hawksbill Turtle Recovery Project, 1989 - 2009.

Sharma-Gounder, S. and R. Veeran. 2010. Ringgold Isles Green Turtle Nesting and Tagging Survey Report 03rd – 09th December, 2010.

Shaver, D.J. 2007. An attempt to re-establish a nesting colony of endangered Kemp's ridley sea turtles (*Lepidochelys kempii*) through experimental imprinting and head-starting. In: Marine Turtles Recovery of Extinct Populations, p. 145-173. L.F. Lopez Juardo and A. Lira Loza (editors). Instituto Canario de Ciencias Marinas.

Snover, M.., Baker, J. and M. Sullivan. 2007. US Pacific Islands Research Plan for Green (excluding Hawai'i) and Hawksbill Turtles. February 2007 draft manuscript, PIFSC.

Summers, T.M., Jones, T.T., Martin, S.L., Hapdei, J.R., Ruak, J.K., and C.A. Lepczyk. 2017. Demography of marine turtles in the nearshore environments of the Northern Mariana Islands. Pac. Sci. 71: 269–286. doi: 10.2984/71.3.3

Summers T.M., Martin S.L., Hapdei J.R., Ruak J.K. and Jones T.T. 2018a. Endangered Green Turtles (Chelonia mydas) of the Northern Mariana Islands: Nesting Ecology, Poaching, and Climate Concerns. Front. Mar. Sci. 4:428. doi: 10.3389/fmars.2017.00428

Summers, T.M., I.K. Kelly, T.M. Work, J.K. Ruak and J.R. Hapdei. 2018b. Human induced trauma and directed take inhibits sea turtle recovery in the Commonwealth of the Northern Mariana Islands. Micronesica 2018-08: 19 pp.

SWOT. 2018. The State of the World's Sea Turtles, Special Feature: Japan. Report 13.

Tapilatu, R. F., P. H. Dutton, M. Tiwari, T. Wibbels, H. V. Ferdinandus, W. G. Iwanggin, and B. H. Nugroho. 2013. Long-term decline of the western Pacific leatherback, Dermochelys coriacea: a globally important sea turtle population. Ecosphere 4(2):25. http://dx.doi.org/10.1890/ES12-00348.1

Tapilatu, R.F.,Wona, H. and P.P. Batubara. 2017. Status of sea turtle populations and its conservation at Bird's Head Seascape, Western Papua, Indonesia. BIODIVERSITAS. v.18 (1): 129-136.

Tiwari, M., Balazs, G.H. and S. Hargrove. 2010. Estimating carrying capacity at the green turtle nesting beach of East Island, French Frigate Shoals. *Marine Ecology Progress Series*, *419*, pp.289-294.

Tuato'o-Bartley, N., Morrell, T.E. and Craig, P., 1993. Status of sea turtles in American Samoa in 1991.

Turtles in the Caribbean Overseas Territories - TCOT (2003). Protocol for monitoring nesting populations. Department of Environment, Food and Rural Affairs and the Foreign and Commonwealth Office. 8 pp.

Van Houtan, K. 2010. Future climate impacts to marine turtle populations, with a focus on the North Pacific Ocean. PIFSC Internal Report IR-10-023.

Van Houtan K.S., J.N. Kittinger, A.L. Lawrence, C. Yoshinaga, V.R. Born, and A. Fox. 2012. Hawksbill Sea Turtles in the Northwest Hawaiian Islands. Chelonian Conservation and Biology 11(1): 117-121.

Van Houtan KS, Francke DL, Alessi S, Jones TT, Martin SL, Kurpita L, King CS and RW Baird. 2016. The developmental biogeography of hawksbill sea turtles in the North Pacific. Ecology and Evolution. doi: 10.1002/ece3.2034.

Vaughn, P.W. 1981. Marine turtles: a review of their status and management in the Solomon Islands. World Wildlife Fund Report No. 1452, 70 pp.

Western Pacific Fishery Management Council (WPFMC). 2005. Final report of the Council's second Sea Turtle Advisory Committee meeting, March 3-4, 2005.

White M. 2012. Nesting Census and Genetic Sampling of an Unstudied Marine Turtle Population at Tongareva Atoll, Northern Cook Islands. NOAA Grant Final Report.

White M. and G. Galbraith. 2013. Rakahanga Atoll: Sea Turtles at a Remote Site in Oceania. Testudo7(5): 30-48.

White, M., Kararaj, E. and Hysko, M. 2014. Preliminary water-sampling to assess the level of biological pollutants from five rivers in Albania.

White, M., 2016. Too hot in Paradise. *The Marine Biologist, April*, *2016*, pp.26-27.

Wilkinson, C., and D. Souter. 2008. Status of Caribbean coral reefs after bleaching and hurricanes in 2005. Global Coral Reef Monitoring Network, and Reef and Rainforest Research Centre, Townsville.

Williams, S.E., L.P. Shoo, J.L. Isaac, A.A. Hoffmann, and G. Langham. 2008. Towards an integrated framework for assessing the vulnerability of species to climate change. PLoS Biol 6(12):e325.

Appendix 1

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

Charles Littnan, Ph.D.
NMFS Pacific Islands Fisheries Science Center
1845 Wasp Boulevard
Honolulu, Hawaii 96818

FEB 2 8 2018

Dear ~~Dr. Littnan~~: Charles!

The National Marine Fisheries Service (NMFS) has issued Permit No. 21260 to NMFS Pacific Islands Fisheries Science Center, for research activities on sea turtles. With the issuance of this permit, Permit No. 15685 is no longer valid.

This permit is effective upon your signature and valid through September 30, 2027. To use your permit:

1. Read the permit, including attachments. If you have questions, call your permit analyst – Erin Markin or Amy Hapeman – at 301-427-8401 before signing the permit.
2. Sign and date both the original and "File Copy" signature pages.
3. Keep the original signature page with your permit.
4. Return the "File Copy" signature page to our office by:
   a. Email to your permit analyst;
   b. Fax (301-713-0376); or
   c. Mail (NMFS Permits and Conservation Division (F/PR1), 1315 East-West Hwy, Silver Spring, MD 20910).

National Marine Sanctuaries: Federal regulations govern activities within National Marine Sanctuaries (NMS) (15 CFR 922) with prohibitions on the use of low-flying aircraft, discharging any material or matter (e.g., tags), and other activities. For further information on NMS permits, contact the national office or appropriate sanctuary as listed in Attachment 3 of the permit.

Unmanned Aircraft Systems: Unmanned aircraft systems (UAS) fall under the jurisdiction of the Federal Aviation Administration (FAA; http://www.faa.gov/). You must be compliant with FAA requirements when operating UAS under this permit. The FAA considers scientific research as either public (governmental) or civil (non-governmental or commercial); it does not fall under the recreational/hobbyist category. You may also be required to obtain additional Federal, State, or local permits to use UAS depending on where you will be working (e.g., National Marine Sanctuaries, National Parks). It is your responsibility to obtain these permits and comply with any other laws or regulations.

Please keep your contact information current in our online database (https://apps.nmfs.noaa.gov). You will receive automated email reminders of due dates for annual and final reports and a notice prior to expiration of your permit.

Sincerely,

Jolie Harrison
Chief, Permits and Conservation Division
Office of Protected Resources

Enclosure

Permit No. 21260
Expiration Date: September 30, 2027
Reports Due: October 31, annually

PERMIT TO TAKE PROTECTED SPECIES[1] FOR SCIENTIFIC PURPOSES

I. Authorization

This permit is issued to the National Marine Fisheries Service Pacific Islands Fisheries Science Center, 1845 Wasp Boulevard, Honolulu, Hawaii, 96818, (hereinafter "Permit Holder;" Responsible Party: Charles Littnan, Ph.D.), pursuant to the provisions of the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq.*) and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226).

II. Abstract

The objective of the permitted activity, as described in the application, is to continue long-term monitoring of sea turtles in the Pacific Islands Region to understand population status, abundance, and trends; maturity; growth rates; and foraging and movement ecology.

III. Terms and Conditions

The activities authorized herein must occur by the means, in the areas, and for the purposes set forth in the permit application, and as limited by the Terms and Conditions specified in this permit, including appendices and attachments. Permit noncompliance constitutes a violation and is grounds for permit modification, suspension, or revocation, and for enforcement action.

A. Duration of Permit

1. Personnel listed in Condition C.1 of this permit (hereinafter "Researchers") may conduct activities authorized by this permit through September 30, 2027. This permit may be extended by the Director, National Marine Fisheries Service (NMFS) Office of Protected Resources or the Chief, Permits and Conservation Division (hereinafter Permits Division), pursuant to applicable regulations and the requirements of the ESA.

2. Researchers must immediately stop permitted activities and the Permit Holder or Principal Investigator must contact the Chief, NMFS Permits and Conservation Division (hereinafter "Permits Division") for written permission to resume:

[1] "Protected species" include species listed as threatened or endangered under the ESA, and marine mammals.

a. If serious injury or mortality[2] of protected species occurs.

b. If authorized take[3] is exceeded in any of the following ways:

i. More animals are taken than allowed in Table 1 of Appendix 1.

ii. Animals are taken in a manner not authorized by this permit.

iii. Protected species other than those authorized by this permit are taken.

c. Following incident reporting requirements at Condition E.2.

3. The Permit Holder may continue to possess biological samples[4] acquired[5] under this permit after permit expiration without additional written authorization provided a copy of this permit is kept with the samples and they are maintained as specified in this permit.

B. Number and Kinds of Protected Species, Locations and Manner of Taking

1. The table in Appendix 1 outlines the authorized species; number of animals to be taken; number of animals from which parts may be received, imported and exported; and the manner of take, locations, and time period.

2. Researchers working under this permit may collect images (e.g., photographs, video) and audio recordings as needed to document the permitted activities, provided the collection of such images or recordings does not result in takes.

3. The Permit Holder may use visual images and audio recordings collected under this permit, including those authorized in Table 1 of Appendix 1, in printed materials (including commercial or scientific publications) and presentations provided the images and recordings are accompanied by a statement indicating that the activity was conducted pursuant to NMFS ESA Permit No. 21260.

---

[2] This permit does not allow for unintentional serious injury and mortality caused by the presence or actions of researchers. This includes, but is not limited to: deaths resulting from infections related to sampling procedures or invasive tagging and deaths or injuries sustained by animals during capture and handling, or while attempting to avoid researchers or escape capture.

[3] By regulation, a take under the Marine Mammal Protection Act (MMPA) means to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal. This includes, without limitation, any of the following: The collection of dead animals, or parts thereof; the restraint or detention of a marine mammal, no matter how temporary; tagging a marine mammal; the negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in disturbing or molesting a marine mammal; and feeding or attempting to feed a marine mammal in the wild. Under the ESA, a take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to do any of the preceding.

[4] Biological samples include, but are not limited to: carcasses (whole or parts); and any tissues, fluids, or other specimens from live or dead protected species; except feces, urine, and spew collected from the water or ground.

[5] Authorized methods of sample acquisition are specified in Appendix 1.

This statement must accompany the images and recordings in all subsequent uses or sales.

4. The Chief, Permits Division may grant written approval for personnel performing activities not essential to achieving the research objectives (e.g., a documentary film crew) to be present, provided:

   a. The Permit Holder submits a request to the Permits Division specifying the purpose and nature of the activity, location, approximate dates, and number and roles of individuals for which permission is sought.

   b. Non-essential personnel/activities will not influence the conduct of permitted activities or result in takes of protected species.

   c. Persons authorized to accompany the Researchers for the purpose of such non-essential activities will not be allowed to participate in the permitted activities.

   d. The Permit Holder and Researchers do not require compensation from the individuals in return for allowing them to accompany Researchers.

5. Researchers must comply with the following conditions related to the manner of taking:

   a. <u>Aerial Surveys for Following, Hovering or Circling over Turtles</u>

      1. *Unmanned Aircraft Systems (UAS)*

         a. Researchers must use a fixed wing or vertical take-off and landing (VTOL) UAS.

         b. Researchers must end each encounter within 60 minutes.

         c. Operate UAS at an altitude no lower than 75 feet.

   b. <u>Capture Methods</u>

      1. *General Netting Conditions*

         a. Keep in-water chase activities and exertion as brief as possible to minimize the increased stress and associated physiological changes that accompany capture. This includes efficient and safe removal of turtles from the net.

2. *Hand Capture and Dip Netting*

   a. Limit the number of attempts to capture an individual turtle to three (3) attempts per day.

3. *Breakaway Hoop Netting*

   a. Follow the procedures for handling and monitoring leatherback sea turtles included as Attachment 1 to this permit.

   b. Only personnel experienced with the hoop net capture may perform this technique.

   c. Keep in-water chase activities and exertion as brief as possible to minimize the increased stress and associated physiological changes that accompany capture. This includes efficient and safe removal of turtles from the net.

   d. Limit the number of attempts to capture a leatherback sea turtle with the hoop net to five (5) per 24-hour period. If Researchers are unsuccessful after the first three (3) attempts, they must wait a minimum of 4 hours before making the final two (2) attempts for the day.

   e. Researchers must only target leatherback sea turtles behaving normally with no evidence of external trauma.

4. *Entanglement Netting*

   a. Use nets with mesh size designed to minimize bycatch of non-sea turtle species.

   b. Attach highly visible surface buoys to the float line of each net, spaced at intervals of every 10 yards or less.

   c. "Net checking" is defined as a thorough check of the net either by snorkeling the net in clear water (entire net must be visible) or by pulling up on the top line such that the full depth of the net is viewed along the entire length. The following intervals are the maximum time between viewing any single point of the net (i.e., each point of the net must be viewed every 30 or 20 minutes, depending on water temperature).

i. Check nets every 30 minutes and more frequently if turtles or other organisms are observed in the net.

ii. Check nets every 20 minutes or less if water temperatures are ≤10°C (50°F) or ≥30°C (86°F).

d. Continuously observe the surface float line of all nets for movement indicating an animal has encountered the net. When this occurs, the net must be immediately and thoroughly checked.

e. Plan for unexpected circumstances or demands of the research activities and have the ability and resources to meet the net checking requirements at all times. Contingencies for inclement weather must be in place. For example:

i. If an animal is highly entangled and requires extra time and effort to remove from the net, Researchers must have sufficient staff and resources to continue checking the rest of the net at the same time.

ii. If inclement weather is predicted that would prevent meeting the net checking requirements, Researchers must remove nets in advance of the weather event.

f. Marine Mammals: Do not deploy entanglement and seine nets when Researchers observe marine mammals within the vicinity of the study area. Allow marine mammals to leave or pass through the area safely before deploying nets.

i. The lead line must be raised and dropped to make marine mammals in the vicinity aware of the net should they enter the research area after nets have been deployed.

ii. Nets must be removed if marine mammals remain in the vicinity of the study area.

iii. If a marine mammal becomes entangled or dies, Researchers must follow these steps:

A. Stop netting activities immediately.

B. If the marine mammal is alive, immediately free it from the net in a safe manner (including cutting the net as necessary).

C. If the animal is dead, hold the carcass.

D. Notify the appropriate NMFS Regional Stranding Coordinator within 8 hours (http://www.nmfs.noaa.gov/pr/health/coordinators.htm).

E. Report the incident as specified in Condition E.2.

F. Suspend permitted activities until the NMFS Permits Division has granted approval to continue research per Condition E.2.

g. Netting in Areas Where Fibropapilloma (FP) is Known to Occur:

i. Thoroughly clean and disinfect nets prior to use in other areas where FP is either not known to be present, is considered uncommon, or where there is limited or no information on FP prevalence.

ii. In those cases, Researchers must disinfect nets using a broadcidal solution and the product-recommended contact time or by thoroughly drying nets in sunlight to inactivate FP-associated herpesvirus.

iii. Appropriate disinfectants include 70% isopropyl alcohol, 10% bleach, and other viricidal solutions with proven efficacy against herpesviruses.

c. Handling Compromised Turtles

1. Researchers must have an experienced veterinarian on call for emergencies and a permitted rehabilitation facility(ies) identified should veterinary care be required on shore to treat a compromised turtle. Compromised turtles include animals that are obviously weak, lethargic, positively buoyant, emaciated, or that have severe injuries or other debilitating abnormalities. Prior to conducting research, notify both the veterinarian and facility of the dates and times of the research to ensure their availability.

2. Strandings are defined as turtles that wash ashore, dead or alive, or are found floating dead or alive (if alive, generally in a weakened condition). If Researchers encounter a stranded sea turtle that they have not captured or handled for research, call the appropriate

stranding response authority and follow instructions on what to do with the animal. See here for contact information: https://www.fisheries.noaa.gov/report. If Researchers are working in an area where such contact is not possible or uncertain, work with the state stranding response authority to define a stranded turtle protocol before going into the field. Any collection or handling of a stranded animal that is not collected through the course of research falls under the stranding response authority (50 CFR 222.310 and 50 CFR 223.206) when a turtle is found in the water. In this case, do <u>not</u> count or report the stranded animal as a 'take' under this permit.

3. If an animal exhibits any major abnormality (including weakness, lethargy, or unresponsiveness) or is severely injured during capture or handling, or is found to be severely injured or otherwise compromised upon capture, Researchers must forego or cease activities that will further stress the animal (erring on the side of caution) and contact the on-call veterinarian as soon as possible. In this case, Researchers must count and report the animal as a 'take' under this permit.

   In such cases, Researchers must implement one of the following options (in order of preference):

   a. Contact and follow the instructions of the on-call veterinarian, and, if necessary, immediately transfer the animal to the veterinarian or to a permitted rehabilitation facility to receive veterinary care.

   b. If the on-call veterinarian or permitted rehabilitation facility cannot be reached, Researchers should err on the side of caution and bring the animal to shore for medical evaluation and rehabilitation, at a permitted rehabilitation facility, as soon as possible.

   c. If the animal cannot be taken to a permitted rehabilitation facility due to logistical or safety constraints, allow it to recuperate as directed by the veterinarian (if successfully contacted), or as conditions dictate, and return the animal to the water.

   d. If the animal is taken to rehabilitation, the Permit Holder is responsible for providing all requested information pertaining to the capture, following the status of the sea turtle, and reporting the final disposition (death, permanent injury, recovery and return to wild, etc.) of the animal to the NMFS Permits Division. Upon transfer, the possession and care of the turtle falls under the authority of the permitted rehabilitation facility.

4. Unresponsive animals: Use the following resuscitation techniques on any turtles that are unresponsive or exhibit severe weakness or lethargy following in-water capture. Resuscitation must be attempted unless the turtle is determined to be deceased based on rigor mortis, decomposition, or confirmation of cardiac arrest by Doppler, ECG, or ultrasonography.

   a. Place the turtle on its plastron so that the turtle is right side up, and elevate its hindquarters at least 6 inches. The amount of the elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Contact the on-call veterinarian immediately for additional instructions.

   b. While it is elevated, periodically rock the turtle gently left to right and right to left by holding the outer edge of the carapace and lifting one side about 3 inches then alternate to the other side.

   c. Keep sea turtles being resuscitated shaded and damp or moist. A water-soaked towel placed over the head, carapace, and flippers is the most effective method to keep a turtle moist. DO NOT place a turtle into a container holding water.

   d. Continue resuscitation until recovery or confirmation of death by onset of rigor mortis, decomposition, or cardiac arrest.

   e. Bring live turtles to shore for medical evaluation at a permitted rehabilitation facility as soon as possible. If the animal cannot be taken to a rehabilitation facility due to logistical or safety constraints, allow it to recuperate as directed by the veterinarian (if successfully contacted), or as conditions dictate, and return the animal to the water. Return all dead turtles to shore for necropsy to be performed at the direction of your on-call veterinarian or permitted rehabilitation facility.

5. Submit an incident report (see Condition A.2 and E.2) if an animal becomes compromised or dies during any research activities.

d. General Handling and Release Requirements

1. Use care when handling live animals to minimize injury.

2. While holding sea turtles out of water, Researchers must:

   f. Protect sea turtles from temperature extremes (ideal air temperature range is between 70°F (21.1°C) and 80°F (26.7°C);

   g. Provide adequate airflow;
   h. Keep sea turtles moist when the temperature is ≥75°F (23.9°C);

   i. Prevent sea turtles from sustaining any injuries; and

   j. Keep the area surrounding the turtle free of materials that could be accidentally ingested or harm the turtle.

3. Exercise extra care when handling, sampling and releasing leatherback sea turtles. Leatherback sea turtles have more friable skin and softer bones and are more susceptible to external trauma. Researchers must:

   a. Only board leatherbacks if they can be safely brought on board the vessel,

   b. Handle and support leatherbacks from underneath, and

   c. Not turn leatherbacks on their backs.

4. To prevent injury during release, lower sea turtles as close to the water's surface as possible.

5. Researchers must carefully monitor newly released turtles' abilities to swim and dive in a normal manner. If a turtle is not behaving normally upon release, recapture the turtle, if safely feasible, and contact your on-call veterinarian (see Condition d.1 above).

e. Handling, Measuring, Weighing, and Marking

1. Refer to Attachment 2 for more information on the requirements for handling and sampling sea turtles.

2. Clean and disinfect all equipment (tagging equipment, tape measures, etc.) and surfaces that come in contact with sea turtles between the processing of each turtle.

3. *Turtles with Fibropapillomas (FP)*

   a. Maintain a designated set of instruments for use on turtles with FP. Items that come into contact with turtles with FP tumors must not be used on turtles without tumors.

   b. Exercise all measures possible to minimize exposure and cross-contamination between affected turtles and those without apparent disease, including use of disposable gloves and thorough disinfection of equipment and surfaces.

   c. Appropriate disinfectants include 70% isopropyl alcohol, 10% bleach, and other viricidal solutions with proven efficacy against herpesviruses.

4. *Flipper and Passive Integrated Transponder (PIT) Tagging*

   a. Examine turtles for existing flipper and PIT tags before attaching or inserting new ones. Researchers must check all flippers.

   b. If Researchers find existing tags, record all tag identification numbers and promptly report them to the Cooperative Marine Turtle Tagging Program (CMTTP) at the Archie Carr Center for Sea Turtle Research (ACCSTR): http://accstr.ufl.edu/resources/report-a-tag/ or by email: accstr@ufl.edu. Researchers must have PIT tag readers capable of reading 125, 128, 134.2, and 400 kHz tags.

   c. Clean and disinfect:

      i. Flipper tags before use (e.g., to remove oil residue).

      ii. Flipper and PIT tag applicators, including the tag injector handle, between turtles.

      iii. The application site before the tag pierces the animal's skin.

5. *Flipper Tagging*

   a. Do not apply more than one tag per flipper for a total of no more than two flipper tags (includes existing flipper tags) per turtle.

   b. Researchers must clean the flipper tag application site and then scrub it with a medical disinfectant solution (e.g., Betadine, Chlorhexidine) followed by 70% percent alcohol before the applicator pierces the animal's skin.

   c. Do not flipper tag animals less than 20 cm straight carapace length (SCL), nuchal notch to pygal tip.

   d. For turtles 20-30 cm SCL, only use 1005 series tags or similar (~ 4.8 x 11.1 mm).

   e. For turtles >30 cm SCL, only use Standard 681 tags.

6. *PIT Tagging*

   a. Use a new, sterile needle for each PIT tag application.

   b. Clean the application site and then scrub it with two replicates of a medical disinfectant solution (e.g., Betadine, Chlorhexidine) followed by 70% alcohol (disinfectant/alcohol/disinfectant/alcohol) before the applicator pierces the animal's skin. Disinfect the injector handle between animals if it has been exposed to fluids from another animal.

7. *Marking the Carapace*

   a. Use non-toxic paints or markers that do not generate heat or contain xylene or toluene.

   b. Make markings easily legible using the least amount of paint or marker necessary to re-identify the animal.

f. <u>Biological Sampling</u>

1. *Blood Sampling*

   a. Only experienced personnel must directly take or supervise blood samples.

b. Use new disposable needles on each animal. Change needles immediately if they contact other surfaces or otherwise become contaminated or damaged.

c. Researchers must thoroughly swab blood collection sites with a medical disinfectant solution (e.g., Betadine, Chlorhexidine) followed by 70% alcohol before sampling. Researchers may use two (2) applications of alcohol if disinfectant solutions may affect intended analyses.

d. Do not attempt blood sampling if an animal cannot be adequately immobilized or conditions on the boat/holding platform preclude the safety and health of the turtle.

e. Researchers must limit attempts (needle insertions) to extract blood from the neck to a total of four, two on either side. Use an individual needle for only one or two attempts before replacing it.

f. You must follow best practices, including retracting the needle to the level of the subcutis prior to redirection to avoid lacerating vessels and causing other unnecessary soft tissue injury and immediately removing the needle if the animal begins to move.

g. Blood Volume Limits:

   i. *Sample volume:* Limit the amount of blood withdrawn to the minimal volume necessary to complete permitted activities. Researchers must not collect more than 3 ml per 1 kg of animal per sample.

   ii. *Sampling period:* Do not exceed the cumulative maximum safe limit described above from a single turtle within a 45-day period. If Researchers take more than 50% of the maximum safe limit in a single event or cumulatively from repeat sampling events from a single turtle within a 45-day period that turtle must not be re-sampled for 3 months from the last blood sampling event.

   iii. *Research coordination:* Researchers must, to the maximum extent practicable, attempt to determine if any of the turtles they blood sample may have been sampled within the past 3 months or will be sampled within the next 3 months by other researchers. The Permit Holder must make efforts to contact other researchers working in the area that could capture the same turtles to ensure that none of the above limits are exceeded.

iv. *Turtles weighing 1 kg or less:* A single sample must not exceed 6% of total blood volume. Total blood volume is estimated as 7% of total body weight. If Researchers plan to collect additional samples in less than 2 months on the same turtle, samples must not exceed 3 ml/kg of turtle.

2. *Tissue Sampling*

a. Use a new sterile biopsy punch, scalpel blade, or scissors on each turtle.

b. Turtles brought on-board the vessel for sampling:

i. Only tissue sample from the limbs, neck, carapace, or shoulder region as described in the application. Researchers must avoid sensitive areas.

ii. For small skin biopsy samples (6 mm diameter or smaller): Use aseptic techniques at all times. At a minimum, thoroughly swab the tissue surface with a medical disinfectant solution (e.g., Betadine, Chlorhexidine) followed by 70% alcohol before sampling. Researchers may use two applications of alcohol if disinfectants may interfere with analyses. Keep the procedure area and your hands clean.

c. If it can be easily determined (through markings, tag number, etc.) that a sea turtle has been recaptured and has been already sampled, Researchers may not sample turtles more than two times during the same permit year.

3. *Gastric Lavage*

a. Experienced personnel must directly perform or supervise lavage.

b. Discontinue washing within 3 minutes.

c. Once the samples have been collected, turn off the water and allow water and food to drain until all flow has stopped. Slightly elevate the posterior of the turtle to assist in drainage.

d. Researchers must thoroughly clean and disinfect equipment after each use.

e. Do not attempt to lavage compromised animals.

4. *Laparoscopy*

a. Do not attempt laparoscopy on compromised turtles.

b. An experienced veterinarian must perform or directly (in-person) oversee this procedure whenever possible. If a veterinarian cannot be present, emergency protocols must be developed by an experienced veterinarian for use by T. Todd Jones, Ph.D. and Camryn Allen, Ph.D.

c. Researchers must follow a veterinary-approved pain management protocol.

d. Researchers may only use sedation or anesthesia following a veterinary-approved protocol and when directly attended by a veterinarian.

g. <u>Transmitters and Instrument Attachments</u>

1. No more than three (3) transmitters/instruments may be placed on an animal at one time, no more than one of which may be a satellite tag. Leatherback sea turtles will receive no more than two (2) transmitters/instruments at one time, no more than one of which may be a pygal or medial ridge attachment and one may be a suction-cup tag.

2. *External Units (Time Depth Recorders, Acoustic or Satellite Tags)*

a. For telemetry devices, attachment material selection, and protocols, Researchers should first use best available, currently published methods, especially with regard to risk for thermal injury. Researchers should test (including monitoring temperature) products not previously used for animal attachment by mock application prior to use on sea turtles.

b. Always incorporate the following considerations into external tag selection and application:

    i. Minimize the frontal area (e.g., the anterior or leading side and edges) of the external tag and ensure it has a low profile.

    ii. Streamline the external tag attachment while covering as small of an area on the turtle as possible. Minimize the use of adhesives, base plates, and build up of adhesive material.

    iii. To the degree possible, avoid placing the external tag at the peak height of the carapace. Place tags slightly anterior or posterior to the peak where uplinks will be maintained and the saltwater switch will still be exposed to the air during breathing, but the frontal area is minimized.

    iv. Minimize the antenna length and diameter to reduce risk of entanglement and/or drag.

c. Researchers must minimize the risk of entanglement for each external attachment. The transmitter attachment must contain a weak link (where appropriate) or have no gap between the transmitter and the turtle that could result in entanglement.

d. For tethered instruments, the lanyard length must be less than half of the turtle's carapace length. It must include a corrosive, breakaway link that will release the unit after its battery life.

e. Provide adequate ventilation around the head of the turtle if attachment materials produce fumes. To prevent skin or eye contact with harmful chemicals, do not hold turtles in water during tag attachment.

f. For procedures that drill through marginal scutes of hard-shelled turtles, Researchers must follow aseptic techniques with two alternating applications of medical disinfectant (e.g., Betadine, Chlorhexidine) followed by 70% alcohol. Use a separate drill bit for each turtle. Bits may be reused if sterilized by autoclave or cold sterilization (e.g., gluteraldehyde) before reuse.

Researchers must use similar aseptic protocols for direct attachment of devices to leatherback turtles, with sterilized drill bits used for each turtle.

g. Crittercam: Place the camera attachment so that turtles are able to move freely without impairment.

h. Holding and Sedation/Anesthesia

1. Researchers must not exceed the following holding times for an animal from the time of capture to release:

   a. 1 hour for standard work-up (no transmitter attachments);

   b. 3 hours if receiving a transmitter attachment; or

   c. 36 hours for animals temporarily held in a facility.

2. For the transport, maintenance, and care of turtles temporarily held in a facility, follow the "Standard Permit Conditions for Care and Maintenance of Captive Sea Turtles" issued by the U.S. Fish and Wildlife Service (available at: https://www.fws.gov/northflorida/seaturtles/Captive_Forms/20130213_revised%20_standard_permit_conditions_for_captive_sea_turtles.pdf).

3. Researchers may only use sedation or anesthesia, such as for imaging, following a veterinary-approved protocol and when directly attended by a veterinarian.

i. Non-Target Species

1. *Bycatch*: Release all incidentally captured species (e.g., fishes and birds) alive as soon as possible.

2. If any listed non-target species are taken (captured, injured, etc.) during research, Researchers must stop activities per Condition A.2 and submit an incident report per Condition E.2. Document adverse interactions in the report, including any pertinent details of the interaction (gear type, what was done to handle and release the animals, location, date, size, water and air temperature, and photos if possible).

3. *Submerged Aquatic Vegetation (SAV; e.g., seagrass), Coral Communities, Hard and Live Bottom Habitat*

   a. Researchers must take all practicable steps including the use of charts, GIS, sonar, fish finders, or other electronic devices to determine characteristics and suitability of bottom habitat prior to using gear to identify SAV, coral communities, and live/hard bottom habitats and avoid setting gear in such areas.

   b. Do not set, anchor on, or pull gear across SAV, coral or hard/live bottom habitats.

   c. If research gear is lost, make diligent efforts to recover the lost gear to avoid further damage to benthic habitat and impacts related to “ghost fishing.”

   e. Seagrass species: Researchers must avoid setting and deploying gear over, on, or immediately adjacent to any seagrass species. If Researchers cannot avoid these species, Researchers must implement the following measures to reduce the potential for seagrass damage:

      i. Set anchors by hand when water visibility is acceptable, to reduce the potential for seagrass damage. Researchers must place anchors in unvegetated areas within seagrass meadows or areas having relatively sparse vegetation coverage. Remove anchors in a manner that would avoid the dragging of anchors and anchor chains.

      ii. Avoid damaging any seagrass species, and if the potential for anchor or net drag is evident, suspend research activities immediately.

      iii. Do not to tread or trample on seagrass and coral reef habitat.

4. *Humpback Whales in Hawaii:* If a humpback whale is observed in the area, Researchers and vessels must maintain a distance of at least 91.4 meters (100 yards) and aircraft must maintain a distance of at least 300 meters (1,000 feet).

5. *Hawaiian Monk Seals:* To minimize disturbance of Hawaiian monk seals:

   a. Consult with the NMFS Hawaiian Monk Seal Research Program and either the U.S. Fish and Wildlife Service (USFWS) at Midway or the State of Hawaii Department of Land and Natural Resources (DLNR) at Kure for approval of any land-based activities.

   b. Do not enter the water when monk seals are present, and if approached by a seal, leave the area.

   c. Report any opportunistic monk seal sightings to the NMFS Pacific Islands Fisheries Science Center, Hawaiian Monk Seal Research Program, NOAA IRC, 1845 WASP Blvd, Building 176, Honolulu, HI 96818, as follows:

      i. In the main Hawaiian Islands: Tracy Mercer; Tracy.Mercer@noaa.gov; phone (808) 725-5718; fax (808) 725-5567.

      ii. In the Northwestern Hawaiian Islands: Thea Johanos; Thea.Johanos-Kam@noaa.gov; phone (808) 725-5709; fax (808) 725-5567.

6. <u>Transfer of Sea Turtle Biological Samples</u>

   a. Samples may be sent to the Authorized Recipients (ARs) listed in Appendix 2 provided that:

      i. The analysis or curation is related to the research objectives of this permit.

      ii. A copy of this permit accompanies the samples during transport and remains on site during analysis or curation.

   b. Samples remain in the legal custody of the Permit Holder while in the possession of ARs.

   c. The Permit Holder may add ARs for analysis and curation of samples related to the permit objectives provided the letter designating the AR is submitted to the Chief, Permits Division specifying the following:

      i. Name and affiliation of the recipient;

      ii. Address of the recipient;

iii. Types of samples sent (species, tissue type); and

iv. Type of analysis or whether samples will be curated.

d. Samples cannot be bought or sold.

C. Qualifications, Responsibilities, and Designation of Personnel

1. At the discretion of the Permit Holder, the following Researchers may participate in the conduct of the permitted activities in accordance with their qualifications and the limitations specified herein:

   a. Principal Investigator – T. Todd Jones, Ph.D. –All research activities except UAS operation.

   b. Co-Investigator(s) – See Appendix 2 for list of names and corresponding activities.

   c. Research Assistants – personnel identified by the Permit Holder or Principal Investigator and qualified to act pursuant to Conditions C.2, C.3, and C.4 of this permit.

2. Individuals conducting permitted activities must possess qualifications commensurate with their roles and responsibilities. The roles and responsibilities of personnel operating under this permit are as follows:

   a. The Permit Holder is ultimately responsible for activities of individuals operating under the authority of this permit. The Responsible Party is the person at the institution/facility who is responsible for the supervision of the Principal Investigator.

   b. The Principal Investigator (PI) is the individual primarily responsible for the taking, import, export and related activities conducted under the permit. This includes coordination of field activities of all personnel working under the permit. The PI must be on site during activities conducted under this permit unless a Co-Investigator named in Condition C.1 is present to act in place of the PI.

   c. Co-Investigators (CIs) are individuals who are qualified to conduct activities authorized by the permit, for the objectives described in the application, without the on-site supervision of the PI. CIs assume the role and responsibility of the PI in the PI’s absence.

   d. Research Assistants (RAs) are individuals who 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.

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

   a. Individuals who perform a function directly supportive of and necessary to the permitted activity (including operation of vessels or aircraft essential to conduct of the activity);

   b. Individuals included as backup for those personnel essential to the conduct of the permitted activity; and

   c. Individuals included for training purposes.

4. Persons who require state or Federal licenses or authorizations (e.g., veterinarians, pilots – including UAS operators) to conduct activities under the permit must be duly licensed/authorized and follow all applicable requirements when undertaking such activities.

5. Permitted activities may be conducted aboard vessels or aircraft, or in cooperation with individuals or organizations, engaged in commercial activities, provided the commercial activities are not conducted simultaneously with the permitted activities.

6. The Permit Holder cannot require or receive direct or indirect compensation from a person approved to act as PI, CI, or RA under this permit in return for requesting such approval from the Permits Division.

7. The Permit Holder or PI may designate additional CIs without prior approval from the Chief, Permits Division provided:

   a. A copy of the letter designating the individual and specifying their duties under the permit is forwarded to the Permits Division by facsimile or email on the day of designation.

   b. The copy of the letter is accompanied by a summary of the individual's qualifications to conduct and supervise the permitted activities.

   c. The Permit Holder acknowledges that the designation is subject to review and revocation by the Chief, Permits Division.

7. The Responsible Party may request a change of PI by submitting a request to the Chief, Permits Division that includes a description of the individual's qualifications to conduct and oversee the activities authorized under this permit.

8. Submit requests to change the PI or CI designations by one of the following:

   a. The online system at https://apps.nmfs.noaa.gov;

   b. An email attachment to the permit analyst for this permit; or

c. A hard copy mailed or faxed to the Chief, Permits Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Room 13705, Silver Spring, MD 20910; phone (301)427-8401; fax (301)713-0376.

D. Possession of Permit

1. This permit cannot be transferred or assigned to any other person.

2. The Permit Holder and persons operating under the authority of this permit must possess a copy of this permit when:

   a. Engaged in a permitted activity.

   b. A protected species is in transit incidental to a permitted activity.

   c. A protected species taken under the permit is in the possession of such persons.

3. A duplicate copy of this permit must accompany or be attached to the container, package, enclosure, or other means of containment in which a protected species or protected species part is placed for purposes of storage, transit, supervision or care.

E. Reporting

1. The Permit Holder must submit incident, annual, and final reports containing the information and in the format specified by the Permits Division.

   a. Reports must be submitted to the Permits Division by one of the following:

      i. The online system at https://apps.nmfs.noaa.gov;

      ii. An email attachment to the permit analyst for this permit; or

      iii. A hard copy mailed or faxed to the Chief, Permits Division.

   b. You must contact your permit analyst for a reporting form if you do not submit reports through the online system.

   c. The report must provide data on disturbance rates of sea turtles specific to UAS operations, including: species, altitude and angle of approach, context of exposure (e.g., behavioral states), and observed behavioral responses to the UAS.

2. Incident Reporting

   a. If a serious injury or mortality occurs or authorized takes have been exceeded as specified in Condition A.2 the Permit Holder must:

      i. Contact the Permits Division by phone (301-427-8401) as soon as possible, but no later than 2 business days of the incident;

      ii. Submit a written report within 2 weeks of the incident as specified below; and

      iii. Receive approval from the Permits Division before resuming work. The Permits Division may grant authorization to resume permitted activities based on review of the incident report and in consideration of the Terms and Conditions of this permit.

   b. The incident report must include 1) a complete description of the events and 2) identification of steps that will be taken to reduce the potential for additional serious injury and research-related mortality or exceeding authorized take.

3. Annual reports describing activities conducted during the previous permit year (from October 1 to September 30 of the following year) must:

   a. be submitted by October 31 each year for which the permit is valid, and

   b. include a tabular accounting of takes and a narrative description of activities and their effects.

4. A combined annual/final report summarizing activities over the life of the permit must be submitted by October 31, 2027, or, if the research concludes prior to permit expiration, within 30 days of completion of the research.

5. Research results must be published or otherwise made available to the scientific community in a reasonable period of time. Copies of technical reports, conference abstracts, papers, or publications resulting from permitted research must be submitted to the Permits Division.

F. <u>Notification and Coordination</u>

1. NMFS Regional Offices are responsible for ensuring coordination of the timing and location of all research activities in their areas to minimize unnecessary duplication, harassment, or other adverse impacts from multiple researchers.

2. The Permit Holder must ensure written notification of planned field work for each project is provided to the NMFS Regional Office listed below at least two weeks prior to initiation of each field trip/season.

   a. Notification must include:

      i. Locations of the intended field study and/or survey routes;

      ii. Estimated dates of activities; and

      iii. Number and roles of participants (for example: PI, CI, veterinarian, boat driver, Research Assistant "in training").

   b. Notification must be sent to the following Assistant Regional Administrator for Protected Resources:

      Pacific Islands Region, NMFS, 1845 Wasp Blvd., Building 176, Honolulu, HI 96818; phone (808)725-5000; fax (808)973-2941
      Email *(preferred)*: nmfs.pir.research.notification@noaa.gov.

3. Researchers must coordinate their activities with other permitted researchers to avoid unnecessary disturbance of animals or duplication of efforts. Contact the Regional Office listed above for information about coordinating with other Permit Holders.

G. Observers and Inspections

1. NMFS may review activities conducted under this permit. At the request of NMFS, the Permit Holder must cooperate with any such review by:

   a. Allowing an employee of NOAA or other person designated by the Director, NMFS Office of Protected Resources to observe and document permitted activities; and

   b. Providing all documents or other information relating to the permitted activities.

H. Modification, Suspension, and Revocation

1. 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.

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

a. In order to make the permit consistent with a change made after the date of permit issuance with respect to applicable regulations prescribed under Section 4 of the ESA;

b. In a case in which a violation of the terms and conditions of the permit is found;

c. In response to a written request[6] from the Permit Holder;

d. If NMFS determines that the application or other information pertaining to the permitted activities (including, but not limited to, reports pursuant to Section E of this permit and information provided to NOAA personnel pursuant to Section G of this permit) includes false information; and

e. 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.

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

I. Penalties and Permit Sanctions

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

2. The NMFS Office of Protected Resources shall be the sole arbiter of whether a given activity is within the scope and bounds of the authorization granted in this permit.

a. The Permit Holder must contact the Permits Division for verification before conducting the activity if they are unsure whether an activity is within the scope of the permit.

b. Failure to verify, where the NMFS Office of Protected Resources subsequently determines that an activity was outside the scope of the permit, may be used as evidence of a violation of the permit, the ESA, and applicable regulations in any enforcement actions.

[6] The Permit Holder may request changes to the permit related to: the objectives or purposes of the permitted activities; the species or number of animals taken; and the location, time, or manner of taking or importing protected species. Such requests must be submitted in writing to the Permits Division in the format specified in the application instructions.

J. Acceptance of Permit

1. In signing this permit, the Permit Holder:

   a. Agrees to abide by all terms and conditions set forth in the permit, all restrictions and relevant regulations under 50 CFR Parts 222-226, and all restrictions and requirements under the ESA;

   b. Acknowledges that the authority to conduct certain activities specified in the permit is conditional and subject to authorization by the Office Director; and

   c. Acknowledges that this permit does not relieve the Permit Holder of the responsibility to obtain any other permits, or comply with any other Federal, State, local, or international laws or regulations.

Donna S Wieting

Donna S. Wieting
Director, Office of Protected Resources
National Marine Fisheries Service

FEB 2 8 2018
Date Issued

Charles Littnan, Ph.D.
Science Center Director, NMFS PIFSC
Responsible Party

3/12/18
Date Effective

FILE COPY

Appendix 1: Table Specifying the Kinds of Protected Species, Locations, and Manner of Taking

Table 1. Authorized Annual Takes of Adult, Subadult, and Juvenile Sea Turtles in the Pacific Islands Region (e.g., Hawaii, American Samoa, Guam, Commonwealth of the Northern Mariana Islands, Pacific Remote Islands Areas [Midway Atoll, Johnston Atoll, Palmyra Atoll, Kingman Reef, Howland Island, Baker Island, Jarvis Island, and Wake Island], and U.S. Exclusive Economic Zone). Distinct Population Segments (DPS) are noted in the table.

Species	Listing DPS Unit	No. Animals per Year	Takes Per Animal	Take Action	Collect Method	Procedure	Details
Turtle, green sea	Central North Pacific, Central South Pacific, Central West Pacific, East Pacific, East Indian-West Pacific, Southwest Pacific (NMFS Threatened and Endangered)	200	1	Harass	Survey, aerial	Count/survey; Photograph/Video; Remote vehicle, aerial (VTOL or fixed wing)	May use fixed wing or rotary systems but not together during a single survey event

Species	Listing DPS Unit	No. Animals per Year	Takes Per Animal	Take Action	Collect Method	Procedure	Details
Turtle, green sea	Central North Pacific, Central South Pacific, Central West Pacific, East Pacific, East Indian-West Pacific, Southwest Pacific (NMFS Threatened and Endangered)	250	2	Capture/Handle/Release	Hand and/or Dip Net	Instrument, epoxy attachment (e.g., satellite tag, VHF tag); Laparoscopy; Lavage, gastric; Mark, shell (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, voided fecal; Sample, oral swab; Sample, scute scraping; Sample, tissue; Sample, tumor, Transport; Ultrasound; Weigh	Capture: tangle encircle, or dip net, hand; Other: 1) Oral exam; 2) Sample, voided urine; 3) inject, oxytetracycline. Laparoscopy or lavage - subset of animals but not both methods on an individual at one time. No more than 3 tags per turtle.
Turtle, hawksbill sea	Range-wide (NMFS Endangered)	50	1	Harass	Survey, aerial	Count/survey; Photograph/Video; Remote vehicle, aerial (VTOL or fixed wing)	May use fixed wing or rotary systems but not together during a single survey event.

Species	Listing DPS Unit	No. Animals per Year	Takes Per Animal	Take Action	Collect Method	Procedure	Details
Turtle, hawksbill sea	Range-wide (NMFS Endangered)	150	2	Capture/Handle/Release	Hand and/or Dip Net	Instrument, epoxy attachment (e.g., satellite tag, VHF tag); Laparoscopy; Lavage, gastric; Mark, shell (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, voided fecal; Sample, oral swab; Sample, scute scraping; Sample, tissue; Sample, tumor, Transport; Ultrasound; Weigh	Capture: tangle encircle, or dip net, hand; Other: 1) Oral exam; 2) Sample, voided urine; 3) inject, oxytetracycline. Laparoscopy or lavage - subset of animals but not both methods on an individual at one time. No more than 3 tags per turtle.
Turtle, olive ridley sea	Range-wide (NMFS Threatened)	20	1	Harass	Survey, aerial	Count/survey; Photograph/Video; Remote vehicle, aerial (VTOL or fixed wing)	May use fixed wing or rotary systems but not together during a single survey event.

Species	Listing DPS Unit	No. Animals per Year	Takes Per Animal	Take Action	Collect Method	Procedure	Details
Turtle, olive ridley sea	Range-wide (NMFS Threatened)	100	2	Capture/Handle/Release	Hand and/or Dip Net	Instrument, epoxy attachment (e.g., satellite tag, VHF tag); Laparoscopy; Lavage, gastric; Mark, shell (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, voided fecal; Sample, oral swab; Sample, scute scraping; Sample, tissue; Sample, tumor; Transport; Ultrasound; Weigh	Capture: tangle encircle, or dip net, hand; Other: 1) Oral exam. 2) Sample, voided urine; 3) inject, oxytetracycline. Laparoscopy or lavage - subset of animals but not both methods on an individual at one time. No more than 3 tags per turtle.
Turtle, loggerhead sea	North Pacific (NMFS Endangered)	20	1	Harass	Survey, aerial	Count/survey; Photograph/Video; Remote vehicle, aerial (VTOL or fixed wing)	May use fixed wing or rotary systems but not together during a single survey event

Species	Listing DPS Unit	No. Animals per Year	Takes Per Animal	Take Action	Collect Method	Procedure	Details
Turtle, loggerhead sea	North Pacific (NMFS Endangered)	100	2	Capture/Handle/Release	Hand and/or Dip Net	Instrument, epoxy attachment (e.g., satellite tag, VHF tag); Laparoscopy; Lavage, gastric; Mark, shell (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, oral swab; Sample, scute scraping; Sample, tissue; Sample, tumor; Transport; Ultrasound; Weigh	Capture: tangle encircle, or dip net, hand; Other: (1) Oral exam, (2) Sample, voided urine (3) inject, oxyteracycline. Laparoscopy or lavage - subset of animals but not both methods on an individual at one time. No more than 3 tags per turtle.
Turtle, leatherback sea	Range-wide (NMFS Endangered)	20	1	Harass	Survey, aerial	Count/survey; Photograph/Video; Remote vehicle, aerial (VTOL)	May use fixed wing or rotary systems but not together during a single survey event.

Species	Listing DPS Unit	No. Animals per Year	Takes Per Animal	Take Action	Collect Method	Procedure	Details
Turtle, leatherback sea	Range-wide (NMFS Endangered)	100	2	Capture/Handle/Release	Net, breakaway hoop net	Instrument, drill carapace attachment; Instrument, suction-cup attachment (e.g., camera); Mark, flipper tag; Mark, PIT tag; Measure; Other; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, voided fecal; Sample, oral swab; Sample, tissue; Sample, tumor; Ultrasound; Weigh	Other: 1) Oral exam, 2) Sample, voided urine 3) inject, oxytetracycline; 4) instrument, pygal or medial ridge attachment but not both on one individual. No more than 2 tags per turtle, one of which may be a suction cup tag.

Appendix 2: NMFS-Approved Personnel and Authorized Recipients for Permit No. 21260.

The following individuals are approved to act as Co-Investigators pursuant to the terms and conditions under Section C (Qualifications, Responsibilities, and Designation of Personnel) of this permit.

Name of Co-Investigator	Activities
Camryn Allen, Ph.D.	All research activities *except* capture by breakaway hoop net, lavage, instrument attachment (drill carapace), operate UAS
Michelle Barbieri, D.V.M.	All research activities *except* capture, tag attachment, and operate UAS
Sallie Beavers	Capture by hand and dip net, instrument attachment (epoxy), lavage, tag (flipper and PIT), sample blood, mark shell (temporarily), oral exam/swab, morphometrics
Shandell Brunson	Capture by hand and dip net, collect tumors, instrument attachment (epoxy), tag (flipper and PIT), mark shell (temporarily), sample blood, scute, and tissue, oral exam/swab, morphometrics
Tommy Cutt	Capture by hand and dip net, mark shell (temporarily), tag (flipper and PIT), sample blood and tissue, morphometrics
Rory Driskell	Operate UAS
Alexander Gaos, Ph.D.	All research activities *except* capture by breakaway hoop net, ultrasound, laparoscopy, operate UAS
Laura Jim	Capture by hand, dip and tangle nets, instrument attachment (epoxy), tag (flipper and PIT), mark shell (temporarily), oral exam/swab, morphometrics
Mark MacDonald	Instrument attachment (epoxy), tag (flipper and PIT), mark carapace (temporarily), sample tissue, morphometrics
Summer Martin, Ph.D.	All research activities *except* capture by breakaway hoop net, instrument attachment (drill carapace), lavage, ultrasound, laparoscopy, operate UAS
Shawn Murakawa	All research activities *except* capture by breakaway hoop net, instrument attachment (drill), plastron marking only, laparoscopy, operate UAS

Name of Co-Investigator	Activities
Marc Rice	All research activities *except* capture by breakaway hoop net, instrument attachment (drill carapace), plastron marking only, ultrasound, laparoscopy, operate UAS
Jennifer Sims	Capture by hand and dip, encircle, and tangle nets, tag (flipper, PIT), mark shell (temporarily), oral exam/swab, morphometrics
Thierry Work, D.V.M.	All research activities *except* tag attachment, laparoscopy, and operate UAS

Biological samples authorized for collection or acquisition in Table 1 of Appendix 1 may be transferred to the following Authorized Recipients for the specified disposition, consistent with Condition B.6 of the permit:

Authorized Recipient	Sample Type	Disposition
Dr. Peter Dutton National Marine Mammal and Sea Turtle Research NMFS Southwest Fisheries Science Center La Jolla, CA	Tissue and blood	Analysis and curation of remaining samples
Dr. Jeffrey Seminoff National Marine Mammal and Sea Turtle Research NMFS Southwest Fisheries Science Center La Jolla, CA	Tissue and blood	Analysis and curation of remaining samples
Dr. Thierry Work, DVM USGS National Wildlife Health Center Hawaii Field Station Honolulu, HI	Tissue	Analysis
Dr. Jennifer Lynch National Institute of Standards and Technology Hollings Marine Laboratory Charleston, SC	Tissue and blood	Analysis
Bishop Museum Honolulu, HI	Tissue	Analysis, curation of samples, and bone cleaning via beetle box

Attachment 1: Procedures for handling and monitoring leatherback sea turtles during capture-related work (revised 10/26/2017).

The following provisions are for handling juvenile and adult leatherback turtles. These requirements incorporate recommendations made by a panel of veterinarians and biologists with experience capturing leatherbacks in the Pacific, Atlantic, and Gulf of Mexico.

Personnel requirements

To effectively monitor leatherback turtles during capture and handling, researchers must have a designated medical observer on each capture outing team. Whenever possible, this observer should be an experienced[7] veterinarian. If a veterinarian is not in attendance, one must be reachable by cellular or satellite phone or radio (as appropriate) in case of emergency. A veterinarian is required to be on board if invasive procedures[8] are to be performed or if the capture interval will be longer than 1 hour.[9] For any captures, at least one individual must have the dedicated role of monitoring vital rates, behavior, and ensuring temperature control. This individual should not have any other duties that limit their attentiveness to these responsibilities. Moreover, monitoring and delegation of responsibilities should be coordinated such that the period of restraint is as brief as required to accomplish research objectives.

The chief scientist for each outing must be trained by a veterinarian in the following information and procedures:

- Acceptable parameters for responsiveness, respiration rate, heart rate, and temperature.
- Recognition and appropriate response to situations that suggest cessation of animal handling/procedures, and initiation of release.
- Safe water reintroduction and monitoring of a turtle in possible distress.

Capture, boarding, handling time, monitoring, emergency intervention

The number of attempts to capture an individual leatherback sea turtle is limited to 5 per 24-hour period. If researchers are unsuccessful after the first 3 attempts, they must wait a minimum of 4 hours before making the final 2 attempts to capture that individual on the day. Unless otherwise stipulated in the permit, only turtles observed to be normal (e.g., normal swimming and diving behavior) and with no evidence of external traumatic wounds or other abnormalities may be approached. **Any animal deemed to be in distress at any time during the pre-capture period must be avoided.**

Upon capture, and unless otherwise stipulated in the permit, the turtle should be immediately released if it is found to have any previously unapparent traumatic injuries, abnormal behavior, or other abnormalities that are deemed by the chief scientist or medical observer to create an

[7] "Experienced" refers to a documented history of working with sea turtles under conditions requiring proficiency in emergency procedures and resuscitation.
[8] "Invasive" includes biopsy or other procedures that involve incision into or penetration of tissues deeper than the dermis (e.g., fat biopsy), excluding phlebotomy, PIT tag implantation, and attachment of other tags/devices.
[9] The 1-hour time duration starts as soon as the leatherback is caught in the net.

additional risk of complication.

A captive duration of one hour or less is preferred. The following parameters are monitored during the capture period. Additional parameters may be added at the discretion of the Principal Investigator (PI), Co-investigator (CI), or attending veterinarian. A "fill-in-the-blank" observation sheet is used and must be retained as part of each animal's permanent capture record.

Parameter	Frequency
Responsiveness/activity level	Throughout
Respiration rate	Upon capture, every 20 minutes
Heart rate*(by Doppler, ultrasound, or ECG))	Upon capture, every 20 minutes
Body temperature	Upon capture, every 20 minutes
Point-of-care analyzer* (for blood gases, electrolytes, glucose)	Upon capture, every 30 minutes

*Recommended if feasible, especially for capture intervals exceeding 1 hr, with initial blood sample taken as soon as possible after the turtle is boarded to facilitate comparison with later samples.

Below are general guidelines regarding alteration of these parameters that should trigger immediate assessment by the medical observer and PI or CI. Note that blood values are only intended for interpretation by an attending veterinarian:

Parameter	Trigger threshold
Responsiveness	Reduction in response to procedures or noxious stimuli
Respiration rate	Apnea for periods >2 min.
Heart rate	<20 bpm
Blood pH	<7.2 (temperature corrected)
Potassium	>6.8 mmol/l
Glucose	<60 mg/dl
Body temperature	Alteration of initial body temperature by >2˚F or 1˚C (or if temp exceeds 86˚F/30˚C)

The attending veterinarian should be prepared to render aid and resuscitation in the event of an emergency. If a veterinarian is not in attendance, members of the capture team must be trained by a veterinarian in basic resuscitation procedures, which may include endotracheal intubation, ventilatory support, and epinephrine administration.[10] The level of training and expected level of intervention is determined by the designated project veterinarian based on the ability/aptitude of the capture team. Such intervention should follow a previously developed response plan that includes remote consultation with a veterinarian by phone and a written contingency protocol if communication is not possible. An emergency field kit should include:

- Means of ventilatory support (e.g., demand breathing valve, 2 L Ambu bag, oxygen cylinder)
- Endotracheal tubes (non-cuffed 10, 12, 14, and 16; other sizes as appropriate)
- Oral speculum and appropriate sized blade
- Water-based lubricant
- Disinfectants (e.g., betadine scrub, isopropyl alcohol)
- Sterile gauze
- Medical tape

[10] Medical intervention must be compliant with pertinent veterinary practice regulations for the state in which captures are being conducted.

- Needles and syringes (size appropriate)
- Epinephrine*

  *Additional medications (e.g., doxapram, lidocaine, sodium bicarbonate, furosemide, dexamethasone sodium phosphate, fluids) and equipment may be included at the discretion of the attending veterinarian.

Attachment 2: Requirements for Handling and Sampling Sea Turtles

Conditions have been included in the permit for research procedures that involve the handling and sampling of sea turtles. These conditions include requirements provided by a suite of expert veterinarians to minimize and mitigate potential impacts to the study animals. This information is being provided to help understand the permit requirements and standard veterinary protocols for sea turtles.

I. Permit requirements for antiseptic practices and research techniques

Measures required to minimize risk of infection and cross-contamination between individuals generally fall under the categories of clean, aseptic, and sterile techniques. Clean technique applies to noninvasive procedures that result in contact with skin or mucous membranes. Aseptic technique is used for brief, invasive procedures that result in any degree of internal contact, e.g. drawing blood. Sterile technique applies to longer invasive procedures, such as laparoscopy or surgery. Reusable instruments for procedures requiring aseptic or sterile technique should be sterilized by standard autoclave or cold sterilization procedures. Instruments that do not have internal contact, e.g. tagging pliers and PIT tag applicators, should be disinfected using a broadcidal solution and the product-recommended contact time between individuals.

Clean technique:

1. Routine hand washing or use of non-sterile disposable gloves.
2. Cleaning and disinfection of equipment between individuals.

Aseptic technique:

1. Disinfection of hands or use of new non-sterile disposable gloves (preferred)
2. Disinfection of the turtle's skin using a surgical scrub (e.g. betadine scrub or chlorhexidine gluconate)† followed by application of 70% alcohol (isopropyl or ethanol) (minimum requirement).*
3. Clean work area.
4. Use of sterile instruments or new disposable items (e.g. needles and punch biopsies) between individuals.

† Alcohol alone may be used in lieu of surgical scrub if necessary to avoid interference with research objectives, e.g. isotopic analysis.

* Multiple applications and scrubbing should be used to achieve thorough cleansing of the procedure site as necessary. A minimum of two alternating applications of surgical scrub and alcohol are to be used for PIT tag application sites and drilling into the carapace, due to potential increased risk of infection.

Sterile technique:

1. To be conducted in accordance with approved veterinary protocol that considers analgesia/anesthesia, use of antimicrobials, anticipated risks and response measures, and exclusionary criteria for animal candidacy.

2. Direct veterinary attendance
3. Disinfection of hands and use of sterile disposable gloves
4. Dedicated site (surgery room) or work area modified to reduce contamination
5. Surgical preparation of skin
6. Sterile instruments

Research Procedure	**Required Technique**
Handling, gastric lavage, and cloacal lavage	Clean technique
Tissue sampling (biopsy punch or comparable)	Aseptic technique
Blood sampling	Aseptic technique
PIT tagging	Aseptic technique; 2 applications of surgical scrub and alcohol
Flipper tagging	Aseptic technique
Carapace drilling for instrument attachment or bone biopsy	Aseptic technique; 2 applications of surgical scrub and alcohol
Bone biopsy (other than carapace)	Sterile
Laparoscopy (+/- biopsy)	Sterile
Large skin, muscle, fat biopsy, other tissue biopsy	Sterile

II. <u>Minimum requirements for pain management and field techniques</u>

Procedures used for sea turtle research include those anticipated to cause short term pain or distress, such as tagging, as well more invasive procedures where relatively longer periods of pain or discomfort may result. The minimum requirements below consider animal welfare and relative benefits and risks of different modes of pain management under field and laboratory conditions. Additional measures are encouraged whenever possible, including sedation or anesthesia for invasive procedures, e.g. laparoscopy, when release does not immediately follow the procedure and full recovery can be assessed. Any protocols that do not include the minimum requirements below, e.g., omission of a systemic analgesic, must be approved by a consulting veterinarian with due consideration of pain management.

Research Procedure	Minimum Requirement
Tissue sampling (biopsy punch or comparable)	None
Blood sampling	None
PIT tagging	Local anesthetic if <30 cm SCL
Flipper tagging	None
Carapace drilling for instrument attachment or bone biopsy	Systemic analgesic
Bone biopsy (other than carapace)	Local anesthetic and systemic analgesic
Laparoscopy	Local anesthetic and systemic analgesic
Laparoscopy biopsy	Local anesthetic, sedation, and systemic analgesic
Large skin, muscle, fat biopsy, other tissue biopsy	Local anesthetic and systemic analgesic

Attachment 3. NOAA Office of National Marine Sanctuaries (ONMS) Sanctuary and Monument Permit Contact Information

Site	Mailing Address	Contact Numbers	Permit Contact(s)
Hawaiʻian Islands Humpback Whale National Marine Sanctuary	Hawaiʻian Islands Humpback Whale National Marine Sanctuary 6600 Kalaniana'ole Highway, Suite 301 Honolulu, HI 96825	wk 808-397-2651 x 251 fax 808-397-2650	Malia Chow Malia.Chow@noaa.gov
National Marine Sanctuary of American Samoa	National Marine Sanctuary of American Samoa P.O. Box 4318 Pago Pago, AS 96799	wk 684-633-6500 x 226 cell 684-252-9786 fax 684-633-7355	Joseph Paulin Joseph.Paulin@noaa.gov
Papahānaumokuākea Marine National Monument	Papahānaumokuākea Marine National Monument NOAA/IRC NOS/ONMS/PMNM 1845 Wasp Boulevard, Building 176 Honolulu, HI 96818	wk 808-725-5805 fax 808-455-3093 wk 808-725-5831 fax 808-455-3093 wk 808-725-5823 fax 808-455-3093	Tia Brown Tia.Brown@noaa.gov Justin Rivera Justin.Rivera@noaa.gov Pua Borges-Smith (Alternate contact) Pua.Borges-Smith@noaa.gov

Appendix 2

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

FEB 2 6 2018

MEMORANDUM FOR: The Record

FROM: F/PR1 – Jolie Harrison
Chief, Permits and Conservation Division

SUBJECT: Categorical Exclusion for the Issuance of Scientific Research Permit No. 21260

NOAA Administrative Order (NAO) 216-6A requires all proposed projects to be reviewed with respect to environmental consequences on the human environment. This memorandum addresses the determination that the issuance of a scientific research permit qualifies to be categorically excluded from further National Environmental Policy Act (NEPA) review.

Proposed Federal Action

The National Marine Fisheries Service (NMFS) proposes to issue a scientific research permit under Section 10(a)(1)(A) of the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq*.).

Description of Applicant's Scientific Research

1. The permit applicant is the NMFS Pacific Islands Fisheries Science Center (PIFSC) [Responsible Party: Charles Littnan, Ph.D.].

2. The permit will be valid through September 30, 2027.

3. Target species and stocks: Threatened and endangered green (*Chelonia mydas*) (Central North Pacific, Central West Pacific, East Pacific, East Indian-West Pacific, and Southwest Pacific Distinct Population Segments (DPS)), hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*) (North Pacific DPS), and olive ridley (*Lepidochelys olivacea*) sea turtles.

4. Location: Pacific Islands Region (e.g., Hawaii, American Samoa, Guam, Commonwealth of the Northern Mariana Islands, Pacific Remote Island Areas, and inclusive Exclusive Economic Zone).

5. Duration: Research will occur year-round. Depending on the location, sampling may occur monthly or during two-week sampling trips from May – October.

6. Objectives: The objective of the research is to continue long-term monitoring of sea turtles in the Pacific Islands Region to understand population status, abundance, and trends; age at maturity; growth rates; and foraging and movement ecology of sea turtles.

7. Methods: Sea turtles would be captured by hand, dip, encircle, breakaway hoop or tangle net for morphometric data, tagging (flipper and passive integrated transponder), biological sampling, and instrument attachment (acoustic, satellite, and/or archival; epoxy, drill carapace, or suction-up attachments) prior to release. Up to three (3) tags would be attached to hardshell turtles and up to two (2) tags would be attached to leatherback sea turtles.

Applicable Categorical Exclusion

Based on the information presented in this document and the application, the issuance of a scientific research permit (SRP) to the NMFS PIFSC for the taking of sea turtles is consistent with activities identified in categorical exclusion (CE) B1and there are no extraordinary circumstances with the potential for significant environmental effects that would preclude the issuance of this SRP from being categorically excluded. The following summarizes the relevant factors supporting a CE determination for this action.

Determination Summary

In determining whether a CE is appropriate for a given permit, NMFS considers the applicant's specified activity (applicant's action) and the potential extent and magnitude of "takes," including shifts at the population or species level, along with the extraordinary circumstances listed in the Companion Manual for the NAO 216-6A. The evaluation of whether extraordinary circumstances (if present) have the potential for significant environmental effects is limited to the decision NMFS is responsible for, which is issuance of an SRP (NMFS' action). While there may be environmental effects associated with the underlying action, potential effects of NMFS' action are limited to those that would occur due to the authorization of "take" of animals[1]. NMFS prepared numerous Environmental Assessments (EAs) analyzing the environmental impacts of the categories of activities encompassed by CE B1 which resulted in Findings of No Significant Impacts. These EAs demonstrate the issuance of a given permit does not affect other aspects of the human environment because the action only affects animals that are the subject of the permit. These EAs also addressed factors in 40 CFR 1508.27 regarding the potential for significant impacts and demonstrate the issuance of permits for the categories of activities encompassed by CE B1 do not individually or cumulatively have a significant effect on the human environment. For these reasons, only circumstances which are present and relevant to the issuance of this SRP permit are evaluated here.

1. Extent and Magnitude of Directed Take

The issuance of this SRP authorizes take of five sea turtle species. The proposed research activities are expected to result in short-term (recoverable) adverse effects on the individual animals targeted by the proposed research and will not result in any changes to the human environment or the target species or stock. The proposed research includes capture of up to 250

[1] In some cases, animals not intended as part of the proposed scientific research activities for which "take" will be authorized may have the potential to be present in a given research area. Therefore, NMFS considers target and non-target species or stocks and assesses potential effects associated with the scientific research for both target and non-target species or stocks.

green, 150 hawksbill, 100 loggerhead, 100 leatherback, and 100 olive ridley sea turtles by hand or dip, encircle, breakway hoop, or tangle nets. Each turtle would be subject to epibiota removal, flipper and passive integrated transponder tagging, temporary carapace marking, morphometric measurements, photograph/video, opportunistic recapture, fecal collection, ultrasound, instrument attachment (up to 3 tags (hardshell); up to 2 tags (leatherback turtles)), and blood and tissue sampling. A subset of sea turtles would also be gastric lavaged or laparoscopied. Sampling and marking activities that involve piercing the skin would result in minor injury at the wound site with wounds healing in days to weeks of the event. Such sampling activities may potentially serve as a point of infection. The risk to non-target protected species is minimized by conducting in-water surveys before deployment of tangle nets, and if non-target protected species are in the vicinity, nets will not be deployed. After nets are deployed, standard monitoring is followed to reduce by-catch. No mortality is being authorized under this permit. In addition, the mitigation measures required by this permit are designed to minimize the potential for adverse impacts to the target species, including unintended consequences, such as mortality or serious injury to the individual animals. Therefore, authorizing take is not expected to have adverse impacts to the populations or species that are the subject of this permit.

The proposed research will take place in the Pacific Island Region ranging from offshore waters in the U.S. Exclusive Economic Zone to coastal waters. The study area includes or is near State and National Parks or wilderness areas, and wildlife refuges. Research would possibly occur in properties listed or eligible for listing on the National Register Historic Places or National Historic Landmarks. The applicant would obtain the required permits to work within these areas. As a NOAA Science Center, the applicant works closely with the National Marine Sanctuaries and Monuments office to obtain all require permits to conduct research. The study area overlaps with critical habitat for endangered Hawaiian monk seals (*Neomonachus schauinslandi*). However, sea turtle research activities are only expected to impact the sea turtle species that are the subject of the permit. The action does not involve the consumptive use of any resources. We expect no adverse impacts to any of the specific primary constituent elements of designated critical habitat areas, since the activities are focused on the target animals. In addition, permit conditions include mitigation measures for how to avoid or minimize impacts to animals and habitat.

Interactions with other protected species in these areas, such as listed[2] marine mammals and fish are not expected because the permit includes mitigation measures to avoid or minimize effects to all protected species that may occur in the study area. For example, this permit requires the applicant to avoid interactions with all other protected species and if other species are encountered, to follow the NMFS Regional marine wildlife viewing guidelines (http://www.nmfs.noaa.gov/pr/education/viewing.htm). Likewise, no effects to animals or habitats protected by the Magnuson-Stevens Conservation and Fisheries Management Act or the Migratory Bird Treaty Act are expected since the research is focused on sea turtles that are the subject of the permit.

Finally, the applicant is required to submit annual reports in which they must provide an accounting of the numbers of animals taken and NMFS tracks take numbers via the Authorizations and Permits for Protected Species database. Therefore, NMFS can modify this

[2] Species listed as threatened or endangered under the Endangered Species Act

permit if there is reason to believe the research is having or has the potential to have an adverse effect on the species or stock.

A summary of the status of the sea turtle populations is listed below and additional information can be found in the status reviews and recovery plans which are available at: http://www.nmfs.noaa.gov/pr/species/turtles/index.htm.

Table 1. Status of Affected Sea Turtles

Common Name	DPS	ESA Status	Minimum Abundance or No. Nesting Females
Green sea turtles	Central North Pacific	Threatened	3,846 nesting females
	Central West Pacific	Endangered	6,518 nesting females
	Central South Pacific	Endangered	2,677 nesting females
	East Pacific	Threatened	20,062 nesting females
	East Indian-West Pacific	Threatened	>77,009 nesting females
	Southwest Pacific	Threatened	83,058 nesting females
Hawksbill sea turtles	Rangewide	Endangered	10,194 – 12,770 nesting females (Pacific Ocean)
Leatherback sea turtles	Rangewide	Endangered	562 nesting females (West Pacific subpopulation)
Loggerhead sea turtles	North Pacific	Endangered	43,320 turtles
Olive Ridley sea turtles	Rangewide	Threatened	1.39 million adults

2. Other Relevant Factors

The issuance of this SRP will not result in highly controversial environmental effects or result in environmental effects that are uncertain, unique or unknown because SRPs have been issued for similar research activities in the same location, for the same species using methods and procedures that employ generally accepted research standards and best management practices that have been tested, verified and approved. In addition, the type of proposed research for sea turtles is well-understood and documented; prior analysis demonstrates issuance of a scientific research permit only affects the animals that are the subject of the permit.

The issuance of this SRP will not establish a precedent for future actions or represent a decision in principle about future actions with potentially significant environmental effects because NMFS' actions under ESA Section 10(a)(1)(A) are considered individually and is based on the best available scientific information, which is continuously evolving. Therefore, issuance of an SRP to a specific individual or organization for a given activity does not guarantee or imply NMFS will authorize others to conduct similar activities. Subsequent requests for permits are evaluated upon their own merits relative to the criteria established in the ESA and its implementing regulations (50 CFR Part 222) on a case-by-case basis.

NMFS' compliance with environmental laws and regulations and Executive Orders (EOs) is based on NMFS' proposed action and the nature the applicant's proposed research activities. Therefore, the Permits and Conservation Division consulted under Section 7 of the ESA to determine if the issuance of this scientific research permit would likely jeopardize the continued existence of listed species or result in an adverse modification of critical habitat. In 2017, the Permits and Conservation Division consulted programmatically on it sea turtle permitting program with the NMFS ESA Interagency Cooperation Division. The resulting Programmatic Biological Opinion (BO; NMFS 2017) determined that issuance of permits for sea turtle research is not likely to jeopardize the continued existence of NMFS ESA-listed species or to results in the destruction or adverse modification of designated critical habitat. After reviewing the request, the Permits and Conservation Division determined that the proposed research falls within the scope of the Programmatic BO. It is the applicant's responsibility to secure the necessary Federal Aviation Administration permits to fly UAS, Institutional Animal Care and Use Committee approvals, National Park special use permits, and permits to operate within or near National Marine Sanctuaries. There are no other environmental laws, regulations, EOs, consultations, federal permits or licenses applicable to NMFS for issuance of this SRP to the NMFS PIFSC.

Reference

NMFS. 2017. Biological and Conference Opinion on the Proposed Implementation of a Program for the Issuance of Permits for Research and Enhancement Activities on Threatened and Endangered Sea Turtles Pursuant to Section 10(a) of the Endangered Species Act. Silver Spring, MD.

Appendix 3

United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 NE 11th Avenue
Portland, Oregon 97232-4181

In Reply Refer to:
FWS/IR09/IR12/AES/Recovery Permits

Dear Permittee:

Enclosed is your U.S. Fish and Wildlife Service recovery permit issued under section 10(a)(1)(A) of the Endangered Species Act (ESA), 16 U.S.C. 1531 *et seq*., and its implementing regulations.

Please refer to the permit number in all correspondence and reports concerning permit activities. Engagement in any activity pursuant to this permit constitutes understanding and acceptance of the Special Terms and Conditions attached to your permit.

By accepting this permit and conducting activities authorized by it, you are agreeing to adhere to the attached Special Terms and Conditions. Failure to comply with the permit Special Terms and Conditions could result in ESA section 9 take violations, or suspension/revocation of this permit.

Please be aware that some species named in your recovery permit may also be listed under various State Endangered Species Acts or otherwise be of special concern to the States. As such, activities affecting those species may not be conducted without first obtaining the appropriate State permits. Possession of a Federal permit does not obviate the need for State authorization.

If you have any questions regarding this matter, please contact Colleen Henson, Regional Recovery Permit Coordinator, at 503-231-6283 or Colleen_Henson@fws.gov. Thank you.

Sincerely,

Program Manager for Restoration and
Endangered Species Classification

Enclosures

NATIVE ENDANGERED & THREATENED SP. RECOVERY
ENDANGERED & THREATENED WILDLIFE

Permit Number: TE72088A-3

Effective: 11/19/2020 Expires: 11/18/2025

Issuing Office:

Department of the Interior
U.S. FISH & WILDLIFE SERVICE
Endangered Species Permit Office
911 NE 11th Avenue
Portland, OR 97232-4181
permitsR1ES@fws.gov

Program Manager for Restoration & Endangered Species Classification

Permittee:

NOAA/NMFS PACIFIC ISLANDS FISHERIES SCIENCE CENTER
1845 WASP BLVD.
BUILDING 176
HONOLULU, HI 96818
U.S.A.

Name and Title of Principal Officer:
T. TODD JONES, PHD - LEADER, MARINE TURTLE BIOLOGY & ASSESSMENT PROGRAM

Authority: Statutes and Regulations: 16 USC 1539(a), 16 USC 1533(d); 50 CFR 17.22, 50 CFR 17.32, 50 CFR 13.

Location where authorized activity may be conducted:
ON LANDS SPECIFIED WITHIN THE ATTACHED SPECIAL TERMS AND CONDITIONS

Reporting requirements:

A. Annual report due by January 31 following each calendar year this recovery permit is in effect.

B. See the attached Special Terms and Conditions for further reporting requirements.

Authorizations and Conditions:

A. General conditions set out in Subpart B of 50 CFR 13, and specific conditions contained in Federal regulations cited above, are hereby made a part of this permit. All activities authorized herein must be carried out in accordance with and for the purposes described in the application submitted. Continued validity or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.

B. The validity of this permit is also conditioned upon strict observance of all applicable foreign, state, local, tribal, or other federal law.

C. Valid for use by permittee named above.

D. Further conditions of authorization are contained in the attached Special Terms and Conditions.

SPECIAL TERMS AND CONDITIONS

1. This Endangered Species Act (ESA) recovery permit is issued under the authority of section 10(a)(1)(A) of the ESA and its implementing regulations at 50 Code of Federal Regulations (CFR) 17. This recovery permit was previously issued on August 9, 2018. All Special Terms and Conditions set forth in that permit are hereby superseded by this permit renewal and amendment.

2. Take Authorization:

   a. The permittee is authorized to purposefully take[1] the following federally listed fish and wildlife species in conjunction with the following authorized activities for scientific purposes or to enhance the recovery, survival, and propagation of the species as specified in the permittee's March 10, 2020, recovery permit amendment application and previous applications, in accordance with the Special Terms and Conditions stated herein.

Species [Common and (*Scientific*) Name] and Federal Status	**Authorized Activities**
Honu (Hawaiian name) or Green sea turtle (*Chelonia mydas*) Central North Pacific (CNP) Distinct Population Segment (DPS) THREATENED	**All Ages (not including eggs) and Sexes**: Capture, recapture, handle, hold, transport, measure, weigh, collect blood and skin tissue samples, and release; necropsy and sample deceased animals; and salvage. **Adults and Immatures**: Biosample (including tumor samples), mark carapace, and attach flipper tags, biotelemetry transmission tags, and passive integrated transponder (PIT) tags. **All Nests**: Locate, monitor, insert data loggers into egg chamber, excavate nests, salvage unhatched eggs, and dead hatchlings; see "All Ages" above for additional activities. **Pivotal Temperature Captive Study - Wild and Captive Eggs**: Collect eggs, handle, hold, transport, conduct the pivotal temperature study, and release immatures into the wild.

[1] Take, as defined by the Endangered Species Act (ESA), for fish and wildlife means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Issuance of a recovery permit is a Federal action subject to the requirements of section 7 of the ESA. Under these requirements, a formal consultation is conducted to determine if the recovery permit action avoids jeopardy and adverse modification of critical habitat. The outcome of the formal consultation is the issuance of a biological opinion. If a recovery permit action is compliant with section 7 and incidental (unintentional) take is anticipated, that take can be exempted through an incidental take statement accompanying the biological opinion. The basis for the exemption is then incorporated into the Special Terms and Conditions of the recovery permit.

Species [Common and (*Scientific*) Name] and Federal Status	**Authorized Activities**
Honu (Hawaiian name) or Green sea turtle (*Chelonia mydas*) Central North Pacific (CNP) Distinct Population Segment (DPS) THREATENED	**Growth Study – Hatchling through Immature Age Classes**: Capture, transport, recapture, feed, release; collect biosamples; conduct health screening; see “All Ages” above for additional activities. **Specialized Research**: Ultrasound and laparoscopy of all captive-reared wild hatchlings and basking, stranded, or nesting (ultrasound only) sea turtles in the wild; esophageal lavage of basking or stranded sea turtles; oxytetracycline injections of basking, stranded, or nesting sea turtles. **Rehabilitation:** Transport, release, recapture, salvage all life stages/ages; see “All Ages” above for additional activities.
Haggan (Chamorro name) or Lauamei ena‘ena (Samoan name) or Green sea turtle (*Chelonia mydas*) Central South Pacific (CSP) DPS ENDANGERED and Central West Pacific (CWP) DPS ENDANGERED	**All Ages (not including eggs) and Sexes**: Capture, recapture, handle, hold, transport, measure, weigh, collect blood and skin tissue samples, and release; necropsy and sample deceased animals; and salvage. **Adults and Immatures**: Biosample, mark carapace, and attach flipper tags, biotelemetry transmission tags, and PIT tags. **All Nests**: Locate, monitor, insert data loggers into egg chamber, excavate nests, salvage unhatched eggs, and dead hatchlings; see “All Ages” above for additional activities. **Pivotal Temperature Captive Study - Wild and Captive Eggs**: Collect eggs, handle, hold, transport, conduct pivotal temperature study, and release immatures into the wild. **Growth Study – Hatchling through Immature Age Classes**: Capture, transport, recapture, feed, release, collect biosamples, conduct health screening; see “All Ages” above for additional activities. **Specialized Research**: Ultrasound and laparoscopy of all captive-reared wild hatchlings and basking, stranded, or nesting (ultrasound only) sea turtles in the wild; esophageal lavage of basking or stranded sea turtles; oxytetracycline injections of basking, stranded, or nesting sea turtles. **Rehabilitation**: Transport, release, recapture, salvage all life stages/ages; see “All Ages” above for additional activities.

Species [Common and (*Scientific*) Name] and Federal Status	Authorized Activities
Honu ‘ea (Hawaiian name) or Haggan karii (Chamorro name) or Laumei uga (Samoan name) or Hawksbill sea turtle (*Eretmochelys imbricata*) Hawai‘i, Mariana Islands, and, American Sāmoa ENDANGERED	**All Ages (not including eggs) and Sexes**: Capture, recapture, handle, hold, transport, measure, weigh, collect blood and skin tissue samples, and release; necropsy and sample deceased animals; and salvage. **Adults and Immatures**: Biosample, mark carapace, and attach flipper tags, biotelemetry transmission tags, and PIT tags. **All Nests**: Locate, monitor, insert data loggers into egg chamber, excavate nests, salvage unhatched eggs, and dead hatchlings; release hatchlings found alive in the nest; see “All Ages” above for additional activities. **Pivotal Temperature Captive Study - Wild and Captive Eggs**: Collect eggs, handle, hold, transport, conduct pivotal temperature study, and release immatures into the wild. **Growth Study – Hatchling through Immature Age Classes**: Capture, transport, recapture, feed, release, collect biosamples, conduct health screening; see “All Ages” above for additional activities. **Specialized Research**: Ultrasound and laparoscopy of all captive-reared wild hatchlings and basking, stranded, or nesting (ultrasound only) sea turtles in the wild; esophageal lavage of basking or stranded sea turtles; oxytetracycline injections of basking, stranded, or nesting sea turtles. **Rehabilitation:** Transport, release, recapture, salvage all life stages/ages; see “All Ages” above for additional activities.

Species [Common and (*Scientific*) Name] and Federal Status	Authorized Activities
Leatherback sea turtle (*Dermochelys coriacea*) ENDANGERED	**All Ages (not including eggs) and Sexes**: Capture, recapture, handle, hold, transport, measure, weigh, collect blood and skin tissue samples, and release; necropsy and sample deceased animals; and salvage. **Adult and Immature**: Biosample, mark carapace (Olive Ridley and Loggerhead only), attach flipper tags, biotelemetry transmission tags, and PIT tags; see "All Ages" above for additional activities. **All Nests**: Locate, monitor, insert data loggers into egg chambers, excavate nests; collect live hatchlings and release; salvage unhatched eggs and dead hatchlings; and release hatchlings found alive in the nest; see "All Ages" above for additional activities. **Rehabilitation**: Transport, release, recapture, salvage all life stages/ages; see "All Ages" above for additional activities.
Loggerhead sea turtle (*Caretta caretta*) North Pacific (NP) DPS ENDANGERED	
Olive ridley sea turtle (*Lepidochelys olivacea*) Hawai'i THREATENED	

b. This permit does not authorize take of federally listed fish and wildlife species[2] that are not specifically authorized under this permit. However, the U.S. Fish and Wildlife Service (Service) acknowledges that incidental (unintentional) take[3] of a co-occurring listed species could potentially occur while conducting certain authorized activities. When applicable, the following Special Terms and Conditions apply to all listed fish and wildlife species that the permittee is not authorized to take under this permit, but which are unintentionally harassed, captured, injured, or killed:

i. Each individual authorized under this permit must be knowledgeable about potentially co-occurring listed species that may occur throughout the habitats in which authorized activities are conducted and must be observant and cautious to the extent that unintentional take of a co-occurring listed species is avoided to the extent practicable.

[2] The ESA defines "fish or wildlife" as any member of the animal kingdom, including without limitation any mammal, fish, bird (including any migratory, non-migratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof.
[3] Incidental take is defined by the ESA as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." For recovery permits this type of take is referred to as unintentional take (*i.e.,* not considered the actual intent of the activities authorized under a permit).

ii. Any listed species that the permittee is not authorized to take under this permit, but is unintentionally captured unharmed during the course of conducting authorized activities, must be released immediately at the point of capture. Activities in the project area where the species/activities are occurring must immediately cease if there is a likelihood of capturing additional individuals while continuing to conduct the activities. In the case of injury, mortality, or undue harassment of listed species for which take has not been authorized, the Recovery Permit Coordinator (RPC) at the Service's Pacific Islands Fish and Wildlife Office (PIFWO – see attached contact list) must be notified within 24 hours. The PIFWO will then make a determination whether additional Special Terms and Conditions and/or restrictions must be applied in this area to address avoidance of take impacts to listed species for which take has not been authorized. The PIFWO will inform the permittee in writing of the determination within 15 calendar days of the initial notification. The continuation of authorized activities in the project area where the species/activities occurred must not be reinitiated until authorized by the PIFWO.

iii. Any unintentional take of listed species not authorized under this permit must be documented in the annual report.

c. This permit does not authorize the removal/possession and/or damage/destruction of federally listed plant species[4] and/or their parts on lands under Federal jurisdiction that are not specifically authorized under this permit. If unauthorized listed plant species are affected by one or more of these actions on Federal lands, the permittee must immediately cease authorized activities in the project area where the species/activities are occurring and notify the RPC at the PIFWO within 24 hours. The PIFWO will then make a determination whether additional Special Terms and Conditions, restrictions, and/or other requirements must be applied. The PIFWO will inform the permittee in writing of the determination within 15 calendar days of the initial notification. Actions associated with listed plant species not authorized under this permit must be documented in the annual report.

3. Geographic Areas:

a. Authorized activities are restricted to the following locations for the green sea turtle CNP DPS, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle NP DPS, and olive ridley sea turtle:

[4] The ESA defines "plant" as any member of the plant kingdom, including seeds, roots, and other parts thereof. The removal/possession and/or damage/destruction of listed plant species include not only the whole plant, but also parts of the plant as previously defined.

i. The beaches surrounding the islands, islets, atolls, and shoals in the Hawaiian Achipelago;

ii. The beaches surrounding Johnston Atoll;

iii. Maui Ocean Center Marine Institute, Maui;

iv. National Oceanic and Atomospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Pacific Islands Fisheries Science Center (PIFSC), O‘ahu;

v. Sea Life Park (SLP), O‘ahu; and

vi. Waikīkī Aquirium, O‘ahu.

b. Authorized activities are restricted to the following geographic areas for the green sea turtle CSP and CWP DPS, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle NP DPS, and olive ridley sea turtle:

i. The beaches surrounding the islands, islets, atolls, and shoals in the Pacific Remote Islands Marine National Monument (not including Johnston Atoll);

ii. All beaches surrounding the islands of the Commonwealth of the Northern Mariana Islands;

iii. All beaches surrounding the island and islets of Guam;

iv. Underwater World, Guam; and

v. All beaches surrounding the islands of American Sāmoa (Tutuila, Aunu‘u, Manu‘a Islands – Ofu, Olosenga, Ta‘u; and Muliava, Nu‘u o Manu, Motu o manu, or Rose Atoll).

c. If required to access authorized locations, the permittee must obtain access authorization from the landowner or manager before entering these locations.

4. Authorized Individuals:

Only individuals on the attached List of Authorized Individuals (List) are authorized to independently conduct activities under this permit. The List may limit activities or identify special conditions or circumstances under which listed individuals may conduct authorized activities. Each named individual must be responsible for compliance with the Special Terms and Conditions in this permit. The List must be retained with these Special Terms and Conditions.

To request changes to the List, the permittee must submit a written or email request to the RPC at the PIFWO. The request must be submitted at least 30 calendar days prior to the requested effective date. The request must include the following information:

a. The name of each individual to be appended to the List;

b. Current position title and employer's name for each individual;

c. The resume/qualifications statement of each individual, detailing their education, training, and experience with authorized species and authorized activities in this permit, or similar species and activities, and type of activity for which authorization is being requested;

d. Concurrently, ensure other permitting entities (*e.g*., Bird Banding Laboratory, Migratory Birds, State fish and wildlife agencies, etc.) have been notified for all associated name changes on issued permits, as appropriate;

e. The names, titles, organizations, email addresses, and phone numbers of a minimum of two references for each individual; and

f. The names of any individuals to be deleted from the List.

The permittee must include the current updated version of the List with this recovery permit once it is received from the PIFWO. This permit will be considered invalid without a current List.

Note: This procedure is for personnel changes to the List only. For requests to renew and/or amend this permit, a complete application and appropriate processing fee (if not fee exempt) must be submitted to the Program Manager for Restoration and Endangered Species Classification at the Service's Portland Regional Office (PRO). The recovery permit Application Form 3-200-59 may be obtained at https://www.fws.gov/forms/3-200-59.pdf.

5. General Permit Responsibilities:

a. Acceptance of this permit serves as evidence that the permittee understands and agrees to abide by the following regulations: 50 CFR Part 13 (general permit procedures), 50 CFR 17.22 (endangered wildlife), and 50 CFR 17.32 (threatened wildlife), as applicable and available at: https://www.ecfr.gov/cgi-bin/ECFR?page=browse. In addition, the permittee must have all other applicable permits prior to the commencement of activities authorized in this permit.

b. Only individuals on the List are approved to conduct activities under this permit. The permittee is responsible for ensuring that all authorized individuals comply with the Special Terms and Conditions in this permit.

c. The permittee and all authorized individuals must have in their possession a printed or digital copy of this permit, including attachments, while conducting authorized activities.

d. The Service requires all handling of listed species be done in an expedient manner that minimizes the risk of injury and mortality. Unless otherwise specified in this permit, captured individuals must be released at their capture site as soon as authorized activities are completed.

e. To prevent the spread of invasive and nonnative species, all equipment, clothing, and boots must be cleaned to remove mud, debris, and vegetative material before arriving at a project area. Invasive species are organisms (includes nonnative pathogens and other microorganisms) that are nonnative to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or impact human health. Nonnative species are species that have been introduced into areas, which were not historically part of their range. If any previously undocumented invasive species are observed in a project area, the Service requests that the permittee contact the PIFWO to report their findings as soon as it is convenient and include the information in the respective annual report.

f. Listed species and/or parts of listed species taken under this permit are not considered the property of the permittee but remain under the authority of the Federal Government. Additionally, they must not be sold, donated, or transferred without written authorization from the Service, unless otherwise authorized in this permit.

g. Ground-disturbing activities must be immediately stopped when human remains or archaeological materials are discovered at a project location. Upon discovery, the permittee must immediately contact the RPC at the PIFWO for further guidance before reinitiating activities. The removal or further disturbance of discovered archaeological materials and properties is not allowed at the project location until the Service provides instructions and/or guidance.

h. The permittee is not authorized to salvage any injured or dead sea turtles that are encountered and appear to have been injured or killed as the result of potential criminal activity. Under these circumstances, the permittee must immediately contact and report their findings to the Resident Agent in Charge at the Service's Office of Law Enforcement (OLE - see attached contact list). In conjunction with the care of sick or injured sea turtles or preservation of biological materials from a sea turtle, the permittee has the responsibility to carry out instructions provided by the Service's OLE to ensure that evidence intrinsic to the specimen is not disturbed. The permittee must document the date, time, location (UTM coordinates), permittee name, permit number, and the circumstances that led to the discovery of the specimen. This information must be provided in the annual report.

i. The permittee is not authorized to remove/reduce to possession (*i.e.*, salvage) any plant or any of their parts that are encountered on Federal lands and appear to have been damaged or destroyed as the result of potential criminal activity. Under these circumstances, the permittee must immediately contact and report their findings to the Service's OLE Resident-Agent-in-Charge. In conjunction with the care or preservation of biological materials from plants, the permittee has the responsibility to carry out instructions provided by the Service's OLE to ensure that evidence intrinsic to the specimen is not disturbed. The permittee must document the date, time, location (UTM coordinates), permittee name, permit number, and the circumstances that led to the discovery of the specimen. This information must be provided in the respective annual report.

j. At the discretion of the Service, a Service employee may inspect the facilities or accompany the permittee during any activity conducted pursuant to this permit. The permittee must allow Service personnel access to any materials and information generated as a result of this permit. Any refusal, obstruction, or hindrance of Service participation in such work shall be grounds for suspension or revocation of this permit in accordance with 50 CFR 13.27 or 50 CFR 13.28, respectively.

k. If the permittee needs to continue work with listed species after the expiration date of this permit, a request for permit renewal (using Application Form 3-200-59) must be submitted to and received at the PRO at least 30 calendar days prior to the permit expiration date. Meeting this requirement allows the permittee to continue currently authorized activities until the renewal application is acted upon. If this requirement is not met, this permit becomes invalid on the permit expiration date.

l. Any new activities, changes in activities, or work in new geographic areas with the same or other listed species will require this permit to be amended. The permittee is not authorized to conduct any of these changes or additions until they have requested (using Application Form 3-200-59) and have received an amended permit.

m. A permit renewal or amendment application will be processed only after all reporting requirements have been met for the current and previous calendar years. If no activities have been conducted during the term of this permit for one or more authorized species, the Service may suspend this recovery permit, or those specific activities for an authorized species under this recovery permit, due to a lack of recovery benefit to the species.

6. Purposeful Take of Green Sea Turtles in the CNP DPS:

The permittee is authorized to carry out the following activities within the geographic areas specified above, and the time limitation specified in the permit, in accordance with the Special Terms and Conditions stated below:

a. General Activities:

i. Only qualified and experienced individuals, as determined by the PIFWO, may perform the authorized activities described below.

ii. Standard Research Protocols for Nesting and Basking Marine Turtles in the Pacific Islands Region and Specialized Research Protocols for Nesting and Basking Marine Turtles in the Pacific Islands Region (PIFWO and NOAA PIFSC (2019, 2020)) or the most recent version of these documents, must be followed (see attached).

iii. Stranded or naturally dead eggs or turtles may be salvaged for necropsy and tissues sampled (skin, blood, right front flipper, and scutes). Necropsies must include notification to or participation by Dr. Thierry Work, U.S. Geological Survey-Biological Resource Division (USGS-BRD), National Wildlife Health Center-Honolulu Field Station (NWHC-FS), (telephone: 808-792-9520; fax: 808-792-9596; email: thierry_work@usgs.gov).

b. Capture/Collection/Handling/Transporting Activities:

i. Up to 5,000 total nesting and basking adult and immature green sea turtles per year may be captured, held, handled, and measured.

ii. In conjunction with the growth study, no more than 10 naturally emerging hatchlings per wild nest totaling 800 hatchlings per year may be captured, held, handled, measured, weighed, biosampled, and released at approximately 30 centimeter (cm) straight carapace length (SCL) (approximately 1 year old). Once in captivity, each hatchling may be handled for no more than 10 minutes.

iii. Up to 20 eggs from no more than 10 wild nests per year (=200 total eggs) (until year 2023) may be collected, measured, weighed, and transported into captivity for a Pivotal Temperature Captive study. After the study, the captive individuals must released per Special Term and Condition 6.(j)(i) below.

iv. From naturally emerging nests no more than 20 hatchlings per nest and no more than 100 nests (=1,000 total hatchlings) (until year 2023), may be captured, held, and transported in conjunction with the Growth Study.

v. From progeny of pre-ESA Sea Life Park captive stock, no more than 20 hatchlings per nest from no more than 10 nests may be collected per year and held in captivity until they are released from the Growth Study as juveniles.

c. Tagging/Marking Activities - Flipper and PIT Tags:

i. Up to 5,000 total nesting and basking adults and immature green sea turtles per year may be flipper and PIT tagged and have their carapace marked.

d. Survey/Monitoring Activities:

i. Up to 500 green sea turtle nests per year may be located, monitored, excavated, and salvaged.

ii. Up to 300 green sea turtle nests per year may be monitored with data-loggers.

e. Biotelemetry Activities:

i. Up to 250 total nesting and basking adult and immature green sea turtles per year may have biotelemetry transmitter tags (acoustic/sonic/radio/satellite) and archival time-depth-recorders (TDR) attached.

f. Ultrasound and Laparoscopy Activities:

i. Ultrasound and laparoscopy may be conducted on up to 200 adults and up to 200 immature basking or stranded sea turtles in the wild per year.

g. Oxytetracycline Injections:

i. Oxytetracycline may be injected into 500 total basking, stranded, or nesting green sea turtles in the CNP DPS per year.

h. Biosampling Activities:

i. Up to 5,000 total adult and immature green sea turtles per year may have tissue (blood, skin, and tumor biopsy) samples collected.

ii. Up to 300 total adult and immature green sea turtles per year may have biosamples (scutes, oral swab, cloaca swab, urine, and feces samples, and oral exam) collected.

iii. Skin and scute samples may be collected from all naturally emerging hatchlings from wild nests each year.

iv. Up to 250 1+ year old juveniles (progeny of pre-ESA captive stock at Sea Life Park) per year may have tissue samples (blood and skin sample) and scutes collected.

v. Up to 200 1+ year old juveniles (collected from the wild) per year may have tissue samples (blood and skin sample) and scutes collected.

vi. Esophageal lavage may be conducted on up to 100 basking or stranded sea turtles per year.

i. Captive Studies:

i. Unless otherwise stated in the Special Terms and Conditions of this permit, all captive studies must be conducted in accordance with the "U.S. Fish and Wildlife Services' Standard Conditions for Care and Maintenance of Captive Sea Turtles" (USFWS 2019), available at: https://www.fws.gov/southwest/es/TexasCoastal/docs/2019_Standard_Conditions_for_Care_of_Sea_Turtles.pdf.

ii. Pivotal Temperature Captive Study

A. A study proposal to collect eggs from green sea turtle nests in the CNP DPS for the Pivotal Temperature Captive Study, pursuant to this permit, must be submitted in writing for approval by the PIFWO RPC, at least 45 business days prior to conducting such activities.

B. Up to 20 eggs from no more than 10 wild nests per year (=200 total eggs) (until year 2023) may be collected, measured, weighed, and transported into captivity for a Pivotal Temperature Captive Study. They must be released into the wild as juveniles (approximately 30 cm SCL; approximately 1 year old).

iii. Growth Study

A. See Special Terms and Conditions 6(b)(v) and 6(b)(vi) of this permit for the number of hatchlings that the permittee may capture for the purposes of the Growth Study.

B. Sea turtles may be weighed and measured weekly, and must be checked for health issues.

C. Blood samples (<0.5 milliliters [ml]) may be collected from the dorsal cervical sinus of all captive-reared wild hatchlings from incubation using a 27-gauge or 29-gauge needle connected to a 1 ml syringe.

D. Laparoscopy of all captive-reared wild hatchlings from incubation may be conducted.

E. Sea turtles must not be handled for more than 30 minutes per week to minimize stress.

F. Food and growth rate determination may be conducted on up to 50 captive sea turtles per year.

G. From naturally emerging nests, no more than 20 hatchlings per nest and no more than 100 nests (=1,000 total hatchlings) (until year 2023) may be captured, held, and transported in conjunction with the Growth Study.

j. Captive Release Methods:

i. All captive-reared sea turtles must be released into the wild upon reaching juvenile age (approximately 30 cm SCL; approximately 1 year old).

ii. Proposals including location to release captive-reared green sea turtles associated with the Pivotal Temperature Captive Study and the Growth Study pursuant to this permit, must be submitted in writing for approval to the PIFWO RPC, at least 45 business days prior to conducting such activities.

7. Purposeful Take of Green Sea Turtles in the CWP and CSP DPS, and the Hawksbill Sea Turtle:

The permittee is authorized to carry out the following activities within the geographic boundaries specified above, and the time limitation specified in the permit, in accordance with the Special Terms and Conditions stated below:

a. General Activities:

i. Only qualified and experienced individuals, as determined by the PIFWO, may perform the authorized activities described below (refer to the attached List).

ii. Standard Research Protocols for Nesting and Basking Marine Turtles in the Pacific Islands Region and Specialized Research Protocols for Nesting and Basking Marine Turtles in the Pacific Islands Region (PIFWO and NOAA PIFSC (2019, 2020)) or the most recent version of the documents, must be followed (attached).

iii. Stranded or naturally dead eggs or turtles may be salvaged for necropsy and tissues sampled (skin, blood, right front flipper, and scutes). Necropsies must include notification of or participation by Dr. Thierry Work, USGS-BRD NWHC-FS (see contact list).

b. Capture/Collection/Handling/Transporting Activities:

i. Up to 250 total nesting and basking adult and immature green sea turtles in the CSP DPS per year may be captured, held, handled, measured, and weighed.

ii. Up to 300 total nesting and basking adults and immature green sea turtles in the CWP DPS per year may be captured, held, handled, measured, and weighed.

iii. Up to 500 nesting hawksbill sea turtles per year may be captured, held, handled, measured, and weighed.

iv. Up to 20 eggs from no more than 5 wild nests per year (=100 total eggs) (until year 2023) may be collected, measured, weighed, and transported into captivity for a Pivotal Temperature Captive study. They must be released into the wild as juveniles (approximately 30 cm SCL; approximately 1 year old).

v. From naturally emerging nests, no more than 20 hatchlings per nest and no more than 100 nests (= 1,000 total hatchlings) (until year 2023), may be captured, held, and transported in conjunction with the Growth Study.

c. Tagging/Marking Activities - Flipper and PIT Tags:

i. Up to 250 total nesting and basking adults and immature green sea turtles in the CSP DPS per year may be flipper and PIT tagged and have their carapace marked.

ii. Up to 300 total nesting and basking adults and immature green sea turtles in the CWP DPS per year may be flipper and PIT tagged and have their carapace marked.

iii. Up to 500 nesting hawksbill sea turtles per year may be flipper and PIT tagged and have their carapace marked.

d. Survey and Monitoring Activities:

i. Up to 100 nests per year of the green sea turtles in the CSP DPS may be located, monitored, excavated, monitored with dataloggers, and salvaged.

ii. Up to 100 nests per year of the green sea turtles in the CWP DPS may be located, monitored, excavated, monitored with dataloggers, and salvaged.

iii. Up to 300 nests per year of the hawksbill sea turtles may be located, monitored, excavated, monitored with dataloggers, and salvaged.

e. Biotelemetry Activities:

i. Up to 20 total nesting and basking adult and immature green sea turtles in the CSP DPS per year may have biotelemetry transmitter tags attached.

ii. Up to 20 total nesting and basking adult and immature green sea turtles in the CWP DPS per year may have biotelemetry transmitter tags attached.

iii. Up to 50 nesting hawksbill sea turtles per year may have biotelemetry transmitter tags attached.

f. Ultrasound and Laparoscopy Activities:

i. Ultrasound and laparoscopy may be conducted on up to 100 adults and up to 100 immature basking or stranded green sea turtles in the CSP and CWP DPS and hawksbill sea turtles in the wild per year.

g. Oxytetracycline Injections:

i. Oxytetracycline may be injected into 200 total basking, stranded, or nesting green sea turtles in the CSP and CWP DPS and hawksbill sea turtles in the wild per year.

h. Biosampling Activities:

i. Up to 250 total adult and immature green sea turtles in the CSP DPS per year may have tissue (blood and skin) samples collected.

ii. Up to 100 total adult and immature green sea turtles in the CSP DPS per year may have biosamples (scutes, oral swab, cloaca swab, urine, and feces samples, and oral exam) collected.

iii. Up to 300 total adult and immature green sea turtles in the CWP DPS per year may have tissue (blood and skin) samples collected.

iv. Up to 100 total adult and immature green sea turtles in the CWP DPS per year may have biosamples (scutes, oral swab, cloaca swab, urine, and feces samples, and oral exam) collected.

v. Up to 500 adult hawksbill sea turtles per year may have tissue (blood and skin) samples collected.

vi. Up to 100 adult hawksbill sea turtles per year may have biosamples (scutes, oral swab, cloaca swab, urine, and feces samples, and oral exam) collected.

vii. Esophageal lavage may be conducted on up to 50 total basking or stranded green sea turtles in the CSP and CWP DPS and hawksbill sea turtles per year.

i. Captive Studies:

i. Unless otherwise stated in the Special Terms and Conditions of this permit, all captive studies must be conducted in accordance with the "U.S. Fish and Wildlife Services' Standard Conditions for Care and Maintenance of Captive Sea Turtles" (USFWS 2019), available at: https://www.fws.gov/southwest/es/TexasCoastal/docs/2019_Standard_Conditions_for_Care_of_Sea_Turtles.pdf.

ii. Pivotal Temperature Captive Study

A. A study proposal to collect eggs from green sea turtle nests in the CSP and CWP DPS and hawksbill sea turtles for the Pivotal Temperature Captive Study, pursuant to this permit, must be submitted in writing for approval by the PIFWO RPC, at least 45 business days prior to conducting such activities.

iii. Growth Study

A. See Special Terms and Conditions 7(b)(v) and 7(b)(vi) of this permit for the number of hatchlings that the permittee may capture for the purposes of the Growth Study.

B. Sea turtles may be weighed and measured weekly, and must be checked for health issues.

C. Blood samples (<0.5 ml) may be collected from the dorsal cervical sinus of all captive-reared wild hatchlings from incubation using a 27-gauge or 29-gauge needle connected to a 1 ml syringe.

D. Laparoscopy of all captive-reared wild hatchlings from incubation may be conducted.

E. Sea turtles must not be handled for more than 30 minutes per week to minimize stress.

F. Food and growth rate determination may be conducted on up to 50 captive green sea turtles from CSP and CWP DPSs per year and on up to 20 hawksbill sea turtles per year.

j. Captive Release Methods:

i. All captive-reared sea turtles must be released into the wild upon reaching juvenile age (approximately 30 cm SCL; approximately 1 year old).

ii. Proposals including location to release captive-reared green sea turtles associated with the Pivotal Temperature Captive Study or the Growth Study pursuant to this permit, must be submitted in writing for approval to the PIFWO RPC at least 45 business days prior to conducting such activities.

8. Purposeful Take of Leatherback Sea Turtle, Loggerhead Sea Turtle in the NP DPS, and Olive Ridley Sea Turtle:

The permittee is authorized to carry out the following activities within the geographic boundaries specified above, and the time limitation specified in the permit, in accordance with the Special Terms and Conditions stated below:

a. General Activities:

i. Only qualified and experienced individuals, as determined by the PIFWO, may perform the authorized activities described below (refer to the attached List).

ii. Standard Research Protocols for Nesting and Basking Marine Turtles in the Pacific Islands Region and Specialized Research Protocols for Nesting and Basking Marine Turtles in the Pacific Islands Region (PIFWO and NOAA PIFSC (2019, 2020)) or the most recent version of the documents, must be followed (attached).

iii. Stranded or naturally dead eggs or turtles may be salvaged for necropsy and tissues sampled (skin, blood, right front flipper, and scutes). Necropsies must include notification of or participation by Dr. Thierry Work, USGS-BRD NWHC-FS (see attached contact list).

b. Capture and Handling Activities:

i. Up to 10 nesting leatherback sea turtles per year may be captured, held, handled, measured, and weighed.

ii. Up to 10 nesting loggerhead sea turtles in the NP DPS per year may be captured, held, handled, measured, and weighed.

iii. Up to 10 nesting olive ridley sea turtles per year may be captured, held, handled, measured, and weighed.

c. Tagging/Marking Activities - Flipper and PIT Tags:

   i. Up to 10 nesting leatherback sea turtles per year may be flipper and PIT tagged.

   ii. Up to 10 nesting loggerhead sea turtles in the NP DPS per year may be flipper and PIT tagged and have their carapace marked.

   iii. Up to 10 nesting olive ridley, sea turtles per year may be flipper and PIT tagged and have their carapace marked.

d. Survey and Monitoring Activities:

   i. Up to 10 nests per year of the leatherback sea turtle may be located, monitored, excavated, dataloggers inserted, and salvaged.

   ii. Up to 10 nests per year of the loggerhead sea turtle in the NP DPS may be located, monitored, excavated, dataloggers inserted, and salvaged.

   iii. Up to 10 nests per year of the olive ridley sea turtle may be located, monitored, excavated, dataloggers inserted, and salvaged.

e. Biotelemetry Activities:

   i. Up to 10 nesting leatherback sea turtles per year may have biotelemetry transmitter tags attached.

   ii. Up to 10 nesting loggerhead sea turtles in the NP DPS per year may have biotelemetry transmitter tags attached.

   iii. Up to 10 nesting olive ridley sea turtles per year may have biotelemetry transmitter tags attached.

f. Biosampling Activities:

   i. Up to 10 adult leatherback sea turtles per year may have tissue (blood and skin) samples collected.

   ii. Up to 10 adult leatherback sea turtles per year may have biosamples (scutes, oral swab, cloaca swab, urine, and feces samples, and oral exam) collected.

   iii. Up to 10 adult loggerhead sea turtles in the NP DPS per year may have tissue (blood and skin) samples collected.

iv. Up to 10 adult loggerhead sea turtles in the NP DPS per year may have biosamples (scutes, oral swab, cloaca swab, urine, and feces samples, and oral exam) collected.

v. Up to 10 adult olive ridley sea turtles per year may have tissue (blood and skin) samples collected.

vi. Up to 10 adult olive ridley sea turtles per year may have biosamples (scutes, oral swab, cloaca swab, urine, and feces samples, and oral exam) collected.

9. Rehabilitation Activities for all Sea Turtle Species:

a. Rehabilitation of sea turtles are restricted to the following locations:

i. PIFSC, O‘ahu.

ii. Sea Life Park, O‘ahu.

iii. Waikīkī Aquarium, O‘ahu.

iv. Maui Ocean Center Marine Institute, Maui.

v. Underwater World, Guam.

b. All rehabilitation must be conducted under veterinary supervision and must follow the "Standard Permit Conditions for Care and Maintenance of Captive Sea Turtles," (USFWS 2019), available at: https://www.fws.gov/southwest/es/TexasCoastal/docs/2019_Standard_Conditions_for_Care_of_Sea_Turtles.pdf.

10. Salvage Activities for all Sea Turtle Species:

a. The permittee may salvage injured or dead individuals of species that are authorized under this permit, with the exception of those that appear to have been injured or killed as the result of potential criminal activity. In the event an individual is salvaged, the permittee must follow the notification process and procedures, as applicable, as described under Special Term and Condition 5(h).

b. Collected/captured malformed, abnormal, or dead individuals, as authorized by the PIFWO, may be sent to a PIFWO-approved repository for diagnostic examinations to determine the reason(s) for their health/physical status and/or death. Refer to the Designated Repository section for instructions on the submission of biological samples and specimens for diagnostic examinations.

c. Individuals found with serious injuries that will likely compromise their survival or subject them to undue pain and suffering may be humanely euthanized based on review and approval from a licensed veterinarian or a State licensed and/or a federally permitted wildlife rehabilitation facility. Euthanasia must follow American Veterinary Medical Association Guidelines available at https://www.avma.org/KB/Policies/Documents/euthanasia.pdf.

d. When feasible, the permittee must contact the RPC at the PIFWO (by telephone, fax, or email) for authorization prior to euthanizing the specimen. Otherwise, the PIFWO must be notified within 24 hours of all salvaged specimens that are euthanized. The specimen must be submitted to a PIFWO-approved repository.

e. Individuals that appear sick (*e.g.,* having a possible pathogenic infection) or are found with serious, but non-life threatening injuries may be taken to a State licensed and/or a federally permitted wildlife rehabilitation facility. Individuals that are unlikely to recover may be humanely euthanized (refer to the Special Term and Condition above). The permittee must contact the PIFWO for instructions on the disposition of recovered individuals.

f. Individuals that are euthanized may be used for additional research activities by the permittee if approved by the PIFWO before their use.

g. The Service recommends that all salvaged specimens that have research or educational value be preserved in accordance with standard museum practices while still providing maximum scientific information. Before expiration of this permit, all salvaged specimens must be properly labeled and deposited at a PIFWO-approved repository. The permittee must provide the repository with a copy of this permit.

h. The Service recommends the permittee inform the appropriate landowner or manager if salvaged specimens are recovered on their respective lands.

11. Unintentional Take Limitations:

The number of sea turtles (all life stages) allowed to be unintentionally injured or killed during authorized activities is zero per calendar year. In the event that the number of individuals of life stages individually or combined allowed to be unintentionally injured or killed is exceeded during performance of authorized activities, the permittee must:

a. Immediately cease the activity resulting in injury or death. Continuation of the activity is dependent on reauthorization by the PRO. After analysis of the circumstances of the injury or mortality, the PRO may amend, suspend, or revoke this permit.

b. Within 24 hours, notify the RPC at the PRO and the PIFWO. Such notification must be followed up in writing to the PRO and the PIFWO within 3 working days. The permittee must provide a written report of the circumstances that led to the injury or mortality; date, time, and precise location of the injured animal or carcass; disposition of the injured animal or suggested disposition of the dead specimen; and a description of the changes in activity protocols that will be implemented to reduce the likelihood of such injury or mortality from reoccurring, if appropriate. The incident must also be discussed in the annual report submitted in the respective calendar year.

c. Unless otherwise authorized, all unintentionally killed specimens must be preserved in accordance with standard museum practices while still providing maximum scientific information. Before expiration of this permit, all preserved specimens must be properly labeled and deposited at a PIFWO-approved repository. The permittee must provide the repository with a copy of this permit.

12. Designated Repository:

Contact the listed designated repository for instructions on how to prepare and submit specimens.

a. NOAA NMFS Pacific Islands Fisheries Science Center, Attention: Summer Martin, 1845 Wasp Boulevard., Building 176, Honolulu, Hawai‘i 96818 (telephone: 808-725-5750; fax: 808-725-5475; email: summer.martin@noaa.gov).

b. NOAA NMFS Southwest Fisheries Science Center, Attention: Erin LaCasella, Marine Turtle Genetics Program, 3333 North Torrey Pines Court, La Jolla, California 92037 (telephone: 858-546-5696; fax: 858-546-7003; email: Erin.LaCasella@noaa.gov).

c. USGS-BRD National Wildlife Health Center-Honolulu Field Station, Attention: Dr. Thierry Work, P.O. Box 50167, 300 Ala Moana Boulevard., Room 8-132, Honolulu, Hawai‘i 96850 (telephone: 808-792-9520; fax: 808-792-9596; email: thierry_work@usgs.gov).

d. University of Massachusetts, Amherst: Dr. Lisa Komoroske, 160 Holdsworth Way, Department of Environmental Conservation, University of Massachusetts, Amherst, Amherst, Maine 01003 (telephone: 413-545-2491; email: lkomoroske@umass.edu).

e. The Bernice Pauahi Bishop Museum (Bishop Museum), Vertebrate Collection Manager, 1252 Bernice Street, Honolulu, Hawai‘i 96817 (telephone: 808-847-3511).

f. If the PIFSC, SFSC, HWHC-FS, U. Mass, Amherst, or the Bishop Museum do not wish to accession the specimens, the permittee must contact both the RPC at the PIFWO and the Service's OLE in Honolulu, Hawai'i for disposition instructions.

13. All reports, publications, photographs, video footage, or other documents that include information gathered under the authority of this permit must reference this recovery permit by permit number. Copies of such documents must be provided to the PIFWO immediately upon their completion. Draft documents, raw/field data and notes, and other information resulting from work conducted under the authority of this permit must be submitted to the Service upon request.

14. Reporting Requirements:

a. An annual report of activities conducted under this permit must be submitted to the RPC at the PRO and the PIFWO by January 31 following each calendar year this permit is in effect. In order to track, document, and assess all project-specific activities conducted pursuant to this permit, we are requiring the annual report to summarize all of the activities conducted pursuant to this permit during the previous calendar year. Activities that are continuous (*i.e.,* overlapping in 2 or more calendar years), must be reported each year the activity is in effect. The annual report must be in the following format:

i. An introduction section addressing reasons and objectives for taking the sea turtle species;

ii. A methods section addressing data collection methods/techniques, data analysis process, personnel working on the project, and effectiveness of the Special Terms and Conditions in minimizing take of the sea turtle species;

iii. A results section that summarizes the data collected for the sea turtle species, including information on any other federally listed species encountered while conducting activities authorized under this permit; and

iv. A conclusion section that specifically provides, at a minimum, application of the results to recommendations for the recovery of the sea turtle species.

b. The annual report must include, but need not be limited to, the following information. The status of ongoing projects and studies under the permit must be briefly summarized as requested below. A comprehensive report(s) on completed projects and studies must be submitted with the respective annual report or any time during the calendar year at the time of completion.

i. Summary presentation and brief discussion of significant research results and their importance with regards to recovery of the the sea turtle species;

ii. Maps and/or locations (including GPS/GIS data, as appropriate) where authorized activities occurred;

iii. The results of all survey or sampling efforts, including estimates of population size of any federally listed species, if possible;

iv. Number of sea turtles that were salvaged under the recovery permit, including capture locations and their disposition;

v. Results of any genetic studies from biological samples collected under this recovery permit;

vi. Quantified take of the sea turtle species, by life stage, including numbers of individuals unintentionally killed (including dates, locations, and circumstances of lethal take), and an estimate of the numbers of individuals otherwise harmed or harassed;

vii. Quantified take for other listed species (including the removal/possession and/or damage/destruction of listed plant species and/or their parts on federal owned or managed lands) not authorized under this permit, including numbers of individuals unintentionally killed (including dates, locations, and circumstances of lethal take), and an estimate of the numbers of individuals otherwise harmed or harassed;

viii. Discovery information and documentation for any potential criminal activity that was reported to the Service's OLE;

ix. Repositories where sea turtle specimens were sent, including salvaged specimens, and any issued diagnostic or examination reports from a repository;

x. Other pertinent observations made during authorized activities regarding the status, biology, or ecology of the sea turtle species;

xi. Reports or other documents that include information on human remains or significant archaeological materials if they were discovered at a project location;

xii. Reports or other documents that include information gathered under the authority of this permit, including the presence of any previously undocumented invasive or non-native species observed in a project area;

xiii. Planned future activities if authorized under this permit; and

xiv. Other specific sea turtle information:

A. The number and location (including DPS) of adult and immature sea turtles captured, marked, flipper-and/or PIT tagged, biotelemetry tagged, ultrasound, laparoscopy, oxytetracycline injection, esophageal lavage, transport, released, and recaptured;

B. The number and location of naturally emerging wild hatchlings that had skin and scute sampling;

C. The number and location (including DPS) of threatened and endangered sea turtle eggs removed from the wild and SLP and the results of the Pivotal Temperature Captive Study;

D. The number and location (including DPS) of threatened and endangered sea turtle hatchlings removed from the wild and SLP, and the results for the Growth Study;

E. Nest success and failure rates separated by geographic location;

F. The number, location, sea turtle species and results of nests where dataloggers were placed;

G. The number of nests, location and results of any artificial or natural impediments that trapped hatchlings in their nest, the number that needed rescuing and resuscitation, and the methods used;

H. Any threats to sea turtles on nesting and basking beaches that were observed or encountered;

I. The number of sea turtles brought in for rehabilitation, released or euthanized, including the facility where the rehabilitation was conducted, and the release location in relation to the capture location; and

J. The number and description of all specimens deposited with the designated depositories (including salvaged eggs and dead hatchlings).

c. Copies of any issued permits required to perform authorized activities must be submitted with the annual report.

d. Submission of annual reports:

i. One copy of an annual report (electronic format preferred) must be submitted to the RPC at the PRO and the PIFWO each calendar year. Annual reports may be submitted electronically to the following email addresses:

PRO: permitsR1ES@fws.gov
PIFWO: FW1PIE_RecPermitAnnRpt@fws.gov

Add the following subject line to the email: Annual report for recovery permit TE-72088A-3.

ii. All email file attachments combined are limited to 25 megabytes in size. If electronic files exceed this size limitation, please: (1) send them in separate emails with appropriately sized attachments, (2) copy them onto a DVD or CD, or (3) send them as a printed document(s).

iii. Preferred formats for annual report documents are Microsoft Word, Excel, or Access; Adobe PDF; graphic files - GIF, JPG, BMP, or TIFF; and ArcGIS spatial files - shapefiles or geo-databases. If different file formats are to be submitted, contact the PIFWO before submission to verify if they will be readable by the Service.

e. If no authorized activities occurred over the course of a calendar year, indication of such by email to the above addresses must be submitted as a report.

14. Failure to comply with reporting requirements may result in non-renewal, non-amendment, or suspension/revocation of this permit.

List of Service Contacts:

U.S. Fish and Wildlife Service
Portland Regional Office (PRO)
Endangered Species Permit Office
911 NE 11th Avenue
Portland, Oregon 97232-4181
Email: permitsR1ES@fws.gov
Telephone: 503-231-6131
Fax: 503-231-6243

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office (PIFWO)
300 Ala Moana Boulevard
Room 3-122
Honolulu, Hawaiʻi 96850
Email: FW1PIE_RecPermitAnnRpt@fws.gov
Telephone: 808-792-9400
Fax: 808-792-9580

U.S. Fish and Wildlife Service
Office of Law Enforcement (OLE)
Resident Agent in Charge
Honolulu, Hawaiʻi (responsible for Hawai`i, Pacific Islands, Guam, Commonwealth in the Northern Mariana Islands, Pacific/Remote Islands and American Samoa)
Telephone: 808-861-8525

List of Non-Service Contacts:

U.S Geological Survey
Biological Resource Division, National Wildlife Health Center-Honolulu Field Station
Dr. Thierry Work
P.O. Box 50167
Ala Moana Boulevard, Room 8-132
Honolulu, Hawaiʻi 96850
Email: thierry_work@usgs.gov
Telephone: 808-792-9520
Fax: 808-792-9596

Annual Report Submission Information:

Annual reports, due by January 31, must be submitted electronically and/or mailed to the following offices:

Portland Regional Office: permitsR1ES@fws.gov
Pacific Island Fish and Wildlife Office: FW1PIE_RecPermitAnnRpt@fws.gov

Species-Specific Literature Citations:

Balazs, G.H. 1995. Innovative techniques to facilitate field studies of the green turtle, *Chelonia mydas*. Pp. 158-161 *in* Proc. 12th Annual Workshop on Sea Turtle Biology and Conservation (Richardson J.I. and T.H. Richardson (compilers) eds.). NOAA Technical Memorandum NMFS-SEFSC-361.

U.S. Fish and Wildlife Service (USFWS). 2019. U.S. Fish and Wildlife Services' Standard Conditions for Care and Maintenance of Captive Sea Turtles. Available at: https://www.fws.gov/southwest/es/TexasCoastal/docs/2019_Standard_Conditions_for_Care_of_Sea_Turtles.pdf.

USFWS and NOAA Pacific Islands Fisheries Science Center (PIFSC). 2019. Standard Research Protocols for Nesting and Basking Marine Turtles in the Pacific Islands Region. Unpublished protocol, 2020, attached.

USFWS and NOAA PIFSC. 2020. Specialized Research Protocols for Nesting and Basking Marine Turtles in the Pacific Islands Region. Unpublished protocol, 2020, attached.

Species-Specific Internet Links:

Eckert, K. L., K. A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly (Editors). 1999. Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4. Available at: https://portals.iucn.org/library/sites/library/files/documents/1999-076.pdf.

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:
FWS/IR09/IR12/AES/RecoveryTE-72088A-3

LIST OF AUTHORIZED INDIVIDUALS
Recovery Permit TE-72088A-3
National Marine Fisheries Service, Pacific Islands Fisheries Science Center

1. Individuals authorized to independently conduct all authorized activities for all species under this permit throughout all geographic areas authorized in permit:

   a. NOAA NMFS Pacific Islands Fisheries Science Center (all individuals are co-investigators): Camryn D. Allen, Alexander Gaos, T. Todd Jones, Summer L. Martin, Shawn K.K. Murakawa, Alexandra S. Reininger, Jan Willem Stamen, and Marylou Staman.

   b. Pacific Islands Fisheries Science Center: Michelle Barbieri (Co-Investigator, Veterinarian) and Claudia Cedillo (Co-Investigator, Veterinary Technician).

   c. Contracted Veterinarians: Meghan Barrett (Co-Investigator, Veterinarian), Agnes Horvath (Co-Investigator, Veterinarian), Gregg Levine (Co-Investigator, Veterinarian), Paul McCurdy (Co-Investigator, Veterinarian), Ednee Yoshioka (Co-Investigator, Veterinarian), and Thierry Work (Co-Investigator, Veterinarian).

   d. Hawai'i Department of Land and Natural Resources, Division of Aquatic Resources: Michelle (Mimi) Olry (Co-Investigator, Veterinarian).

2. Individuals authorized to independently conduct rehabilitation only with off-site supervision and all authorized activities except esophageal lavage, laparoscopy, blood collection from hatchlings, and egg collection for incubation of sea turtles throughout all geographic areas authorized in permit:

   a. NOAA NMFS Pacific Islands Fisheries Science Center (all individuals are Co-investigators): Brittany Clemans, Andrew Glinsky, Christy Kozama, Rob McLean, Erik Norris, Natalie Paliga, Hope Ronco, and Allison Sommer.

   b. NOAA NMFS Pacific Islands Regional Office: Jamie Thomton (Co-Investigator).

   c. USFWS Guam National Wildlife Refuge: Tammy Summers (Co-Investigator).

d. CNMI Department of Marine and Wildlife Resources: Jessy Hapdei (Co-Investigator.

e. American Samoa Department of Marine and Wildlife Resources: Mark MacDonald (Co-Investigator).

f. Maui Ocean Center Marine Institute: Tommy Cutt (Co-Investigator).

g. University of Hawaiʻi, Hilo: Jennifer L. Simms (Co-Investigator).

h. University of Hawaiʻi, Maui: Donna Brown (Co-Investigator).

i. University of Hawaiʻi, Mānoa: Josefa Munoz (Co-Investigator).

j. Hawaiʻi Preparatory Academy, Sea Turtle Research Program: Laura Jim (Co-Investigator), Marc Rice (Co-Investigator).

k. West Hawaiʻi Explorations Academy: Lauren Kurpita (Co-Investigator).

l. Independent Researcher: Jen Homcy (Co-Investigator).

3. Individuals authorized to independently conduct all authorized activities except rehabilitation, esophageal lavage, ultrasound, laparoscopy, oxytetracycline injection, blood collection from all life-stages, egg collection for incubation of sea turtles, and all leatherback sea turtles activities throughout all geographic areas authorized in permit:

a. USFWS, Pacific Islands Fish and Wildlife Office: Sheldon Plentovich (Co-Investigator).

b. USFWS Papahānaumokuākea Marine National Monument (all individuals are Co-Investigators): Elizabeth N. Flint and Daniel Link.

c. USFWS Midway Atoll Marine National Monument (all individuals are Co-Investigators): Eldridge Naboa (Deputy Refuge Manager), Rachel Santulli, and Morgan Walter.

d. USFWS James Campbell National Wildlife Refuge: Kelly L. Goodale (Co-Investigator).

e. USFWS Palmyra Atoll Marine National Monument: Stephan Kropidlowski (Co-Investigator).

f. USFWS Rose Atoll Marine National Monument: Brian Peck (Co-Investigator).

g. USNPS, Kaloko-Honokōhau National Historical Park: Sallie Beavers (Co-Investigator).

h. Pūlama Lānaʻi: Christina Donehower (Co-Investigator).

i. Independent Researcher: Debbie Herrera (Co-Investigator).

j. Hawaiʻi Island Hawksbill Project: Kelleigh Downs (Co-Investigator).

k. Maui Ocean Center: Don McLeish (Co-Investigator).

l. U.H. Mānoa: Alison (Eley) Meeth (Co-Investigator).

4. Supervised individuals (*i.e.,* individuals not authorized above) may conduct activities pursuant to this permit only under the direct, on-site supervision of an authorized individual listed above. "On-site supervision" is defined as having the authorized individual at a distance close enough to enable the authorized individual to immediately assist a supervised individual, as needed, while the supervised individual is conducting an authorized activity. The U.S. Fish and Wildlife Service recommends that each supervised individual receive instructions and/or training before attempting to conduct an authorized activity.

5. To request personnel changes to this List, refer to the Authorized Individuals section in the associated recovery permit.

Signature and Date: for ______________________________
Field Supervisor

This List is valid only if it is dated on or after the permit issuance date. The associated recovery permit will be considered invalid without this List attached.

Standard Research Protocols for Nesting and Basking Marine Turtles in the Pacific Islands Region

These protocols apply to research involving:

Green Turtle (*Chelonia mydas*) Nesting and Basking in the Central North Pacific DPS (T), Central South Pacific DPS (E) and Central West Pacific DPS (E)

Hawksbill Turtle (*Eretmochelys imbricata*) Nesting on Pacific Ocean Islands under US Jurisdiction (E)

Olive Ridley Turtle (*Lepidochelys olivacea*) Nesting on Pacific Ocean Islands under US Jurisdiction (E)

Leatherback Turtles (*Dermochelys coriacea*) Nesting on Pacific Ocean Islands under US Jurisdiction (E)

USFWS Pacific Islands Fish and Wildlife Office

and

NOAA Pacific Islands Fisheries Science Center

2019

TABLE OF CONTENTS

DOCUMENT OVERVIEW AND AUTHORIZATIONS
This document covers the general protocols and activities related to terrestrial research on marine turtles in the Pacific Islands, including the Hawaiian Archipelago, Mariana Archipelago, American Samoa and associated islands, and the Fish and Widlife Refuges and Marine National Monuments in the Pacific.

Note that individuals or organizations granted permits are not necessarily authorized to conduct all of the activities listed in this document:

- Check boxes are included to the left of certain research activities.
- The permittee is only authorized to conduct that activity if the check box has been marked.
- If the checkbox has not been marked, the permittee is not authorized to conduct that activity.
- If there is no checkbox next to a guideline or activity, the permittee are required to adhere to directions stated therein.

A separate research proposal must be submitted for any research activities not covered in this protocol. Permittees must demonstrate training and experience to be authorized for select activities. If individuals want to conduct research on activities for which they do not have experience, they can contact the NOAA Pacific Islands Fisheries Science Center's (PIFSC) Marine Turtle Biology and Assessment Program (MTBAP) (nmfs.pic.MTBAP@noaa.gov) to learn how to receive the necessary training.

Copies of all raw data collected under this permit must be provided on an annual basis by January of the following calendar year to:

- USFWS Pacific Islands Fish and Wildlife Office (PIFWO) – Recovery Permit Coordinator, Email: FW1PIE_RecPermitAnnRpt@fws.gov
- NOAA's PIFSC MTBAP – Email: nmfs.pic.MTBAP@noaa.gov

1. GENERAL MONITORING PROTOCOLS

Permittees must always use care when handling live animals to minimize stress and injuries (Phelan and Eckert, 2006). In the event of an emergency, contact:

- HAWAIIAN ARCHIPELAGO and areas not specifically listed below - Hawai'i Marine Animal Response Hotline at (888) 256-9840
- GUAM – Guam Division of Aquatic and Wildlife Resources (671) 735-3955 ext. 6;
- COMMONWEALTH of the NORTHERN MARIANA ISLANDS – CNMI Division of Fish and Wildlife's Sea Turtle Program Stranding Hotline at (671) 287-8537 or (671) 472-7200
- AMERICAN SAMOA - American Samoa Department of Marine and Wildlife Resources at (684) 633-4465 or (684) 633-5102)

1.1. Nesting surveys and monitoring

1.1.1. Lights and clothing

1.1.1.1. Night surveys will be conducted using ambient light when possible. When necessary, a flashlight using red LED bulbs or fitted with a red filter can be used (Witherington and Martin, 1996; Choi and Eckert, 2009). When feasible, night-vision goggles are recommended in lieu of red light.

1.1.1.2. Use of cell phones, tablets or any other light emitting electronic with the exception of GPS units, PIT scanners and other approved research electronics) is prohibited during night surveys.

1.1.1.3. Dark clothing is to be worn during night surveys (Chacon et al., 2008).

1.1.2. Nesting turtles

1.1.2.1. Marine turtles attempting to nest should not be approached or restrained for research activities prior to initiating oviposition (see section 1.1.3.2 and section 2 for exceptions).

☐ 1.1.2.2. Permittees may approach a nesting turtle to confirm the status of nesting activity phase (e.g., excavating nest chamber, laying eggs, etc.). These should consist of brief approaches by a single person approaching from the rear of the turtle (Yanez, Gaos, and Arauz 2006).

☐ 1.1.2.3. Permittees may approach a nesting turtle for workup (see section 1.2.2. for authorizations) once oviposition has initiated.

☐ 1.1.2.4. In situations where a turtle does not deposit eggs and is returning to the sea, the turtle can be briefly restrained for workup (see section 1.2.2.).

1.1.2.5. At all times other than those referenced above, permittees should remain out of sight of nesting turtles, including at least 30 feet (Pierre-nathoniel, 2006), or as far as possible if working on small beaches (i.e., where 30 feet is unavailable).

1.1.3. Hatchlings

1.1.3.1. Do not touch or interfere with hatchlings as they emerge from the nest or crawl to the ocean. Objects that present a major barrier to a hatchlings ability to reach the ocean may be cleared.

1.1.3.2. Keep a minimum distance of 10-feet away from hatchlings emerging from the nest and crawling from the beach to the water. See exceptions in sections 1.1.3.3. and 4.2.

☐ 1.1.3.3. Hatchlings that are in immediate danger from a threat (e.g., entrapment, depredation) can be moved the minimum distance necessary to avoid the threat and immediately allowed to continue their natural post-hatching activity.

1.1.4. Filming and photography

1.1.4.1. Use of artificial white light or flashes for filming or photos is strictly prohibited due to potential adverse impacts on both adults and hatchlings (Witherington and Martin, 1996).

1.1.4.2. A camera capable of infrared photo or videography can be used.

1.1.4.3. Any photos or filming must maintain a minimum distance of 10 feet from hatchlings and 30 feet from basking or nesting turtles.

☐ **1.2. Retention of nesting females and basking turtles**

1.2.1. *Start of retention:* For nesting turtles, flipper tagging, tissue sampling and electronic tag application shall be initiated after completion of successful nesting or when a turtle abandons a nesting attempt (Balazs and Chaloupka, 2004; Jones et al., 2013). Basking turtles may be retained for the aforementioned purposes at any time.

1.2.2. *Data collection:* Nesting females (after completing oviposition) and basking turtles may be restrained for short periods of time (not to exceed 15 minutes), with the exception of section 1.2.3 to:

- ☐ 1.2.2.1. Record standard morphometric measurements (Eckert et al., 1999)
- ☐ 1.2.2.2. Check for Inconel flipper and passive integrated transponder (PIT) tags
- ☐ 1.2.2.3. Attach Inconel flipper tags (Eckert and Beggs, 2006)
- ☐ 1.2.2.4. Insert PIT tags (Eckert and Beggs, 2006)
- ☐ 1.2.2.5. Take biopsy tissue sample (Dutton et al., 1996)
- ☐ 1.2.2.6. Remove previously applied electronic tags (Mitchell, 2000a)

☐ 1.2.3. *Electronic tags:* Nesting female or basking turtles may be restrained for up to four hours to attach electronic tags (Mitchell, 2000b; Jones *et al.*, 2011; Martin, Gaos and Jones, 2018). See section 2.3 for details.

☐ **1.3. Handling of eggs**

1.3.1. *Clutches at risk*: Eggs that have a high probability (>80%) of inundation or erosion can be moved up to six hours after oviposition (LeBlanc et al., 2012), but care must be taken to maintain the axial orientation of each egg to avoid killing the embryos (Limpus, Baker and Miller, 1979).

1.3.2. *Sanitation:* All egg handling must be done with sanitary latex or nitrile gloves and hands should be clean of all chemical residues (e.g., sunscreen, insect repellent, etc.).

1.4. Fibropapilloma (FP) considerations

When tagging or sampling green turtles displaying FP tumors or lesions, the permittee must:

1.4.1. *Equipment:* Maintain a separate set of equipment for use on animals displaying FP tumors or lesions.

1.4.2. *Sanitation:* Clean all equipment (tagging supplies, calipers, tape measures, razor blades, etc.) using 70% alcohol (isopropyl or ethanol) or a surgical scrub (e.g. betadine scrub or chlorhexidine gluconate) prior to reuse.

2. MARKING AND TAGGING

2.1. Short-term turtle marking (shell painting and etching)

Shell painting and etching (hardshell species only) provides a temporary marking that allows researchers to distinguish between turtles on a beach and subsequently, while at sea.

☐ 2.1.1. *Etching and painting techniques:* An etching tool (e.g., Dremel Moto-Tool) with a "pear-shaped" bit can be used to place an etch or groove in the carapace (Hogarth, 2007). Non-toxic paint can be applied to the etching or directly to a non-etched shell (Hogarth, 2007).

☐ 2.1.2. *Basking turtles:* basking turtles may be approached when crawling up the beach or while basking in order to apply temporary paint or shell etchings.

☐

2.1.3. *Nesting turtles:* Nesting turtles can be temporarily marked using paint or shell etching once completing oviposition. In situations where a turtle does not deposit eggs and is returning to the sea (i.e., false crawl), the turtle can be briefly restrained for workup (see section 1.2.2)(Hogarth, 2007)

2.2. Long-term turtle marking (Inconel and PIT tags)

☐ 2.2.1. *Previous tags:* All marine turtles should be examined for existing tags. If existing tags are found, the tag identification code (and tag location) should be recorded.

☐ *2.2.2. Inconel flipper tags*

2.2.2.1. *Tag preparation:* Prior to use, the oily residue from the manufacturing of the Inconel should be removed by cleaning the tags in hot soapy water and rinsing, or soaking in alcohol (Eckert and Beggs, 2006).

2.2.2.2. *Sanitation:* Identify where the tag will be applied and clean the area with 70% alcohol (isopropyl or ethanol) or a surgical scrub (e.g. betadine scrub or chlorhexidine gluconate).

2.2.2.3. *Tag placement:* Inconel flipper tags can be applied along the trailing edge of both front or rear flippers. The placement of tags varies (Van Dam and Diez, 1999) and can follow historical placement of individual projects. Tags on front flippers can be attached adjacent to or through the first or second large scales. On the hind flippers, the tagging site is adjacent to or through the first large scale. In general, placing a tag closer to the axilla will minimize tag loss (Eckert and Beggs, 2006). Attach Inconel tags so they extend from the edge of the flipper by approximately 25% the length of the tag (Van Dam and Diez, 1999; Eckert and Beggs, 2006). Ensure the tag is placed with the tag number facing upwards.

2.2.2.4. *Tag securement:* Once the tag has been attached, turn the flipper over and examine the bottom of the tag to confirm that the tag has penetrated and that the tip (tine) is completely bent over and secure. An Inconel tag that is not secure can often be re-crimped with the tagging pliers. If this fails, remove the tag carefully and try again with a new tag, using the same puncture hole if possible (Eckert and Beggs, 2006).

☐ *2.2.3. PIT tags*

2.2.3.1. *Sanitation:* Identify where the tag will be applied and clean the area with 70% alcohol (isopropyl or ethanol) or a surgical scrub (e.g. betadine scrub or chlorhexidine gluconate).

2.2.3.2. *Tag placement:* PIT tags can be injected to both rear or front flippers, or in the shoulder areas (Eckert and Beggs, 2006). The syringe containing the PIT tag should be inserted at a seam between scales so the tag is placed between phalanges.

2.2.3.3. *PIT insertion and sanitation:* Insert the needle at an acute angle parallel with the skin of the flipper, with the needle directed proximally (toward the turtle) and the terminal opening of the needle should face upward). Once the plunger has been used to insert the tag and the needle has been withdrawn, place a piece of cotton or gauze with 70% alcohol (isopropyl or ethanol) or a surgical scrub (e.g. betadine scrub or chlorhexidine gluconate) over the needle entry point and maintain pressure for approximately one minute, or longer if bleeding occurs.

2.2.3.4. *Tag confirmation:* Swipe the PIT tag reader over the tagged flipper to confirm the tag is working and the tag number has been properly recorded.

☐ **2.3. Electronic tags (satellite telemetry, radio/sonic, archival)**

Satellite telemetry, radio/sonic and archival tags may only be attached to the carapace of a turtle. See section 1.2 for information on restraining times.

2.3.1.1. *Conditions:* During the time that a nesting turtle is held for electronic tag attachment, it should be kept in shaded area to avoid overheating and a damp cloth should be placed over its eyes to reduce stress.

2.3.1.2. *Methods:* Follow established electronic tag attachment methods (e.g., (Mitchell, 2000a; Jones *et al.*, 2018)

2.3.1.3. *Lighting:* White light is permitted during sat tag application.

3. BIOLOGICAL SAMPLING

All biological samples collected via this permit are to be archived at the Pacific Islands Fisheries Science Center (PIFSC).

☐ **3.1. Skin sampling**

3.1.1. *Method:* A new biopsy punch or razor blade should be used to remove a superficial tissue (~6mm diameter) from the shoulder/neck area or from the hind flippers (Dutton et al., 1996).

3.1.2. *Number of samples:* Two skin samples can be collected from each turtle.

3.1.3. *Sanitation:* Thoroughly clean the tissue surface with 70% alcohol (isopropyl or ethanol) or a surgical scrub (e.g. betadine scrub or chlorhexidine gluconate) prior to and after sampling.

☐ **3.2. Blood sampling**

3.2.1. *Method:* A blood sample (≤ 5mL/kg) can be collected by inserting a sterile needle into the venous sinus on the lateral dorsal region of the neck (Bentley and Dunbar-Cooper, 1980; Owens and Ruiz, 1980).

3.2.2. *Number of samples:* No more than two attempts will be made per dorsal sinus (4 attempts total per turtle) and a new needle will be used between blood sampling attempts.

3.2.3. *Sanitation:* Thoroughly clean the tissue surface with 70% alcohol (isopropyl or ethanol) or a surgical scrub (e.g. betadine scrub or chlorhexidine gluconate) prior to and after sampling.

☐ **3.3. Scute sampling**

3.3.1. *Method:* Scrapings (<0.5mm) can be collected from the central or posterior lateral scutes of hard-shelled turtles to collect keratin (Cardona, Aguilar and Pazos, 2009).

3.3.2. *Precautions:* Avoid (1) portions of the scute that have had previous injury, (2) scute seams, and (3) scraping too deeply.

☐ **3.4. Fibropapilloma sampling**

Tumor biopsies can be taken using the same biopsy procedure as described for skin sampling (see section 3.1)

☐ **3.5. Oral swabs**

A clean cotton swab can be rubbed inside the mouth to collect saliva samples.

☐ **3.6. Cloaca Swab**

A clean cotton swab can be moistened with saline solution and gently inserted into the cloaca of adult turtles to collect cloacal samples

3.7. Urine and/or fecal collection

Place a plastic conical tube or bag on or near the cloaca/penis when the animal is seen urinating or defecating (Amorocho and Reina, 2007).

☐ **4. NEST EXCAVATIONS**

Nests may be excavated to collect data on outcome and to rescue any trapped hatchlings.

4.1. Excavation dates/times

4.1.1. *Observed hatches:* Excavations will not be conducted until at least 24 hours after a hatchling emergence has taken place.

☐ 4.1.2. *Unobserved hatches:* Nests that have been previously marked and continuously monitored, or that appear to have previously hatched (i.e., sand depression, scattered eggs shells, etc.), the permittee is authorized to excavate them after a certain time period. However, incubation periods can vary within and among years and species. Hawksbill incubation periods in Pacific Islands average 63 days, but range from 49 to 91 days. Green turtle incubation periods in Pacific Islands average of 70 days, but range from 54 to 91 days. Given this context, whenever possible the permittee should use the incubation period of other nests that have been monitored and successfully hatched during a similar time period as a proxy for when the unhatched nest can be excavated. If such information is not available, the permittee must wait a minimum of 70 days and 80 days before attempting to excavate a hawksbill or green turtle nest, respectively. At that time the permittee should carefully dig up the sand until reaching the first few eggs and examine their condition. If they are sealed and white, indicating the eggs are potentially still incubating, they should be recovered and given an additional week prior to repeating the process. Nests can be excavated without reservation at 92 days for hawksbills and 100 days for green turtles.

4.2. Live hatchlings

All hatchlings found to be trapped in their nest by natural or manmade impediments should be held in a covered container (i.e., remain in the dark) until excavation of that nest has been completed. Upon completion of nest excavation, hatchlings should be immediately placed approximately two meters above the high tide line and allowed to crawl to the ocean on their own.

4.3. Samples

Unhatched eggs and dead hatchlings will be sent to the PIFSC for archiving and analysis unless otherwise specified. The contents from each nest must be placed in an individual bag (i.e., contents from two or more nests should never be placed in the same bag). Each bag should be labelled with the following information (at minimum):

4.3.1. Date of excavation
4.3.2. Location of nest
4.3.3. Name of person conducting the excavation.
4.3.4. Any other information associated with the nest (i.e., nest monitoring data sheet, nest excavation data sheet.

☐ **4.4. Egg categories**

For nests being inventoried in the field, data should be recorded on the number of:

4.4.1. Empty egg shells (only count those consisting of >50% of shell)
4.4.2. Dead hatchlings found in the nest
4.4.3. Live hatchlings found in the nest.
☐ 4.4.4. In cases where the permittee has been authorized to open whole eggs found in the nest instead of sending them to PIFSC, the contents of eggs can be categorized as follows:
  4.4.4.1. Undeveloped – no signs of embryonic development.
  4.4.4.2. Developed – signs of embryonic development
  4.4.4.3. Pipped – eggs that have holes and often contain ants, larvae, etc.
4.4.5. Nest predation: Note if there are any obvious signs of nest predation (e.g., mongoose, rats, etc.).

4.5. Nest remnants

Unless otherwise permitted, all remnants of the excavated nests that are not being submitted to PIFSC will be placed in the original nest chamber or reburied along the beach in order to maintain natural beach nourishment regimes (Lutz, Musick and Wyneken, 2003).

REFERENCES

Amorocho, D. F. and Reina, R. D. (2007) 'Feeding ecology of the East Pacific green sea turtleChelonia mydas agassiziiat Gorgona National Park, Colombia', *Endangered Species Research*, 3, pp. 43–51. doi: 10.3354/esr003043.

Balazs, G. H. and Chaloupka, M. Y. (2004) 'Spatial and temporal variability in somatic growth of green sea turtles (Chelonia mydas) resident in the Hawaiian Archipelago', *Marine Biology*, 145(5), pp. 1043–1059. doi: 10.1007/s00227-004-1387-6.

Bentley, T. B. and Dunbar-Cooper, A. (1980) 'A blood sampling technique for sea turtles', *National Marine Fisheries Service*, p. 14. Available at: https://www.sefsc.noaa.gov/turtledocs/CR_Bentley_Dunbar-Cooper_1980.pdf.

Cardona, L., Aguilar, A. and Pazos, L. (2009) 'Delayed ontogenic dietary shift and high levels of omnivory in green turtles (Chelonia mydas) from the NW coast of Africa', *Marine Biology*, 156(7), pp. 1487–1495. doi: 10.1007/s00227-009-1188-z.

Chacon, D. *et al.* (2008) 'Manual sobre técnicas de manejo y conservación de las tortugas marinas en playas de anidación de Centroamérica', *Secretaria Pro Tempore de la Convención Interamericana para la Protección y Conservación de las Tortugas Marinas (CIT)*, p. 51.

Chacón, D. *et al.* (2007) 'Manual para el manejo y la conservación de las tortugas marinas en Costa Rica; con énfasis en la operación de proyectos en playa y viveros', *Sistema Nacional de Areas Protegidas*, p. 98.

Choi, G.-Y. and Eckert, K. L. (2009) 'Manual of Best Practices for Safeguarding Sea Turtle Nesting Beaches', *WIDECAST Technical Report No. 9*, (9), p. 86.

Van Dam, R. P. and Diez, C. E. (1999) 'Differential tag retention in Caribbean hawksbill turtles.pdf', *Chelonia Conservation and Biology*, 3(2), pp. 225–220.

Dutton, P. H. *et al.* (1996) 'Molecular phylogeny for marine turtles based on sequences of the ND4-leucine tRNA and control regions of mitochondrial DNA', *Molecular Phylogenetics and Evolution*, 5(3), pp. 511–521. doi: 10.1006/mpev.1996.0046.

Eckert, K. L. *et al.* (1999) *Research and Management Techniques for the Conservation of Sea Turtles Prepared by IUCN / SSC Marine Turtle Specialist Group*. 4. Available at: http://mtsg.files.wordpress.com/2010/11/techniques-manual-full-en.pdf.

Eckert, K. L. and Beggs, J. A. (2006) 'Marine Turtle Tagging - A Manual of Recommended Practices', *WIDECAST Technical Report #2*, (2), p. 40 pp.

Hogarth, W. T. (2007) *Issuance of Endangered Species Act section 10(a)(1)(A) permits for scientific research on endangered and threatened sea turtles in the North Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. Draft.*

Jones, T. T. *et al.* (2011) *Determining transmitter drag and best practice attachment procedures for sea turtle biotelemetry studies*.

Jones, T. T. *et al.* (2013) 'Calculating the ecological impacts of animal-borne instruments on aquatic organisms', *Methods in Ecology and Evolution*, 4, pp. 1178–1186. doi: 10.1111/2041-210X.12109.

Jones, T. T. *et al.* (2018) *Platform Transmitter Terminal (PTT) application and deployment protocol for hard-shelled marine turtles around the Pacific Islands Region*.

Kamel, S. J. (2013) 'Vegetation cover predicts temperature in nests of the hawksbill sea turtle: Implications for beach management and offspring sex ratios', *Endangered Species Research*, 20(1), pp. 41–48. doi: 10.3354/esr00489.

LeBlanc, A. M. *et al.* (2012) 'Nest Temperatures and Hatchling Sex Ratios from Loggerhead Turtle Nests Incubated Under Natural Field Conditions in Georgia, United States', *Chelonian Conservation and Biology*, 11(1), pp. 108–116. doi: 10.2744/CCB-0915.1.

Limpus, C. J., Baker, V. and Miller, J. D. (1979) 'Movement induced mortality of loggerhead eggs', *Herpetologica*, 35(4), pp. 335–338. Available at: http://apps.isiknowledge.com/full_record.do?product=WOS&search_mode=GeneralSearch&qid=18&SID=Y1oMaNCiIC6Mo5M7PH6&page=12&doc=119.

Lutz, P. L., Musick, J. A. and Wyneken, J. (2003) *The Biology of Sea Turtles, vol. II*.

Martin, S. L., Gaos, A. R. and Jones, T. T. (2018) *Sea turtle tagging in the Mariana Islands Training and Testing (MITT) study area*. PIFSC Data Report DR-18-001.

Mitchell, S. V (2000a) 'Use of epoxy in telemeter attachment', *Eighteenth International Sea Turtle Symposium*, NOAA Techn, pp. 254–255.

Mitchell, S. V (2000b) 'Use of epoxy in telemeter attachment', *Eighteenth International Sea Turtle Symposium*, NOAA Techn, pp. 254–255. Available at: https://www.researchgate.net/profile/Jeanne_Mortimer/publication/242254174_SEA_TURTLES_IN_THE_REPUBLIC_OF_SEYCHELLES_AN_EMERGING_CONSERVATION_SUCCESS_STORY/links/5579c12808ae75215871788c.pdf#page=277.

Owens, D. W. and Ruiz, G. J. (1980) 'New methods of obtaining blood and cerebrospinal fluid from marine turtles', *Herpetologica*, 36, pp. 17–20. Available at: http://www.seaturtle.org/PDF/Owens_1980_Herpetologica.pdf.

Phelan, S. M. and Eckert, K. L. (2006) *Marine Turtle Trauma Response Procedures : A Husbandry Manual Prepared by the Wider Caribbean Sea Turtle Conservation*, *WIDECAST*.

Pierre-nathoniel, D. (2006) 'How to behave around sea turtles', *Ministry of Agriculture, Forestry and Fisheries of Saint Lucia*, p. 18.

Witherington, B. E. and Martin, R. E. (1996) *Understanding, assessing, and resolving light-pollution problems on sea turtle nesting beaches*, *Florida Marine Research Publications*.

Yanez, I. L., Gaos, A. R. and Arauz-Vargas, R. (2006) *Protocol Manual, Playa Caletas, Costa Rica*, *Programa Restauracion de Tortugas Marinas*.

Specialized Research Protocols for Nesting and Basking Marine Turtles in the Pacific Islands Region

These protocols apply to research involving:

Green Turtle (*Chelonia mydas*) Nesting and Basking in the Central North Pacific DPS (T), Central South Pacific DPS (E) and Central West Pacific DPS (E)
Hawksbill Turtle (*Eretmochelys imbricata*) Nesting on Pacific Ocean Islands under US Jurisdiction (E)
Olive Ridley Turtle (*Lepidochelys olivacea*) Nesting on Pacific Ocean Islands under US Jurisdiction (E)
Loggerhead Turtle (*Caretta Caretta*) Nesting on the Central North Pacific DPS (E)
Leatherback Turtles (*Dermochelys coriacea*) Nesting on Pacific Ocean Islands under US Jurisdiction (E)

USFWS Pacific Islands Fish and Wildlife Office
and
NOAA Pacific Islands Fisheries Science Center

2020

TABLE OF CONTENTS

Recommended document citation:
USFWS & NOAA 2020. Specialized Research Protocols for Marine Turtles in the Pacific Islands Region. U.S. Fish and Wildlife Service's Pacific Islands Fish and Wildlife Office, Honolulu, HI, USA. 9 p.

General statement
This document outlines the protocols to be followed during specialized terrestrial research conducted by the National Oceanic and Atmospheric Administration (NOAA) in the Pacific Islands Region (PIR). It is an appendix to USFWS permit #TE-72088A-2 for specific research studies on an as-needed basis. All the procedures outlined in this document will only be performed by trained individuals or under the direct supervision of trained individuals. The time limit for each activity is provided Table 1 (additional time details may be provided in the individual sections). All turtles will be released in the vicinity of their original capture location once the procedures are completed.

Table 1. Activities included in this protocol, followed by the life stage of turtles on which the procedure can be performed and the maximum time limit for each activity.

Activity	Performed on	Time limit
Esophageal lavage	I, M, F	20 min.
Ultrasound	M, F	20 min.
Laparoscopy	I, M, F	30 min.
Blood sampling	H, I, M, F	10 min.
Oxytetracycline injection	I, M, F	10 min.
Temperature data loggers	E	10 min.
Egg collection/transportation	E	3-5 d.
Hatchling sampling	H	3 hrs.
Hatchling collection	H	5 d.
Captive rearing	H, I	N/A
Unmanned aerial systems	H, I, M, F	1 hr.

H = hatchling, I = immature (juvenile, subadult), M = male (adult), F = female (adult), E = Eggs

1. **Esophageal lavage** (Adapted from Forbes 1999 and NOAA 2008)

Esophageal lavages will be performed on healthy turtles to collect food samples for diet analysis (Balazs, 1980; Forbes 1999; Seminoff *et al.*, 2002). For the procedure, turtles will be placed in an inverted position (carapace down) on a cushioned surface, with their posterior end slightly elevated such that the head is lower than the body, allowing gravity to assist with collection of esophageal contents. The front flippers will be restrained by staff to prevent the animal from moving during the procedure and the head will be held so that the neck and esophagus remain in line with the longitudinal axis of the body. The turtle will be prompted to open its mouth by gently tugging on the skin of the ventral neck surface, at which time an avian veterinary speculum will be used to keep the mouth open. Two lubricated (e.g., vegetable oil) plastic tubes (details below) will be inserted into the esophagus and gently slid into the forestomach. Seawater will be introduced through a tube (see below) using a manual hand pump at low pressure and a second tube will act as the retrieval tube. The water will flush out food contents from the esophagus and anterior crop, which will be caught using a mesh bag overlying a bin or other receptacle.

The ends of tubes will be smoothed by melting them with a flame and allowing them to cool prior to use, ensuring that the tubing will not damage the walls of the esophagus during insertion. Prior to insertion into the esophagus, tubes will be aligned along the exterior of the turtle to pre-measure the distance to the caudal margin of the pectoral scute of the plastron, roughly corresponding to the level of the stomach. This distance will be marked on the tube with either tape or erasable marker and tubes will be passed no farther than this mark. The water introduction tube will have a diameter of 1/2 – 5/8 inches, while the retrieval tube will have an external diameter of 5/8 – 1 inches, depending upon the size of the turtle. Equipment (e.g., lavage tubes) will be cleaned using 70% alcohol (isopropyl or ethanol) between animals. A separate set of equipment will be used for turtles with fibropapilloma tumors. The actual lavage (i.e., tubes inside turtle esophagus) of an individual turtle will not exceed three minutes.

2. **Ultrasound** (Adapted from Owens 1999)
Ultrasound will determine the sex and reproductive status of adult turtles (Blanvillain *et al.*, 2011; Pease *et al.*, 2010). Turtles will be placed in an inverted position on a cushioned surface. Ultrasound gel will be applied to the skin of the left/right hip (inguinal) region, cranial to the femurs but lateral to the plastron. An ultrasound machine will be used to visualize the gonads (testes/epididymis or ovaries).

3. Laparoscopy (Adapted from Owens 1999 and NOAA 2008)
Laparoscopy will confirm the sex and reproductive status of turtles (Wood et al., 1983; Owens 1999). Prior to the procedure, the turtle will be inverted on a cushioned surface and a surgical scrub (alternating 70% ethanol and iodine scrubs) will be used to sanitize the skin area over the prefemoral fossa, then a general anesthetic (lidocaine, maximum 2mg/kg; NOAA 2008) will be injected into the muscle. The lidocaine will be permitted to act for a minimum of 10 minutes, at which time a 1-2 cm incision will be made over the prefemoral fossa. The turtle will then be inverted and a trocar will be inserted into the peritoneal cavity. Insufflation of the body cavity may be necessary for visualization of internal organs and air will be expelled after gonadal examination (intracelomic fluids may also be administered to displace air). A laprascope will be inserted to visualize the gonads and confirm sex and reproductive status. After gonads are visualized, the turtle will be returned to a horizontal position and the incision area will be sutured [nominally absorbable, suture sizes 2-0, 3-0, or 4-0 (US Pharmacopeia) depending on turtle size] using a mattress-pattern closure. An anti-inflammatory drug (non-steroidal) may be administered to mitigate post-procedure pain. Turtles will be monitored for five minutes after laparoscopy completion for normal activity prior to release. The exception would be if a turtle is extremely active or thrashing (and potentially causing harm), under such a scenario the turtle would be immediately released. Laparoscopy should take approximately 15 min to perform. General anesthetic can be administered in special cases and will be done under the direction of a veterinarian. If a general anesthetic is administered, turtles will be monitored until responsive and exhibiting normal behavior (recovery could take approximately an hour). We will not conduct laparoscopy on animals that appear to be compromised (e.g., unhealthy).

4. Blood sampling (adapted from Owens 1999)
Blood samples will be collected from turtles (Owens 1999) to support research into genetics, health status (e.g. contaminant load, nutritive status, etc.), stable isotopes, and/or sex determination. Prior to the extraction of blood the turtle will be restrained and its posterior will be lifted (when feasible) to facilitate blood flow to the neck area. Neck skin will be disinfected using 70% alcohol (isopropyl or ethanol) and either a syringe and needle (hatchlings) or a vacuum tube with needle (all life stages other than hatchlings) will be inserted to draw blood (Owens and Ruiz 1980). For hatchlings, a total of < 0.05 mL of blood will be collected using a 27- or 29-gauge needle connected to a 1 mL syringe. For life stages other than hatchlings, < 3 mL/kg of blood will be collected using vacuum tube connected to a 21-23 gauge needle depending on size/mass of the turtle. The injection area will be wiped with an iodine scrub once the needle is removed.

5. Oxytetracycline injection
Oxytetracycline injection will help determine age and growth rates (Snover et al. 2011; Goshe et al. 2016)**.** For this procedure, both shoulder areas of turtles will be sanitized using 70% alcohol (isopropyl or ethanol). The antibiotic oxytetracycline (OTC) will subsequently be injected [dosage (mL) = Weight (kg) x 25 (mg/kg) / concentration (mg/mL); NMFS, 2008] into the shoulder muscle of both flippers). Upon complete work-up of the turtle it will be released. The OTC will create a 'stain' in the turtles' bones at a known point in time (time of injection). If the turtle is found in the future either dead-stranded or live-stranded but euthanized due to poor health, skeletochronology of the humeri bones will be used to help determine the turtle's age and growth rate.

6. Temperature data loggers
Temperature data loggers (e.g., Tidbits, Onset Computer Corporation, Bourne, MA, USA) will record nest temperature (Marcovaldi et al. 2014; Liles et al. 2019). To do so, when a female turtle is encountered depositing eggs, the data logger will be placed in the center of the clutch. The center of the clutch will be estimated via visual inspection or by placing two forefingers on the outside of the tail/cloaca and counting eggs (as they are deposited) until an egg count of ~40 eggs. At any point after the female has begun laying eggs a small opening of sand measuring approximately 5 x 5 inches along the edge of the nest may be removed via hand to facilitate access to the eggs, but will be filled in by the female when she covers her eggs. A cord of approximately 2 m in length will be attached to the data logger, with a water-proof tag attached to the other end and inscribed with relevant nest information (date, nest code, etc.). In areas without human presence, the tag end of the cord will be tied to a stationary object (e.g. marine debris or a rock) to prevent loss and facilitate recovery of the data logger. In areas with human presence, the tag will be buried just below the surface of the sand. All data loggers will be retrieved once hatchlings have emerged, typically during nest excavations.

7. Egg incubation
Eggs will be collected from nests and kept in incubators to determine the temperature that produces a 1:1 sex ratio (i.e., pivotal temperature) for turtles (Reinhold et al. 2017). Eggs can be

safely moved within 12 hours of oviposition without any ill effects on hatching success (Williamson et al. 2017a, 2017b; Rings et al. 2015), thus the maximum time for egg collection and placement in incubators under hyoxic conditions will be 3-5 days. Incubators will be located at one of three sites: 1) Tern Island (French Frigate Shoals), 2) Pacific Islands Fisheries Science Center – PIFSC (Honolulu) or 3) Underwater World Guam (Tumon). A predetermined number of eggs (depending on study) will be collected (using gloves) promptly after oviposition.

At Tern Island the incubators will be located adjacent to the egg collection site, thus eggs will be placed directly into bags and immediately transported to the nearby incubators (Eckert 1999; Rings et al. 2015). For incubators located at PIFSC or Underwater World Guam, where the eggs must be transported further distances, eggs will be placed under hypoxic conditions (Williamson et al. 2017a, 2017b), which halts embryonic development (i.e., hypoxia maintains preovipositional arrest and simulates extended egg retention in the mother's oviduct; Rafferty et al. 2013). To do so, groups of 10-20 eggs will be freed of sand and placed in vacuum sealable bags, which will then be sealed using a powered vacuum sealer (Bovolo vacuum sealer or comparable model; Williamson 2017a, 2017b; Rings et al 2015). Eggs will be double sealed (i.e., two bags per set of eggs) to ensure a vacuum tight seal. A cooler will be lined with sand, vermiculite or bubble wrap and the first set of eggs will be placed within the cooler. The first set of eggs will be covered with another layer of sand/vermiculite/bubble wrap and another set of eggs will be placed on top, and this method will be repeated until all eggs are stored. Ice packs will be placed at the bottom and the top of the cooler to help maintain low temperatures, which helps halt embryonic development until eggs can be placed in incubators (Harry and Limpus 1989; Rings et al. 2015).

Eggs will be placed in sand (7% moisture content by mass) within normoxic incubators (GQF HovaBator 1632 or a comparable model). The environmental regimes of the incubators will from 26-32℃ for C. mydas (Patrício et al. 2017) or 27-31℃ for E. imbricata (Mrosovsky et al. 2009). Humidity for both species will be kept between 25-50% distilled water (Di-H_2O) saturation of the sand (between ≈0.05 m3 m−3 and ≈0.10 m3 m−3) (Sifuentes-Romero et al. 2017). Once the hatchlings emerge from the eggs, they will be reared in captivity (see Captive Rearing section below) or released at the original egg collection site. For the latter, hatchlings will be placed in coolers or containers and transported via vehicle, small boat, or ship and released within 24 hours to 5 days (for NWHI) of emergence.

8. Hatchling sampling

Hatchlings will be sampled for genetic research into mating strategies (Stewart and Dutton 2014; Gaos et al. 2018). Hatchlings will be collected using latex gloves as they emerge from their nest or during nest excavations and placed in a container with approximately 2 cm of damp sand (collected from the nest site) placed in the bottom. Each hatchling's right front flipper will be extended over a cutting board and 70% alcohol (isopropyl or ethanol) will be used to sanitize the front flipper. A 2 mm biopsy tool will be used to take a small snip from the trailing edge of the front flipper and placed in a vial with saturated NaCl solution. The hatchling will be placed in a second container with 2 cm of sand (collected from the nest site) placed in the bottom until all hatchlings are sampled, at which time they will be released. Equipment will be cleaned using 70% alcohol (isopropyl or ethanol) between animals.

9. Hatchling collection (for captive rearing. Adapted from Higgins et al. 2003)
In addition to hatchlings produced via incubators, additional hatchlings may be collected from natural nests (i.e., incubated in-situ) for captive rearing (see below). We will avoid collecting hatchlings with visible deformities as they may exhibit stunted and slow growth, as well as feeding and behavioral problems (Higgins et al. 2003). Hatchlings will be collected using gloves as they emerge from their nest or during nest excavations. They will be immediately placed in commercially available plastic containers with lids. Ventilation holes will be made three-quarters of the way up the side of the container. The container will be lined with a piece of solid, open-cell foam rubber (carpet underpadding is the preferred foam type) and moistened with seawater. The hatchlings will be transported by vehicle, small boat, or ship to tanks at the PIFSC, Underwater World Guam, and/or Sea Life Park (SLP). All turtles will be shipped in a climate-controlled vehicle (23–30° C) with temperature and moisture checked regularly and adjusted as necessary. Temperature is vehicle controlled and additional moisture can be added using a fine mist from a spray bottle (Rings et al. 2015). Total time from hatchling collection until being placed in tanks should not exceed 10 days as this is the time period required for hatchling to completely absorb their yolk sac (Higgins 2003).

10. Captive rearing
Turtles will be reared to verify the effectiveness of sex determination techniques (i.e., hormone analysis of blood samples) and to conduct research on food intake and growth rates (Jones et al. 2011; Lemons et al. 2011). All turtles, including hatchlings collected in-situ or produced via incubators (see above), will be reared at approved facilities (e.g., PIFSC, Underwater World Guam, SLP and/or Tern (for short-term holding periods)). All facilities have comprehensive natural seawater systems (pumps, heater/cooler, UV sanitation system, water storage tanks, etc.) and several smooth-surfaced tanks that are large enough to allow for unimpeded movement and complete submersion of turtles. We will follow the detailed rearing protocols outlined in the, “Standard Permit Conditions for Care and Maintenance of Captive Sea Turtles" (USFWS 2013, unpublished report) unless otherwise noted.

11. Unmanned aerial systems
Unmanned aerial systems (UAS) will be used to conduct track counts and abundance estimates of sea turtles (Rees et al. 2018). Research will be carried out using fixed wing, long endurance UAS models or rotary, shorter endurance UAS models (e.g., APH-22 hexacopter) equipped with camera systems. All UAS platforms will be approved by the Federal Aviation Administration (FAA) and NOAA's Office of Marine and Aviation Operations (OMAO). The UAS will be controlled by a FAA licensed UAS pilot who has received UAS flight training by the OMAO. The UAS will be launched from a ship, small vessel, or suitable ground-based launch site and flights will remain in the line of sight of the UAS pilot. Airspace clearance for all operations will be coordinated and approved through FAA and NOAA’s Aircraft Operations Center (AOC) and a Notice of Intent to Fly (NIF) will be developed in coordination with AOC to ensure all operations are within proper limits.

The UAS may circle or hover directly over turtles to collect imagery (confirm species identification, age class, body condition, group size, identify potential social structure, conduct photogrammetry measurements, etc.), but rotary UAS flights will maintain a minimum distance of 20 ft from turtles in order to minimize incidental harassment or disturbance. Fixed-wing UAS platforms generally produce more noise than rotary platforms and thus fixed wing UAS activities will maintain a minimum distance of 50 ft from turtles. The maximum amount of time spent circling or hovering over a turtle using a rotary or fixed wing UAS will be one hour. If the targeted animal or group of animals display avoidance behavior in response to the presence of the UAS, such as accelerated transit, or other aberrant behaviors, the UAS will be immediately piloted out of the vicinity to minimize disturbance.

References:

Balazs GH (1980) Synopsis of Biological Data on the Green Turtle in the Hawaiian Islands. NOAA Tech. Memo. NMFS, NOAA-TM- NMFS-SWFC-7, and University of Hawaii Sea Grant Cooperative Report UNIHI-SEAGRANT CR-81-02.

Blanvillain G, Owens DW, Kuchling G (2011) Hormones and reproductive cycles in turtles. In: Hormones and Reproduction of Vertebrates, Volume 3-Reptiles. Elsevier Inc., pp 277–303.

Forbes, G.A. 1999. Diet Sampling and Diet Component Analysis, pp 144-148. In: Eckert, K. L., Bjorndal, K.A., Abreu-Grobois, F.A. and Donnelly, M. (Eds.) Research and Management Techniques for the Conservation of Sea Turtles, IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Gaos, A.R., Lewison, R.L., Jensen, M.P., Liles, M.J., Henriquez, A., Chavarria, S., Steward, K., Frey, A., Jones, T.T., Dutton, P.H. *2018*. Prevalence of polygyny in a critically endangered marine turtle population. *Journal of Experimental Marine Biology and Ecology.* 506: 91-99.

Goshe, L.R., Snover, M.L., Hohn, A.A., Balazs, G.H. (2016) Validation of back-calculated body lengths and timing of growth mark deposition in Hawaiian green sea turtles. Ecology and Evolution. 6(10): 3208-3215.

Harry J.L. and C.J. Limpus. 1989. Low-temperature protection of marine turtle eggs during long-distance relocation. Aust Wildl Res 16:317–320.

Higgins, B.M (1999) Sea Turtle Husbandry, pp 411-440 In: Eckert, K. L., Bjorndal, K.A., Abreu-Grobois, F.A. and Donnelly, M. (Eds.) Research and Management Techniques for the Conservation of Sea Turtles, IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Jones TT, Hastings MD, Bostrom BL, Pauly D, Jones DR (2011) Growth of captive leatherback turtles, *Dermochelys coriacea*, with inferences on growth in the wild: Implications for population decline and recovery. *J Exp Mar Bio Ecol* 399: 84–92.

Lemons, G.E., Lewison, R., Komoroske, L., Gaos, A.R., Lai, C., Seminoff, J.A. (2011) Trophic Ecology of green sea turtles in a highly urbanized bay: insights from stable isotopes and mixing models. *Journal of experimental marine biology and ecology*. 405: 25-32.

Liles, M., Peterson, T., Seminoff, J., Gaos, A.R., Altamirano, E., Henríquez, A., Gadea, V., Chavarría, S., Urteaga, J., Wallace, B., Peterson, M. (2019) Potential limitations of behavioral plasticity and the role of egg relocation in climate change mitigation for a thermally sensitive endangered species. *Ecology and Evolution*. 2019: 1-20. Doi: 10.1002/ece3.4

Limpus, C.J., Baker, V. & Miller, J.D. (1979) Movement induced mortality of loggerhead eggs. *Herpetologica* 35(4): 335-338.

Marcovaldi, M. A. G., Santos, A. J. B., Santos, A. S., Soares, L. S., Lopez, G. G., Godfrey, M. H., Fuentes, M. M. P. B. (2014) Spatio-temporal variation in the incubation duration and sex ratio of hawksbill hatchlings: Implication for future management. *Journal of Thermal Biology*, 44, 70–77.

Mrosovsky, N., Kamel, S.J., Diez, C.E., van Dam, R.P. (2009) Methods of estimating natural sex ratios of sea turtles from incubation temperatures and laboratory data. *Endang Species Res* 8:147-155.

National Marine Fisheries Service Southeast Fisheries Science Center (2008) Sea Turtle Research Techniques Manual. NOAA Technical Memorandum NMFS-SEFSC-579.

Owens, D. W. and G. J. Ruiz. 1980. New methods of obtaining blood and cerebrospinal fluid from marine turtles. *Herpetologica* 36:17-20.

Owens, D. W. (1999) Reproductive cycles and endocrinology, pp 129-133. In: Eckert, K. L., Bjorndal, K.A., Abreu-Grobois, F.A. and Donnelly, M. (Eds.) Research and Management Techniques for the Conservation of Sea Turtles, IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Patrício, A.R., Marque, A., Barbosa, C., Broderic, A.C. , Godley, B.J., Hawkes, L.A., Rebelo, R., Regalla, A., Catry, P. (2017) Balanced primary sex ratios and resilience to climate change in a major sea turtle population. *Mar Ecol Prog Ser* 577:189-203.

Pease A, Blanvillain G, Rostal DC, Owens DW, Segars A (2010) Ultrasound imaging of the inguinal region of adult male loggerhead sea turtles (*Caretta caretta*). *Journal of Zoology and Wildlife Medecine.* 41: 69–76.

Rafferty A., T. Scheelings, R. Evans, and R. Reina. 2013. Limited oxygen availability in utero constrains the evolution of live-birth in reptiles. Am Nat 181:245–253.

Rees, A.; Avens, L.; Ballorain, K.; Bevan, E.; Broderick, A.; Carthy, R.; Christianen, M.; Duclos, G.; Heithaus, M.; Johnston, D.; et al. The potential of unmanned aerial systems for sea turtle research and conservation: a review and future directions. *Endangered Species Research.* 35: 81–100.

Reinhold, L., Limpus, C.J., Limpus, D.J. & Whiting, A.U. (2017) Pivotal temperature of Loggerhead sea turtles, *Caretta caretta*, from Dirk Hartog Island, Western Australia. Memoirs of the Queensland Museum - Nature 60: 161–171.

Rings C.C., A.R. Rafferty, M.L. Guinea, and R.D. Reina. 2015. The impact of extended preovipositional arrest on embryonic development and hatchling fitness in the flatback sea turtle. Physiol Biochem Zool 88:116–127.

Seminoff JA, Resendiz A, Nichols WJ (2002) Diet of East Pacific Green Turtles (*Chelonia mydas*) in the Central Gulf of California, México. *Journal of Herpetology* 36: 447–453.

Sifuentes-Romero, I., Tezak, B.M., Milton, S.L., Wyneken, J. (2017) Hydric environmental effects on turtle development and sex ratio. Zoology https://doi.org/10.1016/j.zool.2017.11.009

Snover, M. L., Hohn, A. A., Goshe, L. R., & Balazs, G. H. (2011) Validation of annual skeletal marks in green sea turtles *Chelonia mydas* using tetracycline labeling Validation of annual skeletal marks in green sea turtles *Chelonia mydas* using tetracycline labeling. *Aquatic Biology*, 12, 197–204.

U.S. Fish and Wildlife Service (2013) Standard Permit Conditions for Care and Maintenance of Captive Sea Turtles. Available at: https://www.fws.gov/northflorida/SeaTurtles/Captive_Forms/20130213_revised%20_standard_permit_conditions_for_captive_sea_turtles.pdf

Wood, J. R., F. E.Wood, K. H. Critchley, D. E.Wildt and M. Bush. (1983) Laparoscopy of the green sea turtle, Chelonia mydas. *British Journal of Herpetology* 6:323-327.

Williamson, S.A., Evans, R.G., Reina, R.D., 2017a. When is embryonic arrest broken in turtle eggs? *Physiol. Biochem. Zool.* 89, 523–532.

Williamson, S.A., Evans, R.G., Robinson, N.J., Reina, R.D., 2017b. Hypoxia as a novel method for preventing movement-induced mortality during translocation of turtle eggs. *Biological Conservation* 216, 86-92.

Appendix 4

Special Activity Permit
SAP No. SAP 2025-01
Application No. 5338
(Renewal)

Department of Land & Natural Resources
DIVISION OF AQUATIC RESOURCES
1151 Punchbowl Street, Room 330
Honolulu, Hawaii 96813

Date Issued: January 6, 2024

Valid not longer than: January 5, 2025

SPECIAL ACTIVITY PERMIT

The Department of Land and Natural Resources hereby grants permission for certain activities involving aquatic organisms belonging to the people of Hawaii, under Section 187A-6, Hawaii Revised Statutes, and other applicable laws.

The Permittee is

Name:	Dr. Summer Martin	Address:	NOAA Fisheries Protected Species Division Marine Turtle Biology and Assessment Program Pacific Islands Fisheries Science Center 1845 Wasp Blvd., Building 176 Honolulu, HI
Title:	Supervisory Fisheries Biologist		
Affiliation:	Marine Turtle Biology and Assessment Program/Protected Species Division		
Email:	summer.martin@noaa.gov		

This permit is issued, subject to the general and special conditions, to take (capture, harass, possess, collect eggs, transport, measure, tag, take tissue samples, attach transmitters, excavate nests, rescue, treat, rehabilitate, salvage, etc.) regulated organisms (marine turtles), as listed in the table below, using regulated gear (small mesh nets; < 2 inches stretched mesh) for the purposes of enhancing species recovery. This activity is authorized by the federal government under NMFS permit (s) # 21260 and USFWS permit (s) #TE-72088A-3.

Authority: This permit is issued solely for the take of endangered or threatened aquatic life for scientific purposes, as authorized by, and subject to the provisions of, Sections 187A-6 and 195D-4, Hawai`i Revised Statutes ("Haw. Rev. Stat."), and Chapter 13-124, Hawai`i Administrative Rules ("HAR"), and implies no authorization related to any other applicable law or regulation. The permittee is solely responsible for obtaining all other permits and/or authorizations from state, federal and/or county authorities that may be required to conduct the activity.

This permit, signed by authorized representative of the Department of Land and Natural Resources (the Department), authorizes the permittee, and assistants designated on the final page(s) of, or attachments to, this permit, to engage in activities otherwise prohibited by law, subject to the conditions, which include the **Take (sampling), Possession and Transportation** of certain aquatic life from waters of the State, as follows below in Table 1:

Spc. Code	Spc. Description	Spc. Amt.	Morphology	Spc. Size	Island	Location	Comments
Regulated species							
7822	Eretmochelys imbricata | Hawksbill sea turtle | Eretmochelys imbricata	As needed (Various amounts; to be specific in final report)	Turtles (Adult/Juvenile)	Adult/Juvenile Turtles (Any Size)	Hawaii, Oahu, Kauai, Maui, Molokai, Lanai, Ni'ihau* and Kaho'olawe*	State waters (all islands)	Regulated and non-regulated areas authorized; Locations specified in annual report. For Ni'ihau* & Kaho'olawe* see section A. Location)
Continued on next page							

616	Chelonia mydas | Pacific Green sea turtle | honu | Chelonia mydas agassizi	As needed (Various amounts; to be specific in final report)	Turtles (Adult/Juvenile)	Adult/Juvenile Turtles (Any Size)	Hawaii, Oahu, Kauai, Maui, Molokai, Lanai, Ni'ihau* and Kaho'olawe*	State waters (all islands)	Regulated and non-regulated areas authorized; Locations specified in annual report. For Ni'ihau* & Kaho'olawe* see section A. Location)
7823	Lepidochelys olivacea | Olive Ridley Sea Turtle | Lepidochelys olivacea	10	Turtles (Adult/Juvenile)	Adult/Juvenile Turtles (Any Size)	Hawaii, Oahu, Kauai, Maui, Molokai, Lanai, Ni'ihau* and Kaho'olawe*	State waters (all islands)	Regulated and non-regulated areas authorized; Locations specified in annual report. For Ni'ihau* & Kaho'olawe* see section A. Location)
7821	Dermochelys coriacea | Leatherback sea turtle | Dermochelys coriacea	10	Turtles (Adult/Juvenile)	Adult/Juvenile Turtles (Any Size)	Hawaii, Oahu, Kauai, Maui, Molokai, Lanai, Ni'ihau* and Kaho'olawe*	State waters (all islands)	Regulated and non-regulated areas authorized; Locations specified in annual report. For Ni'ihau* & Kaho'olawe* see section A. Location)
7820	Caretta | Loggerhead sea turtle | Caretta	10	Turtles (Adult/Juvenile)	Adult/Juvenile Turtles (Any Size)	Hawaii, Oahu, Kauai, Maui, Molokai, Lanai, Ni'ihau* and Kaho'olawe*	State waters (all islands)	Regulated and non-regulated areas authorized; Locations specified in annual report. For Ni'ihau* & Kaho'olawe* see section A. Location)
7822	Eretmochelys imbricata | Hawksbill sea turtle | Eretmochelys imbricata	50	Turtles (Adult/Juvenile)	Adult/Juvenile Turtles (Any Size)	O'ahu	Imported	imported, all islands
616	Chelonia mydas | Pacific Green sea turtle | honu | Chelonia mydas agassizi	As needed (Various amounts; to be specific in final report)	Turtles (Adult/Juvenile)	Adult/Juvenile Turtles (Any Size)	O'ahu	Imported	imported, all islands
7823	Lepidochelys olivacea | Olive Ridley Sea Turtle | Lepidochelys olivacea	50	Turtles (Adult/Juvenile)	Adult/Juvenile Turtles (Any Size)	O'ahu	Imported	imported, all islands
7821	Dermochelys coriacea | Leatherback sea turtle | Dermochelys coriacea	50	Turtles (Adult/Juvenile)	Adult/Juvenile Turtles (Any Size)	O'ahu	Imported	imported, all islands
7820	Caretta | Loggerhead sea turtle | Caretta	50	Turtles (Adult/Juvenile)	Adult/Juvenile Turtles (Any Size)	O'ahu	Imported	imported, all islands

I. SPECIAL CONDITIONS

A. Location

Activities under this permit are for waters of the island(s) of Hawaii, Oahu, Kauai, Maui, Molokai, Lanai, Ni'ihau* and Kaho'olawe* (*excepting restricted 2 nautical mile boundary Zone A and Zone B surrounding Kaho'olawe-unless authorized from KIRC), including any Marine Life Conservation District (MLCD), Fisheries Management Area (FMA), or other marine area managed by the department where such activities would otherwise be prohibited under State law (see table of managed areas below). **Note*:** Access to shoreline or nearshore waters of Ni'ihau requires landowner (Robinson family) coordination and approval. Activities are authorized in managed areas listed below if necessary:

Island of MAUI	Island of KAUA'I	Island of HAWAI'I
Kahului Harbor FMA[1]	Ahukini Pier FMA	Areas within the West Hawaii
Honolua-Mokuleia MLCD[2]	Hanamaulu Bay FMA	Regional Fishery Management Area
Ahihi-Kinau NAR[3]	Kapaa Canal FMA	(continued):
Molokini Shoal MLCD	Nāwiliwili Harbor FMA	
Kahekili Herbivore FMA	Port Allen FMA	(1) Ka'ūpūlehu Marine Reserve
	Waikaena Canal FMA	(2) North Kohala Fish Replenishment Area
Island of LANA'I	Waimea Pier & Bay FMA	(FRA[6])
Manele Harbor FMA	Hā'ena CBSFA[8]	(3) Puakō-'Anaeho'omalu FRA
Manele-Hoopoe MLCD		(4) Kaloko-Honokōhau FRA
	Island of HAWAI'I	(5) Kailua-Keauhou FRA
Island of MOLOKA'I	Areas within the West Hawaii	(6) Red Hill FRA
Kaunakakai Harbor FMA	Regional Fishery Management Area:	(7) Nāpo'opo'o-Hōnaunau FRA
	Hilo Bay FMA	(8) Ho'okena FRA
Island of KAHO'OLAWE	Kailua Bay FMA	9) Ka'ohe Beach FRA (Pebble Beach)
Restricted 2 nautical mile boundary	Kawiahae Harbor FMA	(10) Miloli'i CBSFA (including Miloli'I
Zone A and Zone B surrounding	Kealakekua Bay MLCD	FRA)
Kaho'olawe	Keauhou Bay FMA	(11) Kikaua Point-Mākole'ā Point Netting
	Kiholo Bay FMA	Restricted Area (NRA[7])
Island of O'AHU	Kona Coast FMA	(12) Nenue Point–Kealakekua Bay NRA
Ala Wai Canal FMA	Old Kona Airport MLCD	(13) Hanamalo Point–Kanewa'a Point NRA
Coconut Island MLR	Lapakahi Bay MLCD	(Part of Miloli'i CBSFA)
Hanauma Bay MLCD	Papawai Bay FMA	(14) Kanonone–Kalīpoa NRA
Heiea Kea FMA	Puako FMA	
Honolulu Harbor FMA	Waiakea PFA[5]	
Kapalama Canal FMA	Wailea Bay MLCD	Island of HAWAI'I
Paiko Lagoon Wildlife Sanctuary	Wailuku River FMA	West Hawaii Regional Fishery
Pōka'i Bay FMA	Wailoa River FMA	Management Area (WHRFMA)
Pūpūkea MLCD	Wawāloli FMA	
Waialua Bay (Hale'iwa Harbor)		Areas in the WHRFMA outside
Waikīkī-Diamond Head SFMA		of all smaller FMA, MLCD, FRA
Waikiki MLCD		and NRA
Wahiawā Public Fishing Area		

Table 2 – Regulated Areas – Definitions: FMA[1] = Fisheries Management Area, MLCD[2] = Marine Life Conservation District, NAR[3] = Natural Area Reserve (DOFAW), MLR[4] = Marine Laboratory Refuge, PFA[5] = Public Fishing Area, FRA[6] = Fish Replenishment Area, NRA[7] = Netting Restricted Area, CBSFA[8] = Community-Based Subsistence Fishing Area

B. **Monitoring/Actions.** This permit authorizes the take (capture, harassment, possession, transport, collection of eggs, measuring, tagging, taking of tissue samples, attaching of transmitters, excavating nests, rescuing, treating, rehabilitating live stranded turtles, salvaging dead turtles, and such related activities associated with marine turtles) of Hawksbill turtles, Green sea turtles, Leatherback turtles, Olive ridley turtles and Loggerhead turtles for the purposes of enhancing species recovery; provided such actions are in compliance with the Endangered Species Act and other applicable federal laws. Researcher will take numbers as required for Hawksbill turtles and Green sea turtles and take up to ten (10) each of Leatherback turtles, Olive ridley turtles and Loggerhead turtles, for a total of thirty (30) across those three species. The researcher requested the following changes/additional takes in State waters for the 2019-2020 SAP: In 2019, the Marine Turtle Biology and Assessment Program had the fourth olive ridley nesting turtle in 40 years in Hawaii and a sighting of a loggerhead nesting on the North Shore of Oahu. Therefore, the program has requested to take (capture, harass, possess, collect eggs, transport, measure, tag, take tissue samples, attach transmitters, excavate nests, rescue, treat, rehabilitate, salvage, etc.) up to ten (10) each of leatherback, olive ridley, or loggerhead sea turtles within State Waters, for a total of up to thirty (30) turtles. These changes have been applied since the 2019 -2021 permit. All live captured turtles are transported to the Marine Animal Recovery Facility (MARFAC) at Pacific Islands Fisheries Science Center (if rehabilitation/recovery is necessary). In addition the permittee is authorized for the importation, possession and transportation of up to fifty (50) turtles per species of Hawksbill turtles, Leatherback turtles, Olive ridley turtles and Loggerhead turtles or their parts and various amounts (as needed; to be specified in final report) of Green sea turtles; provided such actions are in compliance with the Endangered Species Act and other applicable federal laws. All research activities are conducted according to permit conditions and guidelines specified by the federal NMFS permit (s) # 21260 and USFWS permit(s) #TE-72088A-3 and the following IACUC(s): IACUC SWPI_2023-01 and UH IACUC 18-2782-6. This authorization includes activities involving marine turtles within any marine life conservation district, fisheries management area, or other marine area managed by the Department where such activities would otherwise be prohibited under State law. **Note*:** Access to shoreline or nearshore waters of Ni'ihau requires landowner (Robinson family) coordination and approval.

The purpose of this project is to continue long-term monitoring of the status of green and hawksbill turtles in the Hawaiian Islands, in addition to the continued support for the biological recovery and sustained management of sea turtle populations in Hawaii and other US affiliated islands in the Pacific Ocean. The researchers will study these species to determine their abundance, size ranges, health/disease (FP) status, diving behavior, habitat use, foraging ecology, local movements, and migration routes. A variety of research techniques will be employed: i) flipper tagging, passive integrated transponder (PIT) tagging, and shell etchings (mototool) to identify individual turtles, ii) morphometric analysis to determine the size, mass, sex, and health of each captured animal, iii) genetic analysis of tissue samples collected from each turtle to determine nesting beach origin, iv) biotelemetry (radio, acoustic, satellite, archival) to determine movements and habitat use of a subset of captures, v) blood sampling for genetic analysis to determine nesting beach origin and/or assess health status of individuals, vi) diet sampling using esophageal lavage, and vii) stable isotope analysis of tissue samples for foraging ecology research. A primary goal is to integrate data from genetic analysis, flipper tagging, and satellite telemetry to identify nesting beach origins of turtles occurring in the Hawaiian Islands and contribute to the overall understanding of sea turtle stock structure in the Pacific Ocean. Further, researchers will compare current data with those collected in the Hawaiian Islands since 1973 to determine growth rates (Balazs and Chaloupka 2004, Chaloupka and Balazs, 2005) of juveniles and adults, assess changes in the health status of the population, and examine population abundance trends. Genetic studies based on blood and tissue samples are part of an international collaboration to define stock structure of sea turtles in the Pacific.

Distribution of Samples/Invasive Species, Disease and Parasites. The permittee will mitigate for the spread of invasive species, disease and parasites between sampling areas (if sampling in environmentally different areas) by utilizing best management practices, including but not limited to, ensuring that all organisms, hand tools or collection bags/containers are inspected and absent of any non-natives or invasive organisms before transportation to lab aquariums (not applicable where invasive species, disease and parasites are target species for collections) or before collection in a new area, and ensuring that all gear is disinfected or sterilized between collection areas (**see General Conditions O. Other Collection Guidelines: Aquatic Invasive Species**.). Efforts will be made by permittee and authorized assistants to ensure that collection of samples is conducted in such a manner as the process does not result in any additional harm to surrounding organisms or environment. **Researcher will implement collection/sampling design that removes a sustainable proportion from the local population of target**

organisms and make efforts to distribute collection activities across shoreline/reef flat/benthic areas, so as not to consolidate the impacts of collection in one location (if applicable/if collecting samples). Discretion should be used to avoid conflicts with fishers and others during authorized activities. Efforts will be made by permittee and authorized assistants to communicate with the public that have inquiries about the collection activities or methodology. Permittee and authorized assistants will clearly state the overall objective of the project, that these activities require permits, and that the methods the researchers are employing are not approved for recreational fishing but research, education, propagation or management activities ONLY.

C. **Gear and Methods. This permit authorizes the following use of regulated and/or non-regulated gear and methodology:**

Regulated Gear: Seine/gill/drag/draw net (regulated size or < 2 inches stretched mesh) and/or dip or hand nets (< 2 inches stretched mesh and greater than 3 feet in any dimension, including handle)

Non-regulated Gear: Seine/gill/drag/draw net (mesh size: ≥ 2 inch stretched mesh) and/or any dip or hand nets (< 2 inches stretched mesh and less than 3 feet in any dimension, including handle).

If using regulated nets, permittee or authorized assistants will attend nets at all times and release/return all unintended by-catch or non-target organisms as quickly as possible to the marine environment. If using non-regulated nets or traps, permittee will follow the standard regulations for each net: https://dlnr.hawaii.gov/dar/fishing/fishing-regulations/gear-restrictions/

D. **Entanglement Prevention.** Efforts will be made by permittee and authorized assistants to ensure that netting activities are conducted in such a manner as the process does not result in any additional harm to surrounding organisms or to the surrounding environment. Efforts will be made by permittee and authorized assistants to utilize best management practices to eliminate any potential for incidental entanglement of any unintended marine organisms (monk seals, cetaceans, sharks, rays or other protected species) while conducting netting activities. Entanglement prevention practices will include but are not limited to: minimizing the number of structures or components that may potentially cause entanglement during research operations (e.g. loops, holes, slack lines), checking the net regularly for unintended organisms and releasing non-target organisms as quickly as possible and attending the net at all times. **Permittee will immediately notify DAR and the appropriate federal agency to report the entanglement of any protected species, if incidental entanglement occurs.**

E. **Importation, Possession, Transportation and Release.** This permit authorizes the importation, possession and transportation of up to 50 turtles per species of Hawksbill turtles, Leatherback turtles, Olive ridley turtles and Loggerhead turtles or their parts and various amounts (as needed; to be specified in final report) of Green sea turtles; provided such actions are in compliance with the Endangered Species Act and other applicable federal laws. Precautions shall be taken with all imported sea turtles, including sick, dying or dead and frozen animals, to prevent the accidental release of attached organisms (parasitic and non-parasitic) and other potential exotic pathogens into State Waters. **Note**: Importation is for parts (not whole animals), for the purposes of studying parts of animals as they become available for life history, genetic or other research. For example, Marine Turtle Biology and Assessment Program personnel may travel to Guam, CNMI, and American Samoa and bring home skin and blood samples for research purposes. **Release of Organisms.** All live captured turtles will be returned to the wild; provided the turtle can be reasonably expected to survive such a release.

F. **Annual Report:** Upon 90 days post expiration of the permit or 30 days prior to expiration of the permit (depending on **renewal** or **non-renewal** status), the permittee must provide to DAR a final written report summarizing the results of the collection activity carried out under this permit and (if available/applicable) analysis of the data.

1. The annual report should provide a written description of the activity and objective and a written explanation as to how the collection of or activity with a fully protected or regulated marine species for scientific, education, management or propagation purposes is benefiting the State of Hawai'i in general and specifically, the improved management of the species or related species.

2. The annual report must describe the following, in form specified by the Department (access to reporting template on the DAR Permitting Portal can be found at: https://inforps-dp.hawaii.gov/dlnraquaticpermitting/#/research-spreadsheet or for info from #2. a. & c. and #3) – include all other info (#1, #2 b. & d. into a PDF report) – consult permit coordinator for most up-to-date reporting template (if necessary):

   a. **Species name and total quantities and sizes** of all regulated and non-regulated specimens collected under this permit.

   b. **Results of chemical, genetic, physiological, histological, pathological, statistical or other analysis of data** (if possible/applicable).

   c. **GPS coordinates (decimal degrees) of location of each sample taken or action conducted and associated geographic location** (e.g. windward side or east side of Patch Reef 8, or north side of Lilipuna Pier). Multiple samples collected in one single area can be geo-referenced by a single GPS point and associated geographic location.

      If GPS is not available: Make accurate note of your sampling location in field and obtain GPS location from Google Earth after field sampling **(<u>Note:</u> Instructions are for the downloaded program - Google Earth Pro, not web version):**

      i. Click "Tools" in the top line menu and open Options.

      ii. In the "3D View" tab, **find** the "Show Lat/Long" section. Change the default from Degrees, Minutes, Seconds to **Decimal Degrees**.

      iii. Next, click the pushpin icon in the menu; click and drag the pushpin that appears to the point on the map from which you wish to obtain a GPS coordinate:

      (e.g.: Lat: 21.441646, Long: -157.799076)

      iv. Enter GPS coordinate into spreadsheet with associated sampling information (species, amount, size).

   d. **Photo-documentation** of a representative example of organisms collected, methodology, and gear:

      i. Photo-documentation **of marine turtle activities should include one (1) representative example of all activities, including capturing, harassment, collection of eggs/measurements/tissue samples and nest excavation, rehabilitation, necropsies, stranding responses and juvenile and adult tagging.**

      ii. Each representative example should include the following photos: <u>For example of species of turtle, photo-documentation should include</u>: one (1) photo of average specimen of turtle captured (one per species; with scale for size) and; <u>For examples of collection of eggs/measurements/tissue samples and nest excavation, rehabilitation, necropsies, stranding responses, juvenile and adult tagging, photo-documentation should include</u>**;** one (1) photo of each type of activity (with scales for sizes when applicable).

3. An inventory (species list) of organisms (dead or alive) present at the facility or with the permittee the end of the report period, in form acceptable to the Division, must accompany the annual report;

4. The annual report is due at the Division's Honolulu office one month (30 days) before expiration of the permit if renewal is needed or within three months (90 days) after expiration of the permit if renewal is not needed or as otherwise instructed by the Division.

G. **Use of Organisms, Parts of Organisms, Tissue Samples or other Aquatic Resources.** The permittee may not convey in any fashion (including, but not limited to, selling, trading, or giving) any organisms, parts of organisms, tissue samples or other aquatic resources to any person or party in Hawai`i that does not already have a permit from the Department authorizing possession of same and without written approval from DAR. Organisms taken under authority of this permit may be used for scientific study or educational purposes **ONLY**, except as authorized by prior written approval of DAR.

a. This permit authorizes the permittee and authorized assistants to transport live or dead specimens or parts (e.g. shell/tissue/blood/skeleton samples) of organisms as listed in Table 1, within and outside of the state of Hawai'i to the following institutions and authorizes the following institutions to receive live or dead specimens or parts (e.g. shell/tissue/blood/skeleton samples), of organisms as listed in Table 1, from the permittee and authorized assistants (see USFWS permit(s) #TE-72088A-3 for full contact information):

i. U.S. Geological Survey, Biological Resources Division, National Wildlife Health Center, Honolulu Field Station (Dr. Thierry Work), Honolulu, Hawaii 96850

ii. NOAA/NMFS/PIFSC (Dr. Summer Martin or T. Todd Jones), Honolulu, Hawaii 96818

iii. NOAA NMFS Southwest Fisheries Science Center (Erin LaCasella, Marine Turtle Genetics Program), La Jolla, California 92037

iv. The Bernice Pauahi Bishop Museum (Bishop Museum), Vertebrate Collection Manager, Honolulu, Hawaii 96817 (Note: If the Bishop Museum does not wish to accession the specimens, the permittee must contact both the Recovery Permit Coordinator at the PIFWO and the USFWS OLE in Honolulu, HI for disposition instructions).

v. Hawaii Marine Mammal Alliance, Inc./Hawaii Marine Animal Response (HMAR), Micah C. Brodsky - Senior Veterinarian, Kailua, HI 96734

vi. Other institutions/labs to be specified on final annual report (Lab/Institution Name, City, State, Zip Code).

II. GENERAL CONDITIONS:

A. 1. **Effective Date.** This permit becomes effective upon the following:

1. All persons who are actively involved in activities authorized by this permit have read this permit in total and acknowledge understanding and agreement to abide by its conditions by signing the signature sheet at the end of the permit. Note: All authorized assistants should read, agree to the terms and conditions and sign the permit; however in the event that authorized assistant is not able to sign the permit, the principal permittee, by their signature on page 13, acknowledges receipt and understanding of the general and special conditions of this Special Activity Permit on behalf of designated assistants and in addition, agrees to abide

by all of these conditions when conducting activities authorized by this permit, on behalf of designated assistants.

2. Both copies of the signed signature sheet of the permit must be returned to the Division of Aquatic Resources (DAR).

3. Upon approval and signature by the Chairperson of the Department, a **copy of the fully executed permit** will be returned to the applicant.

2. Authority granted by this permit ends on the "Expiration Date" on the first page of this permit.

3. The permittee must carry a copy of this permit on location while performing activities authorized by this permit.

B **Validity.** This permit conveys authority ONLY of the Department relating to its jurisdiction over aquatic resources: the permittee remains responsible for obtaining all other prior permission from other applicable authorities (such as owners of and tenants upon private lands; other divisions of the Department; other local, State and Federal agencies). This permit is valid only if accompanied by a valid National Marine Fisheries Service (NOAA Fisheries) Marine Mammal Protection Act / Endangered Species Act permit or a United States Fish and Wildlife Service (USFWS) Endangered Species Act permit. The permittee shall notify DAR of any proposed changes in research activities prior to implementing such changes for appropriate review and permit amendment. DAR may require the permittee to accommodate the presence of an observer during authorized activities.

C. **Compliance with all applicable County, State, and Federal Requirements.** This permit conveys a privilege to engage in only those activities under the jurisdiction of the Department of Land and Natural Resources. The permittee is responsible for complying with all applicable County, State, and Federal requirements. The permit does not convey any privilege of access over or through private property.

D. **Liability.** This permit does not make the Department of Land and Natural Resources or the State of Hawaii liable in any way for any claim of personal injury or property damage to the permittee or assistants which may occur during any activity conducted under this permit; moreover, the permittee and all assistants agree to hold the Department and State harmless against any and all claims of injury, death or damage resulting from activities of the permittee or any assistant or from actions or omissions under this permit.

E. **Parties Authorized under Permit**. Only the permittee and their authorized research assistants are allowed to participate in the authorized activity. The permittee and each assistant is individually responsible and accountable for his or her actions while performing activities authorized by this permit. The permittee is additionally responsible and accountable for the actions of each assistant. The permittee or their assistant(s) must have with them a copy of this permit while conducting activities authorized by this permit.

F. **Transferability.** This permit is neither transferrable nor assignable to another person. Any person whose name does not appear on this permit and is conducting any activity described herein is subject to prosecution for violation of State laws.

G. **Revocability.** This permit is revocable at will should the Department deem revocation necessary.

H. **Changes to the Permit.** The permittee may request changes to the permit. Any such request to make changes to the permit must be made in writing and received by the Department at least thirty days prior to the change. The addition of new assistants will require each individual to sign the Attachment on page 13, 14, 15, 16, 17 or 18, stating that they have read, understood, and agree to abide by all general and special permit conditions. Note: In the event that authorized assistant is not able to sign the permit, the principal permittee, by their signature on page

13, acknowledges receipt and understanding of the general and special conditions of this Special Activity Permit on behalf of designated assistants and in addition, agrees to abide by all of these conditions when conducting activities authorized by this permit, on behalf of designated assistants. No change may be implemented without written approval from the Department.

The permittee may request to:

1. Add assistants to the permit;
2. Add another permittee or replace an existing permittee in the manner stated above; and
3. Change the activities authorized under this permit.

I. This permit authorizes collection of organisms protected by Federal law only with prior appropriate Federal authority, which must be described on Page 1 of this permit (if applicable).

J. This permit does not authorize the sale of any collected organism.

K. This permit expires on the date indicated on Page 1. **If no renewal is needed**, the permittee must email a PDF of this permit with all signature sheets (or a complete list of assistants if signatures are not available) and additionally email a **PDF version of a final report** (to catherine.a.gewecke@hawaii.gov) with complete information on all activities authorized under this permit (see Special Conditions, **Section F. Annual Report**) within **three months (90 days) after** the expiration date. **If renewal is needed**, permittee must submit a **PDF version of a final report** to the Division **one month (30 days) prior** to the expiration date for DAR biologists to review, in addition to turning in expired permit with signatures no later than the regular **three months (90 days) after expiry date**. If complete report cannot be submitted **one month (30 days) prior** to the expiration date, the permittee will submit a short synopsis of research conducted (PDF version- **one month (30 days) prior** to the expiration date) in past year including information on quantities, genus species and activities conducted, and submit full report no later than the regular **three months (90 days) after expiry date**.

L. **Access to Data.** The permittee and assistants agree to provide access to data obtained under authority of this permit upon request of the from DAR or authorized agent of the Department, and to provide to the Division a copy of each report, published for distribution, prepared with data obtained under this permit. The permittee agrees to provide Department staff access to organisms obtained and held under this permit for on-site inspection of the premises.

M. **Notification.** The permittee agrees to notify the island office of the Division of Conservation and Resources Enforcement (DOCARE – Oahu Central Office: 808-643-3567) at least 24 hours prior to any authorized activity being conducted in the field. See section **O. Other Collection Guidelines** (below) for additional requirements.

N. **Violation of Permit Conditions.** A violation of any terms or conditions of this permit or any violation of State law not covered by this permit may result in revocation of the permit and other penalties as provided by law. In addition, the Department may consider any such violation as grounds for denying any future application for this or any other permit issued by the Department. Any person whose permit has been revoked shall not be eligible to apply for another permit until the expiration of two years from the date of revocation. See HAR § 13-124-7.1.

O. **Coral Activities**: Activities under this permit shall abide by the following conditions (if applicable):

1. Coral - the Permittee must notify DAR Oahu (catherine.a.gewecke@hawaii.gov) within 24 hours of:

   i. Any instance of major damage caused to coral or other marine natural resources, because of collection or other research activities conducted under this permit.

2. Fragmentation - This permit **<u>does not authorize</u>** fragmentation of coral colonies.

3. Rare Species - The following *Porites* species require special permission from the Division prior to collection under this permit: *Porites pukoensis, Porites duerdeni, Porites studeri*. The following *Montipora* species require special permission from DAR prior to collection under this permit: *Montipora dilitata*. The following *Pocillopora* species require special permission from DAR prior to collection under this permit: *Pocillopora ligulata, Pocillopora molokensis*.

4. **No impact-causing activities will be conducted on (or immediately adjacent to) any intact, attached coral colony measuring larger than 1 m x 1 m x 1 m. Specific efforts will be made to avoid damage to any large colonies of living coral.**

P. Other Collection Guidelines:

1. Collecting generally - the Permittee must give notice, in form specified by the Department (email or phone call), to DAR (catherine.a.gewecke@hawaii.gov) and to the Department's Division of Conservation and Resources Enforcement (DOCARE: 808-643-3567), at least 24 hours prior to initial commencement of any series of field collection/sampling activities taken place under this permit **or** on a schedule agreed to by DOCARE and the permittee (i.e. one call notifying of a period of time sampling that will occur across different locations throughout the year). **Researcher will provide the following info when DOCARE is notified:** SAP #, researcher name/institution, date, location, activity description (e.g. sampling or handling turtles, collection of regulated organisms, using regulated gear, sampling in a regulated area or chumming for sharks in a specific location, etc.), description of boat being used (color, size, type of boat)(if applicable), description of vehicle on shore (if applicable), number of people involved in activity, etc.

2. An **Aquatic Invasive Species (AIS) Mitigation Plan** will be filed with the Division prior to conducting any collection under this permit. The Plan will include methods and protocols to minimize AIS or disease movement through gear, supplies and activities of the permittee. Permittee must take actions to verify that collection tools have been disinfected before use if previously used in collection activities.

   <u>Invasive Species/Disease/Parasites:</u> All collection gear deployed must be visually checked for invasive species/disease/parasites and disinfected with 10% bleach solution for 10 minutes before deployment in alternate location, if current or previous activities involved collecting or conducting activities between multiple watersheds/distinct reef areas/islands. If collection gear cannot be bleached, gear must be thoroughly rinsed with fresh water and dried in sun for 24 hours before deployment in alternate location, sterilized with another viable method or alternate sampling gear should be utilized. If sampling disease or anomalous growth specimens, gear should be sterilized between each specimen or new collection gear should be used. **<u>If collecting in Kaneohe Bay or Maunalua Bay</u>**: Kaneohe Bay: All collection gear utilized in Kaneohe Bay must be visually checked for invasive species/disease/parasites (e.g. *Kappaphycus spp., Eucheuma denticulatum, Gracilaria salicornia and Mycale grandis/armata*) and disinfected with 10% bleach solution for 10 minutes before deployment in alternate location other than Kaneohe Bay. Maunalua Bay: All collection gear deployed in Maunalua Bay must be visually checked for invasive species/disease/parasites (e.g. *Avrainvillea amadelpha/lacerata and Gracilaria salicornia*) and disinfected with 10% bleach solution for 10 minutes before deployment in alternate location other than Maunalua Bay. The following species remain a concern to the division: Alien invasive algae (*Kappaphycus spp., Eucheuma denticulatum, Gracilaria salicornia, Acanthophora spicifera, Hypnea musciformis and Avrainvillea amadelpha/lacerata*), Coral disease (*Montipora White Syndrome, Porites trematodiasis, Montipora black band disease, Porites tissue loss syndrome,* and *Porites spp.* and *Montipora* spp. tumors, *Montipora* spp. growth anomaly), Orange keyhole sponge (*Mycale armata/grandis*).

   (If applicable) Permittee will mitigate for the spread of invasive species/disease/parasites by ensuring that all organisms (e.g. coral colonies, fragments or live rock) collected from Kaneohe Bay are absent of any algae fragments or basal attachments of the invasive alga *Kappaphycus spp., Eucheuma denticulatum, Gracilaria salicornia*, or other invasive species/disease/parasites (unless collecting these non-native species specifically) before transporting organisms to alternative location for research.

(If applicable) Permittee will mitigate for the spread of invasive species/disease/parasites by ensuring that all organisms (e.g. coral colonies, fragments or live rock) collected in Maunalua Bay are absent of any algae fragments or basal attachments of the invasive alga *Avrainvillea amadelpha/lacerata, Gracilaria salicornia*, or other invasive species/disease/parasites (unless collecting these non-native species specifically) before transporting organisms to alternative location for research.

Quarantine Protocol. (If applicable) If transporting and holding live organisms (including live rock) in an aquarium/tank: After inspection, organisms transported to other locations on island must have a quarantine protocol involving either closed-system tanks for the entire research period or closed-system tanks for a select amount of quarantine time followed by flow-through tanks with UV lights on outfall. Organisms will be placed in placed into flow-through tanks only if observations indicate that no invasive species are present. Permittee will sacrifice any AIS/disease/parasites if found at this stage, and keep host organisms in closed system tanks for research. Length of quarantine time and type of holding tank (closed-system or open-system) will be determined based on location of collection/location of holding and type of organism collected, after consultation with DAR. Exceptions (after consultation with DAR): If quarantine process is not possible (due to capacity/lack of available closed-system tanks), the quarantine process may not be required for researchers working with organisms such as marine mammals, turtles, fish and invertebrates (other than coral) collected from areas outside of area where research tanks are located, if researchers are able to conduct initial inspection of organisms for AIS/disease/parasites before transporting organisms back to open-system (flow-through tanks) at research location. DAR will work with researchers on a case by case basis, that work with coral and live rock collected from areas outside of outside of the area where research tanks are located, but which may have limited quarantine capacity (lack of available closed-system tanks), to determine if the quarantine process is necessary.

Transport out of Kaneohe Bay/Maunalua Bay (Oahu). Any specimens collected in Kaneohe Bay should not be transported outside of Kaneohe Bay unless being moved to a closed-system aquarium, preserved or verified to be free of non-native organisms (e.g. *Kappaphycus spp., Eucheuma denticulatum, Orange keyhole sponge (Mycale armata/grandis)*) after undergoing quarantine treatment. Any specimens collected in Maunalua Bay should not be transported outside of Maunalua Bay unless being moved to a closed-system aquarium, preserved or verified to be free of non-native organisms (e.g. *Avrainvillea amadelpha/lacerata*) after undergoing quarantine treatment.

3. No organism other than those listed on this permit will be collected or impacted by any activities conducted under this permit.

4. Collecting and transport activities under authority of this permit must be supervised directly, on site, by either the permittee or their authorized assistants (who must be a signatory of this permit).

5. Gear and Methods: Use of any chemical substances pursuant to Section 188-23, Hawai‘i Revised Statutes, electrical shocking devices, or explosives remains expressly prohibited.

6. Use of Organisms: Organisms collected under authority of this permit may not be used for personal consumption or sale; organisms collected under this permit may not be traded, bartered or loaned to other individuals, institutions or entities;

    a. Written approval must be obtained from the Division prior to:

        i. Purchasing or any other acquisition of regulated organisms (regardless of origin) from any other party;

ii. Exchanging or donating any organisms collected under this permit to any other person, party or organization (unless authorized by this permit);

7. Sampling Moratoriums**:** The Division may request a voluntary sampling moratorium, or in some cases, implement a mandatory sampling moratorium, for certain organisms authorized for collection under any current permit, during times of ecosystem pressure caused by natural or anthropogenic stressors. Example of ecosystem pressure may include coral bleaching events, which have occurred most recently in Hawaii during the months of July/August to November. Please take this into consideration when applying for a permit, plan your collections accordingly and be prepared to take a sampling hiatus (if necessary) until the stressor event is determined to have ended. Exemptions may be provided for studies or projects that have a research objective directly related to the naturally or anthropogenically caused stressors, which require collecting data or samples during this period, or select projects that are evaluated to not cause additional pressure during this period.

Q. **OWNERSHIP OF BIOGENETIC RESOURCES.** The State holds legal title to the natural resources and biogenetic resources gathered from state lands, including submerged lands. See Haw. Op.Atty.Gen. Opinion No. 03-03 (April 11, 2003). Biogenetic resources refer to the genetic material or composition of the natural resources and other things connected to, or gathered from public lands. See Davis v. Green, 2 Haw. 327 (1861); United States v. Gerber, 999F.2d 1112 (7th Cir. 1993).

DAWN N. S. CHANG, Chairperson
Department of Land and Natural Resources

cc: (x) DOCARE – (Hawaii, Oahu, Kauai, Maui, Molokai, Lanai, Ni'ihau* and Kaho'olawe*)

(x) DAR – (Hawaii, Oahu, Kauai, Maui, Molokai, Lanai, Ni'ihau* and Kaho'olawe*)

(x) Special Agent in Charge, USFWS, Honolulu

(x) NMFS

SIGNATURES AND AGREEMENT

By my signature below, I acknowledge receipt and understanding of the general and special conditions of this Special Activity Permit. Further, I agree to abide by all of these conditions when conducting activities authorized by this permit. In addition, the following list of designated assistants are authorized to conduct activities under this permit.

All authorized assistants should read, agree to the terms and conditions and sign the permit; however in the event that authorized assistant is not able to sign the permit, the principal permittee, by their signature below, acknowledges receipt and understanding of the general and special conditions of this Special Activity Permit on behalf of designated assistants and in addition, agrees to abide by all of these conditions when conducting activities authorized by this permit, on behalf of designated assistants.

PRINCIPAL PERMITTEE: MARTIN.SUMMER.LYNN.1465084290 Digitally signed by MARTIN.SUMMER.LYNN.1465084290 Date: 2024.01.09 16:46:07 -10'00'

Dr. Summer Martin

DESIGNATED ASSISTANTS:

Signature: ____________________
Print Name: Dr. T. Todd Jones

Signature: ____________________
Print Name: Shawn Murakawa

Signature: ____________________
Print Name: Marylou Staman

Signature: ____________________
Print Name: Camryn Allen

Signature: ____________________
Print Name: Brittany Clemans

Signature: ____________________
Print Name: Laura McCue

SIGNATURES AND AGREEMENT

By my signature below, I acknowledge receipt and understanding of the general and special conditions of this Special Activity Permit. Further, I agree to abide by all of these conditions when conducting activities authorized by this permit.

DESIGNATED ASSISTANTS:

Signature:
Print Name: Michelle Barbieri

Signature:
Print Name: Jan Willem Staman

Signature:
Print Name: Alexander Gaos

Signature:
Print Name: Ednee Yoshioka

Signature:
Print Name: Meghan Barrett

Signature:
Print Name: Irene Kelly

Signature:
Print Name: Sheldon Plentovich

Signature:
Print Name: Sallie Beavers

Signature:
Print Name: Marc Rice

Signature:
Print Name: Laura Jim

Signature:
Print Name: Donna Brown

Signature:
Print Name: Elizabeth Flint

Signature:
Print Name: Debbie Herrera

Signature:
Print Name: Julie Dagenais

Signature:
Print Name: Kelly Goodale

Signature:
Print Name: Lauren Kurpita

Signature:
Print Name: Jeff L. Pawloski

Signature:
Print Name: Gregg Levine

SIGNATURES AND AGREEMENT

By my signature below, I acknowledge receipt and understanding of the general and special conditions of this Special Activity Permit. Further, I agree to abide by all of these conditions when conducting activities authorized by this permit.

DESIGNATED ASSISTANTS:

Signature:		Signature:	
Print Name:	Leah Kerschner	Print Name:	Jason Aleshire
Signature:		Signature:	
Print Name:	Lisa Komoroske	Print Name:	Jamie Thomton
Signature:		Signature:	
Print Name:	Claudia Cedillo	Print Name:	Allison Sommer
Signature:		Signature:	
Print Name:	Hope Ronco	Print Name:	Christy Kozama
Signature:		Signature:	
Print Name:	Theirry Work	Print Name:	Michelle Olry
Signature:		Signature:	
Print Name:	Rachel Sprague	Print Name:	Jonathan Sprague
Signature:		Signature:	
Print Name:	Daniel Link	Print Name:	Jennifer Sims
Signature:		Signature:	
Print Name:	Jen Homcy	Print Name:	Andrew Rossiter
Signature:		Signature:	
Print Name:	Robert Rameyer	Print Name:	Laura Jackson

SIGNATURES AND AGREEMENT

By my signature below, I acknowledge receipt and understanding of the general and special conditions of this Special Activity Permit. Further, I agree to abide by all of these conditions when conducting activities authorized by this permit.

DESIGNATED ASSISTANTS:

Signature: ______________________
Print Name: Renee Breeden

Signature: ______________________
Print Name: Cristian Cayanan

Signature: ______________________
Print Name: Megan Lamson

Signature: ______________________
Print Name: William Walsh

Signature: ______________________
Print Name: Thomas Jim

Signature: ______________________
Print Name: Thomas Cutt

Signature: ______________________
Print Name: Andrew Glinsky

Signature: ______________________
Print Name: Jessy Hapdei

Signature: ______________________
Print Name: Erik Norris

Signature: ______________________
Print Name: Brian Peck

Signature: ______________________
Print Name: Alexandra Reininger

Signature: ______________________
Print Name: Mike Salmon

Signature: ______________________
Print Name: Tammy Mae Summers

Signature: ______________________
Print Name: Jeanette Wyneken

Signature: ______________________
Print Name: Don McLeish

Signature: ______________________
Print Name: Robin Baird

Signature: ______________________
Print Name: Kimberly Wood

Signature: ______________________
Print Name: Jordan Lerma

SIGNATURES AND AGREEMENT

By my signature below, I acknowledge receipt and understanding of the general and special conditions of this Special Activity Permit. Further, I agree to abide by all of these conditions when conducting activities authorized by this permit.

DESIGNATED ASSISTANTS:

Signature: ______________________ Signature: ______________________
Print Name: Josefa Munoz Print Name: Jon Schneiderman

Signature: ______________________ Signature: ______________________
Print Name: Tim Clark Print Name: Stephan Kropidlowski

Signature: ______________________ Signature: ______________________
Print Name: Aisha Rickli-Rahman Print Name: Erin LaCasella

Signature: ______________________ Signature: ______________________
Print Name: Agnes Horvath Print Name: Paul McCurdy

Signature: ______________________ Signature: ______________________
Print Name: Kelleigh Downs Print Name: Alix Gibson

Signature: ______________________ Signature: ______________________
Print Name: Boomer Hodel Print Name: Rob McLean

Signature: ______________________ Signature: ______________________
Print Name: Jamie Stoll Print Name: Natalie Paliga

Signature: ______________________ Signature: ______________________
Print Name: Charles Littnan Print Name: Lizabeth Kashinsky

Signature: ______________________ Signature: ______________________
Print Name: Shelbie Ishimaru Print Name: Lauren Kurpita

SIGNATURES AND AGREEMENT

By my signature below, I acknowledge receipt and understanding of the general and special conditions of this Special Activity Permit. Further, I agree to abide by all of these conditions when conducting activities authorized by this permit.

DESIGNATED ASSISTANTS:

Signature:	Signature:
Print Name: Morgan Walter	Print Name: Rachel Santulli
Signature:	Signature:
Print Name: Allison (Eley) Meeth	Print Name: Sophie Whoriskey
Signature:	Signature:
Print Name: Eldridge Naboa	Print Name: Alphina Liusamoa
Signature:	Signature:
Print Name:	Print Name:
Signature:	Signature:
Print Name:	Print Name:
Signature:	Signature:
Print Name:	Print Name:
Signature:	Signature:
Print Name:	Print Name:
Signature:	Signature:
Print Name:	Print Name:
Signature:	Signature:
Print Name:	Print Name:

Appendix 5

PAPAHĀNAUMOKUĀKEA
Marine National Monument

Dear Monument Co-Trustees:

The National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (FWS), the State of Hawaiʻi through the Department of Land and Natural Resources (DLNR) and the Office of Hawaiian Affairs (OHA) (collectively, the Co-Trustees) have approved the issuance of permit number PMNM-2024-001 to conduct activities within Papahānaumokuākea Marine National Monument ("Monument"). 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-2024-001

This permit is not valid until your signature page is received at this office. The original copy should be signed and returned to the monument office via email or at the following address within 30 days of issuance:

NOAA/Inouye Regional Center
NOS/ONMS/PMNM/Attn: Permit Coordinator
1845 Wasp Blvd, Building 176
Honolulu, Hawaiʻi 96818

You are required to carry a signed copy of the permit with you while conducting the permitted activities. 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 Phillip Howard at Phillip.Howard@noaa.gov.

Thank you for your continued cooperation with NOAA, FWS, the State of Hawaiʻi, and the Office of Hawaiian Affairs.

PAPAHĀNAUMOKUĀKEA
Marine National Monument

CONSERVATION AND MANAGEMENT PERMIT

Project Title: Co-Trustee Conservation and Management Activities in Papahānaumokuākea Marine National Monument

Permittee Names
Papahānaumokuākea Marine National Monument Co-Trustee Representatives:

Jared Underwood
Superintendant
Papahānaumokuākea Marine National Monument
Department of the Interior
U.S. Fish and Wildlife Service

Brian Neilson
Division of Aquatic Resources Administrator
Papahānaumokuākea Marine National Monument
State of Hawai'i Department of Land and Natural Resources

Eric Roberts
Superintendent
Papahānaumokuākea Marine National Monument
National Oceanic and Atmospheric Administration

Stacy Kealohalani Ferreira
Ka Pouhana (Chief Executive Officer)
Office of Hawaiian Affairs

Permit Number: PMNM-2024-001

Effective Dates: January 1, 2024 – December 31, 2024

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, Hawaiʻi Administrative Rules remain in effect for activities in State waters.

The National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (FWS), State of Hawaiʻi through the Department of Land and Natural Resources and the Office of Hawaiian Affairs (collectively the Co-Trustees) have reviewed and endorsed the activities listed in this permit. Based on applicable authorities, this permit hereby authorizes the permittees listed above to conduct conservation and management activities within the Monument subject to the terms and conditions enclosed herein. 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:

To safeguard the resources and ecological integrity of the Monument, early and ongoing coordination of interagency activities will occur between the action agency and interested Monument management partners as soon as details of activities are identified. For example, a joint tracking sheet and calendar of proposed activities to be covered under the manager’s permit will be kept and continually updated by agency staff. In addition, logistics planning and coordination meetings between all Monument Management Board (MMB) agencies may be implemented to further synchronize activities. The goal of early coordination is the commitment to identifying, incorporating, and customizing best management practices for specific activities prior to the activity occurring.

The following activities are authorized by this permit:

ENTRANCE

1. Staff, volunteers, cultural liaisons, or contractors necessary for the permitted activities may enter the Monument for conservation and management activities, and resident families of Midway Atoll may enter the Monument. Invited news media representatives may enter the Monument to provide public information of conservation and management activities. All personnel will be identified and information will be provided to the Monument Permit Coordinators prior to each entry; this information is documented digitally on a shared spreadsheet. The permit applicants shall ensure that all personnel assigned to conduct conservation and management activities authorized under this permit are fully qualified to perform in the assigned role(s) and shall be limited to the scope of actions set forth in this permit and all other applicable policies, protocols, permits, and regulations. (ALL MMB AGENCIES)

OPERATIONS

2. Operating field stations of the National Wildlife Refuge System (NWRS) and the State of Hawaiʻi Kure Atoll State Wildlife Sanctuary, necessary for meeting mission and purposes of refuges and the Monument in support of on-site management and resource conservation including but not limited to: (STATE) (FWS)

    a. Maintaining and repairing/replacing facilities and their components (e.g., carpentry, electrical, plumbing, welding, general construction); (STATE) (FWS)
    b. Building and other facilities deconstruction and reconstruction; (STATE) (FWS)
    c. Maintaining airport and airstrips, including improvements such as runway lighting replacement, taxiway maintenance (including repaving, and painting/marking); (FWS)
    d. Painting, including all preparation work such as scraping, washing, etc.; (STATE) (FWS) and
    e. Lead-based paint soil remediation, including removing sand/soil from around many or all affecting buildings and proper on-site containment of this material. (STATE) (FWS)

3. Supporting and re-supplying field camps and field stations, including but not limited to, delivery and removal of supplies, equipment, people, waste, and/or assets necessary for operations. (ALL MMB AGENCIES)

4. Operating vessels to provide access for conservation and management activities. Authorized vessel operations shall include, but are not limited to:

    a. Operating, mooring and anchoring small boats; (ALL MMB AGENCIES)
    b. Conducting maintenance, proficiency training and safety measures for authorized vessels; (ALL MMB AGENCIES)
    c. Anchoring of the authorized vessels and small boats on sandy substrate only, and all anchors must be lowered into place; (ALL MMB AGENCIES)
    d. Establishing and utilizing an underwater mooring at Nihoa to allow for safer and more environmentally sound "anchoring" for authorized support vessels (ALL MMB AGENCIES)
    e. Discharging gray water outside of all Special Preservation Areas and the Midway Atoll Special Management Area (MASMA); (ALL MMB AGENCIES) and
    f. Discharging biodegradable solid waste associated with galley operations restricted to 3 nautical miles (ground to 1 inch in diameter) and 12 nautical miles (unground) outside of all Special Preservation Areas and the Midway Atoll Special Management Area (MASMA). (ALL MMB AGENCIES)

5. Possessing fishing gear to conduct sustenance fishing for pelagic species within Midway Atoll Special Management Area (MASMA) in accordance with the Monument Management Board Policy on Sustenance Fishing (Attachment #2). (ALL MMB AGENCIES)

6. Operating aircraft and airfields, including necessary maintenance and use of airfields and runways at Midway Atoll (Kuaihelani). (FWS)

7. Conducting on-site reviews and operational evaluations including, but not limited to: (ALL MMB AGENCIES)

    a. On-site reviews by management and congressional personnel; (ALL MMB AGENCIES)
    b. Agency site visits and meetings for management planning and programmatic assessments; (ALL MMB AGENCIES) and
    c. On-site management and safety reviews to gauge implementation and effectiveness of Monument management and programs. (ALL MMB AGENCIES)

8. Conducting personnel safety, fitness, and health maintenance including, but not limited to: (ALL MMB AGENCIES)

    a. Biking and jogging at Midway Atoll (Kuaihelani); and (ALL MMB AGENCIES)
    b. Swimming and bathing at all islands and atolls (ALL MMB AGENCIES); and
    c. Conducting health and safety activities for all personnel, including but not limited to: site safety reviews, adverse weather and emergency response procedures, safety protocols, and continuation of operation plans. (ALL MMB AGENCIES)

RESOURCE SURVEY AND MONITORING

9. Closed or open circuit SCUBA diving, swimming and snorkeling as necessary to support conservation and management activities covered under this permit. (ALL MMB AGENCIES)

10. Touching coral, living or dead, necessary to support conservation and management activities covered under this permit. (ALL MMB AGENCIES)

11. Attracting any living Monument resource, necessary to support conservation and management activities covered under this permit. (ALL MMB AGENCIES)

12. Surveying and monitoring target species and habitats to evaluate trends and status for management purposes. Activities in direct support of management, monitoring, and characterization may include: (ALL MMB AGENCIES)

    a. Placing scientific equipment or drilling into submerged and emergent lands in order to install scientific equipment, devices, markers, oceanographic instrument arrays, unmanned aerial systems, remotely operated camera systems, and remote viewing camera systems on submerged or emergent lands, and performing necessary maintenance activities on such equipment; (NOAA) (STATE) (FWS)

b. Collecting climatological data and necessary scientific information from on-site equipment; (NOAA) (STATE) (FWS)
c. Photographing and filming (including UAS) as necessary to document Monument resources; (ALL MMB AGENCIES)
d. Non-lethal marking and tagging for monitoring purposes; (ALL MMB AGENCIES) Note: Prior to authorization to conduct work which may result in the "take" of a protected species, a separate ESA/MMPA permit shall be required. (NOAA) (STATE) (FWS)
e. Visual, non-invasive marking and tagging for monitoring purposes; (ALL MMB AGENCIES) and
f. Physical surveying of and sampling from landfills, storage tanks, contamination sites, or other potentially hazardous materials associated with current and former occupation and use of the Northwestern Hawaiian Islands (NWHI); (NOAA) (STATE) (FWS) and
g. Visual, acoustic, electronic (i.e. Conductivity-Temperature-Depth (CTD) casts) and/or unmanned (aerial and marine) surveys in support of monitoring coral reefs, pelagic environments, and estimating the abundance and distribution of animals in the NWHI. (NOAA) (STATE) (FWS)

13. Removing, moving, taking, harvesting, possessing, injuring, disturbing, or attempting to remove, move, take, harvest, possess, injure, or disturb biological, chemical, or geological samples for analysis in support of activities under approved management plans, restoration or recovery plans, and for base line inventory and monitoring of population trends and habitat conservation and management. (ALL MMB AGENCIES)

14. Removing, moving, taking, harvesting, possessing, or attempting to remove, move, take, harvest, or possess a set number of any visually observable marine organism morphotype (except mammals) or terrestrial plant morphotype (including fungi), which cannot be visually identified or may represent a new geographic record or new species, with the set number based upon the per island/atoll abundance criteria below: (ALL MMB AGENCIES)

a. One (1) specimen can be taken, removed, or possessed if in abundance assessment cannot be ascertained, or less than ten (10) such specimens are present, cumulative during the course of the collection event per island and atoll; (ALL MMB AGENCIES)
b. Up to three (3) specimens can be taken, removed, or possessed if an abundance assessment of ten (10) or more such specimens is ascertained, cumulative during the course of the collection event per island or atoll; (ALL MMB AGENCIES) and
c. For clonal organisms that cannot be visually identified or may represent a new geographic record or new species, take shall be limited to no more than half the clonal organism visually observed. Up to three (3) clonal specimens of similar morphology can be taken, removed, or possessed if an abundance assessment of

ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island or atoll. (ALL MMB AGENCIES)

15. Conducting habitat mapping for the production of accurate, high-resolution base maps with methods to include: (ALL MMB AGENCIES)

    a. Data collecting to include optic, acoustic, and metal detector technologies, as well as land and dive operations, including the use of a remotely operated vehicle (ROV) and UAS, for ground truthing; (ALL MMB AGENCIES) and
    b. Global Positioning System (GPS) mapping and Light Detection and Ranging (LIDAR) work. (ALL MMB AGENCIES)

NATURAL RESOURCE PROTECTION, RESTORATION, AND REMEDIATION

16. Conducting management actions necessary to understand and carry out protection, restoration, and remediation of species and habitats, such as carrying out existing species recovery and restoration plans (ALL MMB AGENCIES).

    a. Conducting wildlife disentanglement, health response (including treatment and necropsy), and translocation activities according to existing species recovery plans; (NOAA) (STATE) (FWS)
    b. Conducting population augmentation or reestablishment activities such as capture, translocation, reintroduction, and out-planting; (ALL MMB AGENCIES)
    c. Conducting invasive species controls by mechanical, chemical and manual methods as needed; (ALL MMB AGENCIES)
    d. Investigating and monitoring of contamination in abiotic or biotic resources. (NOAA) (STATE) (FWS)

17. Removing marine debris, including but not limited to, plastic pollution, trash, derelict fishing gear and other materials (land and ocean-based) that pose threats to Monument resources. Activities may include: (ALL MMB AGENCIES)

    a. Disentangling wildlife from marine debris and other materials by authorized personnel; (NOAA) (STATE) (FWS)
    b. Tracking debris via drifter buoys and Unmanned Aerial Vehicles; (NOAA) (STATE) (FWS)
    c. Monitoring of sites that have been cleared of debris for recovery rates and effects of removal; (ALL MMB AGENCIES)
    d. Locating and removing 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; (ALL MMB AGENCIES) and
    e. Removal of sessile encrusting flora and fauna associated with marine debris. (ALL MMB AGENCIES)

18. Providing emergency response and damage assessment, mitigation, restoration, and monitoring post-response management. (ALL MMB AGENCIES) Activities may include:

    a. Conducting damage assessment, mitigation, restoration, monitoring, and post-response management in coordination with appropriate federal and/or state resource agencies and, as appropriate, consistent with NOAA, FWS, and State of Hawaiʻi Damage Assessment and Restoration regulations, policies, and procedures (e.g., oil spills, ship groundings, tsunami-generated marine debris, damage assessments, monitoring alien species, monitoring coral bleaching events, collection of bleached coral or alien species); (ALL MMB AGENCIES) and
    b. Conducting activities in response to an unusual mortality event (including but not limited to threatened and endangered species, marine mammals, and migratory birds) mass stranding or other urgent species response. (NOAA) (STATE) (FWS)

CULTURAL AND HISTORICAL RESOURCE IDENTIFICATION AND PROTECTION

19. Removing, moving, taking, harvesting, possessing, injuring, disturbing; or attempting to remove, move, take, harvest, possess, injure, or disturb post-contact artifacts as needed, subject to National Historic Preservation Act (NHPA) consultation when applicable, for the purpose of identifying, documenting, interpreting, preserving, and protecting the Monument's cultural and historic resources. (ALL MMB AGENCIES)

20. Monitoring and surveying historic sites. (ALL MMB AGENCIES)

21. Conducting or allowing for the preservation and conservation of artifacts subject to successful NHPA Section 106 consultation and appropriate approvals from other Federal agencies (e.g., U.S. Navy), when applicable. (ALL MMB AGENCIES)

22. Non-commercial filming and photographic activities for the purposes of further documenting and capturing the history of the NWHI. (ALL MMB AGENCIES)

23. Locating historic artifacts using passive side scan sonar, metal-detector, or (land-based) ground penetrating radar. (ALL MMB AGENCIES)

24. Returning of any previously collected samples to appropriate areas in Papahānaumokuākea with proper cultural and biological protocols and in coordination with appropriate federal and/or state resource agencies and community partners, including OHA and the Papahānaumokuākea Native Hawaiian Cultural Working Group, as appropriate. (ALL MMB AGENCIES)

25. Recording of atmospheric, celestial, biological, and other environmental observations for the purpose of developing and understanding natural trends, changes and cycles. (ALL MMB AGENCIES)

26. Conducting native Hawaiian cultural protocols and ceremonies, including offering of culturally and biologically appropriate hoʻokupu in accordance with Monument regulations and Best Management Practices. (ALL MMB AGENCIES)

27. Removing, moving, taking, harvesting, possessing, injuring, disturbing; or attempting to remove, move, take, harvest, possess, injure, or disturb non-living culturally significant natural materials acquired during Monument operations and activities for cultural ceremony, practices and education. (ALL MMB AGENCIES)

28. Transferring culturally significant natural materials acquired during Monument operations and activities to Hawaiian cultural practitioners, in coordination with appropriate federal and/or state resource agencies and community partners, including OHA and the Papahānaumokuākea Native Hawaiian Cultural Working Group, and with the appropriate transfer documents and required permits. (ALL MMB AGENCIES)

29. Maintaining, preserving, caring for, and perpetuating Native Hawaiian wahi kūpuna (cultural sites) and iwi kūpuna (ancestral bones) in accordance with proper cultural protocols and consultation per the NHPA, Native American Graves Protection and Repatriation Act, Archeological Resources Protection Act, American Indian Religious Freedom Act and applicable sections of the Hawaiʻi State Constitution, Hawaiʻi Revised Statutes and Hawaiʻi Administrative Rules. (ALL MMB AGENCIES)

30. Conducting activities necessary for maintaining and preserving historic sites on Midway Atoll. (ALL MMB AGENCIES)

OUTREACH AND EDUCATION

31. Gathering information and experiences from personnel within the Monument to develop agency web pages, Navigating Change projects, and other Monument educational outreach products. (ALL MMB AGENCIES)

32. Removing, moving, taking, harvesting, possessing, injuring, disturbing; or attempting to remove, move, take, harvest, possess, injure, or disturb non-living debris and biological samples and specimens such as albatross boluses and carcasses for educational and/or outreach projects. (ALL MMB AGENCIES)

33. Transferring educational and outreach materials (e.g., albatross boluses or other non-living debris or biological samples) shall be according to one of the following categories, subject to all applicable permits and Monument Management Board (MMB) approved transfer documents: (ALL MMB AGENCIES)

    a. *Internal transfers*. Transfers among the MMB agencies provided such educational and/or outreach material shall remain within the custody of the MMB. (ALL MMB AGENCIES)

b. *External transfers*. Transfers outside of the MMB agencies if authorized in writing, to government agencies and accredited educational institutions, for the purpose of cultivating, informing, or involving constituencies that support or enhance conservation of the natural, cultural, and historic resources of the Monument. (ALL MMB AGENCIES)
c. *Loan Transfers*. Loans of biological samples or specimens, which must be returned to the MMB with a specified time frame and are subject to conditions stipulated in writing, to government agencies and accredited educational institutions for the purpose of supporting educational or outreach projects that enhance conservation of the natural, cultural, and historic resources of the Monument. (ALL MMB AGENCIES)

34. Conducting news media and VIP site visits to enhance public knowledge and understanding of Monument resources. (ALL MMB AGENCIES)

35. Conducting environmental, cultural, and historical education programs throughout the Monument by designated agency staff and contractors. (ALL MMB AGENCIES)

HAWAIIAN MONK SEAL CONSERVATION AND MANAGEMENT ACTIVITIES

36. Conducting the following population monitoring activities:

    a. Conducting seal assessments by visually identifying animals, and marking and tagging animals; (ALL MMB AGENCIES)
    b. Instrumenting seals including but not limited to mounted cameras and telemetry tags. (NOAA)

37. Operating unmanned aircraft systems (UAS) to assist in monitoring Hawaiian monk seal population. (NOAA)

38. Traversing Mokumanamana to conduct population assessment surveys only when full surveys cannot be completed by boat landing or UAS operations. (NOAA)

39. Placing acoustic recording devices on submerged sandy substrate to capture underwater vocalizations of Hawaiian monk seals. (NOAA)

40. Installing trail cameras in terrestrial areas to monitor entrapments and animal behavior. (ALL MMB AGENCIES)

41. Disentangling monk seals from marine debris. (NOAA) (STATE) (FWS)

42. Conducting health surveillance and response, including but not limited to cutting umbilical cords, antihelminthic treatments, lancing abscesses, administering antibiotics and vaccinations, responding to disease outbreaks, necropsy and collecting/archiving/transferring samples for further research and diagnostic collaboration. (NOAA) (STATE) (FWS)

43. Translocating Hawaiian monk seals, consisting of the following types:

    a. *Intra-atoll*: These translocations will include moving seals from areas of high risk where threats are imminent to safer areas and moving pups to promote maternal fostering when necessary. Field staff will perform these movements; greater resources (e.g., veterinarian care) will not typically be necessary. (NOAA)
    b. *Inter-atoll*: These translocations will include transport of weaned female pups from atolls/islands of low survival to those of higher survival. (NOAA)
    c. *MHI-NWHI*: These translocations will include transport of main Hawaiian Island (MHI) seals that are considered a threat to themselves or humans because they have demonstrated a pattern of interacting with humans. (NOAA)
    d. *NWHI-captive care*: Seals may be taken into temporary captivity for treatment at appropriate, federally permitted rehabilitation facilities in the MHI for release back in the NWHI (i.e., permitted for captive care of injured, ill or prematurely weaned seals). (NOAA)
    e. Aggressive male seal translocation to areas with no pups or juveniles. (NOAA)

44. Reuniting nursing mothers and pups, when separated (includes instances of pup switches). (ALL MMB AGENCIES)

45. Mitigating male aggression towards pups and juveniles (individual and multiple male-based aggression), including utilizing all federally permitted techniques (including, but not limited to, poles, rocks, slingshots, and air horns). Mitigation tools shall be applied as appropriate for the given context (i.e., the intensity, severity and frequency of aggression and the location, with regard to other species in the area such as birds). Mitigation may include temporarily separating males from juveniles by placing either in temporary shore-pens (see below). Mitigation also may include removal of the male(s) from the area by:

    a. Translocation to a location where no pups or juveniles will be harmed; (NOAA) (STATE) (FWS)
    b. Placement in an appropriate, federally permitted facility that is agreeable and permitted to care for a male indefinitely; (NOAA)
    c. Lethal removal: this type of removal will only be applied when the above two options are not feasible, possible or exhausted. The preferred technique for euthanasia will be via physical means (e.g., firearm, captive bolt, etc.), in order for the carcass to remain in PMNM and for culturally appropriate and environmentally proper disposal to occur. When necessary, chemical euthanasia and removal of the carcass from PMNM will be allowed. (NOAA)

46. Conducting captive care of compromised seals to administer veterinary care and/or food supplementation. Captive care may include the capture and transport of seals to shore-pens (in the NWHI) or facilities in the MHI. NWHI seals under care in the MHI may be returned to the NWHI when a licensed veterinarian deems them rehabilitated and transport is feasible. The seals will then be released to the NWHI site deemed most

appropriate for their subsequent survival (determined on the basis of such factors as the intensity and severity of imminent threats to the seals and recent survival trends at each atoll/island). (NOAA)

47. Monitoring shark activity at Lalo (French Frigate Shoals). Monitoring may include camping on islets with shark incidents on nursing pups and recording shark activity and shark-seal interactions via hand-held or mounted cameras (cameras will be mounted on a pole 15’ or less with no guy wires to be used only during the field season and attended daily by field staff). (NOAA)

48. Placing temporary shore-pens at select NWHI breeding sites to facilitate monk seal recovery activities described here within (e.g., translocations, captive care, and male aggression mitigation). (ALL MMB AGENCIES)

49. Attracting Monument living marine resources using baited hooks, with bait to include fish parts (brought from outside the Monument), shark remains (obtained from permitted activities), and salvaged monk seal tissues (obtained from deceased monk seals at Lalo (French Frigate Shoals) and brought from outside the Monument). (ALL MMB AGENCIES)

50. Removing, moving, taking, possessing, injuring, or disturbing; or attempting to remove, move, take, possess, injure, or disturb up to **13** Galapagos sharks (*Carcharhinus galapagensis*) within a distance of 700 meters from the shorelines and inlets at Lalo (French Frigate Shoals) in consultation with OHA and the Papahānaumokuākea Native Hawaiian Cultural Working Group. Only Galapagos sharks with a minimum size of 2 meters (6.5 feet) tail length or greater shall be lethally removed. Permittees are required to safely release Galapagos sharks smaller than the minimum size limit as well as all other non-target species. The following four removal methods are authorized:

    a. Deploying a *hand-held harpoon* from shore or small boat when a targeted Galapagos shark is observed. Targeted shark shall then be hauled on shore or alongside a small boat for humane euthanasia using a .44 caliber bang stick. (NOAA)

    b. Deploying a baited *handline* from shore or small boat. Targeted shark caught shall then be hauled on shore or alongside a small boat for humane euthanasia using a .44 caliber bang stick. (NOAA)

    c. Deploying *bottomsets*, where each bottomset shall have a maximum of ten baited hooks and a buoy line at the top and an anchor (9-12 lb.) at the bottom. All bottomset gear shall be deployed only on sandy substrate and shall be closely monitored by field project personnel. (NOAA)

    d. Deploying *drumlines*, where each drumline shall consist of a single baited hook and drum-buoy with gear configuration to allow baited hook to rest on the bottom or suspended above the seafloor. All drumline gear shall be deployed only on sandy substrate and shall be closely monitored by field project personnel. (NOAA)

51. Possessing fishing gear in support of permitted activities, within a distance of 700 meters from the shorelines of East, Trig, Gin, Little Gin, and Round islets (Lalo / French Frigate Shoals). All fishing gear shall be monitored closely to prevent mortality of non-target species. (NOAA)

52. Placing anchors on submerged lands that are part of authorized fishing gear. All anchors shall be placed on sandy substrate and all anchors removed when fishing gear is retrieved. (NOAA)

53. Conducting necropsies on euthanized Galapagos sharks on Tern Island, Lalo (French Frigate Shoals) for the purpose of obtaining morphometric measurements, reproductive state, and removing samples of muscle, liver, vertebrae, and gut contents for scientific analyses. (NOAA)

54. Discharging of Galapagos shark remains (post-necropsy) at a distance of approximately 0.5 miles seaward from the Lalo (French Frigate Shoals) breaking reef. Global Positioning System (GPS) coordinates shall be recorded at each carcass discharge site. One carcass, including any lethal by-catch shall be disposed of at each site. (NOAA)

55. Transferring necropsy samples from Galapagos shark remains to researchers for scientific analyses:

    a. Diet analysis through isotope screening (vertebrae) (NOAA)
    b. Diet analysis through fatty acid profiles (liver) (NOAA)
    c. Ciguatera and mercury level testing (muscle and liver) (NOAA)
    d. DNA analysis from fin clip and stomach contents, if available (NOAA)

56. Transferring biological samples (e.g., teeth and skin) for cultural purposes to practitioners shall occur only to such persons conducting protocol in PMNM. (NOAA)

57. Erecting temporary polyvinyl tents for housing monk seal field teams at Lalo (French Frigate Shoals), Kamole (Laysan), Kapou (Lisianski), Manawai (Pearl and Hermes) and Hōlanikū (Kure). One tent at each site may have a radio antenna extending upwards <10ft. (NOAA) (FWS)

No further disturbance of the cultural or natural resources of the Monument is allowed.

The MMB may monitor activities under the permit. Any member of the MMB or their designee 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 or designee, 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 or designee, 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.

PERMITTED ACTIVITY LOCATION:

Other than entrance into the Monument, the permitted activities listed above are allowed at the following locations:

1. The permittees may conduct conservation and management activities throughout all areas of 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 permittees 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 permit expiration date.

   NOAA/Inouye Regional Center
   NOS/ONMS/PMNM/Attn: Permit Coordinator
   1845 Wasp Blvd, Building 176
   Honolulu, HI 96818

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-Trustee signatories listed at the end of this permit. Modifications to this permit must be requested in the same manner as the original request was made. Any modifications requested by the permittees, 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-Trustee signatories listed at the end of this permit, be renewed or reissued. However, there is no right to a

renewal or reissuance. 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. For a list of federal, state, and local laws and regulations, refer to attached Papahānaumokuākea Marine National Monument Laws and Regulations document. Activities under this permit may be conducted only after any other permits or authorizations necessary to conduct the activities have been obtained.

7. The permittees 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 are 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 Hawaiʻi, the Office of Hawaiian Affairs, 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 Hawaiʻi are held in trust under the Hawaiʻi State Constitution, Article XI, Sec. 1. The State of Hawaiʻi 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 (subject to change):

    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. A minimum of one electronic copy (Microsoft Word preferred, but not required), must be submitted to the Co-Trustees. The annual report is due by December 31 for each calendar year the permit was in effect. 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 permittees 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-2024-001. 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 below:

Permit Coordinator
NOAA/Inouye Regional Center
NOS/ONMS/PMNM
1845 Wasp Blvd., Building 176
Honolulu, HI 96818

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 Hawaiʻi retain a lifetime, non-exclusive, worldwide, royalty-free license to use the same for government purposes, including copying and dissemination, 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.

26. Permittee is required to work in conjunction with the U.S. Fish and Wildlife Service, Hawaiian Islands National Wildlife Refuge and Midway Atoll National Wildlife Refuge

regarding any arrangements at Nihoa Island, Mokumanamana (Necker Island), the islands of Lalo (French Frigate Shoals), Pūhāhonu (Gardner Pinnacles), Kamole (Laysan Island), Kapou (Lisianski Island), the islands of Manawai (Pearl and Hermes Atoll), Midway Atoll (Kuaihelani), and with the State of Hawaiʻi Kure Atoll Seabird Sanctuary Manager at Hōlanikū (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. Hawaiian Islands National Wildlife Refuge: Amanda Boyd, 808-792-9488 or Amanda_J_Boyd@fws.gov

b. Hōlanikū (Kure Atoll): Cynthia Vanderlip at kureatoll@gmail.com

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 research 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 permittee 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 protocol 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 ship 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 (BMP) and guidelines, as attached:

a. Marine Alien Species Inspection Standards for Maritime Vessels (PMNM BMP #001)
b. Protocol for Acquiring Avian Blood Samples (PMNM BMP #002)
c. Human Hazards to Seabirds Briefing (PMNM BMP #003)
d. Best Management Practices for Boat Operations and Diving Activities (PMNM BMP #004)
e. Protocol to Reduce Impact to the Laysan Finch (PMNM BMP #005)
f. General Storage and Transport Protocols for Collected Samples (PMNM BMP #006)
g. Best Management Practices for Terrestrial Biosecurity (PMNM BMP #007)
h. Protocols Necessary for Conducting Trolling Research and Monitoring (PMNM BMP #008)
i. Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles (PMNM BMP #009)
j. Marine Wildlife Viewing Guidelines (PMNM BMP #010)
k. Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (PMNM BMP #011)
l. Precautions for Minimizing Human Impacts on Endangered Land Birds (PMNM BMP #012)
m. Nonnative Species Inspection Requirements at Midway Atoll (PMNM BMP #015)
n. Best Management Practices for Activities on Nihoa (PMNM BMP #016)
o. Best Management Practices for Maritime Heritage Sites (PMNM BMP #017)
p. Rodent Prevention and Inspection Standards for Permitted Vessels (PMNM BMP #018)
q. Best Management Practices for Activities on Mokumanamana (PMNM BMP #019)
r. Best Management Practices to minimize the spread of nuisance alga (BMP# 20)

9. To ensure minimal disturbance to birds and safety of monument staff, all inland GPS survey work must be pre-approved by the on-island manager or staff escort prior to surveying.

10. An evaluation of additional permits (i.e. MMPA, MBTA, USACE, etc.) required and/or regulatory environmental consultations needed (i.e. ESA Section 7, MSA EFH, NHPA Section 106, etc.) will occur for each co-manager activity and be obtained/completed prior to the activity occurring (as necessary).

11. Permittee is required to work in conjunction with the U.S. Fish and Wildlife Service, Hawaiian Islands National Wildlife Refuge and Midway Atoll National Wildlife Refuge regarding any arrangements at Nihoa Island, Mokumanamana (Necker Island), the islands of Lalo (French Frigate Shoals), Pūhāhonu (Gardner Pinnacles), Kamole (Laysan Island), Kapou (Lisianski Island), the islands of Manawai (Pearl and Hermes Atoll), Midway Atoll (Kuaihelani), and with the State of Hawaiʻi Kure Atoll Seabird Sanctuary Manager at Hōlanikū (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. Lalo (French Frigate Shoals): Deputy Superintendent, Amanda Boyd; email Amanda_J_Boyd@fws.gov, or telephone 808-286-1320.
b. Midway Atoll (Kuaihelani): Midway Refuge Manager, Elaine Johnson; email Elaine_Johnson@fws.gov, or telephone 808-954-4818.
c. Kamole (Laysan Island): Deputy Superintendent, Amanda Boyd; email Amanda_J_Boyd@fws.gov, or telephone 808-286-1320.
d. Hōlanikū (Kure Atoll): Kure Biological Field Station Supervisor, Cynthia Vanderlip at kureatoll@gmail.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.

JARED UNDERWOOD Digitally signed by JARED UNDERWOOD Date: 2023.12.21 08:59:21 -10'00' 12/21/2023

Jared Underwood Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of the Interior
U.S. Fish and Wildlife Service

COLLINS.VINCENT.A.1365821859 Digitally signed by COLLINS.VINCENT.A.1365821859 Date: 2023.12.19 09:31:40 -10'00'

Eric Roberts Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

Dec 20, 2023

Brian Neilson Date
Division of Aquatic Resources Administrator/State Co-Manager,
Papahānaumokuākea Marine National Monument
Department of Land and Natural Resources
State of Hawaiʻi

Dec 22, 2023

Stacy Kealohalani Ferreira Date
Ka Pouhana (Chief Executive Officer)
Office of Hawaiian Affairs

Attachments (24):
1. PMNM Rules and Regulations
2. Monument Management Board Policy on Sustenance Fishing
3. Papahānaumokuākea Marine National Monument Rules and Regulations
4. Map of the Papahānaumokuākea Marine National Monument
5. Permit Acknowledgment Form
6. Marine Alien Species Inspection Standards for Maritime Vessels (PMNM BMP #001)
7. Protocol for Acquiring Avian Blood Samples (PMNM BMP #002)
8. Human Hazards to Seabirds Briefing (PMNM BMP #003)
9. Best Management Practices for Boat Operations and Diving Activities (PMNM BMP #004)
10. Protocol to Reduce Impact to the Laysan Finch (PMNM BMP #005)
11. General Storage and Transport Protocols for Collected Samples (PMNM BMP #006)
12. Best Management Practices for Terrestrial Biosecurity (PMNM BMP #007)
13. Protocols Necessary for Conducting Trolling Research and Monitoring (PMNM BMP #008)
14. Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles (PMNM BMP #009)
15. Marine Wildlife Viewing Guidelines (PMNM BMP #010)
16. Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (PMNM BMP #011)
17. Precautions for Minimizing Human Impacts on Endangered Land Birds (PMNM BMP #012)
18. Nonnative Species Inspection Requirements at Midway Atoll (PMNM BMP #015)
19. Best Management Practices for Activities on Nihoa (PMNM BMP #016)
20. Best Management Practices for Maritime Heritage Sites (PMNM BMP #017)
21. Rodent Prevention and Inspection Standards for Permitted Vessels (PMNM BMP #018)
22. Best Management Practices for Activities on Mokumanamana (PMNM BMP #019)
23. Best Management Practices to minimize the spread of nuisance alga (PMNM BMP# 20)

Dec 20, 2023

Dawn N. S. Chang | Date
Chairperson
Board of Land and Natural Resources
Department of Land and Natural Resources
State of Hawai'i

JARED UNDERWOOD Digitally signed by JARED UNDERWOOD
Date: 2023.12.21 08:57:11 -10'00'

12/21/2023

Jared Underwood | Date
Superintendent
Papahānaumokuākea Marine National Monument
Department of the Interior
U.S. Fish and Wildlife Service

COLLINS.VINCENT.A.1365821859 Digitally signed by COLLINS.VINCENT.A.1365821859
Date: 2023.12.19 09:55:09 -10'00'

Eric Roberts | Date
Superintendent
Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

Appendix 6

NATIONAL MARINE FISHERIES SERVICE

Assurance of Animal Care and Use Form

IACUC Use Only

IACUC Number:2019-03M **USDA Classification:** C ☒ D ☒ E ☐

Date Received 11/7/2019 **Initial Review Date:** 12/2/2019

IACUC Training Complete: ☒

IACUC Recommendations: Approved: ☒ Not Approved: ☐

Withhold Approval Pending Modification ☐

Type of Submission: New ☐ Modification ☒ 5-Year Renewal ☐

IACUC Chair Signature: ______________________________ **Date:** 12/19/2019

Project Title:

Marine turtle research and assessment in the Pacific Islands Region (e.g. Hawaii, American Samoa, Guam, CNMI, PRIAs, inclusive EEZ, associated high seas, and adjacent foreign waters) to estimate population structure, abundance, and trends.

Principal Investigators: Dr. T. Todd Jones (MTBAP)
Region: Pacific Islands
Division: Protected Species
Program: Marine Turtle Biology and Assessment

Permit Coordinator: Dr. Camryn Allen (MTBAP)
Co-Investigators: Mrs. Shawn Murakawa, Ms. Shandell Brunson, Dr. Summer Martin, Dr. Camryn Allen, Dr. Alexander Gaos, and Mrs. Marylou Staman

All monitoring, and research projects involving marine mammals and marine turtles must be approved by the SWR/PIR Regional NMFS Institutional Animal Care and Use Committee prior to the commencement of the project. Principal Investigators (PI) are to submit the completed Assurance of Animal Care Form (hereafter Assurance Form) to the SWR/PIR IACUC Office. Assurance forms need to be submitted for IACUC review 4 weeks prior to submitting a permit application.

Please submit the completed Assurance Form as an electronic file in Microsoft Word to Tina Nguyen, SWR/PIR IACUC Coordinator, (tina.l.chen@noaa.gov). Please check to ensure we have received the document. **Remember that you must still sign the declaration page.** This may be done in person or you may print off the declaration page, sign it, and send it via regular mail or by fax (858-546-7003). A specific IACUC number will be assigned to the Assurance Form. If you are unclear as to what is required to complete the Assurance Form, please contact Brittany Hanser (858-546-5629) or Tina Chen (858-546-5610).

YOUR ASSURANCE FORM WILL NOT BE APPROVED UNTIL COMPLETE.

The Assurance Form will be valid for **5 years after approval** contingent upon the IACUC receiving annual reports and that methods have not changed. As stipulated in the Animal Welfare Act, the Assurance Form may be renewed annually by the PI for a maximum of 2 renewals. You will receive an annual review form from the SWR/PIR IACUC for 4 years and on the fifth anniversary of this approved Assurance Form you will be notified of its termination. At this time you will need to submit a new Assurance Form for review.

I attest to the accuracy and completeness of the information provided. I promise to conduct this work with animals in accordance with the protocol as approved by the NMFS IACUC under the NMFS Animal Care and Use Policy. I will not make any substantive changes in the above protocol without first obtaining the approval of the NMFS IACUC, and I will not use any procedures which are not included in this form.

Principal Investigator/
Applicant Signature_____________________________________Date:_____8 November 2019___

A. Administrative Data

Project Title:
Marine turtle research and assessment in the Pacific Islands Region (e.g. Hawaii, American Samoa, Guam, CNMI, PRIAs, inclusive EEZ, associated high seas, and adjacent foreign waters) to estimate population structure, abundance, and trends.

Science Center, Division and/or Program: PIFSC Protected Species Division, Marine Turtle Biology and Assessment Program

Principal Investigator: Dr. T. Todd Jones

Mailing Address: NOAA IRC, 1845 Wasp Boulevard, Building 176, Honolulu, HI 96818

Telephone: 808 725-5713 **Fax:** 808 725-5567

Email: todd.jones@**noaa.gov**

Initial Submission ☐ ☐ **OR** **Renewal** ☐ ☐ **OR** **Modification** ☒ ☐

Funding Source: NMFS

Grant Title (if different from Project Title): Click here to enter text

Anticipated Start Date: 12/21/2017 **Anticipated End Date:** 12/20/2022

Location Where Animals Will Be Housed or Study Site(s):
Pacific Islands Region including (1) the Hawaiian Islands, (2) American Samoan Islands, (3) Guam, (4) the Common Wealth of the Northern Mariana Islands (CNMI), (5) the Federated States of Micronesia, (6) Republic of the Marshall Islands, (7) the Republic of Palau, (8) the Pacific Remote Islands Areas (PRIAs; Midway Atoll, Johnston Atoll, Palmyra Atoll, Kingman Reef, Howland Island, Baker Island, Jarvis Island, and Wake Island), and (9) Southeast Asia (e.g. Indonesia and Philippines)

Permits: Identify all relevant permits (Federal, State and other) necessary to conduct this project. Provide permit type(s), permit number(s), and expiration date(s). Please indicate if a permit application is pending a decision.

Table 1. Permits acquired or submitted to conduct the research proposed for this project on sea turtles in the Pacific Island Region

Permit Type	Permit Number	Expiration/Submission Date

ESA10a1A	21260	Expires 09/30/2027
USFWS Recovery Permit	TE-72088A-2	Expires 08/08/2023
State of Hawaii	SAP 2020-01	Expires 01/06/2020 Renewal submitted 11/2019
USFWS Scientific Collection Permits for Guam, CNMI, and American Samoa	Scientific Collection Permit	Maintained yearly

*The NMFS policy intends to comply with the **Animal Welfare Act** (AWA) - Title 7 of U.S. Code §2131 et. seq. and implementing regulations and adhere to the principles of the **U.S. Government Principles** for the Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training (USGP) and follow the guidelines in the National Research Council **Guide for the Care and Use of Laboratory Animals.***

B. Justifications

In accordance with USGP #2, "Procedures involving animals should be designed and performed with due consideration of their relevance to human or animal health, the advancement of knowledge, or the good of society."

1. **Research Goals:**

a. What are the scientific issues addressed by the research? Specifically, how will this research improve human and animal health or advance knowledge?

All species of sea turtles (except flatback turtles, *Natator depressus*, found only along the continental shelf of Australia) are protected under the U.S. ESA throughout all areas under U.S. jurisdiction, associated high seas, and adjacent foreign Exclusive Economic Zones (EEZs). In the central, South, and western Pacific, this applies to Hawaii, Guam, CNMI, American Samoa, the eight unincorporated U.S. territories (Howland, Baker, Wake, Jarvis, and Midway Islands, Johnston Atoll, Palmyra Atoll, and Kingman Reef), as well as the U.S.-affiliated but independent nations of the Republic of the Marshall Islands (RMI), Federated States of Micronesia (FSM), and the Republic of Palau (National Marine Fisheries Service and U.S. Fish and Wildlife Service, 1998a, 1998b, 1998c, 1998d, 1998e). Recovery plans for populations of sea turtles within the PIR were finalized in 1998 and serve as guidance in actions to recover these populations (National Marine Fisheries Service and U.S. Fish and Wildlife Service, 1998a, 1998b, 1998c, 1998d, 1998e). This proposed long-term study of PIR sea turtles directly responds to recovery action items in the Recovery Plans for U.S. Pacific Populations of sea turtles including:

1.1 “Protect and manage turtles on nesting beaches” with an emphasis on 1.1.5 “Collect biological information on nesting turtle populations”; 2.1 “Protect and manage turtle populations in the marine environment” with an emphasis on 2.1.2 “Determine distribution, abundance, and status in the marine environment”, 2.1.3 “Reduce the effects of entanglement and ingestion of marine debris”, 2.1.6 "Study the impact of diseases on turtles", 2.1.7 “Develop/maintain carcass stranding network”, and 2.1.8 “Centralize administration and coordination of tagging programs”; 2.2 “Protect and manage marine habitat, including foraging habitats” with an emphasis on 2.2.1 “Identify important marine habitats”; and 4.1 “Support existing international agreements and conventions to ensure that turtles in all life- stages are protected in foreign waters” (because sea turtles are a shared resource due to their trans-boundary migrations). Furthermore, NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and research conducted by the Marine Turtle Biology and Assessment Program (MTBAP) of the Protected Species Division at the Pacific Islands Fisheries Science Center (PIFSC) supports NOAA’s mission to conserve and recover sea turtle populations in the Pacific.

Research directed towards sea turtles in foraging, nesting, and migratory habitat can provide a wealth of information on the abundance, trends, survival, and growth of juvenile and adult turtles. Well-designed monitoring studies include but are not limited to (1) capture/tagging work to provide information on individuals, (2) habitat use, (3) growth, (4) diet, (5) health and disease, (6) survival, (7) residency, and (8) endocrine analysis to determine reproductive status, sex and sex ratio (Allen et al., 2015), and age at sexual maturity.

b. What are the specific goals of the animal studies described in this protocol?

- The purpose of this project is to initiate, conduct, and continue long-term monitoring of the status of sea turtles in the PIR, associated high seas, and adjacent foreign EEZs. All research will be performed in concert with local authorities and sea turtle programs [e.g., Guam Department of Agriculture, Division of Aquatic & Wildlife Resources (DAWR); Common Wealth of the Northern Mariana Islands (CNMI) Department of Land and Natural Resources, (DLNR) Division of Fish and Wildlife (DFW); Department of Environment and Natural Resources Philippines; and USFWS] to ensure efforts are not duplicative. NOAA Fisheries has the mandated responsibility for research and management of sea turtles in the marine environment. The MTBAP at the PIFSC, i.e. the applicant here, is the lead program in the PIR that supports NMFS’s core mission to conserve and recover sea turtle populations in the PIR EEZ, associated high seas, and adjacent foreign EEZ. MTBAP fulfills federal statutory and programmatic mandates under the ESA and furthers the agency’s goals. These may be general research goals – such as elucidating questions of stock structure, population monitoring, fulfilling stock assessment needs – or specific questions related to turtle ecology. We will conduct saturation tagging and rapid assessments of sea turtles (of both sexes) throughout the PIR and associated waters/lands to estimate their abundance, nesting demographics, stock structure, body size ranges, residence times, health/disease status, sex and endocrine function, diving behavior, habitat use, foraging ecology, local movements, and migration routes. This data is critical to ESA Section 7 analyses for fishery and other human impact assessments.

Primary goals of foraging ground, nesting beach, and migratory habitat research is to integrate data from abundance surveys, genetic analysis, flipper tagging, and satellite telemetry to reveal the population structure of turtles occurring in terrestrial, nearshore, and high sea ecosystems across the PIR and in adjacent foreign EEZ. We will compare collected data overtime to determine growth rates of juveniles and adults, examine population abundance trends, and assess changes in the health status of the populations. These data will directly aid in our understanding of threats and age-based mortality rates.

PIFSC will be a repository for samples collected under this animal care application obtained via our permitted activities [NMFS ESA10a1A #15685, #17022, #21260, and #18688; USFWS recovery permit TE-72088A-1] to facilitate research projects conducted by MTBAP, our regional partners, and collaborators at other NMFS science centers.

2. Explain why animal studies are preferred to **non-animal alternatives** in achieving these research goals.

   There are no non-animal alternatives available to study the life history of protected sea turtle species. This study is designed for the implementation of Recovery Items for PIR sea turtles, therefore the observations, measures, and research is directly on the species involved.

In accordance with the Animal Welfare Act – "...the principal investigator has provided written assurance that the activities do not unnecessarily duplicate previous experiments."

3. Does this research **duplicate** previous experiments? ☐ **YES** ☒ **NO**
   If YES, please explain why this duplication is necessary.

4. Do the animal procedures planned for this research involve only **simple field observation** with no impact on either the animals or their environment?
   ☐ **YES** ☒ **NO**
   If **YES**, it is not necessary to complete the informational sections of this protocol form. Instead, fill answer the following:

a. Use Appendix A to describe the study activities. Include all precautions to ensure no adverse impact on the study animals and their environment.
b. Include species copies of any required permits.
c. Submit this package to the NMFS Regional IACUC Chair

If **NO**, the remainder of this form must be completed. Proceed to the next section.

In accordance with the USGP #3, "The animal selected for a procedure should be of an appropriate species and quality and the minimum number required to obtain valid results."

5. List the **research species** (and stock) and describe why it is the most appropriate species to use in these studies:
   - Green turtle (*Chelonia mydas*): Central West Pacific DPS – Endangered, Central North Pacific DPS – Threatened, and Central South Pacific DPS – Endangered
   - Hawksbill turtle (*Eretmochelys imbricata*): PIR – Endangered throughout range
   - Olive ridley (*Lepidochelys olivacea*): PIR – Threatened throughout range
   - Loggerhead (*Caretta caretta*): North Pacific Ocean DPS – Endangered, South Pacific Ocean DPS – Endangered
   - Leatherback (*Dermochelys coriacea*): PIR – Endangered throughout range

   These species reside/forage/migrate within PIR's oceanic and neritic waters and nest on beaches of the PIR and associated foreign waters (e.g., Hawaii, Guam, CNMI, American Samoa, Rose Atoll, Indonesia, and Philippines) and are protected under the ESA. Because of their protected status and the need to obtain information specific to each species, they are the most appropriate species to use in these studies (National Marine Fisheries Service and U.S. Fish and Wildlife Service, 1998a, 1998b, 1998c, 1998d, 1998e).

6. How many animals do you plan to use for the protocol? Please provide a justification for the numbers of animals used (e.g., statistical power, survey, etc.).

   This animal care application is to cover the permitted activities in NMFS ESA10a1A #21260 (valid until September 2027) and USFWS recovery permit TE-72088A-2 (valid until August 2023). Both permits include new research projects (described below).

   We will observe, capture (in-water), and interact [via bycatch (NMFS ESA10a1A #18688) or terrestrial emergence (e.g. nesting or 'basking')] with green, hawksbill, leatherback, loggerhead, and olive ridley sea turtles within the PIR (See Table 2 for numbers) to estimate their abundance, size ranges, health status, habitat use, foraging ecology, local movements, and migration routes. We base our sample size/take numbers on the total number of turtles in the populations in our study area (using previous encounter rates and abundance estimates for each sea turtle population in our study area).

Based on the annual nesting cycles, non-terrestrial emergence (i.e. 'basking'), and in-water capture we estimate that we will interact with no greater than: 3,000 green, 550 hawksbill, 200 leatherback, 200 loggerhead, and 200 olive ridley sea turtles. For the Central North Pacific (CNP) green sea turtle population, skin samples will be collected from all naturally emerging hatchlings from wild nests each year. Sample collection from all hatchlings in a nest will provide for a statistically viable study, help determine both the operational sex ratio and the breeding sex ratio, look for evidence of multiple paternity and polygyny, and aid in genomic kinship analyses. Stewart and Dutton (2014) sampled all hatchlings of 58 nests of the endangered leatherback sea turtle (*Dermochelys coriacea*) with no observable injury (the hatchling successfully crawled and swam after sampling), therefore no impacts are expected from increasing the number of CNP green turtle hatchlings to be sampled. Blood samples will be collected from hatchlings to assist with our genomics and sex ratio studies similar to new research techniques [genomics, (Komoroske *et al.*, 2019) and loggerhead hatchling sex determination, (Tezak, 2019)], which assess multiple paternity and the potential feminization effects of climate change.

In 5 year cycles, MTBAP focuses research within different areas of the PIR and adjacent foreign waters. Not all sites can be sampled annually due to fluctuating logistical and agency funding limitations, thus we will rely heavily on our regional partners in the various areas and coordinate research priorities covered by partner permits. However, in years where we can visit multiple sites and in partnership with our PIR partners we will use close to all of our requested takes. In addition, the number of turtles that can be interacted with or captured on an expedition (or in a given year) is always uncertain due to weather/ocean conditions, and behavioral variations, hence availability of the turtles. Realizing these somewhat unpredictable limitations, the goal is to safely, humanely, and effectively interact with (via terrestrial emergence or in-water capture) as many turtles as possible for quantitative analyses, such as trends in abundance and survival probability.

<u>Terrestrial (all species):</u> We will conduct saturation tagging and rapid assessments of sea turtles (of both sexes) throughout the PIR to monitor population change and mortality. We will tag a subset of turtles with biotelemetry devices following terrestrial encounter (nesting, non-nesting terrestrial emergence, etc.) to better understand their movements post terrestrial emergence. See Table 2 for expected takes for all species.

For green turtles specifically, our nesting beach abundance surveys span the Central North Pacific (CNP), Central West Pacific (CWP), and Central South Pacific (CSP) distinct population segments. Within the CNP itself we estimate 800 – 1000 nesting females per season and several hundred in the CWP and CSP. Therefore, we could interact with upwards of 1500 nesting green sea turtles per year within the PIR.

In-water (all species): MTBAP monitors and conducts research on sea turtle populations in over 2 million square miles of U.S. EEZ encompassing four main archipelagos (Hawaii, American Samoa, Mariana Islands, and PRIAs), all of which have endangered/threatened marine turtle populations residing, using, or transiting within the area. Expanded knowledge of changes in demographic rates at all sea turtle life stages is critically needed. To understand these population dynamics requires a long-term capture-mark-recapture study. The annual takes must be great enough to insure adequate recaptures because subsequent captures of the same turtle are necessary to insure adequate data to model population trends and growth rate. Expanded knowledge of changes in demographic rates at all sea turtle life stages is critically needed (National Research Council, 2010). The majority of these life stages are immature stages (non-reproductive, non-nesting) hence only available to science by capture of individuals in the sea. We suspect that the majority of in-water captures throughout the PIR and adjacent foreign waters will be immature turtles (juveniles/subadults) ranging in straight carapace length (SCL) of 20 – 70 cm. Turtles will not be targeted for sex or size. Capture may take place any time of year as turtles are year round residents of the PIR. Turtles will be captured during annual field research trips (2 – 3 weeks in length) within the PIR and adjacent foreign waters yearly, or as opportunity arises (e.g., NOAA cruises).

7. Complete the following table below to define the numbers(s) of animal(s) to be used in each **category and type procedure(s)**. All information must be consistent with the project plan and MMPA/ESA permit application. Use the following animal welfare categories:

Category (adapted from AWAR):

B: applies only to animals held captive in non-research status (display, rehabilitation, brood stock, holding).

C: applies to little or momentary pain or discomfort e.g. blood sampling with a needle and syringe, morphometric measurements, lavage, suction-cup tagging, etc.

D: applies to potential discomfort or pain which is relieved by the appropriate anesthetic or analgesic e.g. transmitter implantation under general or local anesthetic with analgesic effect, skin or blubber biopsy *under local anesthetics*, coring of dorsal ridge, etc.

E: applies to discomfort of pain which is not relieved thus requires written justification and full IACUC approval and documented in the annual report to APHIS (must consider the 3 R's) – NOT APPLICABLE

In accordance with the AWA: "The principal investigator has considered alternative to procedures that may cause than momentary or slight pain or distress to the animals, and has provided a written narrative description of the methods and sources (e.g. the Animal Welfare Information Center) used to determine that alternative were not available…."

Table 2. Takes of five species of wild and captive sea turtles of multiple life stages (hatchling, juvenile, sub-adult, and adult) within the PIR per year (Permits: ESA10a1A #21260 and USFWS recovery permit TE-72088A-1)

	SPECIES				
CATEGORY LEVEL	**Green**	**Hawksbill**	**Leatherback**	**Loggerhead**	**Olive Ridley**
Category C – observe, capture, ID (shell etch, PIT/flipper tag) morphometric analysis, release	1,500	350	100	100	100
Category C - transmitter attachment	200	100	20	100	100
Category C – skin/tumor biopsy (see general procedures below)	1,500	350	100	100	100
Category C – blood sample	1,500	350	100	100	100
Category C – scute scrapings	1,500	350	0	100	100
Category C – oral/cloaca swab, urine/feces collection	1,500	350	100	100	100
Category C – Gastric lavage	800	350	0	100	100
Category C – ultrasound	800	270	100	100	100
Category C – plastron marking	600	250	10	100	100
Category C – oxytetracycline injection	200	100	100	100	100
Category C – nest components (egg morphometrics, datalogger, hatchling morphometrics, hatchling tissue sampling, excavations) *skin may be collected from all naturally emerging CNP hatchlings	1,500*	200	100	100	100
Category D – laparoscopy	200	50	0	100	100
Category D – core of dorsal ridge for transmitter attachment	0	0	100	0	0
Maximum # of animals needed for project per year	3,000*	550	200	200	200

C. Research Procedures

1. General Procedures.

In accordance with the AWA, "Procedures that may cause more than momentary or slight pain or distress to the animals will a) be performed with appropriate sedatives, analgesics, or anesthetics unless withholding such agents is justified for scientific reasons in writing by the principal investigator and will continue for only the necessary period of time; b) involve in their planning, consultation with the attending veterinarian…, c) not include the use of paralytics without anesthesia…"*
**e.g. biopsy sampling, tagging etc.*

The tissue samples that are collected during research efforts are used for collaborative research with the SWFSC (Marine Turtle Genetics and the Marine Turtle Ecology and Assessment Program) and PIFSC (Life History Program) for genetic, stable isotope, and aging analysis. At present, we are not administering lidocaine or a comparable anesthetic at the time of tissue biopsy as these are the protocols given for tissue sampling by our collaborators. In conversation with our collaborators we have discussed the effects of a variety of preservatives commonly used to store tissue biopsy and blood samples and that the introduction of particular preservatives alters the chemical signature of the sample, rendering the sample as either unusable or unreliable in stable isotope studies (Lemons et al. 2012, Ruiz-Cooley et al 2011). The possibility of lidocaine altering the chemical signature of samples precludes us from using it until data is available on its long term effects. Having sampled turtles for 21 years, personal observations (TTJ) show that the turtles behave normally during and after procedures and do not have infections or wounds from skin sampling upon recapture.

2. Anesthetics and Analgesics:

If anesthetics or analgesics are to be used, please provide the following information: procedure, anesthetic, dose and method of administration

Procedure	Anesthetic	Dose & Method of Administration
Leatherback sea turtle satellite transmitters are attached directly to the carapace (see Appendix B). The attachment location on the carapace is wiped down topically with anesthetic after the site is sterilized with separate applications of antiseptic (e.g., betadine) and isopropyl alcohol	a topical anesthetic (e.g. ethyl chloride)	NA

In accordance with AWA: "Activities that involve surgery include appropriate provision for pre-operative and post-operative care of the animal in accordance with established veterinary medical and nursing practices. All survival surgery will be performed using aseptic procedures, including surgical gloves, masks, sterile instruments, and aseptic techniques."

3. **Surgical Procedures** – Is surgery to be performed? ☒ **YES** ☐ **NO**

   a. If **YES**, list surgery location/room or field site: PIR

   b. If **YES**,
      i. is it a terminal procedure? ☐ **YES** ☒ **NO**
      ii. is it a survival procedure? ☐ **YES** ☒ **NO**

   c. If **YES**, then describe the surgical procedure to be performed in Appendix B. Be sure to include the protocol to be followed to ensure asepsis.
   See #11 within Appendix B

   d. If aseptic procedures are not to be performed, use this space below to justify why not and describe the procedure of choice.
   Not applicable

   e. Describe the post-operative care (both immediate and long-term).
   See #11 within Appendix B

4. **Euthanasia** - Will the animals be terminated at the end of the research?
   ☐ **YES** ☒ **NO**

   If **YES,** provide the method of euthanasia:

   Please consult NMFS Research Protocol Guidelines (TBD) for acceptable practices. (AVMA Guidelines, AAZV Guidelines, etc)

In accordance with the AWA, "Personnel conducting procedures on the species being maintained or studied will be appropriately qualified and trained in those procedures."

5. Please describe below the **training and qualifications** of yourself and other individuals who are included in this protocol. In particular, please be very specific about the hands-on training of those individuals performing procedures which may produce animal discomfort (i.e., restraint, injections, blood collection, surgery, tagging, biopsy, tooth extraction, urine, fecal, gastric, milk, semen, sample collection, euthanasia, etc.). Use Appendix C to further describe training and experience.

All individuals included in this protocol have been trained to capture and handle/restrain marine turtles and apply identification measures (shell etching and PIT/flipper tag). Standard operating procedures and methods described in this application are peer-reviewed methods widely accepted by the scientific community. The procedures described have been designed to minimize stress and pain to the animals while maximizing data collection. CVs for the PI and CI(s) are attached.

The number of years of experience handling and tagging marine turtles is provided for each person in parenthesis after their name.

Dr. T. Todd Jones (23) – proficient in all aspects of research including leatherback biotelemetry attachment and laparoscopy
Shawn Murakawa (27)
Shandell Brunson (17)
Dr. Summer Martin (15) -– proficient in most aspects of research including leatherback biotelemetry attachment
Dr. Camryn Allen (8) – hands-on laparoscopy training
Dr. Alexander Gaos (17) – proficient in leatherback biotelemetry attachment
Marylou Staman (11)

D. Husbandry Practices (research facility or rehabilitation facility)

If the animals are maintained at a research facility, an APHIS license is required and the facility must comply with AWA. If the animals are maintained at a rehabilitation facility, it must meet the NMFS Rehabilitation Facility Standards.

1. Will the research require holding the animals in temporary or long term captivity (this includes rehabilitation)? ☒ **YES** ☐ **NO**
2. If **YES**, describe the husbandry practices that will be used.
   - Husbandry practices for turtles held in captivity are outlined in previously published husbandry guidelines (Wibbels, 1999; Higgins, 2003)
   - Turtles will be held for captive studies within tanks that meet or exceed the requirements set forth in USFWS' Standard Permit Conditions for Care and Maintenance of Captive Sea Turtles (2013), see Table 3).
   - Three veterinarians are available to monitor the health of captive animals. Dr. Michelle Barbieri is our primary veterinarian and is on staff at PIFSC. Dr. Gregg Levine is our on-call (secondary) veterinarian for sea turtle-related veterinary emergencies, and Dr. Thierry Work is available as well. CVs for all three veterinarians are provided along with our application.

Table 3. Holding tank surface area requirements based on the largest carapace length for each size class (Straight Carapace Length, SCL) adapted based on USFWS specifications within the Standard Permit Conditions for Care and Maintenance of Captive Sea Turtles (2013).

Turtle size class, SCL (cm)	depth requirement (m)	surface area requirement (m^2)

< 6	0.30	0.03
6 - 50	0.76	2.77
50 - 65	0.91	4.59
> 65	1.22	6

3. If **YES**, describe procedures for disposition of dead animals, including whether or not a necropsy will be performed.
   - If a captive animal dies a necropsy will be performed and tissue samples will be archived in the PIFSC repository

4. Will the animals be removed from the facility? ☒ **YES** ☐ **NO**
   a. If **YES**, for how long?
      Permanently
   b. If **YES**, to where?
      Release back into wild upon study completion___
   c. If **YES**, will they be returned to the facility? ☐ **YES** ☒ **NO**
   d. If **NO**, why not?
      All wild animals will be held in captivity until release back to the wild

Note - If removal will be greater than 24 hours, a variance request may be required.

E. Environmental Safety

1. Are infectious agents to be used or potential exposure? ☐ **YES** ☒ **NO**
   If YES, the agent(s) is ____

   ____

   If YES, is the agent infectious to humans? ☐ **YES** ☐ **NO**
2. Are chemical hazards to be used? ☒ **YES** ☐ **NO**
   If **YES**, the chemical hazards include isopropyl or ethyl alcohol, epoxy resin, polyamide resin, permanent marker, non-toxic paint, polyester resin, methyl ethyl ketone, and anti-fouling paint will be used in satellite attachments, basic cleaning of skin and shell for sampling. As well, oxytetracycline will be used for bone marking for growth studies. We will abide by and carry the SDS sheets for these chemicals and follow the recommendations of the NOAA/IRC Safety and Environmental Compliance Officer (William Putre).

3. Are radioisotopes to be used? ☐ **YES** ☒ **NO**
   If **YES**, the radioisotope is____

4. Are other biohazards of concern like exposure to zoonotic agents?
   ☐ **YES** ☒ **NO**
   IF **YES**, the biohazard(s) is ____

Note - If any of the above questions are answered YES, all procedures must comply with NMFS Environmental Safety requirements (TBD).

F. NMFS Training on Animal Care and Use (TBD)

Have you completed the NMFS Vertebrate Animal Care and Use Training Program?

☒ **YES** ☐ **NO**

If **YES**, give date of Training Program 09/29/2016

See Table 4 below

If **NO**, you must complete this Training Program within 1 calendar year of the date of approval of this protocol and submit certification thereof to the Chair of the IACUC. This Program covers the composition and function of the IACUC, historical background, NMFS policy on animal care and use, animal welfare concerns, protocol submission, and occupational health and safety. Failure to complete this program within 1 calendar year could result in suspension of the project by the IACUC.

G. Occupational Health and Safety

List all the names and telephone numbers of personnel, including yourself, associated with this project and identified in this protocol who will work with animals or animal tissue. Check the appropriate box to indicate whether or not each individual has completed the NMFS Animal Care and Use Training Program. Also, check the appropriate box to indicate if each individual has fulfilled requirements for vaccination and/or testing.

Table 4. List of personnel associated with this project who will work with animals or animal tissue

NMFS Animal Care and Use Training	Date	Vaccination/ Testing	Date	Name	Phone	Email
☒Yes ☐ No	11/7/19	☐Yes ☒ No		T. Todd Jones	808-725-5713	Todd.Jones@noaa.gov
☐☒						
☒Yes ☐ No	11/7/19	☐Yes ☒ No		Shawn Murakawa	808-725-5731	Shawn.Murakawa@noaa.gov
☒Yes ☐ No	11/7/19	☐Yes ☒ No		Shandell Brunson	808-725-5744	Shandell.Brunson@noaa.gov
☒Yes ☐ No	9/29/16	☐Yes ☒ No		Summer Martin	808-725-5750	Summer.Martin@noaa.gov

☒Yes ☐ No	3/2/17	☐Yes ☒ No		Camryn Allen	808-725-5751	Camryn.Allen@noaa.gov
☒Yes ☐ No	11/9/17	☐Yes ☒ No		Alexander Gaos	808-725-5717	Alexander.Gaos@noaa.gov
☐Yes ☐ No	11/7/19	☐Yes ☒ No		Marylou Staman	808-725-5380	marylou.staman@noaa.gov

H. Assurance

I attest to the accuracy and completeness of the information provided. I promise to conduct this work with animals in accordance with the protocol as approved by the NMFS IACUC under the NMFS Animal Care and Use Policy. I will not make any substantive changes in the above protocol without first obtaining the approval of the NMFS IACUC, and I will not use any procedures which are not included in this form.

Principal Investigator/Applicant: **Date:** 8 November 2019

I have reviewed the research protocol outlined on this form and hereby transmit it to the NMFS IACUC for review.

Center or Regional Director:__________________________Date:_______

Appendix A

Observational Study Description(s) from page _____
Not applicable. See Appendix B.

Appendix B

Research Procedures Description(s) from page: 13

Describe the animal procedures that are to be performed and the necessity in fulfilling the goals and objectives of the project. Be sure to be specific about any procedures which may impact the health and comfort of the study animals (e.g., frequency of performance of any procedures, methods of restraint, blood sample volumes, etc.). Please provide a justification for the animal numbers used.

MTBAP will employ a variety of techniques to meet our research objectives for turtles in-water and on land in various life stages (hatchling, juvenile, subadult, and adult) as well as for turtles in captivity (research studies):

Terrestrial and In-water Studies

1. OBSERVE/COLLECT METHODS

   Terrestrial: Turtles will be sampled as they nest or haul out ('basking') on the beaches of the PIR.

   - Nesting turtles will be approached and processed according to standard practice as recommended in the *Research and Management Techniques for the Conservation of Sea Turtles* by the IUCN/SSC Marine Turtle Specialist Group (Wibbels, 1999).
   - Turtles are placed in a holding enclosure for restraint to allow for full processing and satellite tagging when appropriate (e.g. returning to sea post nesting). The turtle is visually examined for overall health, body condition, injuries, barnacles, or any abnormalities. Turtles that have interacted with fishing gear are examined for injuries, photographed, and the gear is removed. If fibropapilloma tumors are present, they are counted and the location of each tumor is recorded; they may also be sampled.

   In-Water: Turtles will be observed/captured in the nearshore/coastal waters (bays, reefs, canals, etc.) and high seas (via NOAA white ships) of the PIR (i.e., Hawaiian Islands, Midway Atoll, Johnston Atoll, Palmyra Atoll, Kingman Reef, Howland Island, Baker Island, Jarvis Island, Wake Island, American Samoa, Guam, and Common Wealth of the Northern Mariana Islands) as well as adjacent foreign waters. Capture may take place any time of year as turtles are year round residents of the PIR. Turtles will be captured during annual field research trips (2-3 weeks in length) to the PIR yearly, or as opportunity arises (e.g., NOAA cruises). Turtles will be captured by various methods including: hand capture while snorkeling or by diving from a slow moving boat, dip (scoop) net capture in shallow coastal and reef waters, entanglement net capture, or strike (encircle) net capture (Balazs et al., 1987). All of these methods have been successfully and safely employed to study and tag sea turtles in coastal waters (Blumenthal et al., 2010; Martin et al., 2016; Seminoff et al., 2002). When an animal is captured it is placed in large inner tubes with a plywood bottom and/or held inside the boat and then processed in the boat or on shore (Balazs et al., 1987; Blumenthal et al., 2010). On shore, turtles are placed in a certified or purpose-built holding box with protection for plastron (e.g. yoga mat). The turtle is kept in the shade and wet towels are used to keep the animal calm and cool. The animal is monitored to be sure it is breathing (typically they breathe every 30-50 seconds but can go several minutes between breaths). Turtle is visually examined for overall health, body condition, injuries, barnacles, or any abnormalities. Turtles that have interacted with fishing gear are examined for injuries, photographed, and the gear is removed. If fibropapilloma tumors are present, they are counted and the location of each tumor is recorded. All tissue collections, esophageal lavage, tag/biotelemetry applications, and laparoscopies will be performed by trained personnel. All data are recorded on individual data sheets. Turtles will be released at or very close to the capture site, at the water's edge or close to the surface of the water, and will be monitored for normal behavior following release.

A. NOAA research vessel ('white ship'): NOAA surveys from research vessels in the high seas provides us with a unique opportunity to survey turtles on the beach from the white ship or small boats launched from the white ship
B. NOAA small boats: observation of turtles
C. Charter boat: observation of turtles
D. Aerial Survey: surveys will not occur over areas where marine mammals haul out
   - Unmanned aerial vehicle (UAV): observational survey (including photography/videography) of turtles from 'white ship', small boat, charter boat, or land to obtain abundance estimates
   - Manned aerial surveys: observational survey (including photography/videography) of turtles to obtain abundance estimates
E. Hand capture: Turtles will be captured by hand by a trained group,. Hand capture will involve free-diving (~ 2-20 m) to capture turtles resting/foraging on bottom substrate. If turtles take notice of the diver and attempt flight they will not be pursued. Capture from slow moving boats will also involve spotting turtles from the boat and easing into the water to hand-capture or free-divers will be towed behind the boat and will signal the captain and then subsequently dive to the resting turtle. Turtles will immediately be brought to the surface and lifted into the boat, or, for nearshore capture, turtles will be brought to the shore and placed in turtle holding bins.
F. Dip (scoop) net: Large fishing scoop nets are used to capture turtles in shallow coastal waters. After the turtle is netted it is removed from the net and processed in the boat or on shore. Species other than sea turtles are not caught in the dip nets.
G. Entanglement net: Large-mesh entanglement nets are constructed of 2 mm diameter line (e.g. monofilament, nylon, braided) with a stretched diagonal mesh of 46 cm (23 cm^2 mesh). The lengths of the nets range from 20 to 100 m and the depths range from 1.5 to 8.0 m (with maximum

water depth of 8 m). The nets are set at the surface extending vertically through the water column. Floats are embedded in the top line of the net and the bottom line is weighted. Nets are deployed close to shore (< 100 m from the shoreline) in shallow, sandy or muddy (estuarine, generally of seagrass or macro-algae) habitats, and continuously monitored (hand checked every 0.5 hours) by boat (with 4 crew members minimum). While hand-checking a net issues are dealt with (e.g., algae clumps removed, rays freed, twists in net fixed, or anchor pulled and reset by boat). A net may be set more than once per day at several locations within a study area. Set times vary by location, but typically do not exceed 12 hours (nets monitored twice per hour). Typical capture for a 12 hour soak time is 2-6 turtles but can be greater. If many turtles are caught within the first couple hours the nets will be pulled to allow adequate time for the researchers to mark, measure, and release the turtles.

H. Strike (encircle) net: the net is deployed from a boat and encircles the turtle with the net. Similar to entanglement nets, the strike net has floats on the top (float line), weights at the bottom (lead line), and typically the mesh size is a stretched diagonal mesh of 46 cm (23 cm^2 mesh) and is large enough to prevent bycatch of other species. Once deployed the net is brought back onboard promptly (short soak time). If a turtle is encircled by the net, the net will slowly be brought back into the boat so that the circle around the turtle becomes tighter with the aim of the turtle becoming tangled in the net allowing for easy capture. The turtle will be brought on board the boat for processing either on the boat or onshore.

2. HOLDING TIME
   A. Terrestrial: Holding time for each animal will not exceed the amount of time necessary to examine, measure, weigh, tag, and collect tissue samples. However this will be ongoing while the turtle is nesting, hence actual restraint ('holding') will often not be required. Under normal circumstances, an individual will not be 'held' any longer than it takes for the female to complete nesting. When biotelemetry devices are attached, holding time will increase to 1 – 2 hours post-nesting event.
   B. In-water: Holding time for each animal will not exceed the amount of time necessary to examine, measure, weigh, tag, and collect tissue samples. Under normal circumstances, an individual will be held for approximately 1 – 2 hours. When biotelemetry devices are attached, holding time will increase to up to 3 hours. Certified large animal carriers or boxes built to such standards will be used for short-term holding of turtles.
3. TURTLE IDENTIFICATION – The turtle's skin will be cleaned with an antiseptic (alcohol, betadine, etc.) prior to the application of marks/tags. If turtles have been previously tagged the existing tag numbers (metal and PIT) are recorded.
   A. A light-colored non-toxic paint is applied to the carapace for temporary marking
   B. Shell etchings (mototool): Shell etching is conducted by using a dremel tool to engrave a shallow (1-2 mm deep and ~ 2 cm in height) groove (i.e.

numbers, letters, or symbols) into a carapacial scute; a light-colored non-toxic paint is then applied to the inscription (Balazs, 1995). A simple and durable carapace marking method to individually recognize turtles from a distance constitutes a valuable research tool. The ability to identify turtles in this manner enhances data collection and sharply reduces the level of disturbance during encounters after the initial flipper tagging.

C. Flipper (Inconel) tags: Turtles may be tagged with metal Inconel tags (Style 681, National Band and Tag Company) using the standard technique described in the Marine Turtle Specialist Group Manual on Research Techniques (Wibbels, 1999). The Inconel tags will be attached to the trailing edge of a fore or hind flipper. The applicator is similar to that used to ear-tag livestock; the pointed end of the tag goes through the flipper and connects on the underside. Tag retention for these tags varies; although some tags are retained for up to 20 years, some loss occurs after 2 – 4 years.

D. Passive integrated transponder (PIT) tagging: turtles are PIT tagged with small (14 mm length x 2 mm diameter) electromagnetically-coded glass-encased "microchips" – Destron Tx 1406L. The tags are individually packaged in a disposable pre-sterilized needle applicator to eliminate the possibility of cross contamination. PIT tags are injected between the digits of the fore/hind flipper or intramuscularly within triceps or shoulder region. They are read with a scanner, and are designed to last the life of the turtle. Preliminary PIT tag retention studies have shown extremely high retention (Parmenter, 1993; McDonald and Dutton, 1996; Balazs and Chaloupka, 2004).

4. MORPHOMETRIC ANALYSIS TO DETERMINE THE SIZE, MASS, SEX, AND HEALTH (BODY CONDITION) – includes but is not limited to measurement of the curved and straight carapace length (CCL / SCL) and width (CCW/SCW). These measurements are taken with a flexible measuring tape and with large forestry straight calipers. Turtles are weighed (1) in an animal carrier placed on a flat electronic scale which is placed on the ground or (2) with a tripods (or other piece of equipment which provides lift), cargo net or rope, and a hanging scale.
5. MARK-RECAPTURE TO ESTIMATE GROWTH RATES, RESIDENCE TIMES, TIME TO MATURITY, AND POPULATION ABUNDANCE – intentional resampling of turtles over periods of months to > year
6. BIOTELEMETRY TO DETERMINE MOVEMENTS AND HABITAT USE –
   - Prior to attachment, the transmitters will be treated with an environmentally safe anti-fouling paint (e.g. Propspeed). The attachment area on the carapace will be lightly sanded (hardshell turtles only) to remove algae and cleaned with alcohol or acetone. Care will be taken to avoid fumes collecting in holding enclosure or use of solvents or solvent rags close to the head. Biotelemetry devices (e.g. satellite, sonic, and archival) will be attached to the carapace in two ways depending on species and habitat. (1) with thin coats of fiberglass resin as described in Balazs et al. (1996). A non-toxic elastomer compound will be used to "cushion" the transmitter and hold it in place during

the attachment procedure. A thin coat of laminating resin will be applied to the carapace and transmitter and 4-6 strips of fiberglass cloth will be pasted over the transmitter to attach it. This technique has been widely used and is an accepted, safe, and effective method for transmitter attachment to hardshell turtles (Balazs et al., 1996). The turtles will be held for no longer than 3 hours until resin has cured and will then be released. Or (2) with thin coat of two-part marine epoxy as described in Hart and Fujisaki (2010). A 0.75 cm layer of epoxy will be applied to the footprint area of the tag on the carapace. Tag will be placed on epoxy footprint with enough pressure to cause the epoxy to ooze out on the sides. The epoxy will then be pulled up along the sides of the tag with a spatula until it hardens. Generally, an epoxy putty (e.g. JB WaterWeld) is then applied around the tag, which will then be painted with marine antifouling paint. We may use any variation of the resin or epoxy attachment techniques as we see fit (e.g. turtle size or tag size).

- For the leatherback sea turtle, transmitters are attached directly to the carapace at two locations: (1) the pygal region and (2) the medial dorsal ridge. The attachment site is sterilized with three separate applications of antiseptic (e.g., povidone-iodine) and isopropyl alcohol and then desensitized with a topical anesthetic (e.g., ethyl chloride) prior to drilling.
    - The pygal region of the carapace (the overhanging posterior projection of the carapace) is an ideal location for attachment of tethered tags [e.g., pop-up satellite tags (PSATs)] or archival tags and has been used successfully in previous studies (Morreale et al., 1996). The tethered PSAT or archival tag is anchored by drilling a hole (~ 4 mm) through the pygal process using an orthopedic drill bit (cleaned with antiseptic). Flexible stainless steel wire or fishing filament coated in soft tubing (surgical or vinyl) soaked in antiseptic (e.g., Betadine) is threaded into the hole. The monofilament line or stainless steel wire is anchored to the pygal by passing the line through a 5 cm diameter button or fishing bead soaked in antiseptic (e.g., Betadine) beneath the pygal. The line/wire is then threaded back through the pygal and through the single piece of tubing and a 5 cm diameter button or fishing bead soaked in antiseptic (e.g., Betadine) located at the upper end of the pygal. The line continues above a dorsal crimp and attaches to the PSAT or archival tag. The length of the tether will not be exceed 15-20 cm. This method outlined here offers several modifications from the pygal attachment method used in leatherback telemetry studies by Morreale et al. (1996). The short tether and breakaway feature of the tether pin in PSATs is designed to minimize potential for entanglement in fishing gear or flotsam.
    - Tags are attached at the medial dorsal ridge at the most prominent portion of the ridge, generally posterior to the greatest width of the carapace, in order to reduce drag (Jones *et al.*, 2011b, 2013). An orthopedic drill bit (cleaned with antiseptic) will be passed horizontally through the medial ridge to create two ~ 4.5 mm

diameter holes by a few mm depth (not entering the body cavity). Then, a flexible polymer tubing (e.g. Tygon) - cut to size and soaked for 1 hour in antiseptic (e.g., Betadine) in individual plastic bags - will be passed through the drill tracks. A base for the tag will be created from a silicone putty. A 1.8 mm diameter flexible stainless steel wire coated in plastic will be passed through the transmitter via the flexible polymer tubing in order to secure the transmitter to the dorsal ridge using a stainless steel crimp which will corrode, allowing for the tag to detach (~ 1 yr after attachment).

A. Acoustic/Sonic/Radio: If a study site is deemed appropriate, radio/sonic tags can be used to elucidate fine scale use of nearshore environments (following terrestrial emergence) including: diel movements, activity ranges, presence-absence data (Seminoff et al., 2002; Seminoff and Jones, 2006). Turtles would be instrumented with a very high frequency (VHF) radio transmitter (e.g., MOD 400, Telonics) and a sonic transmitter (e.g., V16, VEMCO or DT96, Sonotronics). The attachment technique would follow Jones et al. (2011a) and Seminoff and Jones (2006). Then, using a VHF receiver (e.g., TR-4, Telonics) with a 3-element antenna, determinations can be made on the general location of each tagged turtle. Maximum reception range of VHF transmissions is ~ 12 km but the origin of transmission becomes indistinguishable within ~ 0.25 km of tracked turtles. Therefore to pinpoint a turtle's location sonic telemetry can give accurate location < 0.25 km. Sonic transmissions can be monitored with sonic receivers (e.g., VR60, VEMCO) with a directional hydrophone. Maximum reception range of sonic signals is ~ 2 km and signal origin is distinguishable to within ~ 5 m of tracked turtles. Turtles can be tracked via small center console boats or rigid-hauled inflatable boats, or presence-absence data and general location can be obtained from shore using the VHF receiver.

B. Satellite: Satellite tags may be attached alone or as a combination with archival or acoustic/radio transmitting tags. Biotelemetry (i.e., biologging) tags will follow the drag recommendations of Jones et al. (2011a) as a function of body size. For example, based on Jones et al. (2013) a tag frontal area (including attachment medium/materials) of 5 cm^2 will increase drag of a 60 cm SCL turtle by < 5% ; typically, tag attachments are designed to have drag <10% (<5% when possible). For short durations, 1-2 weeks, larger instruments (e.g. video camera, accelerometer, acoustic recorder) increasing drag up to 30% may be used, however, the overall drag implications for short durations are minimal (Jones et al., 2013). Juvenile turtles will receive tags typical of Wildlife Computers 'Spot 5' and Telonics TAM-4xxx series tags (variable dimensions based on configuration) and larger subadults will be outfitted with GPS fast-loc technology tags such as the Wildlife Computers SPLASH-400(a) or Telonics TAM 4510. Jones et al. (2011a) have recently shown when these typical tags are attached posterior to the initial hump of the carapace, using minimal adhesives, that the increased drag costs can be reduced to less than 5% of the turtle's body drag alone. All tags will be employed with a hydrodynamic design/attachment in mind. Pop-up satellite tags (PSAT) will be attached to leatherback turtles via pygal process (caudal peduncle) or alternatively Wildlife Computers tags (e.g. SPLASH10-F-294A Octagon Ridgemount or Mk10-AL) which are shaped to conform to the leatherback carapace will be attached directly to the medial dorsal ridge.

- Again protocols for double tagging as described in Jones et al. (2011a) will be used. Combinations could include the following: 1) Telonics TAM 4510 (the largest satellite transmitter to be used), dimensions = 15.0 x 7.3 x 3.9 cm, 435 g; 2) Telonics TAM 4410, dimensions = 11.8 x 6.5 x 3.2 cm, 248 g, 3) Telonics TAM 2639, dimensions = 3.2 x 6.6 x 3.0 cm, 90 g; 4) Wildlife Computers 'Splash' Tag, variable dimensions based on configuration; and 5) Wildlife Computers 'Spot 5' Tag, variable dimensions based on configuration. The Telonics TAM-4xxx series utilizes a new hydrodynamic design. The TAM 2639 is a location only tag. The TAM 4510, TAM 4410, Splash, and Spot-5 tags record location and depth data. Attaching two miniature satellite transmitters on the same turtle provides valuable data relating to tag failure and animal mortality.

C. Archival: Archival tags may be attached to the carapace independently or in conjunction with a location only single satellite tag and/or acoustic tag. Wildlife Computers Mk9 Time-Depth Recorders (dimensions = 6.7 x 1.7 mm x 1.7 cm) and Lotek LAT 1500 Time, Temperature and Depth Recorders (dimensions = 11 x 35 mm), Sonotronics (acoustic), Vemco (radio) tags may be used depending on research site and study question (Brill et al., 1995). Acoustic tag frequencies range from 32-83 kHz (55 bpm) and radio tag frequencies range from 140-220 MHz (60-65 bpm); decibel range 30-50. All attachments (size of archival tag and length of turtle) will follow the protocol set forth by Jones et al. (2011a).

7. TISSUE COLLECTION – The turtle's skin will be cleaned with an antiseptic (alcohol, betadine, etc.) prior to sampling.

A. Skin sampling for genetic analysis to determine nesting beach origin (genetic stock), disease related studies, and stable isotope analysis for foraging ecology research

- Two skin samples (~ 6 mm diameter) will be collected from each turtle using a new and/or sterilized (with 10% bleach and 70% isopropyl alcohol) biopsy punch, scissor, or razor blade. Skin samples are preserved (e.g., saturated salt, ethanol, etc.) and archived within the PIFSC repository for future analyses.

B. Blood sampling for genetic, health, stable isotope, and/or endocrine analysis to obtain genetics for nesting beaches, assess health status (e.g. contaminant load, nutritive status, etc.), foraging location and trophic level, and sex of individuals

- Following a previously published technique and IACUC approved protocol, we will collect a blood sample (≤ 3 mL/kg) by inserting an individually packaged pre-sterilized needle, attached to a 'vacutainer' blood collection tube (a sterile tube with a closure that is evacuated which creates a vacuum inside the tube allowing for the collection of the volume of blood specified on the tube, range: 2 – 10 mL) or syringe, into the venous sinus on the lateral dorsal region of the neck, using the technique described in Bentley and Dunbar-Cooper (1980) and Owens and Ruiz (1980). No more than 2 attempts will be made per dorsal sinus (4 attempts total per turtle); and a new needle will be used between blood sample attempts. Potential future uses of the samples may include persistent organic pollutant measurements, heavy metal measurements, plasma chemistry health panels, endocrinology, proteomics, metabolomics, genomics, immunology, virology, and many others.
- These samples may be used in conjunction with skin sample to perform bulk and compound specific stable isotope analysis. The different tissues [i.e., blood (plasma, whole, RBC), skin, and scute] have different isotope turnover rates and therefore give data on acute versus long-term foraging ecology (Seminoff *et al.*, 2006, 2009). Blood samples will also be used for health status [percent cell volume, amino acid levels (in relation to forage), and contaminants].

C. Scute Sampling: We typically sample from the central or posterior lateral scutes to collect keratin (via scrapings, < 0.5 mm) for analyses such as toxicant and stable isotope studies. We will avoid (1) portions of the scute that have previous injury, (2) scute seams, and (3) scraping too deeply to prevent injury to the turtle.

D. FP biopsy: Tumor samples may be taken using the same biopsy procedure as described for skin sampling. Instruments used on turtles with FP will not be used for turtles without tumors. Tumor samples are preserved and archived at the PIFSC repository for future disease related studies. Tumor samples are not taken from every turtle with FP as it is not expected to be common for turtles of the PIR (non-Hawaii).

E. Oral swab: a sterile cotton swab will be rubbed inside the mouth to obtain a sample

F. Cloaca Swab to examine reproductive status: a trained MTBAP team member will moisten a cotton swab with saline and then gently insert (~4 cm) it into the cloaca of adult turtles to obtain cells to examine female cloaca cytology or identify the presence of spermatozoa in males. The sample obtained on the swab will then be placed onto a glass slide for microscopic imaging. This is a minimally invasive procedure which has been used in many other species (e.g. mice, birds, etc.). This technique might also be used to obtain a fecal sample if possible/necessary.

G. Urine and/or feces collection to determine reproductive status (e.g. presence of spermatozoa) or toxin analysis – we will opportunistically collect a urine or feces sample by placing a plastic conical tube on or near the cloaca/penis when the animal is seen urinating or defecating

8. ORAL EXAMINATION AND/OR ESOPHAGEAL LAVAGE FOR DIET SAMPLING
   A. The oral cavity of the animals will be examined immediately after encounter in order to collect food samples for diet analysis. The samples will be removed from oral cavity with tweezers.
   B. Esophogeal lavage will be performed on some animals (not including nesting females) immediately after encounter in order to collect food samples for diet analysis (Legler, 1977; Balazs, 1980; Seminoff *et al.*, 2002). This procedure involves inserting soft plastic tubing down the esophagus to the "pre-stomach," and flushing it with water poured into the tubing. Contents are caught in a mesh bag. The procedure takes 5 – 10 min, and poses no risk to the turtle when the technique is performed by a trained individual.
      - Turtles are placed on their back (carapace down) on a padded table or in an inner tube with their posterior end slightly elevated so the head is lower than the body. This allows for maximum drainage from the mouth. The front flippers are restrained by field staff to prevent the animal from moving during the procedure. The mouth is opened by holding the head securely and gently prying the beak open with an avian veterinary speculum. A veterinary canine mouth gag is inserted at the anterior end of the mouth and expanded to keep the mouth open. A plastic tube (with no sharp edges), lubricated with vegetable oil or spray, is gently inserted into the esophagus, and seawater is introduced using a manual, self-priming diaphragm hand pump at low pressure to flush out food particles from the esophagus and anterior crop. For turtles 35-50 cm SCL, a tube with outside diameter of 8 mm is used. For turtles over 55 cm SCL, a tube with outside diameter of 12 mm is used. Food items are collected in a mesh bag that is placed over the turtles head. The flushing process takes less than one minute and the entire procedure takes approximately 5 min.
9. ULTRASOUND TO DETERMINE SEX AND REPRODUCTIVE STATUS – turtles will be placed in a recumbent position (carapace down) with a protective barrier underneath them (e.g. yoga mat, inner tube, tire, etc.), ultrasound gel will be applied to the skin, and a field-portable ultrasound machine will be used to visualize the gonads (testes/epididymides or follicles/eggs) of adult turtles to determine sex and reproductive status via the left/right hip region (cranial to the femurs but lateral to the plastron). This is a minimally invasive procedure which has been used in other sea turtle studies (Pease *et al.*, 2010; Blanvillain *et al.*, 2011).
10. PLASTRON MARKING FOR SOFTNESS RELATED TO REPRODUCTIVE ACTIVITY – similar to a previously published and minimally invasive protocol

(Blanvillain *et al.*, 2008, 2011), turtles will be placed in a recumbent position (carapace down) with a protective barrier underneath (e.g. yoga mat, inner tube, tire, etc.), a marker will be used to delineate the whole plastron and the area of softness on the plastron of adult male turtles for reproductive comparisons with the hormone/ultrasound analysis. A photograph will be obtained and analyzed using the software Plastron, which was specifically developed to calculate the area of softness relative to the whole plastron.

11. LAPAROSCOPY FOR SEX DETERMINATION AND ASSESSMENT OF HEALTH – Not performed on nesting females. We will follow the technique as outlined in the National Marine Fisheries Service (NMFS; 2008) 'Sea Turtle Research Techniques Manual' and previously permitted for other NMFS Science Centers. This procedure will only be performed by trained individuals or under the supervision of trained individuals. To prevent infection, aseptic techniques will be followed. Laparoscopy will not be conducted on animals that have been compromised (e.g. unhealthy, overheated, etc.). Prior to the procedure, a general anesthetic (short-acting) and/or an antibiotic (to minimize any potential infection) may be administered. Turtle temperature will be maintained at capture temperature. Prior to the procedure, a general anesthetic (short-acting) or an antibiotic (to reduce the chance of infection) can be administered. The animal will be restrained vertically, the entry site (prefemoral fossa) will be scrubbed and injected with a local anesthetic, a 1 – 2 cm incision will be made, entry into the peritoneal cavity will be achieved by trocar, insufflation of the body cavity may be necessary for visualization of internal organs and air will be expelled after gonadal examination (administration of intracelomic fluids may also displace air and provide per-postoperative care), and the wound will be sutured (nominally absorbable, suture size dependent upon turtle size but will be 2-0, 3-0, or 4-0) using a mattress-pattern closure. To reduce post-procedure pain with no sedation, an anti-inflammatory (non-steroidal) may be administered. All turtles will be monitored after laparoscopy completion for normal activity prior to release.
12. OXYTETRACYCLINE INJECTION TO DETERMINE AGE AND GROWTH – following a validated and published technique (Goshe et al., 2016) for PIR, an antibiotic [oxytetracycline, Dosage (mL) = Weight (kg) x 25 (mg/kg) / concentration (mg/mL); National Marine Fisheries Service Southeast Fisheries Science Center, 2008] is injected into the shoulder muscle and 'stains' the turtle bones at a known point in time (time of injection). Future recovery of the turtle (dead-stranded or live-stranded but euthanized due to poor health) will allow for determination of the turtle's growth rate since bone marking and for age estimation (skeletochronology).
13. DATA LOGGERS IN NESTS – data loggers will be placed within nests to record nest temperatures throughout the incubation period to aid in interpretation of sex and sex ratio of hatchlings within the nest, and to ultimately be used for climate change related research. Once a turtle is depositing eggs, the data logger is placed in the middle of the nest (typically at an egg count of ~ 50 eggs). The cord attached to the data logger will be tied to a stationary object (e.g. marine debris or a rock) to prevent loss of the data logger. A GPS waypoint will also be recorded

in addition to the data logger's serial number, location, and date/time of placement.

14. NESTING COMPONENTS
    A. Egg deposition
        - Upon laying, the number of eggs deposited within the nest will be counted
        - A subset of eggs (n = 20) will be weighed and size measured (via electronic calipers)
        - 20 eggs/nest from 10 nests/species (green and hawksbill) will be collected for use in pivotal temperature studies to estimate the temperature which produces a 1:1 sex ratio of hatchling turtles. We will use hormone analysis (via blood sample) and laparoscopy to verify individual sex. Ultimately turtles will be released unharmed back to the wild
    B. Hatchling emergence
        - Hatchlings will be weighed and size measured (via electronic calipers)
        - Blood samples (≤ 0.2 mL) will be collected from the dorsal cervical sinus of a subset of hatchlings using a 25-gauge x 0.5 inch (or smaller) needle connected to a 1 mL syringe according to previously published methods (FitzSimmons, 1998; Wibbels *et al.*, 1998; Jensen *et al.*, 2006; Mader and Rudloff, 2006). In general, 10% of a hatchling's blood volume can be safely collected (Wibbels *et al.*, 1998; Mader and Rudloff, 2006); a 17 g hatchling has ~1.3 mL of blood, therefore, a 0.13 mL blood sample could be collected. Green turtle hatchlings from the CNP weigh between 30-40 g and have greater blood volume, therefore, the maximum volume collected for a 40 g hatchling would be 0.2 mL. Blood samples are collected for sex ratios studies where the plasma will be used for either hormone or protein analysis.
        - Skin or scute sampling of hatchlings for genetic analysis to determine nesting beach origin (genetic stock) and paternity (through comparison of hatchling genetics to genetics of known mothers)
            - A skin or scute (a small edge of one of the trailing marginal scutes) sample (~ 2 mm) will be collected from each hatchling using a new and/or sterilized (with 10% bleach and 70% isopropyl alcohol) biopsy punch, scissor, or razor blade according to published protocols (FitzSimmons, 1996; Dutton and Stewart, 2013). Skin samples are preserved (e.g. saturated salt, ethanol, etc.) and archived within the PIFSC repository for future analyses
    C. Nest excavations – To determine hatching success (the percentage of eggs in a nest that produce live hatchlings)
        - Collection and opening of all unhatched eggs to determine embryonic development

- Skin or scute sampling of live and dead hatchlings as described above (#14B)
- Collection and preservation of all nest contents from a subset of nests/season

D. Removal of hatchlings from wild for captive rearing (see Table 3 for tank size)
   - A subset of hatchlings (n = 20/nest, 10 nests/species) will be captive-reared to determine their sex via laparoscopic gonad examination to validate the sex we predict for the nest which the hatchling came from (1) via nest temperature data loggers and (2) via blood hormone analysis

Captive Studies

1. Research experiments conducted on captive turtles are permitted under USFWS permit # TE-72088A-2 and will occur at PIFSC sea water system tanks or at other facilities (e.g. Sea Life Park, MOCMI, Waikiki Aquarium, and Underwater World Guam) throughout the PIR which have their own permits and IACUC approvals for holding turtles in captivity. All turtles will be tagged (e.g. PIT and flipper tag) for easy identification.
   - The sea water system tanks at PIFSC are new and state of the art. The tanks designated for sea turtles can be an open or closed system. The tanks vary in size and can accommodate small and large turtles.
   - MTBAP collects samples for research purposes from stranded turtles held in PIFSC tanks for rehabilitation.
   - PIFSC tanks are inspected bi-annually by Dr. Michelle Barbieri, the veterinarian for the Protected Species Division at PIFSC, as well as by the IACUC committee at the University of Hawai'i, Manoa.

A. Growth Study – To better understand population dynamics of turtles in the PIR (e.g Jones et al., 2011b) and due to the importance of age and growth demographic data for ESA population assessment, we plan to estimate food intake and growth rates for progeny bred and reared at Sea Life Park and held at parks/aquariums listed above.

B. Sex Study
   - Captive hatchlings at Sea Life Park and a subset of wild hatchlings (described above in #14D, n = 20/nest, 10 nests/species) will be captive-reared in holding tanks (see Tables 3) until ~ 30 cm SCL to determine their sex via laparoscopic gonad examination for validation of the sex we predict for the nest which the hatchling came from (1) via nest temperature data loggers and (2) via blood hormone analysis
      - Blood samples (≤ 0.2 mL) will be collected from the dorsal cervical sinus of a subset of hatchlings using a 25-gauge x 0.5 inch (or smaller) needle connected to a 1 mL syringe according to previously published methods(FitzSimmons, 1998; Wibbels *et al.*, 1998; Jensen *et al.*, 2006; Mader and Rudloff, 2006).

- Laparoscopy will be performed when turtles reach one year of age or ~ 30 cm SCL according to the methodology described above (#11).

Appendix C

Training and Experience description(s) – you may include CVs here or attach as separate files.

CVs for the PI and CIs are attached as separate files.

REFERENCES

Allen CD, Robbins MN, Eguchi T, Owens DW, Meylan AB, Meylan PA, Kellar NM, Schwenter JA, Nollens HN, LeRoux RA, *et al.* (2015) First assessment of the sex ratio for an East Pacific green sea turtle foraging aggregation: validation and application of a testosterone ELISA. *PLoS One* 10: e0138861.

Balazs GH (1980) Synopsis of Biological Data on the Green Turtle in the Hawaiian Islands. NOAA Tech. Memo. NMFS, NOAA-TM- NMFS-SWFC-7, and University of Hawaii Sea Grant Cooperative Report UNIHI-SEAGRANT CR-81-02.

Balazs GH (1995) Innovative techniques to facilitate field studies of the green turtle, Chelonia mydas. In: Richardson JI, Richardson TH (Compiliers), eds. Proceedings of the Twelfth Annual Workshop on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-361, pp 158–161.

Balazs GH, Chaloupka MY (2004) Spatial and temporal variability in somatic growth of green sea turtles (Chelonia mydas) resident in the Hawaiian Archipelago. *Mar Biol* 145: 1043–1059.

Balazs GH, Miya RK, Beavers SC (1996) Procedures to attach a satellite transmitter to the carapace of an adult green turtle, Chelonia mydas. In: Keinath JA, Barnard DE, Musick JA, Bell BA, eds. Fifteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-387, pp 21–26.

Bentley TB, Dunbar-Cooper A (1980) A blood sampling technique for sea turtles. *Natl Mar Fish Serv* 14.

Blanvillain G, Owens DW, Kuchling G (2011) Hormones and reproductive cycles in turtles. In: Hormones and Reproduction of Vertebrates, Volume 3-Reptiles. Elsevier Inc., pp 277–303.

Blanvillain G, Pease AP, Segars AL, Rostal DC, Richards AJ, Owens DW (2008) Comparing methods for the assessment of reproductive activity in adult male loggerhead sea turtles Caretta caretta at Cape Canaveral, Florida. *Endanger Species Res* 6: 75–85.

Brill RW, Balazs GH, Holland KN, Chang RKC, Sullivan S, George JC (1995) Daily movements, habitat use, and submergence intervals of normal and tumor-bearing juvenile green turtles (Chelonia mydas L.) within a foraging area in the Hawaiian islands. *J Exp Mar Bio Ecol* 185: 203–218.

Dutton PH, Stewart KR (2013) A method for sampling hatchling sea turtles for the development of a genetic tag. *Mar Turt Newsl* 138: 3–7.

FitzSimmons NN (1996) Use of microsatrellite loci to investigate multiple paternity in marine turtles. In: Bowen BW, Witzell WN, eds. Proceedings of the International Symposium on Sea Turtle Conservation Genetics. NOAA Technical Memorandum NMFS-SEFSC-396, Miami, Florida, pp 69–78.

FitzSimmons NN (1998) Single paternity of clutches and sperm storage in the promiscous green turtle (Chelonia mydas). *Mol Ecol* 7: 575–584.

Goshe LR, Snover ML, Hohn AA, Balazs GH (2016) Validation of back-calculated body lengths and timing of growth mark deposition in Hawaiian green sea turtles. *Ecol Evol* 1–8.

Hart KM, Fujisaki I (2010) Satellite tracking reveals habitat use by juvenile green sea turtles Chelonia mydas in the Everglades, Florida, USA. *Endanger Species Res* 11: 221–232.

Higgins BM (2003) Sea turtle husbandry. In: Lutz, P. L., Musick, J. A., Wyneken J, ed. The Biology of Sea Turtles Volume II. CRC Press, Boca Raton, FL., pp 411–440.

Jensen MP, Abreu-Grobois FA, Frydenberg J, Loeschcke V (2006) Microsatellites provide insight into contrasting mating patterns in arribada vs. non-arribada olive ridley sea turtle

rookeries. *Mol Ecol* 15: 2567–2575.
Jones TT, Bostrom BL, Carey M, Imlach B, Mikkelsen J, Ostafichuk P, Eckert SA, Opay P, Swimmer Y, Seminoff JA, *et al.* (2011a) Determining Transmitter Drag and Best Practice Attachment Procedures for Sea Turtle Biotelemetry Studies.
Jones TT, Hastings MD, Bostrom BL, Pauly D, Jones DR (2011b) Growth of captive leatherback turtles, Dermochelys coriacea, with inferences on growth in the wild: Implications for population decline and recovery. *J Exp Mar Bio Ecol* 399: 84–92.
Jones TT, Van Houtan KS, Bostrom BL, Ostafichuk P, Mikkelsen J, Tezcan E, Carey M, Imlach B, Seminoff JA (2013) Calculating the ecological impacts of animal-borne instruments on aquatic organisms. *Methods Ecol Evol* 4: 1178–1186.
Komoroske LM, Miller MR, O'Rourke SM, Stewart KR, Jensen MP, Dutton PH (2019) A versatile Rapture (RAD-Capture) platform for genotyping marine turtles. *Mol Ecol Resour* 19: 497–511.
Legler JM (1977) Stomach Flushing: A Technique for Chelonian Dietary Studies. *Herpetologica* 33: 281–284.
Mader DR, Rudloff E (2006) Emergency and Critical Care. In: Reptile Medicine and Surgery. Elsevier, pp 533–548.
McDonald DL, Dutton PH (1996) Use of PIT Tags and Photoidentification to Revise Remigration Estimates of Leatherback Turtles (Dermochelys coriacea) Nesting in St. Croix, U. S. Virgin Islands, 1979-1995. *Chelonian Conserv Biol* 2: 148–152.
Morreale SJ, Standora EA, Spotila JR, Paladino F V (1996) Migration corridor for sea turtles. *Nature* 384: 319–320.
National Marine Fisheries Service and U.S. Fish and Wildlife Service (1998a) Recovery Plan for U.S. Pacific Populations of the Olive Ridley Turtle (Lepidochelys Olivacea). National Marine Fisheries Service, Silver Spring, MD.
National Marine Fisheries Service and U.S. Fish and Wildlife Service (1998b) Recovery Plan for U.S. Pacific Populations of the Green Turtle (Chelonia Mydas). National Marine Fisheries Service, Silver Spring, MD.
National Marine Fisheries Service and U.S. Fish and Wildlife Service (1998c) Recovery Plan for U.S. Pacific Populations of the Hawksbill Turtle (Eretmochelys Imbricata). National Marine Fisheries Service, Silver Spring, MD.
National Marine Fisheries Service and U.S. Fish and Wildlife Service (1998d) Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (Dermochelys Coriacea). National Marine Fisheries Service, Silver Spring, MD.
National Marine Fisheries Service and U.S. Fish and Wildlife Service (1998e) Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle (Caretta Caretta). National Marine Fisheries Service, Silver Spring, MD.
National Marine Fisheries Service Southeast Fisheries Science Center (2008) Sea Turtle Research Techniques Manual. NOAA Technical Memorandum NMFS-SEFSC-579.
National Research Council (2010) Assessment of Sea-Turtle Status and Trends: Integrating Demography and Abundance. Washington, D.C.
Owens DW, Ruiz GJ (1980) New methods of obtaining blood and cerebrospinal fluid from marine turtles. *Herpetologica* 36: 17–20.
Parmenter CJ (1993) A preliminary evaluation of the performance of passive integrated transponders and metal tags in a population study of the flatback sea turtle, Nataor depressus. *Wildl Res* 20: 375.

Pease A, Blanvillain G, Rostal DC, Owens DW, Segars A (2010) Ultrasound imaging of the inguinal region of adult male loggerhead sea turtles (Caretta caretta). *J zoo Wildl Med* 41: 69–76.
Seminoff JA, Jones TT (2006) Diel movements and activity ranges of Green turtle (Chelonia mydas) at a temperate foraging area in the Gulf of California, Mexico. *Herpetol Conserv Biol* 1: 81–86.
Seminoff JA, Jones TT, Eguchi T, Hastings M, Jones DR (2009) Stable carbon and nitrogen isotope discrimination in soft tissues of the leatherback turtle (Dermochelys coriacea): Insights for trophic studies of marine turtles. *J Exp Mar Bio Ecol* 381: 33–41.
Seminoff JA, Jones TT, Eguchi T, Jones DR, Dutton PH (2006) Stable isotope discrimination (δ13C and δ15N) between soft tissues of the green sea turtle Chelonia mydas and its diet. *Mar Ecol Prog Ser* 308: 271–278.
Seminoff JA, Resendiz A, Nichols WJ (2002) Diet of East Pacific Green Turtles (Chelonia mydas) in the Central Gulf of California, México. *J Herpetol* 36: 447–453.
Stewart KR, Dutton PH (2014) Breeding Sex Ratios in Adult Leatherback Turtles (Dermochelys coriacea) May Compensate for Female-Biased Hatchling Sex Ratios. *PLoS One* 9: e88138.
Tezak BM (2019) Sea Turtle Sex Ratios in a Changing Climate. Florida Atlantic University, Ph.D. Thesis.
U.S. Fish and Wildlife Service (2013) Standard Permit Conditions for Care and Maintenance of Captive Sea Turtles.
Wibbels T (1999) Diagnosing the sex of sea turtles in foraging habitats. In: Eckert KL, Bjorndal KA, Abreu-Grobois FA, Donnelly M, eds. Research and Management Techniques for the Conservation of Sea Turtles Prepared by IUCN / SSC Marine Turtle Specialist Group. pp 139–143.
Wibbels T, Hanson J, Balazs GH, Hillis-Starr ZM, Phillips B (1998) Blood sampling techniques for hatchling Cheloniid Sea Turtles. *Herpetol Rev* 29: 218–220.

Appendix 7

Programmatic Environmental Assessment

Marine Turtle Research Program (MTRP)

June 2011

Lead Agency:	**National Oceanic and Atmospheric Administration,** **National Marine Fisheries Service,** **Pacific Islands Fisheries Science Center**
Responsible Official:	**Michael P. Seki, Ph.D.** Acting Director, Pacific Islands Fisheries Science Center
Point of Contact:	**George Balazs** Marine Turtle Research Program Protected Species Division National Marine Fisheries Service Pacific Islands Fisheries Science Center 2570 Dole Street Honolulu, Hawaii 96822 (808) 983-5733

Summary

This Programmatic Environmental Assessment (PEA) was prepared in accordance with National Environmental Policy Act of 1969 (42 U.S.C. §4321, *et seq*.), as implemented by the Council of Environmental Quality regulations (40 C.F.R. §1500-1508); and NOAA Administrative Order Series (NAO) 216-6, *Environmental Review Procedures for Implementing the National Environmental Policy Act*, of May 20, 1999.

The green, hawksbill, loggerhead, leatherback, and olive ridley sea turtles are all listed under section 4(c) of the Endangered Species Act of 1972 (16 U.S.C. §1531, *et seq*.). Under the Proposed Action, the Marine Turtle Research Program (MTRP) proposes to continue its long-standing research activities with the addition (i.e., expansion) of new studies on the site fidelity of marine turtles to foraging grounds. The research activities include collecting biological and ecological data on marine turtle stocks in the Hawaiian Archipelago, providing technical assistance to and collaborating with marine turtle researchers across the Pacific Islands Region, and contributing to the scientific literature through publications relevant to the recovery of these stocks. The MTRP also includes responding to and aiding stranded turtles. The potential impacts on the human environment of the Proposed Action, and a range of reasonable alternatives, are discussed and analyzed in this PEA.

Contents

Acronym	Full description
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNMI	Commonwealth of the Northern Mariana Islands
DAR	State of Hawaii, Division of Aquatic Resources
DLNR	State of Hawaii, Department of Land and Natural Resources
DOI	Department of the Interior
DPS	Distinct Population Segment
EA	Environmental Assessment
EOD	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
FBSAD	Fisheries Biology and Stock Assessment Division of PIFSC
FFS	French Frigate Shoals
FONSI	Finding of No Significant Impact
FP	Fibropapillomatosis disease
GPS	Global Positioning System
IACUC	Institutional Animal Care and Use Committee
IUCN	International Union for Conservation of Nature and Natural Resources
KRF	Kewalo Research Facility
MHI	Main Hawaiian Islands
MPA	Marine Protected Area
MTAP	Marine Turtle Assessment Program of PSD/PIFSC
MTRP	Marine Turtle Research Program of PSD/PIFSC
NEPA	National Environmental Policy Act of 1969
NGO	Non-Governmental Organization
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOC	National Ocean Council
NPS	United States National Park Service
NRC	National Research Council
NWHI	Northwestern Hawaiian Islands
PEA	Programmatic Environmental Assessment
PIFSC	NMFS Pacific Islands Fisheries Science Center
PIR	Pacific Islands Region
PIRO	NMFS Pacific Islands Regional Office
PIT	Passive Integrated Transponder
PMNM	Papahānaumokuākea Marine National Monument
PSD	Protected Species Division of PIFSC
RIA	Radioimmunoassay
RPM	Responsible Program Manager
SPREP	South Pacific Regional Environmental Program
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1 Purpose of and Need for Action

1.1 Status of Sea Turtles in the Pacific

Green, hawksbill, loggerhead, leatherback, and olive ridley sea turtles are protected throughout United States waters under the Endangered Species Act of 1972 (ESA). In the central and western Pacific, this includes: Hawaii, Guam, the Commonwealth of the Northern Mariana Islands (CNMI), American Samoa, Howland Island, Baker Island, Wake Island, Jarvis Island, Midway Atoll, Johnston Atoll, Palmyra Atoll, and Kingman Reef (NMFS and USFWS 1998a, 1998b, 1998c, 1998d, 1998e). Inclusion of these species into the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has made it illegal to trade any products made from these species among the U.S. and 169 other countries. Recovery plans for all U.S. Pacific populations of sea turtles were finalized in 1998 and serve as guidance in actions to recover these stocks.

The green turtle (*Chelonia mydas*) is listed as threatened under the ESA throughout its Pacific Range, except for the endangered population nesting on the Pacific coast of Mexico. The green turtle in Hawaii is a genetically distinct stock. Analysis of mitochondrial DNA demonstrates the genetic discontinuity of the Hawaii population from other green turtle populations in the Pacific (Bowen et al. 1992, Balazs and Chaloupka 2004b, Dutton et al. 2008). Furthermore, protection and management of the Hawaiian stock are not complicated by international migrations because this stock forages and nests within the United States. Foraging grounds are primarily located in the waters surrounding the Main Hawaiian Islands (MHI), whereas nesting primarily occurs on sandy beaches 500 miles to the northwest of Honolulu in the Northwestern Hawaiian Islands (NWHI), with 90% of all nesting occurring at French Frigate Shoals (FFS) (Figure 1) (Balazs 1976). The Hawaiian green turtle stock is demonstrating encouraging signs of population recovery after years of protective efforts as indicated by a steady long-term increase in the number of nesting females in the NWHI as well as increases in the number of immature green turtles residing in foraging pastures of the MHI (Balazs 1996, Balazs and Chaloupka 2004a, Balazs and Chaloupka 2006, Chaloupka and Balazs 2007, Chaloupka et al. 2008a). However, outside of Hawaii, green turtle populations have seriously declined throughout most of the Pacific. The harvest of green turtles by humans for meat and eggs is the most serious threat. Other threats include habitat loss, incidental capture in commercial and recreational fishing gear, boat collisions, shark attack, and the tumor disease fibropapillomatosis (FP) (NMFS and USFWS 1998a, Chaloupka et al. 2008b).

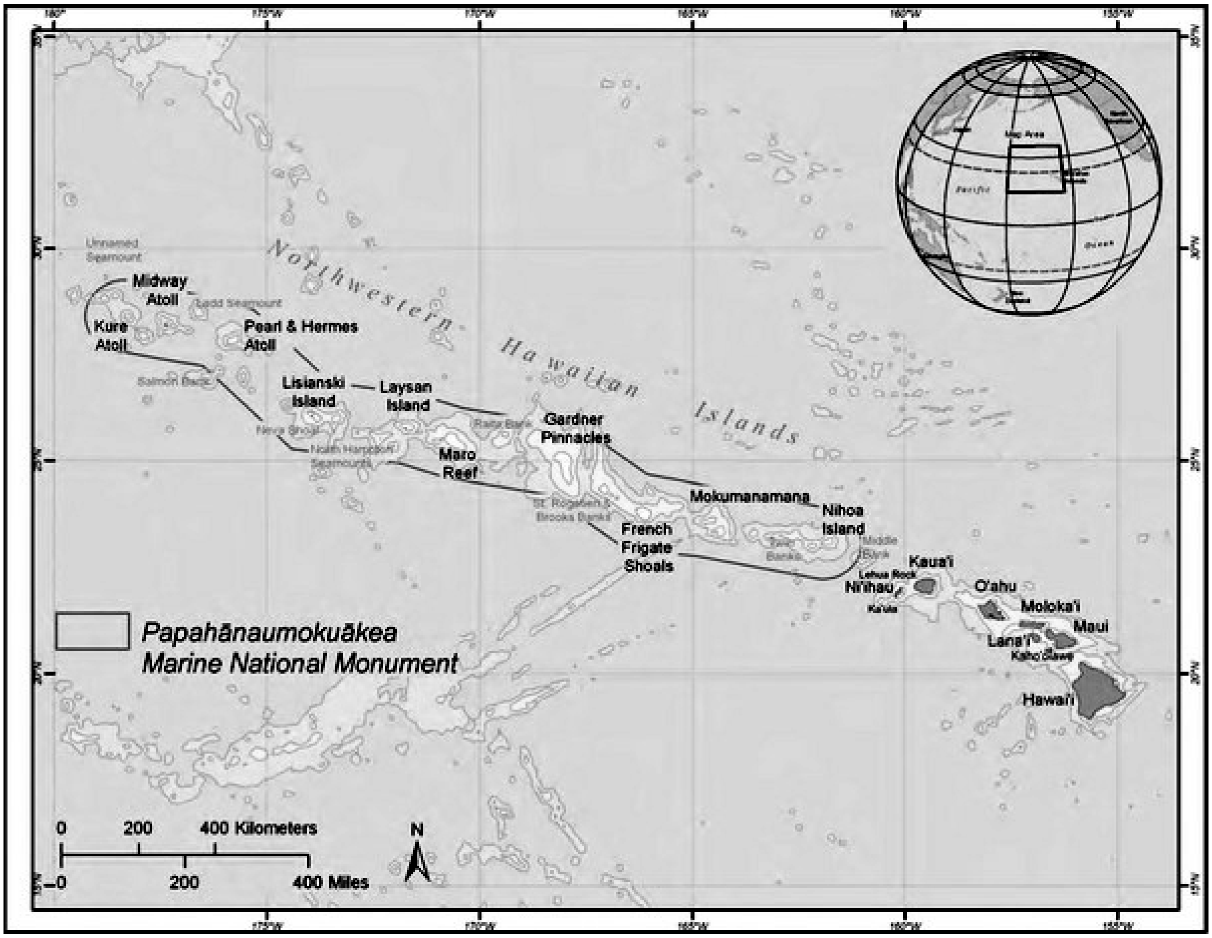

Figure 1. The Hawaiian Archipelago, showing the Northwestern Hawaiian Islands, Main Hawaiian Islands, and boundaries of the Papahanaumokuakea Marine National Monument (from noaa.gov).

The hawksbill turtle (*Eretmochelys imbricata)* is listed as endangered throughout its range. Hawksbill populations have declined dramatically in the Pacific, and the species is rapidly approaching extinction because of a number of factors. The intentional harvest of this species for meat, eggs, and tortoiseshell and the illegal international trade of items made from this species are the greatest threats to its survival. Other threats to the continued existence of this species include beach erosion, coastal construction, habitat loss, capture in fishing nets, and boat collisions (NMFS and USFWS 1998b). Hawksbill turtles nest in small numbers in the MHI (i.e., Hawaii, Maui, and Molokai) and migrate through, rest, and forage in the near-shore waters (Parker et al. 2009). Immature and mature hawksbills occasionally strand in the MHI and are documented through the MTRPs stranding research program. This population has not demonstrated signs of recovery despite years of protective efforts (G. Balazs, pers. comm. May 2006).

The loggerhead turtle (*Caretta caretta*) is listed as a threatened species throughout its range. In 2010, NMFS and USFWS proposed to reclassify loggerheads in the North Pacific as a distinct population segment (DPS) with an endangered status (75 FR 12598). Loggerheads in the North Pacific are derived primarily from nesting beaches in Japan (Bowen et al. 1995, Kamezaki et al. 2003); whereas, loggerheads in the South Pacific are derived primarily from nesting beaches in eastern Australia and New Caledonia (Limpus and Limpus 2003, Boyle et al. 2009). These stocks are threatened primarily by incidental capture in commercial fishing gear (i.e., longline gear and nets) and loss or degradation of nesting habitat (NMFS and USFWS 1998d, Polovina et al. 2000, 2003, 2004, 2006, Peckham et al. 2007, Howell et al. 2008, Howell et al. 2010, Kobayashi et al. 2008, Chaloupka et al. 2008c).

The leatherback turtle (*Dermochelys coriacea*) is listed as endangered throughout its range. Leatherback populations in the Pacific are in severe decline and, in some cases, on the verge of extinction. The decline is primarily attributed to incidental take in coastal and high seas fisheries, the killing of nesting females by humans for meat, and the collecting of eggs at nesting beaches. Leatherbacks encountered in Hawaii represent individuals in transit between nesting beaches and foraging grounds. Some of the largest nesting populations of leatherback turtles in the world border the Pacific Ocean, but no nesting occurs on beaches under U.S. jurisdiction (NMFS and USFWS 1998c).

The olive ridley turtle (*Lepidochelys olivacea*) is listed as threatened in the Pacific, except for the Mexican nesting population, which is classified as endangered. The olive ridley is widely regarded as the most abundant sea turtle in the world; however, it is rare in the central Pacific because there are no nesting beaches in the Pacific Islands. Occasionally, a wayward female is found nesting in the Hawaiian Islands, most recently in 2009 on the Island of Oahu. Individuals also occasionally strand in the MHI and are incidentally captured in the Hawaii-based deep-set longline fishery more frequently than the other species. The primary threats to this species throughout the Pacific are incidental take in fisheries and harvest of eggs and adults on Mexican and Central American nesting beaches (NMFS and USFWS 1998e).

1.2 Background of the Marine Turtle Research Program (MTRP)

The MTRP began at the University of Hawaii, Hawaii Institute of Marine Biology in 1972. In 1981, NMFS took over management of the program and expanded the research on the Hawaiian population of green sea turtles through creation of the MTRP at its Honolulu Laboratory (now the Pacific Islands Fisheries Science Center, PIFSC). Since then, the MTRP has further expanded its research to include hawksbill sea turtles which nest and forage in the MHI, as well as olive ridley, loggerhead, and leatherback sea turtles which are incidentally captured in commercial fisheries but are rarely seen in the MHI. The MTRP also collaborates with the Marine Turtle Assessment Program (MTAP), which is also located at PIFSC. The MTAP uses data collected by the MTRP to develop sea turtle population assessments.

While the MTRP serves as the primary data collection and analysis entity of sea turtles in the region at NMFS, the management duties (e.g., writing Biological Opinions) are the responsibility of the NMFS, Regulatory Program, Pacific Islands Regional Office (PIRO). PIRO and the U.S. Fish and Wildlife Service (USFWS) share responsibility for the conservation and recovery of sea turtles pursuant to ESA mandates in the Pacific Islands Region. The Pacific Islands Region includes the Hawaiian Archipelago and the U.S. Insular Areas of the Pacific Ocean (Figure 2). NMFS has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and USFWS has the lead for the conservation and recovery of sea turtles on nesting beaches.

The field research activities of the MTRP are focused on: (1) nesting surveys; (2) foraging and resting habitat surveys; and (3) stranding response and research. These research activities occur in both the NWHI and MHI. Additionally, the MTRP collaborates with researchers worldwide, focusing efforts on the nations in and around the Pacific Islands Region and serves as a model for other sea turtle research programs. With nearly 40 years of continuous data collection, the MTRP provides technical insight, logistical advice, and shares its experiences with other U.S. and international sea turtle research programs.

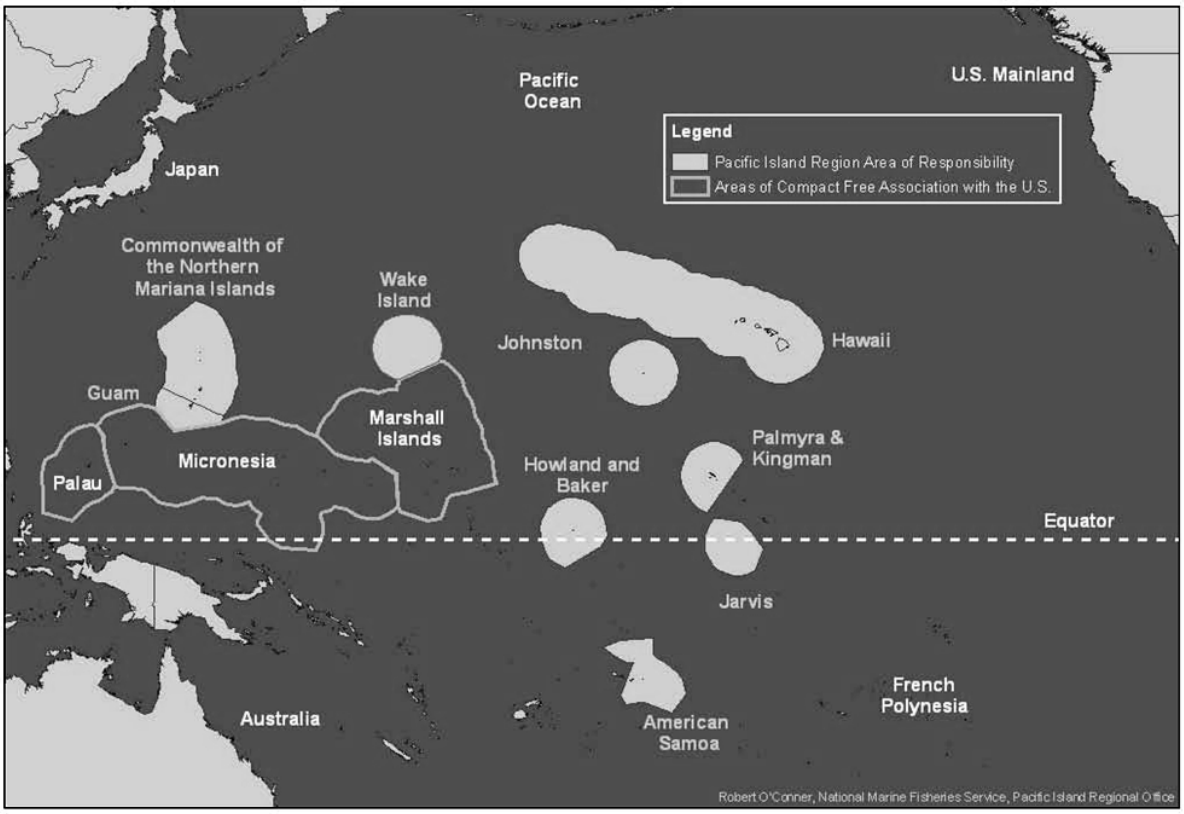

Figure 2. The Pacific Islands Region, showing the Hawaiian Archipelago and U.S. Insular Areas (with the Exclusive Economic Zone shaded around each) (from noaa.gov).

1.2.1 Nesting Surveys to Assess Abundance, Trends, Survival, and Threats

Nesting surveys are the most common method used to monitor marine turtle populations. Appropriately designed nesting beach surveys can provide information on the size of the adult female population, hatchling production, and inter-annual variability in production (Schroeder and Murphy 1999). Threats to these life-stages (i.e., nesting females and hatchlings) can be quantified such as: (1)

nest destruction from predation, inundation, and other females attempting to nest; (2) habitat loss from beach erosion and sea level rise; and (3) hatchling predation on land and in the water.

Nesting surveys have been conducted on East Island at FFS (Figure 3) for 38 consecutive years and provide an index of abundance for the Hawaiian green turtle stock. Trained biological technicians conduct annual nesting surveys at East Island. New turtles are tagged, measured, and sampled (i.e., tissue for genetic analysis and health, including FP tumors), and tags of previously tagged turtles are recorded. Satellite tags, or time-depth recorders, or both are deployed on nesting green turtles to determine habitat use, migration routes between breeding and foraging grounds (Balazs and Ellis 2000), daily and seasonal use of foraging and resting habitat, and localized movements of breeding males and gravid females between nesting and breeding sites and associated basking sites. Temperature data loggers are deployed in the substrate of East Island to provide data relevant to temperature-dependent sex determination and sex ratios of green turtle hatchlings.

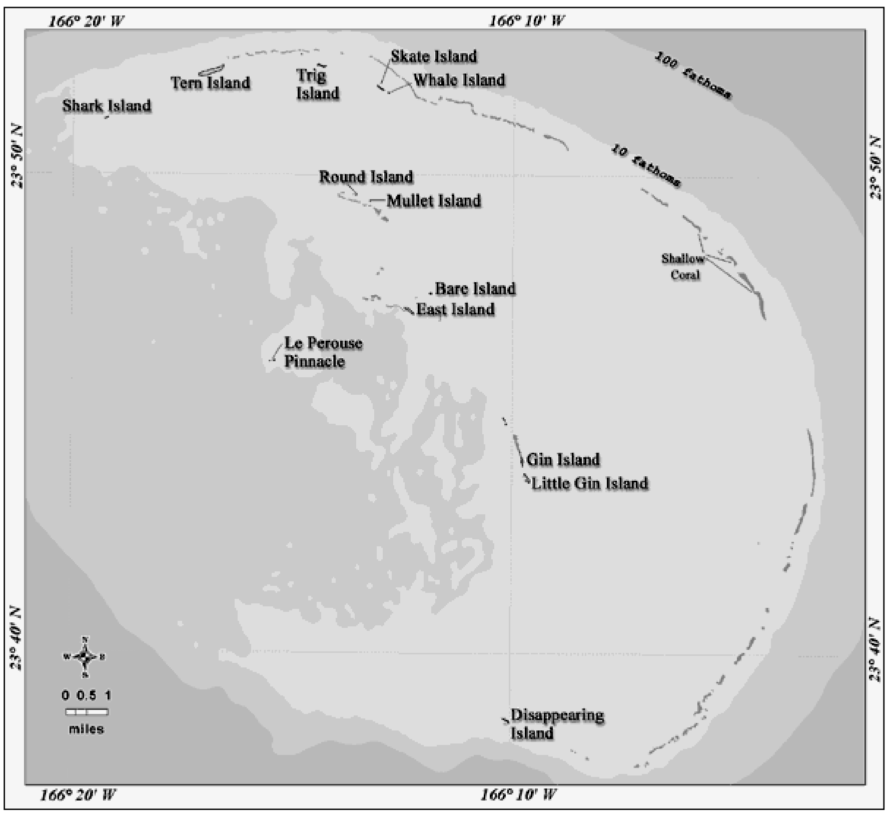

Figure 3. Map of French Frigate Shoals (from noaa.gov).

1.2.2 Foraging and Resting Surveys to Assess Abundance, Trends, Survival, and Growth

Although studying sea turtles in the water is difficult, research directed towards sea turtles on foraging and aquatic resting grounds can provide a wealth of information on the abundance, trends, survival, and growth rates of juvenile and adult turtles. Well-designed monitoring studies include capture and tagging work to provide information on individuals, habitat use, growth, diet, health and disease, survival, and residency. A primary goal of foraging ground research is to integrate data from genetic analysis, flipper tagging, and satellite telemetry to identify nesting beach origins of turtles occurring in the Hawaiian Archipelago and contribute to the overall understanding of sea turtle stock structure in the Pacific Ocean.

Turtles are captured in shallow coastal and reef waters for these studies using various methods, including: hand net, scoop net, hand capture while snorkeling, hand capture while diving from a slowly moving boat, entanglement net capture, and bullpen net capture (Balazs et al. 1987, Balazs et al. 1998). All of these methods have been successfully and safely employed to study and tag green turtles in coastal waters of the Hawaiian Islands. Turtles are released at or very close to the capture site shortly after they have been processed.

1.2.3 Stranding Response and Research

The stranding response and research program of the MTRP has responded to sick, injured, or dead marine turtles in the Hawaiian Archipelago since 1982. Necropsies of stranded turtles provide information on species distribution, stock structure, sex ratio, health and disease, diet, age and growth, and cause of mortality and have been the source of data for numerous scientific publications (Work and Balazs 2002, Work et al. 2004, Work et al. 2005, Zug et al. 2002, Chaloupka et al. 2008b, Van Houtan et al. 2010).

1.3 Purpose of the Proposed Action

The purpose of the MTRP is to collect biological and ecological data on marine turtle stocks in the Hawaiian Archipelago, facilitate the collection of biological data on marine turtles in the Pacific Islands Region, and contribute scientific input relevant to the recovery of these stocks. The objectives of the program are:

1. Continue to conduct original research, in cooperation and coordination with peers in the United States and countries in and around the Pacific Islands Region, of the biology, life history, and ecology of sea turtles in their benthic habitats and on nesting beaches.

2. Continue to monitor population trends at nesting beaches and in foraging areas and identify new areas to monitor as appropriate, while continuing to explore the use of remote viewing digital imaging cameras and other experimental equipment for research and monitoring.

3. Continue to conduct a sea turtle stranding and salvage network for research, rescue, rehabilitation, and return to the wild, involving the collection of long-term data sets.

4. Continue to conduct health assessments, with focus on FP disease complex, to determine causes, evaluate impacts to individuals and populations, and develop and implement containment measures.

5. Continue to conduct education and outreach by training of NMFS and international observer personnel in research protocols on sea turtles captured incidental to Pacific Ocean fisheries as

part of their duties aboard commercial longline fishing vessels as well as continuing to train research personnel from within and around the Pacific Islands Region in sea turtle research techniques, and continue to share data, analyses, experience, and information to increase international research capacity.

6. Continue to conduct fishery bycatch reduction and mitigation research through international collaboration, leading to increased knowledge of the pelagic ecology and movements of sea turtles in the Pacific Ocean.

7. Continue long term monitoring and modeling by the process of data storage, management, and retrieval of long-term datasets collected from stranded individuals and during research conducted on nesting beaches and nearshore sea turtle benthic habitats. Continue the development and application of simulation modeling of sea turtle population dynamics using MTRP long-term datasets for the assessment of the status of the various stocks of sea turtles with emphasis on the green turtle in Hawaii.

11. Continue public outreach and scientific publishing by conducting educational outreach to the public, focused on sea turtle research projects and results, and using captive sea turtles when appropriate, to build public support for sea turtle research, and continue to publish research findings in a timely manner in peer-reviewed journals to increase the knowledge base of sea turtle biology and population dynamics worldwide.

1.4 Need for the Proposed Action

Research suggests that marine turtle populations today are less than ten percent of their historical numbers (Lotze et al. 2006). The systematic human exploitation of sea turtles for eggs, meat, and shells is considered a major factor in their decline (McClenachan et al 2006). These threats continue today, with the added impacts from incidental commercial fisheries capture, beach development, and climate change. The effect of changes in climatic variables (e.g., sea surface temperature, nest temperature, ocean productivity) on sea turtle abundance and distribution is the least understood yet may be the dominant long-term threat worldwide (Van Houtan 2010). More detailed research on all of these population influences is therefore essential to ensure the continued existence of marine turtles in the world's oceans.

1.4.1 Natural Impediments to Recovery

Habitat Loss

The principal nesting beaches for this stock are low-lying, small, sand islets located several hundred miles from the developed Hawaiian Islands. Most of the land at the primary nesting grounds of FFS is less than 2 m above sea level. Substantial loss of habitat has already occurred at FFS from 1963 – 2004 (Antonelis et al. 2006) and projected loss of habitat due to sea level rise for East Island is between 3% and 33% for a rise in sea level of +9 to +88 cm, whereas land loss at some of the other islets at FFS (Trig, Gin, and Little Gin) may be as great as 99%. East Island is the primary nesting site for Hawaiian green turtles and has the potential to host a substantially larger nesting population (Tiwari et al. 2010).

However, habitat loss of entire islands due to sea level rise may impose the greatest risk to the continued existence of this population. Laysan and Lisianski Islands may provide refuge for nesting turtles because their elevation is higher (Baker et al. 2006) provided other environmental variables (i.e., sand temperature and ocean currents) are conducive to the survival of hatchlings.

Reproduction

Changes in climate affect animals, such as sea turtles, whose reproductive success is determined by environmental factors. The sex of hatchling sea turtles is determined by nest temperatures. Increasing beach temperatures may lead to skewed sex ratios and ultimately a female biased population. Additionally, if beach sand temperatures increase considerably, the overall success of each nest may decrease due to embryonic mortality at high temperatures. Changes in sea surface temperatures may also change the timing of breeding and nesting (Van Houtan 2010).

Food availability

Competition for herbivorous food resources among green turtles may lead to reduced growth rates and increased time to maturity. This population exhibits slow and declining rates of growth at several sites in the MHI (Balazs and Chaloupka 2004b). As this population continues to recover, competition for resources will increase, not only between turtles but also between herbivorous fishes, and other reef creatures (Wabnitz et al. 2010). Green turtles are extremely resilient in harsh conditions (as are many reptilian species), so the overall impact of reduced food resources may not ultimately lead to death, however it may lead to even slower growth rates and greater age to maturity which could impact the recovery rate of the population.

Predation

Green turtles are preyed upon by sharks, finfish, and presumably sea birds in the marine environment. It is anticipated that the protected status of the NWHI and the resulting elimination of fishing pressures will provide all species and stocks the time and space to recover to higher population levels. This in turn may lead to higher predation rates of hatchlings by finfishes off the nesting beaches and higher rates of interactions between sharks and adult turtles in the inter-nesting habitat resulting in injury and potentially death.

Disease

The tumor disease, FP, which is caused by a herpes virus, is an ongoing threat to green turtles in the Hawaiian Archipelago. It has been estimated that FP causes approximately 28 percent of the injuries and mortalities to green turtles in Hawaii (Chaloupka et al. 2009). While some individuals may contract the disease and eventually overcome it, many others are plagued with large tumors that interfere with their ability to see and forage, and eventually lead to death. At some sites in the MHI, the disease has declined in both severity and prevalence (Chaloupka et al. 2009). At other sites, such as around the island of Maui, the disease still affects a large proportion of the population, but the overall trend is decreasing (Van Houtan et al. 2010).

1.4.2 Anthropogenic Impediments to Recovery

Commercial harvest

The Hawaiian green sea turtle population was listed in 1978 as a threatened species under the ESA. This listing was primarily because the stock had been over-harvested from the early nineteenth century up until 1978. Green sea turtles were killed by the thousands for their meat, skins, calipee (i.e., cartilage), eggs, and shells. Currently, the commercial harvest of all sea turtles in the United States is illegal. Even though the Hawaiian green sea turtle population is increasing, it has been demonstrated that they are vulnerable to exploitation because the population is relatively small and individuals are particularly slow growing, taking 35 years or more to reach maturity.

Fishing Interactions

The incidental capture of green turtles in commercial and recreational fishing gear is a continuing concern. The interaction between green turtles and recreational fishing gear is the second most common cause of strandings in the MHI (7%). Discarded monofilament fishing line, fishing hooks, and gillnets pose serious threats to green turtles including injury, flipper amputation, and death. The cause of approximately half of all strandings is undetermined. Because drowning is difficult to determine (Work and Balazs 2010), it is possible that fishing gear interactions are responsible for a greater percentage of sea turtle fatalities than we currently believe (Chaloupka et al. 2009). The current regulations restricting gillnet fishing in the MHI should reduce the number of turtles incidentally caught and killed in gillnets.

Marine Debris

The entanglement in and ingestion of marine debris is a potential threat to this population. Such debris includes discarded or abandoned fishing gear such as nets and lines as well as plastics such as bags, 6-pack rings, tar balls, Styrofoam, and other refuse that might ensnare or be consumed by a green turtle. Entanglement in discarded nets and lines, as well as ingestion of plastics and other discarded debris may lead to injury or death.

Habitat Degradation

Green turtles depend upon algae, sea grass, and coral reef habitats for food and refuge. The degradation of these habitats poses a serious threat to the recovery of sea turtle stocks. Degradation of these habitats occurs through pollution, over-fishing, disease, anchoring, climate change, and other anthropogenic factors (Jackson et al. 2001, Rogers and Garrison 2001, Orth et al. 2006).

1.4.3 National Research Council Assessment

In 2010, the National Research Council (NRC), Committee on the Review of Sea Turtle Population Assessment Methods, published a report entitled *Assessment of Sea-Turtle Status and Trends: Integrating Demography and Abundance*. The report addressed programs from across the nation and found that current monitoring generally does not provide enough information on sea turtle populations to evaluate the effectiveness of protective measures and additional data are needed for stock assessments. A thorough population assessment needs to include a description and evaluation of change over time and space in the following areas:

- population structure (e.g., species, subspecies, distinct population segments)
- population lifecycle and demography (e.g., life stages, rates of survival, reproduction)
- population abundance and trends (e.g., evaluation and extrapolation of population indices)
- population ecology and behavior (e.g., habitat, distribution and movements, predators and prey, disease, parasites, contaminants)
- population size (e.g., numbers of individuals, age structure, sex ratio)
- current and projected threats (e.g., human-caused injury or mortality, habitat destruction, climate change)
- sources of variability (e.g., genetic, demographic, environmental, catastrophic).

To be useful in decision making, an assessment requires more than simple description of trends; the large and diffuse nature of sea turtle populations make extrapolation of trends over time, space, and generations difficult at best and potentially misleading. Observed and potential changes in sea turtle populations through time need to be assessed with age-structured models to determine population-wide status accurately and to diagnose causes of population change. As described in the Proposed Action, the MTRP has been collecting these types of data for the last 38 years and proposes to continue collecting these types of data in addition to additional population ecology and behavior data in order to contribute to a thorough population assessment of sea turtles in the Pacific Islands Region (National Research Council, 2010).

1.5 Geographic Scope of Analysis

The geographical scope of MTRP activities includes field research in the Hawaiian Archipelago, and cooperative research, technical assistance, and capacity building in the rest of the Pacific Islands Region. The islands, reefs, and atolls that are located within in the Pacific Islands Region, but outside of the Hawaiian Archipelago, are also referred to as the U.S. Insular Areas of the Pacific Ocean (U.S. GAO 1997). Of these Insular Areas, the United States has sovereignty over Guam (an organized unincorporated territory), American Samoa (an unorganized unincorporated territory), and the Commonwealth of the Northern Mariana Islands (CNMI) (a commonwealth in political union with the United States). Meanwhile, Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Atoll, and Wake Island are unincorporated and unorganized territories of the United States. Palmyra Atoll is an unorganized incorporated territory of the United States, meaning that it is subject to all provisions of the U.S. Constitution (U.S. GAO 1997).

This large geographical area roughly encompasses the range of the five sea turtle species being studied. The MTRP focuses on green turtle stocks because over 97% of the sea turtles encountered within the Hawaiian Archipelago are of that species. However, hawksbill sea turtles are also included, as this species is present within Hawaiian Archipelago and may be caught incidental to coastal fishing activities.

Loggerhead, leatherback, and olive ridley sea turtles are found rarely in the Hawaiian Archipelago because this area is generally outside their natural range. However, data have been and will continue to be collected from any individuals of these species encountered in the Hawaiian Archipelago during all activities of the MTRP.

The MTRP includes coordination and collaboration with and assistance to other sea turtle researchers in and around the Pacific Islands Region. Coordination, collaboration, or assistance may take the form of data collection (including technical instruction of research techniques), financial support, or both. These coordinated research efforts would be conducted in a manner consistent with the Proposed Action. If future research projects are not consistent with the type or scope of activities analyzed in this document, then they will need to conduct an additional separate NEPA analysis. A listing of the persons and agencies who have been involved with the MTRP is included in Section 6. Future coordination and collaboration may include other individuals from these agencies, institutions, and non-governmental organizations, or different but related organizations.

1.5.1 Relevant Resource Issues within the Geographic Scope of Analysis

The Hawaiian Archipelago provides habitat for the five federally threatened and endangered sea turtle species discussed in Section 1.1. It also provides habitat for the federally endangered Hawaiian monk seal (HMS). The HMS uses the same islands and atolls in Northwestern Hawaiian Islands as green sea turtles. The Northwestern Hawaiian Islands have been designated as critical habitat for HMS. Because the green sea turtle nesting season overlaps with the HMS weaning season, the potential interactions of the proposed action and HMS will be included in the environmental impacts section. Unlike the green sea turtle, the HMS monk seal forages primarily around the Northwestern Hawaiian Islands and few HMS (by recent estimates less than ten percent of the entire population) are found on the Main Hawaiian Islands. Therefore the potential for adverse impacts to HMS from the resting and foraging research, and stranding response and research program in the MHI has been considered, found to be negligible, and will not be considered in detail.

Along with HMS, the Hawaiian Archipelago is habitat for a large and diverse community of 22 seabird species. Each year millions of seabirds breed, nest, and forage in the NWHI. The proposed action will include data collection, field camping, and stranding response near these seabird colonies. Therefore, these impacts will be discussed in detail.

Within the geographic scope of analysis are several federally designated marine national monuments. The NWHI were designated as the Papahanaumokuakea Marine National Monument (PMNM) on June 15, 2006 by President George W. Bush in Presidential Proclamation 8031. Given the field work and data collection activities in the PMNM, specifically at FFS, the potential impacts of the proposed action on the marine resources of PMNM will be discussed in detail. Since creation of the PMNM the MTRP has conducted its research in accordance with the PMNM Management Plan and received permits for the Co-Trustees to conduct its research in the PMNM. The proposed research will continue to provide the data necessary for managers to further the restoration and remediation of the resources within the PMNM.

On January 6, 2009, the President Proclaimed three additional Maine National Monument in the Pacific Islands Region. Given that no field work is proposed in the Pacific Remote Islands Marine National Monument, the Marianas Trench Marine National Monument, or the Rose Atoll Marine National Monument potential impacts to these protected areas has been considered, was found to be negligible, and will not be discussed in detail.

Green sea turtles also have an important cultural relationship with Pacific Islanders. Known as honu in Hawaiian, green sea turtles are part of regional traditions, chanted in stories, and found in ancient petroglphys. Historically, green sea turtles also provided meat and eggs for food, and shell and bone for tools and weapons. Given the important role of sea turtles to the cultures and traditions of the Pacific Islands Region, the MTRP has worked with local communities to help in achieving the goal of recovery for all of the sea turtle species in the region. The proposed action includes a number of measures to avoid and minimize adverse affects to sea turtles and these are discussed in detail.

Given that the proposed action does not include constructing any permanent infrastructure, discharges of fill material, dredging, or using any hazardous materials that could be released into the environment, it has been determined that the potential impacts to water quality, noise, aesthetics, traffic, public access to the coastline, vegetation, air quality, are negligible. Therefore, impacts to these resources have been considered, but will not be discussed in detail.

On February 18, 2010, the Council on Environmental Quality released draft NEPA guidance on the consideration of the effects of climate change and greenhouse gas emissions. The direct and indirect impacts of a changing global climate (e.g., warmer nest temperatures and rising sea levels) on sea turtles have been discussed in section 1.4. The scientific research surveys and activities being proposed would not directly generate greenhouse gases, but the automobile and ship travel necessary to reach the research sites and implement the stranding response would consume a small amount of petroleum products annually and produce a negligible amount of greenhouse gases. These emissions would not be reasonably anticipated to even approach causing the direct emissions of 25,000 metric tons or more of carbon dioxide-equivalent greenhouse gas emissions on an annual basis, and therefore the impacts to global climate change will not be discussed in detail.

On July 19, 2010, concurrent with the release of the *Final Recommendations of the Interagency Ocean Policy Task Force* issued by the White House Council on Environmental Quality (CEQ), President Obama released an Executive Order (EO; rescinds EO 13366 of December 17, 2004) entitled *Stewardship of the Ocean, Our Coasts, and the Great Lakes*. This EO adopts the recommendations of the CEQ Task Force and directs executive agencies to implement the recommendations under the guidance of the National Ocean Council (NOC) created by the EO. The proposed action is consistent with these recommendations and will contribute to the scientific understanding of our ocean ecosystems.

Executive Order 12898 requires federal agencies to address actions affecting environmental justice in minority populations and low-income populations. The proposed research will take place primarily in unpopulated areas (e.g., a federal monument, public beaches on the MHI) involving principally short-term temporary data collection activities. Collaboration with other researchers, agencies, and NGOs will be on a mutual basis. As such, the proposed research will have negligible environmental effects on minority and low-income communities, and therefore will not be discussed in detail.

Executive Order 13089 requires federal agencies to identify actions that may affect coral reefs, protect and enhance the condition of coral reef ecosystems through existing programs, and ensure their actions do not degrade the conditions of coral reef ecosystems. The proposed sea turtle research activities will include work in the vicinity of coral reefs. The proposed action does not involve any direct impacts to coral reefs. The proposed action does aim to facilitate the recovery of sea turtles, which will have a small indirect beneficial effect on coral reefs by increasing the abundance of these native algae grazers to the ecosystem. The proposed action would have only short-term temporary effects on coral reefs during sea turtle captures and the algal studies, and impacts to coral reefs have been considered, but will not be discussed in detail.

Executive Order 13158 requires federal agencies to avoid harm of Marine Protected Areas. The nesting research will take place in a MPA (e.g., PMNM) and the stranding response may take place in other MPAs in the MHI (e.g., Pupukea Marine Life Conservation District, Hawaiian Islands Humpback Whale National Marine Sanctuary). The MTRP will avoid harm of MPAs to the maximum extent practicable while conducting the proposed action through implementation of the various avoidance and minimization measures described below.

The proposed MTRP activities will be undertaken in a manner consistent with the Hawaii Coastal Zone Management Program and will not affect any coastal use or resource. Therefore, impacts to these resources have been considered, but will not be discussed in detail.

Within the geographic scope of analysis occur a number of archeological and cultural resources. The NWHI are an important cultural resource in the Hawaiian traditions. Native Hawaiian seafarers travelled frequently between the MHI and NWHI. The NWHI are home two of the most important Hawaiian archeological sites, Nihoa Island and Mokumanamana (Necker Island). These islands are home to a number of sites listed on the National Register of Historic Places, including numerous heiau (i.e., places of worship). The proposed action does not include activities at either of these islands, or at any other location that is anticipated have resources listed on the National Register of Historic Places (e.g., East Island is a dynamic landform composed of coral rubble and sand). Therefore, impacts to these resources have been considered, but will not be discussed in detail.

2 Proposed Action and Alternatives

The MTRP proposes to continue the current research program that has been implemented over the last 38 years in Pacific Islands Region (Alternative A) with the addition of research on the Study of Site Fidelity to Foraging Grounds (Proposed Action: Alternative C). This document includes a range of reasonable alternatives (e.g., Alternative B) that address the purpose of the MTRP and need for sea turtle research and collaboration, while avoiding and minimizing adverse impacts to the environment.

2.1 Alternative A: Status Quo

The MTRP is one of the few long-term sea turtle research programs in the world, with more than 38 years of continuous, quality data.

2.1.1 Components of the Current MTRP

Using the techniques and methods described below, which have been implemented using the associated standard operating procedures (see 2.1.3), the MTRP currently undertakes a number of sea turtle research investigations that can be grouped into three broad categories: those associated with beach/nearshore habitat; those associated with pelagic habitat; and those associated with technical assistance, training, international collaboration, and analytic actions (Table 1). Table 1 identifies the specific techniques and methods described in Section 2.1.2 with its corresponding alphanumeric label and its associated research component identified in Sections 2.1.1.1, 2.1.1.2, and 2.1.1.3.

As noted above, most of the research is conducted on green turtle and hawksbill stocks endemic to the Hawaiian Islands Archipelago. Additionally, the MTRP studies loggerhead, olive ridley, and leatherback sea turtles incidentally caught in commercial fisheries on the high seas or by research programs in the Pacific Islands Region. These species are found infrequently within the MHI and are studied as part of the stranding program.

2.1.1.1 Research on Sea Turtle Stocks in the Hawaiian Islands on Beach/Shoreline Habitats

a. **Nest-Based Egg and Reproductive Success.** Evaluation of egg incubation, hatchling production, and examination of nest contents post-hatching, including evaluation of sex ratios based on temperatures measured in the nest and determining the sex of dead hatchlings salvaged, in the nest or on the beach.

b. **Nesting Beach Characteristics and Productivity. Collection of data from the nesting beach.** Assisting federal (USFWS and National Park Service, NPS) and state (Hawaii Department of Land and Natural Resources, DLNR, Division of Aquatic Resources, DAR) personnel with collection of data from green turtles and nests at FFS and the MHI, as well as from hawksbill turtles and nests at Volcano National Park on the Island of Hawaii and other locations in the MHI (i.e., Maui and Molokai). Data collected may include identification of the female, date of encounter or nest deposition, date of nest hatching, location of nest, nest density, degree of egg fertility, and hatchling production. This may involve affixing passive or active tags to nesting females.

c. **Stranding.** As part of a widespread stranding network, collection of data from live and dead stranded sea turtles, care and rehabilitation of live animals, and necropsy of dead animals.

d. **Post-Pelagic Juvenile and Adult Nearshore Foraging and Resting Habitat.** Identification of location, characteristics, and daily and seasonal use of foraging and resting habitat and local movements of post-pelagic juveniles and adults using marked animals with active transmitters.

e. **Breeding Males and Gravid Females Inter-nesting Habitat and Movements.** Identification of location, characteristics, and daily and seasonal use of foraging and resting habitat and localized movements of breeding males and gravid females between nesting at breeding sites and associated basking sites.

f. **Food Habits.** Collection of data from live and dead turtles and reef habitat, including evaluation of food found in the mouth, stomach, crop, gastrointestinal tract, or feces; and stable isotope studies using tissues.

g. **Basking Sea Turtles.** Collection of data from basking green turtles regarding, when appropriate, life stage, sex, health status, tags, and DNA.

h. **Fibropapillomatosis.** Collection of data related to the existence, causes, extent, and progression/regression of the FP disease complex.

i. **Localized Overcropping of Algal Forage by Increasing Numbers of Green Turtles.** Evaluation of potential for overcropping of algae by increasing numbers of sea turtles in the recovering Hawaiian population and other assessments of forage characteristics.

j. **Identification and Biology of Epibiota (animals and plants that live on the skin and shell of sea turtles).** Collection of barnacles, leeches, algae, and other flora and fauna attached to skin and shell for determining life cycle biology and taxonomy.

k. **DNA Analysis.** Collection of skin, blood, and/or tissue from live or dead turtles for stock identification.

l. **Internal Parasites.** Collection of blood from live turtles and tissues from dead turtles to analyze for presence of parasites and determine life cycle biology and taxonomy.

m. **Evaluation of Physical Condition.** Turtles are visually examined for emaciation status which ranges from a healthy, robust turtle to a weak and severely emaciated (i.e. neck/shoulders and/or plastron concave/sunken) turtle. Several measurements are taken to document body thickness, length, width, and weight. Samples may be taken for analysis of diet, stable isotopes, blood values, growth rates, disease, and external epibiota (an indication of reduced activity).

2.1.1.2 Research on Sea Turtle Stocks in the Hawaiian Islands in Pelagic Habitats

a. **Post-Hatchling Juvenile Pelagic Habitat Location and Use.** Tracking juvenile turtles marked with an active transmitter to determine use of ocean habitats over time, potentially including juveniles less than 25 cm in length as technology improves to create smaller telemetry equipment.

b. **Adult Migratory Movements.** Tracking adult sea turtles marked with an active transmitter to determine use of ocean habitats over time and migration between breeding and foraging grounds.

c. **Bycatch Data.** Management and evaluation of data collected from both live and dead sea turtles incidentally caught during coastal fishing or in commercial fisheries. Also may involve attaching telemetry equipment to the shell, when appropriate, to evaluate survival and movements.

d. **Release of Captive-Reared Turtles into the Environment.** Providing scientific advice and assistance regarding the release of captive-reared green turtles of the Hawaiian genetic stock into suitable habitat offshore of the Hawaiian Islands; as well as release of other species, such as captive-reared loggerhead turtles, into suitable habitat in cooperation with Pacific Islands and Pacific Rim nation research programs.

e. **Selected Projects for Cooperative Research on Captive-Bred/Captive-Reared Turtles at Authorized Facilities.** Any research conducted on turtles located at Sea Life Park Hawaii or other authorized facilities in which MTRP is a collaborator, including projects such as nest and hatchling research, training in research techniques, tissue and blood sampling, inspection and morphometrics, and educational outreach.

2.1.1.3 Research on Sea Turtle Stocks in the Pacific Islands Region through Technical Assistance, Training, Collaboration, and Analytic Actions

a. **International Collaboration.** Working collaboratively with sea turtle researchers from other Pacific Rim and Pacific Island nations and providing assistance to research programs to build research capacity, including training in research techniques, sharing information and data exchange, and providing scientific advice.

b. **Training Fishery Observers in Research Techniques.** Training fishery observers aboard commercial fishing vessels in collection of sea turtle data from sea turtles caught incidentally by commercial fishery.

c. **Education and Outreach.** Developing and distributing written educational materials, in conjunction with on-site field activities, making presentations at adult- and children-oriented venues, publishing in periodicals and peer-reviewed journals, and providing specimens to museums on-loan and other public and educational institutions.

d. **Modeling Population Dynamics.** Storing and manipulating data and using the data to develop models of sea turtle population dynamics and population recovery collaboratively with the Marine Turtle Assessment Program (MTAP) and other national and international programs and collaborators.

e. **Age and Growth Rates.** Analysis of data based on measurements collected from live and dead turtles and bone structure data collected from dead turtles to evaluate population age structure and individual growth rates.

2.1.2 Techniques and Methods Used by the MTRP for Sea Turtle Research Involving Varying Levels of Interaction with Dead and Living Sea Turtles

A. Encounter. This involves observing turtles from a distance.

1. Observe feeding and other behavior, either visually or with a camera.
2. Record presence, either visually or with a camera.
3. Count numbers, either visually or with a camera.

B. Capture. This involves the actual handling of individual turtles.

1. Capture using gear in the water, such as a scoop net, a tangle net, or trapping in a pen.
2. Capture by hand, either on land or in the nearshore waters.
3. Capture on beaches, with open "box pen."
4. Capture of hatchlings and collection of eggs, either in the nest or on the beach.
5. Capture of dead or live stranded individuals, involving primarily capture by hand at the stranding site.
6. Incidental bycatch in commercial fisheries in the Pacific Ocean.

C. Inspect. This involves handling and manipulating the individual turtle after capture.

1. Measure for size and growth rate.
2. Weigh.
3. Attempt to determine sex visually.
4. Conduct external and oral exam for health status.
5. Search for presence of biota on skin/carapace, such as barnacles or leeches.
6. Conduct exam for external injuries, such as evidence of attempted predation, fishing line entanglement, or boat strike.
7. Record existence of and information from tag(s).
8. Count and describe FP tumors.

D. Sample. This involves handling and taking physical samples from individual turtles, alive and dead, after capture.

1. If animal is alive, in addition to the external inspections above, the following may be collected:
    a. Blood samples for total protein, packed cell volume, serum chemistry, and/or parasites and other desired considerations.
    b. Samples of biota living on skin or carapace, such as barnacles, leeches, and algae.
    c. FP tumors (if recapture, measure for progression/regression of disease).

d. Skin or blood for DNA identification.

e. Food samples from crop and/or mouth, including esophageal lavage.

f. Feces.

g. Tissue for stable isotope study.

2. If the animal is dead, during external exam and/or necropsy, in addition to the above samples (other than blood), the following may be collected:

a. Humerus bones and other tissue samples.

b. Food from gastrointestinal tract.

c. Urine and/or feces.

d. Reproductive organs for sex identification and reproductive status and fertility.

e. Tumor samples (if a recapture, evaluate for progression/regression of disease).

f. Skeletal materials.

g. Skin or other tissue for DNA identification.

h. Tissue for stable isotope study.

i. Epibiota (i.e., plants and animals attached to the skin and shell of a turtle).

j. Tissues from nest remains.

E. Tag. This involves placing a physical tag either into tissue of the flipper, under the skin surface, or affixed to the shell of the individual turtle.

1. Passive tags:
   - External flipper tag (metal or plastic);
   - PIT tag injected under the skin that can then be electronically scanned;
   - External shell mark (i.e., alphanumeric identification etched into shell and painted white)
2. Active Tags:
   - Radio transmitter that either transmits globally using satellites or short-range using sonic and VHF frequencies attached to the shell;
   - Archival tag (collects and stores temperature, depth, time, and location data).

F. Veterinarian Care. This involves the handling and manipulation of individual turtles by licensed veterinary professionals for the purposes of rehabilitation and captive care.

1. Rehabilitate sick or injured turtles for release into the wild, including transport, holding, handling, diagnosis, observation of behavior, treatment (such as dosing with medicine and

surgery performed by a licensed veterinarian), feeding and other necessary care. Veterinary procedures typically performed may include but are not limited to:

- radiographs
- surgical flipper amputation under gas anesthesia
- medications administered (e.g., antibiotics, fluids, mineral oil, GasX, etc.)
- force feeding
- fishing line extracted from mouth or cut short at mouth if unable to extract
- fish hook removed with or without minor surgery and local anesthetic
- shell repaired with fiberglass/resin/epoxy/stainless steel wire
- tumor surgically removed (cryosurgery or cutting) or treated with topical ointment (blood root) or injection (Dermex)
- Endoscopy

2. Conduct humane euthanasia of a sick or injured sea turtle if two or more veterinarians decide it has no chance to recover or survive in the natural environment. There are only two Institutional Animal Care and Use Committee (IACUC) approved methods of euthanasia for reptiles, barbiturate overdose and penetrating captive bolt, and the MTRP only uses barbiturate overdose.
3. Conduct a comprehensive necropsy of all euthanized turtles by a licensed veterinary pathologist.

G. Transport of Captured Turtles. This involves handling, stabilizing, and transporting living turtles.

1. Using a certified animal carrier, with the turtle covered with a wet pad for cooling on a plane, in the back of a vehicle, or on a boat if the individual is captured at sea.
2. Transport of salvaged and frozen dead turtles or turtle tissues, boxed and shipped by ground or air transport.

H. Release of Wild Turtles Back into the Natural Environment. This involves tagging, transporting to the appropriate release point, and release of individuals into suitable habitat, as defined by sea turtle experts.

I. Collection of Environmental Samples. This involves collection of information and physical samples from the environment in support of sea turtle research.

1. Collect invertebrates such as sponges, algae and sea grasses in known turtle foraging areas.
2. Collect reef fish observed to groom sea turtles, such as saddleback wrasse, surgeonfish, and tangs for presence of viruses and other pathogens.
3. Collect sediments for presence of viruses and other pathogens.
4. Record and archive seawater temperature data.

5. Record and archive sand temperature data.
6. Collect seawater for presence of viruses and other pathogens.
7. Record and archive weather data and associated oceanographic characteristics.
8. Collect beach sand for analysis of beach physiology (sand grain size, porosity, water content, etc.).
9. Collect invertebrates and non-cleaning fish from foraging habitats for presence of viruses and other pathogens.

J. Technical Assistance, Modeling, Data Analysis, Educational Outreach, and International Collaboration. This involves data storage and manipulation, developing and using population models, educational outreach, and collaborating with international sea turtle researchers from the Pacific Rim and Pacific Island nations to further research in support of the recovery of Pacific stocks of sea turtles. Technical assistance involves the transfer of specific scientific expertise to train professionals in other countries, assist in data analysis, provide supplies, and perform other noninvasive actions.

Table 1. Sea turtle research techniques and methods potentially associated with each research project in the MTRP. The numbers and letters in the cells represent the specific actions described in Section 2.1.2.

	A. Encounter	B. Capture	C. Inspect	D. Sample	E. Tag	F. Vet Care	G. Transport	H. Release	I. Environmental Sampling	J. Modeling / Collaboration
1. Research conducted on the beach or in the nearshore ocean										
a. Reproductive Success	1-3	2-5	1-3,6	1d 2a,d,f-h					4,5,7,8	
b. Nesting Beach Research	1-3	2,3,4	1-8	1a-d,g 2j	1-2		1	H	5,7,8	
c. Strandings	1-3	1-3,5,6	1-8	1a-g 2a-h	1-2	1-3	1-2	H		
d. Nearshore Foraging and Resting Habitat	1-3	1-3,5	1-8	1a-g	1-2	1-3	1	H	1,2,3,4,6,9	
e. Breeding Adult Inter-nesting Habitat	1-3	1-3,5[1]			1-2[1]				4-8	
f. Food Habits	1-3	1-3,5,6	1-8	1a,e-g 2b,c,h	1-2		1	H	1,9	
g. Basking	1-3	3	1-8	1a-e,g	1-2		1	H	4-7	
h. Fibropapillomatosis Disease Complex	1-3	1,2,3,5,6	1-8	1a-c 2e,i	1-2	1-3	1-2	H	1-4,6,9	
i. Overcropping	1-3	1-3,5	1-8	1e,g	1-2		1	H	1,9	

	A. Encounter	B. Capture	C. Inspect	D. Sample	E. Tag	F. Vet Care	G. Transport	H. Release	I. Environmental Sampling	J. Modeling / Collaboration
j. Epibiota	1-3	1-3,5,6	1-8	1b 2i		1,3	1-2	H		
k. DNA		1-6		1d 2g, j			1-2	H		
l. Internal Parasites		1-3,5		1a 2a		3	1-2	H	9	
m. Evaluation of Physical Condition	1-3	1-3,5,6	1-8	1a-g 2a-c,e,g-i	1-2	1-3	1-2	H	1	
2. Research conducted in the ocean										
a. Pelagic Juvenile Habitat	1-3	1-3,5,6	1-8	1a-g	1-2		1	H	4,7	
b. Adult Migration		1-3,5,6	1-8	1a-d,g	1-2		1	H	4,7	
c. Bycatch	1-3	1,5,6	1-8	1a-g, 2a-i	1-2	3	1-2	H	7	
d. Captive Release	1-3		1-8	1a-d,g	1-2		1	H		
e. Captive-Bred / Reared Research at Facility	1-3		1-8	1a,d,g	1	3	1	H	5,8	
3. Analytic, training, modeling, and educational outreach										
a. Collaboration			1-8	1a-g 2a-i	1-2		2			J
b. Education / Outreach	1-3			2f			1	H		J
c. Observer Training	1-3		1,6,7	2a,g	1-2					J
d. Modeling										J
e. Age / Growth Analysis										J

[1] at locations other than French Frigate Shoals

2.1.3 Standard Operating Procedures for Implementation of Methods and Techniques

2.1.3.1 Standard Operating Procedures Accepted Worldwide

The MTRP ensures the safety of research and technician personnel first and foremost in all Program activities, and conducts constant training of all personnel in the implementation of techniques and methods, both in the laboratory and in the field.

All research techniques and methods are conducted consistent with accepted standards within the sea turtle research community (Eckert et al. 1999) based on efficacy and the experience gained through 34 years of implementation.

Eckert et al. (1999) incorporates standards for:

- Capturing (L.M. Ehrhart and L.H. Ogren. *Studies in Foraging Habitats: Capturing and Handling Turtles*; see also: Balazs et al. 1987 and Balazs et al. 1998);
- Tagging (S.A. Eckert. *Data Acquisition Systems for Monitoring Sea Turtle Behavior and Physiology*; G.H. Balazs. *Factors to Consider in the Tagging of Sea Turtles*; see also: Balazs et al. 1996);
- Collecting physical measurements (A.B. Bolten. *Techniques for Measuring Sea Turtles*);
- Diet sampling and diet component analysis, including the use of esophageal lavage (G.A. Forbes. *Diet Sampling and Diet Component Analysis*, see also: G.H. Balazs 1992);
- Measuring growth and growth rates (R.P. Van Dam. *Measuring Sea Turtle Growth*);
- Genetic population sampling (N. FitzSimmons, C. Moritz, and B.W. Bowen. *Population Identification;* also see: Bowen et al. 1992);
- Determining clutch size and reproductive success (J.D. Miller. *Determining Clutch Size and Hatching Success*);
- Diagnosing sex of sea turtles in foraging habitats (T. Wibbels. *Diagnosing the Sex of Sea Turtles in Foraging Habitats*);
- Techniques for evaluating infectious diseases of sea turtles (L.H. Herbst*. Infectious Diseases of Sea Turtles*);
- Tissue sampling and biopsy techniques (E.R. Jacobsen. *Tissue Sampling and Necropsy Techniques;* see also Dutton and Balazs 1996);
- Techniques for sampling blood and conducting laparoscopy for determining reproductive cycles (D. Wm. Owens. *Reproductive Cycles and Endocrinology*);
- Conducting stranding and salvaging networks (D.J. Shaver and W.G. Teas. *Stranding and Salvage Networks*)

2.1.3.2 MTRP Standard Operating Procedures

These standard operating procedures are designed to minimize the impact of MTRP's techniques and methods on the environment, and turtles in particular.

- Skin sites for all activities that require puncturing the skin, such as tag application activities that require attachment to skin (physical tags or PIT tags), and collecting biopsies and blood samples, and use of tools for carapace marking and measuring, are cleaned with an antiseptic.
- Skin biopsies are taken from turtles incidentally caught in commercial fisheries, confiscated by law enforcement, captured during fieldwork, encountered on a nesting beach, and stranded turtles. The biopsy (a small plug of skin and tissue) is quickly taken from the edge of a hind flipper or from the soft skin near the hind flippers using a sharp pre-sterilized punch tool.

- When possible, satellite and VHF radio transmitters are attached, removed, and/or replaced on nesting females only when the turtle has finished nesting to avoid nest abandonment.
- All wild turtles are typically held for field research activities for periods of time varying from minutes to 1 to 2 hours, unless a satellite or radio transmitter is being attached, at which point holding could extend to 3 hours.
- All drugs, including topical medications, vitamins and dietary supplements, and antibiotics are administered to turtles only by trained staff under the supervision of licensed veterinarians using approved IACUC protocols.
- Release of wild turtles from anywhere in the Hawaiian Islands back into the natural environment either during research activities or after rehabilitation at the NMFS Kewalo Research Facility (KRF) in Honolulu, Hawaii includes:
    - Any potentially diseased individual (known to be or potentially exposed) will not be released into areas having no known evidence of disease. When necessary, the animal is placed in quarantine for an appropriate duration, and the animal is observed for abnormal physical, physiological, or behavioral conditions; blood samples are collected to ensure absence of or an acceptable level of medical problems, as determined by a veterinary pathologist, prior to release.
    - Turtles stranded in areas not known to have the FP disease (i.e., leeward coast of Hawaii) are never released back into the original stranding site because the seawater used at KRF is recycled from the Oahu coast and the turtles could have been infected during their rehabilitation. All such turtles are released at sites on Oahu.
    - Turtles with or without FP tumors stranded from waters known to have the disease are released into calm waters close to the capture site, or in Kaneohe or Kailua Bays. Kaneohe Bay has the highest prevalence of FP disease in Hawaii and has calm waters; therefore, it is an appropriate release site for animals that have previously been exposed to the disease.
    - Turtles with one or more flipper amputated in the wild or by surgery because of severe entanglement or physical damage are released into calm waters of Kailua Bay or Maunalua Bay on Oahu to facilitate swimming.
    - Turtles are transported by truck to the release site in an approved container, covered with a wet absorbent pad, and are carried by hand where they are released near the water’s edge or gently from a boat.
    - After release, observers watch for the turtle to surface several times to breathe to ensure that the turtle is behaving normally and moving away from shore.

2.1.3.3 Standard Operating Procedures for Avoiding Disturbance to Other Species, Especially Monk Seals on Sea Turtle Nesting Beaches, Including at East Island, FFS

Prior to going into the field to conduct MTRP activities, all personnel undergo training, study the program's standard operating procedures manual, and are prepared to adhere to all requirements.

- On East Island, monk seals typically rest facing inland, therefore researchers always scan with the flashlight from the shoreline berm towards the center of the island to avoid shining the light in the eyes of monk seals.
- If a monk seal happens to be facing the researcher, the light is turned off and the researcher slowly moves away.
- Researchers encountering monk seals remain at an appropriate distance at all times.
- Nesting research surveys at East Island are conducted no more than once per hour to minimize disturbance to nesting turtles, seabirds, and monk seals unless a particular turtle needs to be identified or observed.
- Researchers maintain a low profile during daylight when encountering a monk seal, and whenever possible, pass it from downwind.
- Researchers attempt to keep noise or sudden sounds to a minimum.
- If a monk seal notices the researcher, the person crouches down and slowly moves away.

Although sea turtle nesting at FFS spans several months, sea turtle researchers are typically on East Island for up to 45 days at the height of the nesting season, June and July, which minimizes disturbance to monk seals and other sensitive wildlife.

2.2 Alternative B: Expansion of the Status Quo Program to Include the Study of Hatchling Predation at FFS

This alternative would include the current program as described in Alternative A plus include a study at FFS to determine the causes and levels of green turtle hatchling predation on land and in the nearshore environment. This alternative would include: (1) capturing wild live predatory birds (e.g., frigatebirds) and inducing them to regurgitate their crops; (2) evaluating population levels and food habits of large predatory fish such as jacks (the family Carangidae) and ghost crabs; (3) collecting tissue samples from predators and dead hatchlings for conducting a stable isotope food habit study; and (4) using on-land remote cameras and underwater videography.

This study would require capturing potential predators of hatchlings, including live birds, fish, and ghost crabs. Birds would be captured by hand or long handled fishing nets. Study would be conducted during the peak sea turtle hatching period in September, on East and Tern Islands. No more than 200 frigatebirds would be captured and studied. This would include lethal collection of fish and ghost crabs for stomach content and DNA analyses to determine if hatchlings have been consumed. Methods to identify the predation event would include tethering hatchlings to lines (Gyuris 1994) or by visual tracking (Stewart and Wyneken 2004). Up to 580 hatchlings per year would be used in this study for up to three years. Hatchlings would be collected shortly after emergence from their nest and stored in a cool, shaded box. Hatchlings would be used within 12 hours of capture. Animals that did not regain their post-emergence vigor would not be used for the study, and would be released into the ocean. Hatchlings would be tethered to lines for approximately 10 minutes. If no predation event occurred the animal will be released and allowed to swim away. If predation event occurs, it is assumed that this represents a normal predation event that would have occurred. These animals are presumed dead at this point. Techniques and methods used will be consistent with those described (Tables 1 and 2).

Table 2. Sea turtle research techniques and methods potentially associated with the study of predation levels on hatchlings entering the sea.

	A. Encounter	B. Capture	C. Inspect	D. Sample	E. Tag	F. Vet Care	G. Transport	H. Release	I. Environmental Sampling	J. Modeling / Collaboration
Green Turtle Hatchling Predation	1-3	1,4 - hatchlings 1 predators	1-4,6 hatchlings 1-3,6 predators	1e, 2b,h predators			2		4,5,7	

2.3 Alternative C (Proposed Action): Expansion of the Status Quo Program to Include the Study of Site Fidelity to Foraging Grounds

This alternative would include the current program as described in Alternative A and also include: (1) capturing and relocating post-pelagic juvenile and subadult green turtles that exhibit slow growth rates in potentially over-cropped foraging areas and other suitable areas with more abundant forage, and; (2) tracking and monitoring their movements and subsequent rate of shell growth. This alternative would not include the activities discussed under Alternative B. This study would evaluate if slow turtle growth rates may be caused by decreased food in over-cropped foraging grounds from an increasing green turtle population in the area. Over-cropped areas would be determined by biomass estimates and consumption rates, estimates of available forage, and the amount of competition for available resources. All turtles selected for the study would be resident to the area and have at least 5 years of evidence of slow carapace growth as indicated from recapture data. A trial study with one turtle would be conducted to test the relocation technique and, if successful, the study would be expanded to include the minimum sufficient number of turtles for statistical analyses, approximately 40. All of the coastal areas of the MHI, except the leeward coast of Hawaii Island, are known to have some level of FP disease. To avoid spreading the disease, either studies would be conducted outside of the leeward coast of Hawaii Island, or turtles moved from sites along the leeward coast of Hawaii Island would only be relocated to other areas along this coast. Techniques and methods used will be consistent with those described earlier (Tables 1 and 3).

Table 3. Sea turtle research techniques and methods potentially associated with the study of site fidelity to foraging grounds.

	A. Encounter	B. Capture	C. Inspect	D. Sample	E. Tag	F. Vet Care	G. Transport	H. Release	I. Environmental Sampling	J. Modeling / Collaboration
Green Turtle Foraging Site Fidelity	1-3	1,2	1-8	1a-g	1-2	1	1	H	1,3,4,6,7,9	

2.4 Alternative Not Considered in Detail

2.4.1 No Federal Action

An alternative that stops the MTRP research activities is not being considered in detail because: (1) this program is consistent with the recovery plans of all five species of marine turtles (NMFS and USFWS 1998a, 1998b, 1998c, 1998d, 1998e); (2) sea turtle populations have not recovered per the recovery plans; and (3) the causes, spread, and impacts of FP disease are poorly understood and the disease remains a potential threat to sea turtle recovery.

If the MTRP ceased conducting research on sea turtles, then data would not be collected on sea turtle stocks or life history (i.e., nesting, foraging, movement, genetics). Furthermore, the program would not engage in international collaboration, training, technical assistance, education, outreach, population modeling, or data analysis. As agents and federal employees of the NMFS, MTRP staff would continue to aid stranded sea turtles in accordance with the programmatic permit described at 50 CFR § 222.310.

This alternative would fail to meet the purpose of the MTRP at the PIFSC and would fail to fulfill the data needs of the federal government as the entity responsible for sea turtle recovery. Furthermore, data that otherwise would have been collected and analyzed by the MTRP would not be published in the peer-reviewed literature and other technical reports. Therefore, it would be difficult for the federal government and related management organizations to develop or implement management strategies for sea turtle species in the Pacific Ocean because they would not have the necessary biological and ecological information about the species.

This alternative would result in a short-term reduction in minor adverse impacts to the environment (i.e., turtles and similarly affected species) because researchers would not be actively working in the field handling turtles and collecting data. Handling turtles causes a small amount of non-lethal stress to the animal, but implementation of the standard operating procedures described in minimizes these temporary effects. The long-term impact of this alternative would be a lack of data necessary to analyze population trends and make management decision to recover these species (i.e., remove them from the list of threatened and endangered species). This would have moderate direct and indirect adverse ramifications on the cultural identity and practices of native peoples, tourism, the fishing industry, and ecological services (e.g., food-web maintenance) in the Pacific Islands Region.

The lack of research staff in the field would also likely reduce the overall response to stranded turtles because there would be fewer people in locations where turtles occur. It is anticipated that non-federal governmental agencies and non-governmental agencies (NGOs) would take over some of those data collection tasks, but the extent that these agencies would fill the role of the MTRP is difficult to predict. Given that the MTRP serves as the primary data collecting entity in the region, it is unlikely these agencies would have the same focused purpose or level funding, staff, or expertise to meet the data needs. Therefore, this no federal alternative fails to meet the purpose and need of the MTRP, and will not be considered further in this document.

3 Description of Affected Environment

The Pacific Islands Region covers approximately 1.5 million square nautical miles and coincides with the management area of the National Marine Fisheries Service, Pacific Islands Region (i.e., the U.S. Exclusive Economic Zone of the central and western Pacific). The focus of the MTRP data collection and stranding response and research activities is in the Hawaiian Archipelago. Nesting surveys will be conducted primarily on East Island at FFS in the NWHI. Resting and forging research will be conducted primarily in the MHI. Activities located in the U.S. Insular Areas of the Pacific Islands Region would be limited to episodic collaboration with other researchers (mostly as technical assistance), and stranding response and research. The baseline environmental conditions within this vast geographic scope of analysis range from degraded (e.g., the highly urbanized Waikiki Beach on the island of Oahu), to a protected marine national monument (e.g., PMNM in the virtually uninhabited NWHI). A detailed description of the environmental conditions within the Pacific Islands Region is provided in the Final Programmatic Environmental Impact Statement (FPEIS) prepared by the Western Pacific Regional Fisheries Management Council in coordination with NMFS entitled *Toward an Ecosystem Approach for the Western Pacific Region: From Species-Based Fishery Management Plans to Place-Based Fishery Ecosystem Plans* (WPRFMC 2009). Given that the majority of the environmental impacts of the proposed action involve handling sea turtles on dynamic landforms (i.e., environments that are constantly changing, such as coral sand beaches), and do not involve permanent adverse impacts to the physical environment, this section will provide a general description of this large geographic area.

3.1 Hawaiian Archipelago

3.1.1 Northwestern Hawaiian Islands

The NWHI were are an assemblage of islands, atoll, reefs, banks, pinnacles, and seamounts that stretch approximately 1,200 miles northwest of the Island of Kauai. The NWHI are a sacred and spiritual place to the Kanaka Maoli (Native Hawaiians). The NWHIs are the oldest part of the Hawaiian archipelago and are also known as the Leeward Islands. There are ten main islands and atolls (from southeast to northwest): Nihoa Island, Mokumanama (Necker Island), French Frigate Shoals, Garnder Pinnacles, Maro Reef, Laysan Island, Lisianski Island, Pearl and Hermes Atoll, Midway Atoll, and Kure Atoll. The two southernmost islands, Nihoa and Mokumanamana, are basaltic islands with little beach areas. Four of the five middle landmasses are open atolls (French Frigate Shoals [FFS] and Maro Reef) and sandy islands (Laysan and Lisianski). La Perouse Pinnacle (at FFS) and Gardner Pinnacles are small basaltic outcrops, remnants of islands similar to Nihoa and Mokumanamana. The three northernmost landmasses, Pearl and Hermes, Midway, and Kure, are classical atolls. The beaches of the NWHI are highly dynamic given their low-lying topography and exposure to waves and currents from the northern and southern hemisphere. The texture of beaches ranges from fine sand to corral rubble. This emergent land is vital habitat to the 14 million resident and migratory seabirds, which rely on these islands for roosting and breeding habitat and on the surrounding waters for food and which are protected under the Migratory Bird Treaty Act (PMNM 2008). The NWHI are part of the State of Hawaii (except for Midway Atoll, which is under control by the Federal government).

The NWHI have had varying levels of legal protection since their discovery. In response to the slaughter of millions of seabirds by poachers, President Theodore Roosevelt created the Hawaiian Islands Bird

Reservation in 1909. In 1940, President Franklin Delano Roosevelt renamed it the Hawaiian Islands National Wildlife Refuge. Since 1940, most of the populations of plants and animals on the islands have rebounded to their pre-exploitation levels (Rauzon 2001). The entire chain is now part of the Papahanaumokuakea Marine National Monument. As a National Monument, access to the islands and atolls, and activities within 50 nautical miles of the shoreline are regulated through a permitting system co-administered by the NMFS, USFWS, and State of Hawaii.

French Frigate Shoals is the primary location of the green sea turtle nesting surveys. Occasionally, abundance surveys are also opportunistically completed on other islands as part of the PIFSC research program. FFS is the largest atoll in the chain, with approximately 9,300 hectares of coral reef habitat and only 27 hectares of emergent land. The islets within the atoll are highly dynamic systems made of coral sand and the total area of emergent land can fluctuate from year to year. The focus of the nesting surveys is East Island, a sparsely vegetated sand island. Tern Island has been modified from a naturally sand island to an airplane runway, with a number of associated permanent buildings. These buildings and associated infrastructure serve as the base for research at FFS. The modifications of Tern Island are a result of dredge and fill operations within the atoll. Aside from the temporary USFWS and NMFS staff that lives on Tern Island, FFS is not inhabited by humans.

3.1.2 Main Hawaiian Islands

The eight main islands make up only one quarter of the Hawaiian Archipelago’s area, but are home to almost all 1.3 million people that live in the state. The eight high volcanic islands include (from southeast to northwest): Hawaii, Maui, Kahoolawe, Lanai, Molokai, Oahu, Kauai, and Niihau. The islands are located approximately 2,500 miles from North America and 3,000 miles from Asia. Despite these distances, tourism constitutes the largest part of the Hawaiian economy. Tourists are attracted to the tropical climate and diverse marine resources including coral reefs, sandy beaches, and surf breaks. The sandy beaches are generally protected by the fringing reefs but the sediment dynamics are vulnerable to disruption of near-shore currents. Agriculture and the military are the other main sources of state income. Consequently, the marine resources of the MHI experience pressures for overuse at tourist destinations and shipping traffic at the military bases and ports. Oahu is the most populous island and one of the most densely populated areas in the United States.

The MTRP is based at the Pacific Islands Fisheries Science Center in Honolulu, Hawaii. The rehabilitation facility of sea turtles is located at the Kewalo Research Facility also in the city of Honolulu. The facility is equipped with three tanks of various sizes allowing for the rehabilitation of turtles of all sizes and conditions. Tanks have active saltwater filtration and pump systems. All tanks and equipment are thoroughly cleaned to avoid disease transfer from individuals. Furthermore one tank is dedicated for turtles with FP.

3.1.3 Marine Resources around the Islands

The Hawaiian Archipelago falls within the Insular Pacific-Hawaiian Large Marine Ecosystem (LME) (Sherman 1991). The movement of water in the region is dominated by North Pacific Subtropical Gyre, which rotates clockwise, and is located between the North Equatorial Current and Subtropical High

(WPRFMC 2009). It is considered a low productivity ecosystem due to limited nutrient availability, but it has a high diversity of marine species (NMFS 1999). The most valuable fisheries in the MHI are tuna (bigeye, yellowfin, skipjack, and albacore). Other commercial fisheries within the LME include bottomfish, near-shore reef fish, and invertebrates (e.g., lobster, shrimp, squid, and octopus). Marlin, yellowfin tuna, and albacore are important recreational fisheries. Subsistence and recreational fishing pressure is high near-shore, and around the more densely populated islands. Subsistence and recreational fishing is primarily for near-shore reef fishes, tuna, and mahi mahi. The coral reefs that surround the islands provide not only habitat for fish and other marine life, but protect the coastline from powerful seasonal waves.

The marine resources of the NWHI are somewhat unique and range from shallow reef to deepwater banks. The shallow reefs are composed of reef-building corals (generally found in the less than 30 meters of water), unconsolidated sediments, hard bottom substrates, non-reef building corals, and algae. The NWHI are habitat for approximately 355 species of algae and 838 species of invertebrates (Friedlander et al. 2005). Deepwater habitats include banks, shoals, slopes, and seamounts. These deepwater habitats are home to a number of bottomfish, spiny and slipper lobsters, and precious gold, pink, and black corals. Overall, the marine resources of the NWHI are characterized by a diverse assemblage of reef fish, pelagic fish, cetacean, pinnipeds, algae, and invertebrates. Approximately 54 percent of the biomass in the NWHI is composed of apex predators, such as sharks and jacks (Friedlander and DeMartini 2002). The percentage of apex predators in the MHI is a fraction of that amount. Historically, the NWHI were extensively fished for bottomfish, sharks, tunas, and lobsters. Consequently, the abundance of these species is still below their pre-exploitation levels.

3.2 U.S. Insular Areas

As described in section 1.5, the U.S. Insular Areas are located within the Pacific Islands Region, but outside of the Hawaiian Archipelago. This includes Guam, American Samoa, the Commonwealth of the Northern Mariana Islands (CNMI), Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Atoll, Wake Island, and Palmyra Atoll. The MTRP activities within the U.S. Insular Areas are generally limited to technical assistance to sea turtle researchers, educational outreach, and occasionally stranding response. Because the MTRP does not include any specific field research within the U.S. Insular Areas, a description of the environment is included by reference (WPRFMC 2009).

4 Environmental Impacts of the Proposed Action and Alternatives

The proposed action and alternatives involve primarily short-term, temporary research (i.e., collection of biological and ecological data) and stranding response activities. Because the five species of sea turtles being studied are listed under the ESA, the direct, indirect, and cumulative effects of the research on the turtles is focus of this part of the assessment. As described in section 2, the MTRP has developed and over the last 38 years refined many avoidance and minimization measures for handling and working with sea turtles. As described in section 3, the existing baseline conditions within the geographic scope of analysis vary with the level of human activity (i.e., from an uninhabited island to heavily developed beachfront city). This section will discuss the impacts of the Proposed Action and Alternatives on each relevant resource component. These impacts will be compared to the existing baseline conditions by rating them as negligible, minor, moderate, and major. These ratings are made by taking into consideration the context, intensity, and likelihood of the impact.

4.1 Impacts to Sea Turtles

4.1.1 Impacts of Handling and Transporting Live Sea Turtles

Handling and transporting live sea turtles is essential for diagnosis and treatment. All live stranded sea turtles, other than individuals that are lightly entangled (i.e., not injured) in fishing gear and can be disentangled and released on site, are captured by trained staff and collaborators and transported to a facility for diagnosis and treatment by a licensed veterinarian. Whenever possible, turtles are rehabilitated and ultimately released back into their natural environment. Handling and transporting sea turtles will have a minor short-term temporary direct adverse impact on the animal's condition because they are wild animals not accustomed to being restrained by humans. Direct minor adverse impacts of transporting sea turtles, such as over-heating, are minimized by covering the turtle with a wet pad during transport. These impacts are the same for the Proposed Action and Alternative B.

Under Alternative C, an additional 40 turtles may be handled and transported. The additional number of turtles handled and transported would result in a slightly greater magnitude of minor short-term temporary adverse impacts to sea turtles.

4.1.2 Impacts of Capturing Sea Turtles

As with any marine habitat capture program, there is a possibility that captured turtles could experience short- and long-term adverse impacts from capture, ranging from near-drowning to drowning by entanglement. To minimize the potential for adverse impacts, when nets are in the water to capture turtles, they are constantly monitored and turtles are immediately retrieved from the net (Ehrhart and Ogren 1999). Additionally, several field personnel are in the water during all capture activities (hand capture and tangle netting) to ensure that stress to the animal is minimized during capture by passive restraint during hand capture and immediate removal from the net. A veterinarian is on call during all capture activities in the event consultation is required. If a turtle is encountered during capture activities in a comatose state, resuscitation is attempted. Handling time during capture activities is minimized to reduce the potential for additional stress. Turtles are only handled for the amount of time necessary to complete sampling, measuring, examination, and tagging. No stranded tagged turtles have been determined to have died from capture-related activities over the past 24 years (Balazs, pers. comm.). Therefore, no mortality is predicted to occur from capturing and therefore the direct adverse impacts are considered short-term and minor.

Under Alternative B, an additional 580 hatchlings may be captured and tethered to a line during the predation research. These hatchlings represent a fraction of the number individuals that are hatched each year. However, by tethering the hatchlings to a line it increases the probability they are killed by a predator such as an ulua or frigatebird. These adverse impacts would be minor but adverse and permanent.

Under Alternative C, an additional 40 turtles may be captured; however this represents a fraction of the total number of turtles captured. The number of turtles captured would still result in minor short-term temporary adverse impacts to sea turtles.

4.1.3 Impacts of Collecting Samples

For a complete understanding of sea turtle population dynamics and life history, it is necessary to identify individuals and obtain biological samples for genetics, diet, disease, and habitat use. Turtles are flipper tagged with metal inconel tags and PIT using standard techniques (Balazs 1999); blood samples are taken using a medical grade needle and syringe (Bolten 1999, Owens 1999); diet samples are safely obtained by esophageal lavage (Forbes and Limpus 1993); and tissue biopsies are taken using a biopsy punch (Dutton and Balazs 1996). All methods used are performed by trained personnel and have been peer-reviewed and used by sea turtle researchers worldwide. The collection of these samples has direct minor short-term adverse impacts to sea turtles. The MTRP does not perform unnecessary sampling on sick or injured animals unless a veterinarian determines the animal is sufficiently healthy for samples to be taken. No mortality is expected from tagging, blood sampling, or tissue biopsy. Esophageal lavage, when implemented as proposed will have no long-term adverse impacts to the turtle. Many individual turtles have been lavaged multiple times without any known detrimental effect. Individuals have been recaptured from the day after the procedure up to many years later and appear to be healthy and feeding (Forbes 1999). These impacts are the same for the Proposed Action and Alternatives.

4.1.4 Stress from Capturing Turtles with FP That Are Already Immunosuppressed

Both turtles with and without FP are captured and sampled to document the prevalence of FP disease. The progression or regression of the disease is also studied for previously captured individuals and evaluated at the population level. It has been documented that all turtles experience some level of stress when captured (Jessop and Hamann 2005). However, behavioral indications of capture-related stress have been found to be temporary (T. Work, DVM, USGS, pers. comm. May 2006).

Green turtles severely afflicted with FP were determined to be immunosuppressed and chronically stressed prior to capture (Aguirre et al. 1995). Because capture methods are identical for diseased and non-diseased turtles, any observed differences in blood chemistry are likely related to disease and not attributed to stress from capture. Therefore the stress from capturing turtles with FP has a negligible impact.

Turtles that are lightly or moderately afflicted with the disease appear to function at normal levels once returned to the ocean. This has been documented through the subsequent recapture of many of these individuals. In many instances, turtles initially captured with mild to moderate FP tumors have been recaptured with reduced tumor load or no evidence of tumors at all, further indicating that capture stress was not detrimental to the animal's health and well-being. Turtles with severe FP are removed from the study site and evaluated by two veterinarians, a clinical vet and a wildlife disease pathologist. This is not only done for the welfare of the animal, it also removes potentially infectious agents from the water. Additionally, both tumored and non-tumored turtles have been captured and held in captivity, and no behavioral differences were observed. (T. Work, DVM, USGS, pers. comm. May 2006). These impacts are the same for the Proposed Action and Alternatives.

4.1.5 Impacts of Nesting Surveys

During nesting surveys, researchers walk the beach to record data, including: identification of the female, date of encounter or nest deposition, date of nest hatching, location of nest, and nest density. Surveys are conducted no more than once per hour to minimize disturbance. Nesting females can become skittish or disturbed if a light is shined on their face during egg deposition, or if they see the researcher or the researcher's shadow. To reduce the likelihood of disturbance, flashlight use is minimized and the light is covered with the hand with the first two fingers spread slightly to focus the beam. Researchers always approach a nesting turtle slowly from the rear. Before contact is made with the turtle, her activity is noted, and an attempt to identify her by shell etching or tag is made. Based on her activity, the researcher decides if it is the appropriate time to safely tag and sample (if necessary) the turtle without disrupting the nesting process. The best time for the researcher to interact with the turtle is after egg laying is complete to minimize adverse impacts. PIT tags are best inserted directly under the skin into the hind flipper after the female has completed egg laying, when she typically goes into a trance-like state. Alternatively, PIT tags are inserted when the turtle is crawling, making a body pit, covering the eggs, or backfilling, but never while excavating the egg chamber or depositing eggs to avoid any potential for nest abandonment. Every pre-sterilized needle used to install the tag is used only once and disposed of properly after the work. PIT tags are minute, and have negligible long-term adverse impacts to the turtle. The presence of researchers conducting the nesting surveys has a negligible impact on turtles while they rest on the beach prior, during, and after nesting as a result of these avoidance and minimization measures. These impacts are the same for the Proposed Action and Alternatives.

4.1.6 Impacts of Stranding Response and Research

The stranding research program of the MTRP has responded to sick, injured, or dead marine turtles in Hawaii since 1982. The stranding response and research has a minor short-term adverse impact from handling stranded sea turtles, but a moderate long-term beneficial effect on the sea turtle population by providing care to approximately 250 sea turtles per year and returning them to the wild. Necropsies of stranded turtles that are found dead provide information on species distribution, stock structure, sex ratio, health and disease, diet, age and growth, and cause of mortality and have been the source of data for numerous scientific publications (Work and Balazs 2002, Work et al. 2004, Work et al. 2005, Zug et al. 2002, Chaloupka et al. 2008b). The collection of dead turtles in Hawaii provides a short-term benefit to the local community by reducing the adverse impacts to aesthetics and water quality that a decaying turtle would have on the environment. These impacts are the same for the Proposed Action and Alternatives.

4.1.7 Public Perception of Adverse Impacts to Sea Turtles During Research Activities

To prevent misconceptions by the public of potential harm inflicted on sea turtles during research activities, the MTRP has an active public outreach and education program providing pamphlets and literature at all active field sites. Informal and formal presentations at public events, schools, and hospitals are an active and continuous part of the program. The MTRP also supports an extensive marine turtle stranding network and the stranding hotline phone number is made available to the public through magnets, mailings, newspaper advertisements, phonebook listing, television public service announcements, and through long-term cooperation with state agencies. All persons who call the stranding hotline or who are encountered in the field are offered a full explanation of research and conservation activities and their purpose, as well as educational sea turtle literature. As a result of directed outreach effort on turtle research activities, we anticipate minimal, if any, adverse public opinion associated with these activities. These impacts are the same for the Proposed Action and Alternatives.

4.1.8 Impacts of Satellite Tags and Time-depth Recorders

During nesting surveys, satellite tags, time-depth recorders, or both are deployed on green turtles. These instruments are vital in determining habitat use, migration routes between breeding and foraging grounds (Balazs and Ellis 2000), daily and seasonal use of foraging and resting habitat, and localized movements of breeding males and gravid females between nesting and breeding sites and associated basking sites. Installation of these instruments during nesting surveys has a minor adverse short-term impact on sea turtles because the turtles need to be temporarily restrained. The attachment of satellite tags to the shell of a sea turtle may potentially interfere with mating or cause increased drag to sea turtles while they swim. Females with satellite tags from previous years have been observed nesting, however, and post hatching nest inventories indicated these nests contained fertilized eggs (S. Hargrove, pers. comm., July 2010). Certain transmitters, if improperly attached, because of their size, position, and weight increase drag and may substantially interfere with normal migration patterns, disrupting mating (Jones and Seminoff *in press*). To avoid these pitfalls, we follow the recommendations of Jones (2010), to use an array of smaller transmitters (no larger than 6cm x 3cm x 10cm), and apply attachment methods to reduce additional drag. Thus, applying smaller transmitters in the proper methodology diminishes the probability that the animals will be adversely affected. Satellite tags remain on a turtle for less than two years and only four, or 2-3%, of turtles are fitted with satellite tags. Therefore, the attachment of satellite tags to sea turtles results in minor long-term adverse impacts to sea turtles. These impacts are the same for the Proposed Action and Alternative B.

Under Alternative C, an additional 10 turtles may be fitted with GPS tags, within a one year period. Tags would remain on for less than two years. The additional number of turtles tagged would result in a slightly greater magnitude of minor long-term adverse impacts to sea turtles.

4.1.9 Euthanizing Individual Sea Turtles

Humane euthanasia is only performed by a licensed veterinarian if he determines that an individual cannot survive or function in the wild. These animals are typically in extremely poor health and in a condition beyond treatment. Examples of such cases include animals severely afflicted with FP for which there is no cure, or animals with severe physical trauma beyond repair because of shark attack or boat strike. In such cases, euthanasia is performed for humane reasons and the animal is used for furthering scientific understanding of marine turtle disease and basic biology. The adverse impacts of humanely euthanizing sea turtles that are beyond treatment and incapable of surviving in the wild is negligible. These impacts are the same for the Proposed Action and Alternatives.

4.2 Impacts to the Environment

4.2.1 Impacts to Algae and Sea Grass Populations

Green turtles in Hawaii feed primarily on algae and, to a lesser degree, sea grass. Sampling algae and sea grass from foraging grounds is useful for studies such as diet, growth rates, and FP disease. Samples collected would amount to < 1 kg per 100 meter transect per day of study. Up to four transects are sampled per study day. Samples are collected in accordance with guidelines set forth by the State of Hawaii, Department of Land and Natural Resources, Hawaii Fishing Regulations. Algae samples are hand-clipped as required by the regulations, not taken by the holdfast, causing no adverse impact to any algal population. Algae found in green turtle diets can grow at least 10-12% per day, easily replacing any loss from collecting activities (Russell and Balazs 1994). Therefore, the direct adverse short-term impacts of collecting algae samples are minor and the indirect impacts are negligible. These impacts are the same for the Proposed Action and Alternatives.

4.2.2 Potential to Spread Invasive Species

A number of plant and animal species have previously become established on various islands in the NWHI. Alien species can have a profound effect on the native flora and fauna of the NWHI by outcompeting, preying on, and replacing native species, as well as providing habitat for non-native species, requiring large-scale efforts to eradicate these species, although with mixed results.

Strict procedures are used to minimize the potential introduction of alien species by research activities conducted at the remote field sites. All tents are placed and all work is done on the perimeter of the island, generally seaward of the vegetation zone. Stringent protocols are used to ensure that no species are introduced to the islands. These protocols include:

1. 48-hour freezing of all non-sensitive food and equipment,
2. Removal of all packaging materials which may harbor foreign plants or animals;
3. Packing all food, personal effects, and small equipment in plastic bags which are in turn placed in sterilized 5-gallon plastic buckets;
4. Packing all large equipment in either plastic cases or pallet tubs, all of which are fumigated prior to landing;

5. All soft gear (**e.g.,** daypacks, straps, nets, bags, bedding, tents, clothing, footwear) used at each field site is either new or has not been used at any other location; and no use of any fresh food item which either may become established (tomatoes, sunflower, mustard, or alfalfa seeds) or foods which may harbor molds or fungi will be used.

All quarantine and transport procedures between and among NWHI sites are stipulated as Special Rules and Conditions attendant to all permits issued by the Monument, and such procedures will therefore be followed as part of the action.

To prevent spreading invasive species or pathogens within the Main Hawaiian Islands, gear/equipment is not loaned to other projects and it is not used outside of the Main Hawaiian Islands. All gear is cleaned after each use to prevent transfer of organisms between sites.

Therefore, the direct and indirect impacts of invasive species resulting from the proposed action and alternatives are negligible.

4.2.3 Impacts of Nesting Research on Hawaiian Monk Seals

The MTRP has conducted nesting beach research on East Island at FFS every year since 1973. Two researchers are deployed to FFS during the peak of the nesting season, June and July, for approximately 6 weeks to count, tag, identify, measure, and sample nesting females. One person at a time camps at East Island to conduct the field research, while the other is stationed at Tern Island to perform data entry. The two researchers alternate shifts on East and Tern Islands approximately every 4 days. A series of full-season saturation surveys were conducted from 1988-1992, where complete coverage of the nesting season (approximately 120 days) at East Island was achieved (Wetherall et al. 1998). The saturation surveys provide detailed information on the nesting biology of Hawaiian green turtles and updated values for basic biological parameters. One factor that influenced MTRPs decision to minimize the sampling period of the green turtle nesting research season was the strain of staffing more people at FFS during the monk seal pupping season, which coincides with the green turtle nesting season. Since then, standard operating procedures (see Section 2.1.3.3) have been adopted to avoid and minimize disturbance to other species, especially monk seals, while conducting marine turtle research. Prior to deployment, each MTRP researcher must undergo training in standard operating procedures for avoiding impacts to monk seals during MTRP activities. Any sea turtle monitoring activities that would directly affect monk seals are aborted until it is clear to return at a later time.

Currently, monk seal field campers are stationed at FFS from May through September and use small boats to make daily transits between islands. While the majority of monk seal researchers do not actually camp on the islands, special situations have required camping at times. USFWS personnel and volunteers are present at FFS year round.

While the MTRP does not currently conduct marine turtle nesting research on other atolls in the NWHI, it has been done in the past and there may be a need to do it in the future. Monk seal researchers camp at each atoll in the NWHI from May through September and at certain atolls year round. If marine turtle researchers were to expand efforts beyond FFS, the same measures employed at FFS to minimize impacts on other species would be adopted for new locations.

Through the implementation of the standardized avoidance and minimization measures, the direct adverse short-term impacts to Hawaiian monk seals are minor and the indirect impacts are negligible. These impacts are the same for the Proposed Action and Alternatives.

4.2.4 Impacts of Nesting Research on the Physical Resources in the PMNM

The proposed action includes continuous nesting surveys on East Island at FFS for up to 45 days during the summer. East Island is a coral rubble island with no infrastructure and sparse vegetation. Each researcher spends approximately 4 days camping on the island during the nesting season, before rotating with a person stationed on Tern Island. The camping is rudimentary with no electricity or fire. Tern Island has permanent buildings (former Coast Guard barracks), solar panels, a reverse-osmosis water supply system, a runway, a septic system, a small-boat dock, and internet capabilities. Supplies (i.e., all food, water, and sundries) are ferried between Tern and East Islands on small boats. The small boat operators are trained to avoid the corals located between the islands, thereby avoiding direct adverse impacts with the reef. The small boats are maintained in good working order to avoid spills and breakdowns. The boats have the direct adverse impacts of emitting combustion pollutants in the air, but these emissions are negligible considering the small size of the boat engine, infrequent trips between islands, and lack of other emitters in the region. While camping on East Island in a tent, the researchers rely on imported food and collect all trash and other waste. After the nesting surveys are completed, all equipment and supplies are removed from East Island and either sent back to Honolulu or stored on Tern Island until the next season. Therefore, the direct and indirect impacts to the physical environment (i.e., air, water, and soil) are minimal because of the short-term presence on East Island, small-scale tent camping, and removal of all supplies upon completion. These impacts are the same for the Proposed Action and Alternatives.

4.2.5 Impacts on Seabirds

The proposed action will occur along the coast and in the ocean where seabirds will be encountered. However, the Proposed Action does not involve killing, capturing, or intentionally disturbing any seabirds. Seabirds may be indirectly adversely affected by sea turtle survey and capture activities that involve walking along a beach where seabirds are roosting. Surveys and stranding response activities will avoid seabird nests because seabirds generally nest on vegetation or on higher elevation ground where sea turtle do not nest and bask. Overall, these adverse impacts will be short-term, temporary, and negligible because any bird flushed by such activities would either return to the site after the researcher has passed, or the bird would occupy another section of beach. Surveys at FFS are much more likely to temporarily flush seabirds given that many thousands of seabirds breed on FFS each year. To a certain degree the seabirds at FFS have become accustomed to the presence of humans on FFS. Currently NMFS and USFWS staff occupy the island, and each year most birds are captured and tagged by USFWS biologist.

With Alternative B, wild live predatory birds (e.g., frigatebirds), would be captured and forced to regurgitate their crops. No more than 200 birds would be studied during the peak hatching period. After capture, birds will be released on site and mortality is not expected. Therefore the direct adverse short-term impacts to frigatebirds would be minor.

4.2.6 Impacts on Cultural Resources

Island and coastal communities in the U.S. Pacific region are intricately connected with the coral reef ecosystems that surround them. Much of the mythology, legends, and customs of native islanders encompass the surrounding marine environment as crucial components of life, especially sea turtles. Local coral reef resources provide food, cultural activities, subsistence, and revenue through artisanal, recreational, and commercial fisheries. Indigenous Pacific Island communities have a strong cultural and economic dependence on the marine environment. Traditional Hawaiian fishery management activities centered on strictly enforced social and cultural controls on fishing. These fishery management activities were based on time and area closures to keep fisheries from disturbing natural processes and habitats of food resources considered important. Recently, the cultural focus has been reinforced when the state of Hawaii supported the development of community-based subsistence fisheries areas in a few communities. Fisheries management plans have been prepared by these communities and are based on integrating traditional observational methods and modern scientific techniques. Traditional fishing activities are used to restore community values and stewardship while revitalizing a locally sanctioned code of fishing conduct.

Ancient Hawaiians developed a special relationship with the land and sea, which provided them with sustenance and recreation, molded their cultural values, and cultivated their deep connection to ecosystems. Fishing, gathering of ocean algae (*limu*), and subsistence use of ocean resources have been a traditional way of life for native Hawaiians. Fishes also provided the primary source of protein in the Hawaiian diet. The strict enforcement of traditional *kapu* system (forbidden or taboo) was an effective control to prevent overharvesting of ocean resources. *Kuleana* (responsibility), which interweaves honor and duty, describes the approach to Hawaiian resource management, and reinforces the idea of resource stewardship as opposed to resource management.

The longest recorded traditional Hawaiian chant, the *Kumulipo* (source of deep darkness) is a history of how all life forms came and evolved, beginning with the coral polyp as the building block of all life. This creation chant tells the story of Native Hawaiians' ancestral connection with the gods who created the coral polyps, the NWHI, which are seen as *kūpuna* (or respected elders), and everything else in the Hawaiian Archipelago, including Native Hawaiians. The symbolism of the union of earth mother, Papahānaumoku, and sky father, Wākea, is the foundation for the name of the Papahānaumokuākea Marine National Monument.

Punalu'u beach on the island of Hawaii has been an MTRP study location and is the setting for the most well known Hawaiian sea turtle legend (Balazs et al. 1994). As documented by Hawaiian historian Mary Kawena Pukui, in ancient time two sea turtles (honu-po'o-kea and honu-'ea) came to Punalu'u beach where the mother gave birth to an egg she buried in the sand. With her digging, the mother released a freshwater spring that is seen today. Later, the mother's egg hatched becoming the "turtle girl" named Kauila. Kauila the turtle was able to assume human form and play with local children, but would change into a turtle again before going back into the water. "Children used to catch fish and shrimp in the spring, and Kauila watched lest the little ones fall in. The people loved Kauila for this and because her spring gave them drinking water" (Handy et al. 1972). Local Hawaiians believe Kauila's presence can still be felt at Punalu'u today and that Kauila is the "mystical mother" of all Hawaiian sea turtles.

The MTRP research program recognizes the human cultural and the ecological importance of marine turtles and near-shore ecosystems to Pacific Island cultures. All MTRP personnel are briefed according to local cultural histories and practices to raise appropriate awareness and sensitivity. The MTRP works with the public and local volunteers to avoid and minimize any misconception of the research that the public may have. While these research and stranding response activities have minor short-term, temporary direct adverse impacts on individual sea turtles, the long-term beneficial effects of a greater scientific understanding of the species will contribute to their recovery and therefore be considered a moderate beneficial effect on this cultural resource.

4.3 Cumulative Impact Analysis

The Council on Environmental Quality (CEQ) defines cumulative effects as "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" (40 CFR 1508.7). The size of the Pacific Islands Regions is enormous – the U.S. Exclusive Economic Zone within the Pacific Islands Region covers approximately 1.5 million square nautical miles. While the proposed action includes research, stranding response, and technical collaboration within this entire region, each activity is implemented on a small-scale (e.g., only a few researchers at any one time capturing and measuring a single sea turtle) and for a short time period (e.g., a stranding response may take a couple of hours). Over the last 38 years the MTRP, in conjunction with its collaborators, has witnessed a moderate long-term beneficial impact of the program on green sea turtles as documented by the steady increase in their population in the Hawaiian Archipelago. Still, the five federally listed sea turtle species have not met their recovery goals.

4.3.1 Impacts of Past Actions within the Scope of Analysis

The first human inhabitants of the Hawaiian Islands were Polynesian explorers more than 1,500 years ago. When Captain James Cook arrived in Hawaii in 1778 several hundred thousand Hawaiians lived in the MHI. At that time, the NWHI were unpopulated (Cleghorn 1988). However, prior to Cook's arrival, the islands of Nihoa and Mokumanamana in the NWHI were visited by people from the MHI. Most notably, people sailed frequently between communities located on Niihau, Kauai, and Nihoa Islands (PMNM 2008). It is believed that Nihoa supported a permanent population for several hundred years as evidenced by archeological sites that include substantial habitation sites and agricultural terraces (Cleghorn 1988). Meanwhile, Mokumanamana was believed to be only temporarily inhabited for cultural and religious purposes (Cleghorn 1988). Both islands contain many religious structures such as heiau (places of worship) and platform foundations with upright stones that mark the important journey of the sun through the seasons (PMNM 2008). Nihoa and Mokumanamana Islands also provided valuable natural resources such as birds, bird eggs, loulu palm wood, makiukiu grass, and fish (PMNM 2008).

Since their discovery, the shallow coral atolls of the NWHI have been the sites for many shipwrecks (PMNM 2008). Often stranded sailors slaughtered and ate green sea turtles and Hawaiian monk seals to survive. The first shipwreck on FFS was in 1786. Other early inhabitants of the atoll included feather hunters, sealers, whalers, guano miners, and fishermen. More recently East Island, and then Tern Island, was home to a Coast Guard long-range navigation transmission (LORAN) station. A runway was constructed on Tern Island by the Navy in 1940. After the Navy's departure, the runway was used to transport sea turtles to market. Sea turtles were actively harvested for their meat and shells until 1978 when they were listed on the Endangered Species List. Since 1978 the number of nesting female green sea turtles at FFS has continued to increase (Figure 4).

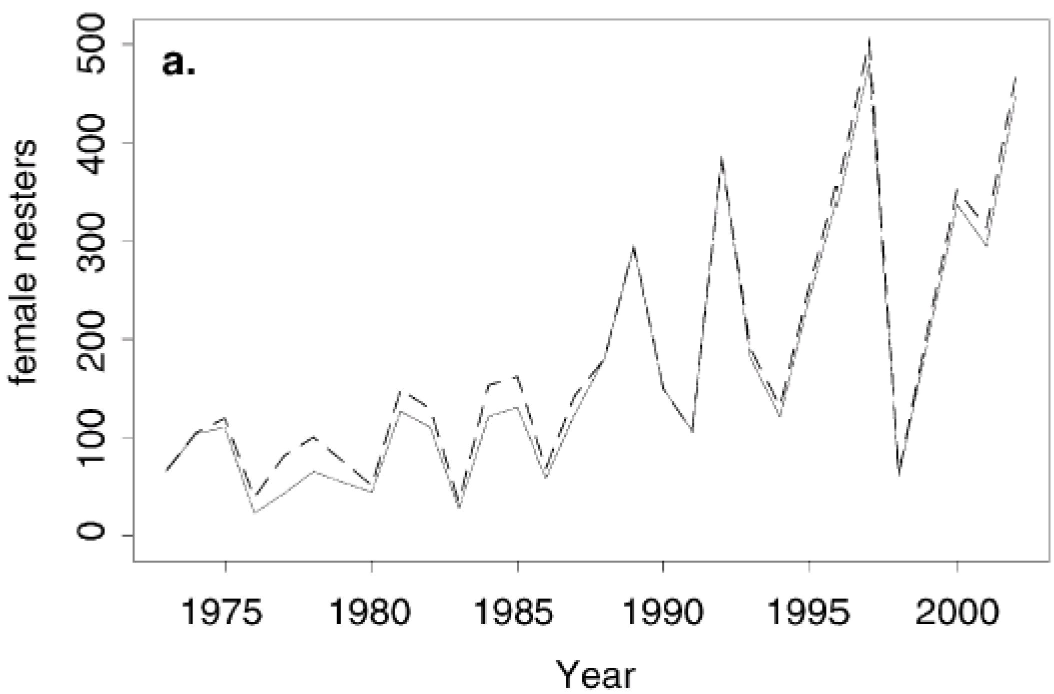

Figure 4. Trends in French Frigate Shoals Green Turtle Nester Abundance (from Balazs and Chaloupka 2004).

These data document the steady increase in the green sea turtle population. The MTRP has conducted nesting surveys on East Island at FFS for 38 consecutive years and provides a critical index of abundance for the Hawaiian green turtle stock. New turtles are tagged, measured, and sampled (i.e., tissues are taken for genetic analysis and health assessments such as FP tumors), and tags of previously tagged turtles are recorded. Research on the MHI has similarly captured, tagged, measured and sampled thousands of green sea turtles in the MHI (Figure 5).

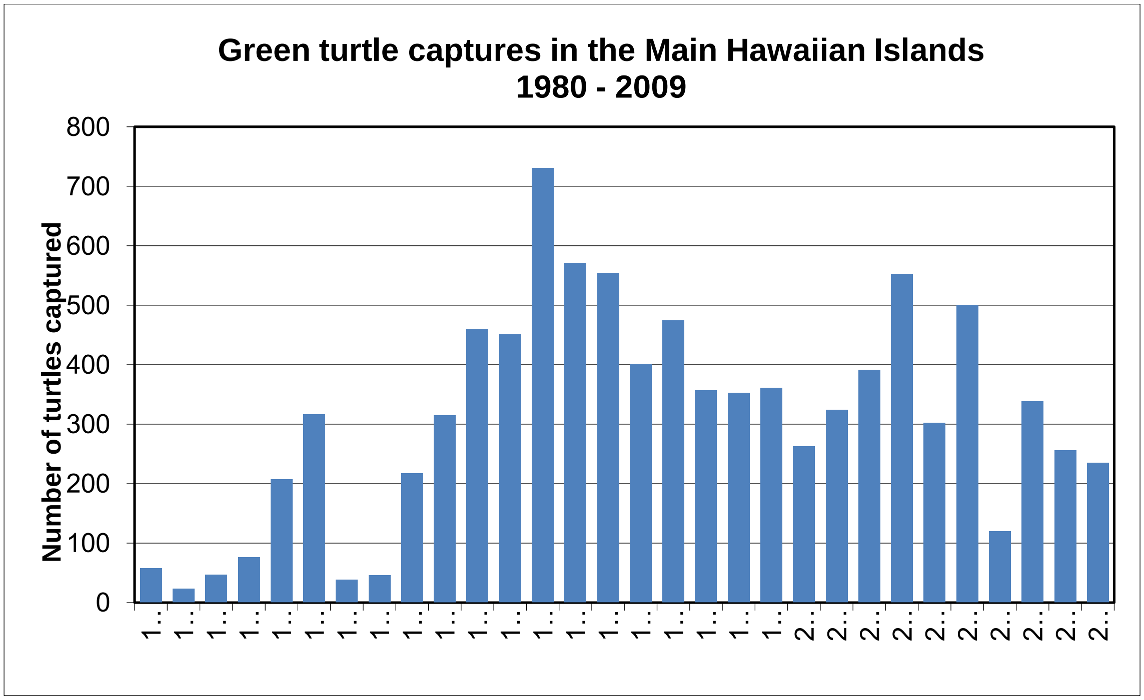

Figure 5. Number of green sea turtle captured during the year (some caught more than once per year).

As a complement to the nesting, foraging, and resting habitat research surveys, the MTRP has responded to sick, injured, and dead sea turtle strandings in the Hawaiian Archipelago. From 1982 through February 2006, the MTRP collected information from 4,451 stranded turtles. Of these individuals, 135 (3 %) were previously tagged by the MTRP. The most common cause of mortality among tagged turtles was FP (21%). Recent trends in the diversity and abundance of sea turtles cared for in the stranding response program is shown in Table 4. Green turtles make up the largest proportion of strandings in Hawaii, with only incidental strandings of hawksbill, olive ridley, loggerhead, and leatherback turtles, which is assumed to be representative of their presence.

Table 4. The number and species of sea turtles stranded in the Hawaiian Islands.

Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Green turtle	260	250	269	274	263	288	256	267	237	245
Hawksbill	5	4	5	3	4	7	6	9	6	5
Olive ridley	6	0	1	4	3	0	1	1	1	0
Loggerhead	1	0	0	0	1	0	0	0	0	0
Total	271	254	275	281	270	295	263	277	244	250

4.3.2 Impacts of Present Actions within the Scope of Analysis

PIFSC currently conducts a number of research projects in the Pacific Islands Region. The research is divided over several disciplines including oceanography, fisheries, coral reefs, marine mammals, and sea turtles. Given the long-distance migrations of many pelagic species, and the vital ecological and commercial role that marine resources serve, the PIFSC works with a number of local (e.g., fisherman, universities), national (e.g., U.S. Fish and Wildlife Service), and international (e.g., foreign educational institutes) collaborators.

PIFSC oceanographic research spans the Pacific Islands Region and includes both insular and pelagic habitat and ecological research. Oceanographic data collection generally involves measuring ocean and atmospheric variables using several different platforms. Ship-based instruments, such as CTD systems and echosounders, are used to measure ocean conditions ranging from temperature to micronekton density. Submersibles and remotely operated vehicles are used to collect data in remote parts of the Pacific Ocean. The majority of oceanographic research has negligible direct impact on marine resources because it conducted using remote sensing technology. The collection of small amounts of ocean water, such as samples used to study plankton, have minimal, localized, and only temporary adverse impacts on the ocean and negligible impacts on sea turtles.

PIFSC fisheries research involves collecting and analyzing data on the regional fisheries. Data are collected from the log books of fishing vessels, during targeted fishing surveys, and through socio-economic studies of the fishing industry. One of these programs specifically measures the bycatch of sea turtles, seabirds, and marine mammals in the regional fisheries and identifies methods to minimize this incidental capture. These bycatch reduction efforts have a small though beneficial effect on the environment in general and sea turtles in particular. The largest potential for direct and indirect adverse impacts to the environment is from the active fishing data collection component. However, these fishing activities are conducted infrequently, on a very limited scale, and targeted to the species being studied thereby resulting in only short-term temporary adverse impacts to marine resources. The potential direct and indirect adverse impacts of the fisheries research on sea turtles is negligible.

PIFSC coral reef research focuses on long-term ecological monitoring surveys, biodiversity research, and marine debris removal. These activities occur across the Pacific Islands Region. Surveys are conducted from research ships using echosounders, autonomous underwater vehicles, and cameras, or underwater by SCUBA divers and snorkelers. In general, research cruises range for couple days to couple months in length, and occur a few times per year. A number of instruments are also temporarily deployed on the ocean floor to remotely study coral reef communities and ecological processes. These include: ecological acoustic recorders, autonomous reef monitoring structures, calcification acidification units, acoustic Doppler current profilers, wave and tide recorders, ocean data platforms, and transect markers. These instruments may be temporarily secured to the substrate using metal stakes or heavy weights. During monitoring surveys voucher specimens of algae, invertebrates, substrate, fish, and coral are collected for identification and genetic analysis. The voucher samples are collected on a small scale and represent a fraction of the biomass being studied. Occasionally, cores of corals are collected and analyzed using computed tomography (CT or CAT) scans. These cores are only taken from massive corals by skilled biologist to analyze growth patterns to minimize impacts. Marine debris removal has a short-term adverse on coral reefs because pieces of the reef may be broken when derelict fishing nets and fishing line are removed, however there is long-term beneficial effect on the coral reefs and marine life after the debris is removed from the ecosystem. Sea turtles may be encountered during the monitoring surveys, but the direct and indirect adverse impacts of coral reef research on sea turtles will be negligible.

PIFSC marine mammal research focuses on cetaceans (i.e., whales and dolphins) of the central and western Pacific Ocean, as well as Hawaiian monk seals in the Hawaiian Archipelago. Cetacean abundance and distribution surveys are conducted aboard ships and boats using visual and acoustic scan. Passive acoustic surveys of cetaceans are conducted by temporarily deploying a high-frequency acoustic recording package on the ocean floor. Genetic samples are episodically collected by taking a small piece of skin without long-term harm to the animal. The Hawaiian monk seal research includes field camps in the NWHI and surveys in the MHI. Sea turtles have been and will be encountered during the marine mammal monitoring surveys. These encounters result in no greater than short-term disturbance and it is unlikely the research will have any long-term or indirect adverse affects to sea turtles because the biologist are trained to minimize interactions with sea turtles.

The U.S. Fish and Wildlife Service and State of Hawaii, Department of Land and Natural Resources, also staff field camps in the NWHI to collect ecological data and conduct other management activities. The U.S. Fish and Wildlife Service works on FFS, Midway Atoll, and Laysan Island in conjunction with NMFS. The focus of USFWS research is seabirds, while the focus of their ecological restoration is the revegetation of native plant communities. Seabirds are a natural predator of recently hatch sea turtles. The State activities are based on Kure Atoll and they work with both the USFWS and NMFS to collect ecological data, conduct revegetation activities, and remove marine debris. These activities in the NWHI are regulated by the Papahanaumokuakea Marine National Monument. Access to the Monument and each research site is by ship, small boat, or airplane (i.e., to runways located on Tern Island at FFS and on Sand Island at Midway Atoll). The principle ships used as a platform for the research are NOAA research vessels Oscar Elton Sette and Hi’ialakai. Occasionally chartered ships are used to conduct the necessary support trips. Small boats (approximately 20 feet in length) transport people and gear from the ships at sea to the islands when there are not dock facilities. Each NOAA ship spends approximately 100 days per year in the PMNM. The diesel-powered ships operate as efficiently as possible (i.e., drives directly from point to point) to minimize fuel consumption because supplies are limited in this remote area. Consequently, the amount of diesel air pollution (e.g., NOx, SOx, particulate matter) is negligible, especially considering the vast size of the Pacific Ocean and lack of other air pollution emitters in the island region. Furthermore, the State of Hawaii is considered to have one of the best air quality records in the nation, with criteria pollutant levels below state and federal ambient air quality standards (Hawaii 2007). The contribution of these few research ships to greenhouse gas emissions is negligible relative to other emitters. Given that the ships rarely anchor when stopped to conduct small boat operations (e.g., on- and off-loading supplies), impacts to coral reef habitat is avoided. The ships are equipped with Type 2 marine sanitation device wastewater treatment systems. To minimize the short-term adverse impacts to water quality, treated wastewater is discharged outside of Special Preservation Areas and Special Management Areas (PMNM 2008). These direct adverse impacts to water quality are negligible considering the relatively small size of the ships, limited number of sea days, and volume of water in the Pacific Ocean. The number of ship days in the MHI is small fraction of the commercial and recreation shipping industry ship days.   The ships are relatively slow, cruising at less than 10 knots. The small boats similarly operate at slow speeds and are required to look for sea turtles swimming in their path so that they can be avoided. There are approximately 70 flights into the Monument per year by airplane. Researchers that live on each island for one to six month periods are required to abide by strict conditions. All food and most of the water is imported. The remaining water is generated by reverse-osmosis. The researchers burn a limited supply amount of propane to cook and generate electricity. The direct and indirect adverse impacts of non-MTRP research activities in the NWHI on sea turtles is minor.

Within the Pacific Ocean a number of other public and private organizations also conduct sea turtle research under the jurisdiction of NMFS. A review of the NMFS Authorizations and Permits for Protected Species (APPS) website (accessed May 11, 2011, last updated February 2, 2011) identified a total of eight permits (Table 5). Stretching approximately 6,000 miles from CNMI to California, these permits cover all five listed sea turtle species.

Table 5. NMFS APPS active listed sea turtle research permits in the Pacific Ocean.

File Number	Project Title	Organization	Location	Expiration	Species
10027	Research in the Palmyra Atoll National Wildlife Refuge	American Museum of Natural History	Palmyra Atoll	7/31/2013	Green and hawksbill sea turtles
14097	NMFS SWFSC pinniped, cetacean, and sea turtle studies	SWFSC	North Pacific Ocean	6/30/2015	Green, hawksbill, leatherback, loggerhead, and olive ridley sea turtle
14381	Sampling sea turtle bycatch in the Hawaiian longline fisheries	PIRO	Hawaiian and American Samoa longline fishery	3/1/2015	Green, hawksbill, leatherback, loggerhead, and olive ridley sea turtle
14510	Scientific research in Sam Gabriel River and Los Alamitos Bay, CA; strandings; and power plant entrainments	SWFSC	Coastal California	4/30/2015	Green, hawksbill, leatherback, loggerhead, and olive ridley sea turtle
1556	Scientific Research	CNMI	Saipan, Tinian, and Rota	6/1/2011	Green and hawksbill sea turtles
1581	Scientific Research	PIFSC	Hawaiian Islands	12/31/2011	Green and hawksbill sea turtles
1591	Scientific Research	SWFSC	San Diego Bay, CA	10/31/2011	Green, loggerhead, and olive ridley sea turtle
1596	Scientific Research	SWFSC	Pacific Ocean	2/1/2012	Leatherback sea turtle

Non-research activities within the Pacific Islands Region that occur in vicinity of the Proposed action range from commercial fisheries, to trans-Pacific commercial shipping, to recreational activities such as fishing, boating, and snorkeling. In particular, the incidental capture (i.e., bycatch) and mortality of sea turtles in commercial fisheries has been well documented (Lewison and Crowder 2007). Sea turtles are either caught directly in fishing gear by hooks or in nets (both gillnets and trawlnets), or indirectly in derelict fishing gear floating in the ocean. Commercial fisheries in the Pacific Ocean for highly migratory species (e.g., tunas and billfish) are managed by the Western and Central Pacific Fisheries Commission because they cross international boundaries. Commercial domestic fisheries (i.e., fisheries within the U.S. Exclusive Economic Zone) are managed by the NMFS Pacific Islands Regional Office and Western Pacific Regional Fisheries Management Council. Historically, fisheries in the Western Pacific Region were managed with species-specific Fishery Management Plans (FMP) (i.e., Pelagics, Bottomfish and Seamount Groundfish, Crustaceans, Precious Corals, and Coral Reefs), but beginning in 2010 are being managed under Fishery Ecosystem Plans (FEP) (WPRFMC 2009). These FEPs include: the Hawaii Archipelago, American Samoa Archipelago, Mariana Archipelago, Pacific Remote Islands Areas, and the Pacific Pelagic. These FEP are intended to accomplish the objectives of the Magnuson-Stevens Act through the incorporation of ecosystem science and principles. Furthermore, each of these organizations has implemented measure to reduce the bycatch of sea turtles. For example, in Hawaii sea turtle bycatch was reduced in the longline swordfish fishery by replacing traditional J-hooks with circle, and squid bait with fish bait, while maintaining target species catch rates (Gilman et al. 2007). Furthermore, the WPRFMC has banned the use of drift gillnets and increased the number of trained observers on fishing boats. PIFSC and PIRO also actively search for and remove marine debris from within the Pacific Islands Region. Together, these management activities and the MTRP stranding response program have reduced the unintentional mortality of sea turtle compared with historical levels.

4.3.3 Reasonably Foreseeable Actions in Scope of Analysis

This level of PIFSC research will likely continue into the near future given the existing statutory requirements and Executive Orders for fisheries, coral reefs, marine mammals, and sea turtles. It is also anticipated that the same non-federal actions will continue into the future. No information is available to suggest these actions will change substantially in the reasonably foreseeable future that would be related to sea turtles.

5 Environmental Permits and Regulatory Requirements

MTRP activities conducted within the land and waters in the jurisdictions of marine protected areas, marine national monuments, wildlife refuges, or areas managed by federal, state, or local agencies will be conducted under established scientific research and collection permits issued by the responsible managing agencies. These include:

5.1 Activities in the United States, the U.S. Insular Areas, or upon the high seas

5.1.1 Endangered Species Act

Research that would "take" (i.e., harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct) a federally threatened or endangered species for scientific purposes or to enhance the propagation or survival of listed species:

- <u>Section 10(a)(1)(A) Permit</u> from NMFS or USFWS.

  The NMFS Protected Resources Division issued a Section 10(a)(1)(A) permit to the MTRP on December 13, 2006. The permit includes water-based activities for green and hawksbill sea turtles and is valid until December 31, 2011, (renewed every 5 years). The USFWS issued a Section 10(a)(1)(A) take permit (TE739350-4) for hawksbill sea turtles on December 4, 2007. The permit is valid until December 4, 2011. The USFWS confirmed on May 26, 2011 that the take of green sea turtles on land (i.e., nesting surveys) in the State of Hawaii is covered by the exceptions to prohibitions relating to threatened sea turtles for research or conservation (50 CFR 223.206(a)(2)(c) and 50 CRF 17.31(b)).

Any federal action that may affect a federally listed threatened or endangered species or its designated critical habitat:

- <u>Section 7 Consultation</u> with the National Marine Fisheries Service or U.S. Fish and Wildlife Service. An action that may adversely affect a listed species requires formal consultation, which concludes with a biological opinion (BO; states the opinion of the Service as to whether or not the Federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat). A BO may include an incidental take statement for an otherwise legal action.

  Critical habitat has not been designated for any of the five sea turtles within the boundary of the proposed action. The MTRP has established (in cooperation with the Hawaiian monk seal research program at PIFSC) and implements standard practices to avoid harassing or taking Hawaiian monk seals. On June 13, 2011, NMFS PIRO concurred with the MTRP determination that that the annual nesting survey at FFS is not likely to adversely affect the Hawaiian monk seal or its designated critical habitat.

The proposed action would not be located near the federally listed Nihoa finch, Nihoa millerbird, or Laysan finch, therefore would not affect these species.

5.1.2 Animal Welfare Act

Research that would use live marine mammals or sea turtles may require a:

- Approved Protocol and Assurance from the Animal Care and Use Committee (IACUC).

The MTRP has an approved IACUC protocol dated July 1, 2010 (renewed annually).

5.1.3 Marine Mammal Protection Act

Research that would "take" (i.e., harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal) an ESA-listed marine mammal or involve Level A Harassment (i.e., has the potential to injure a marine mammal or marine mammal stock in the wild) of a non-ESA-listed marine mammal for scientific or enhancement purposes:

- Scientific Research and Enhancement Permit from the NMFS.

Research that would involve Level B Harassment (i.e., has the potential to disturb a 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) of a non-ESA-listed marine mammal:

- General Authorization from the NMFS.

For maritime activities that may result in the incidental take of a marine mammal:

- Incidental Take Authorization or Letter of Authorization (LOA) from NMFS.

For maritime activities that may incidentally take small numbers of marine mammals by harassment (i.e., any act of pursuit, torment, or annoyance).

- Incidental Harassment Authorization (IHA) from NMFS.

The MTRP has established (in cooperation with the Hawaiian monk seal research program at PIFSC) and implements standard practices to avoid harassing or taking Hawaiian monk seals.

5.1.4 Migratory Bird Treaty Act

Research that would take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter any migratory bird, or the parts, nests, eggs, or product.

- Scientific Collecting Permit from USFWS.

The proposed action would not, nor attempt to, take or possess any migratory birds or products. Under Alternative B, a scientific collecting permit would be necessary to capture frigatebirds.

5.1.5 Magnuson-Stevens Fishery Conservation and Management Act

Research that may adversely affect Essential Fish Habitat (EFH) in the U.S. Exclusive Economic Zone requires consultation with NMFS. EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH has been designated for the Pelagics, Bottomfish and Seamount Groundfish, Crustaceans, Precious Corals, and Coral Reef Ecosystems Management Unit Species. Within the Pacific Islands Region, this designated EFH includes the water column down to 1,000 meters and other specific habitats within that range.

- <u>EFH Conservation Recommendations</u> from NMFS.

  The proposed action would not adversely affect EFH because it only involves short-term temporary data collection activities in the Pacific Ocean.

5.1.6 Clean Water Act

Research that involves discharging dredged or fill material (e.g., placing rock or concrete) into waters of the U.S. may require a:

- <u>Section 404 permit</u> from the U.S. Army Corps of Engineers.

  The proposed action would not discharge dredged of fill material into waters of the United States.

5.1.7 River and Harbor Act

Research that involves work (e.g., placing equipment on the sea floor or in the water column) that could affect navigation, or the construction or maintenance of structures such as any permanent mooring structure may require a:

- <u>Section 10 permit</u> from the U.S. Army Corps of Engineers.

  The proposed action would not involve work or structures in navigable waters of the United States.

5.1.8 Papahānaumokuākea Marine National Monument (PMNM)

All activities within the PMNM require a permit and must be categorized under one of six permit types: research, education, conservation and management, Native Hawaiian practice, special ocean use, and recreational (Midway only). Research within the PMNM may require a:

- <u>Research, or Conservation and Management Permit</u> issued by Co-Trustees of the PMNM.

The proposed action has been included as part of the annual Conservation and Management Permit.

5.2 Activities in the Hawaiian Islands

5.2.1 Hawaii Revised Statutes and Administrative Rules

Research in Hawaii state waters that collects aquatic life or uses certain fishing gear and methods may require a:

- Special Activity Permit from Hawaii Department of Land and Natural Resources, Division of Aquatic Resources.

  The MTRP has received a Special Activity Permit No. 2011-03 for scientific activities on sea turtles in state waters through June 30, 2011, (renewed annually), per Hawaii Revised Statute 187A-6.

6 List of Agencies and Persons Consulted

6.1 Federal Agencies

6.1.1 National Oceanic and Atmospheric Administration

- Ms. Patty Miller, HIHWNMS, Maui: Coordinates volunteers for stranding response on Maui.
- Mr. Justin Vizbeicke, HIHWNMS, Kona: Coordinates volunteers and provides stranding response in Kona.

6.1.2 U.S. Geological Survey

- Dr. Thierry Work: Veterinarian, Wildlife Disease Specialist; conducts necropsies, performs euthanasia, participates in ocean capture research.

6.1.3 U.S. Fish and Wildlife Service

- Ms. Susan White, PMNM, Mr. Mike Silbernagle and Mr. David Ellis, James Campbell NWR, and Ms. Glynnis Nakai, Maui: All are involved in the coordination of nesting research activities in either the NWHI or MHI.

6.1.4 National Park Service

- Ms. Sallie Beavers, Kaloko-Honokohau National Historic Park: Long-term collaborator in ocean capture research.
- Mr. Will Seitz, Hawaii Volcanoes National Park: Manages Hawksbill nesting beach project on the Big Island. Provides MTRP with biological samples from nest remains and strandings.

6.2 State Agencies

6.2.1 State of Hawaii

- Mr. Alton Miyasaki, Department of Land and Natural Resources, Division of Aquatic Resources (DAR), Oahu: Provides assistance with State of Hawaii permitting.
- Mr. Skippy Hau, DAR, Maui: Strandings and nesting beach research on Maui.
- Mr. Don Heacock, DAR, Kauai: Strandings and nesting beach research on Kauai.
- Mr. John Coney and Dr. Jason Turner, University of Hawaii (UH) at Hilo: Big Island stranding response.
- Mr. Jeffrey Kuwabara, UH at Manoa, Marine Option Program: Coordinates student employees for after hours, weekend, and holiday stranding response on Oahu.
- Ms. Donna Brown, UH, Maui College, Marine Option Program: Coordinates student employees for stranding response on Maui.

6.3 Non-governmental Agencies

6.3.1 Local

- Mr. Alan Hong, Hanuama Bay, Manager: Collaborator on ocean capture research.

- Mr. Jeffrey Pawlowski, Sea Life Park Hawaii: Collaborator on research related to captive-bred and reared green turtles.
- Ms. Joanne Pettigrew, Malama na Honu (MnH): Non-profit group providing education outreach at Laniakea Beach on Oahu's north shore.
- Mr. Marc Rice, Hawaii Preparatory Academy: Long-term collaborator on ocean capture research and responds to strandings north of Kona.
- Dr. David Hyrenbach, Hawaii Pacific University: Collaborator on ocean capture research.
- Dr. Robert Morris, DVM: Contract veterinarian, provides veterinary care/treatment for sick or injured marine turtles.

7 List of Preparers

Stacy Hargrove, M.Sc.
Marine Turtle Research Program
NOAA Research Biologist
NMFS, PIFSC

George Balazs, M.Sc.
Marine Turtle Research Program
NOAA Research Biologist
NMFS, PIFSC

Tyler Bogardus, B.S.
Marine Turtle Research Program
JIMAR Research Associate
NMFS, PIFSC

Matthew Vandersande, D.Env.
Director's Office
NEPA and Permits Coordinator
NMFS, PIFSC

Judith Lee, M.Sc.
President, Senior Analyst
Environmental Planning Strategies, Inc.
Davenport, IA

8 References

Aguirre, A.A., G.H. Balazs, T.R. Spraker, T.S. Gross. 1995. Adrenal and hematological responses to stress in juvenile green turtles (*Chelonia mydas*) with and without fibropapillomas. Physiol. Zool. 68(5):831-854.

Antonelis, G.A., J.D. Baker, T.C. Johanos, R.C. Braun, and A.L. Harting. 2006. Hawaiian monk seal (*Monachus schauinslandi*): Status and conservation issues. Atoll Research Bulletin. 543:75-101.

Baker, J.D., C.L. Littnan, and D.W. Johnston. 2006. Potential effects of sea level rise on the terrestrial habitats of endangered and endemic megafauna in the Northwestern Hawaiian Islands. Endangered Species Research 4:1-10.

Balazs, G.H. 1976. Green turtle migrations in the Hawaiian Archipelago. J. Biol. Conser. 9:125-140.

Balazs, G.H. 1992. Innovative techniques to facilitate field studies of the green turtle, *Chelonia mydas*. In: Proc. 12th Annual Workshop on Sea Turtle Biology and Conservation. 25-29 February 1992, Jekyll Island, GA. NOAA Technical Memorandum NMFS-SEFSC-361. pp.158-161.

Balazs, G.H. 1996. Behavioral changes within the recovering Hawaiian green turtle population. *In:* J.A. Keinath, D.E. Barnard, J.A. Musick, and B.A. Bell (comps.), Proceedings of the Fifteenth Annual Symposium on Sea Turtle Biology and Conservation, February 20-25, 1995, Hilton Head, South Carolina, p. 16-21. U.S. Dept. Commerce NOAA Tech. Memo. NMFS-SEFSC-387.

Balazs, G.H. Factors to Consider in the Tagging of Sea Turtles. 1999. *In:* Eckert, K.L, K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly (Eds). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Balazs, G.H. and M. Chaloupka. 2004a. Thirty-year recovery trend in the once depleted Hawaiian green sea turtle stock. Biological Conservation. 117(2004):491-498.

Balazs, G.H. and M. Chaloupka. 2004b. Spatial and temporal variability in somatic growth of green sea turtles (Chelonia mydas) resident in the Hawaiian Archipelago. Mar. Biol. 145:1043-1059.

Balazs, G.H. and M. Chaloupka. 2006. Recovery trend over 32 years at the Hawaiian green sea turtle rookery of French Frigate Shoals. Atoll Research Bulletin 543:147-158.

Balazs, G.H. and D.M. Ellis. 2000. Satellite telemetry of migrant male and female green turtles breeding in the Hawaiian Islands. *In:* F.A. Abreu-Grobois, R. Briseno-Duenas, R. Marquez-Millan, and L. Sarti0martinez (comps.), 16th Symp. Proc. Addendum in the Proc. Of the 18th International Sea Turtle Symposium, March 3-7, 1998, Mazatlan, Sinaloa, Mexico, p. 281-283. US Dept. of Commerce, NOAA Tech. Memop. NMFS-SEFSC-436.

Balazs, G.H., R.G. Forsyth, A.K.H. Kam. 1987. Preliminary assessment of the habitat utilization by Hawaiian green turtles in their resident foraging pastures. NOAA Technical Memorandum NMFS-SWFSC. 71:1-107.

Balazs, G.H.,W.C. Dudley, L.E. Hallacher, J.P. Coney, and S.K. Koga. 1994. Ecology and cultural significance of sea turtles at Punalu'u, Hawaii. *In:* Bjorndal KA, Bolten AB, Johnson DA, Eliazar PJ (comps). Proc. 14th Ann. Symp. on Sea Turtle Biology and Conservation, March 1-5, 1994, Hilton Head, South Carolina, p. 10-13. U.S. Dept. Commerce, NOAA Tech. Memo. NOAA-TM-NMFS-SEFSC-351, 306 p.

Balazs, G.H., R.K. Miya, S.C. Beaver. 1996. Procedures to Attach a Satellite Transmitter to the Carapace of an Adult Green Turtle, *Chelonia mydas*. In: J.A. Keinath, D.E. Barnard, J.A. Musick, and B.A. Bell (compilers). Proc. 15th Annual Symp on Sea Turtle Biology and Conservation, Hilton Head, SC. NOAA Technical Memorandum NMFS-SEFSC-387. pp.21-26.

Balazs, G.H., W. Puleloa, E. Medeiros, S.K.K. Murakawa, D.M. Ellis. 1998. Growth Rates and Incidence of fibropapillomatosis in Hawaiian Green Turtles Utilizing Coastal Foraging Pastures at Pala'au, Moloka'i. In: Epperly, S.P., J. Braun, Eds. Proc. 17th Ann. Symp. Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-415, pp.131-132.

Bolten, A.B. 1999. Techniques for Measuring Sea Turtles. *In:* Eckert, K.L, K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly (Editors). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Bowen, B.W., A.B. Meylan, J.P. Ross, C.J. Limpus, G.H. Balazs, J.C. Avise. 1992. Global population structure and natural history of the green turtle (*Chelonia mydas*) in terms of matriarchal phylogeny. Evolution. 46(4):865-881.

Bowen, B.W., F.A. Abreugrobois, G.H. Balazs, N. Kamezaki, C.J. Limpus, and R.J. Ferl. 1995. Trans-Pacific migrations of the loggerhead turtle (*Caretta Caretta*) demonstrated with mitochondrial-DNA markers. Proceedings of the National Academy of Sciences of the United States of America 92:3731–3734.

Boyle, M.C. N.N. FitzSimmons, C.J. Limpus, S. Kelez, X. Velez-Zuazo, and M. Waycott. 2009. Evidence for transoceanic migrations by loggerhead sea turtles in the southern Pacific Ocean. Proc. Royal Soc. B. 276:1993-1999.

Chaloupka, M. and G.H. Balazs. 2007. Using Bayesian state-space modelling to assess the recovery and harvest potential of the Hawaiian green sea turtle stock. Ecological Modelling; 2007, v. 205, no. 1-2, pp. 93-109.

Chaloupka, M, K.A. Bjorndal, G.H. Balazs, A.B. Bolten, L.M. Ehrhart, C.J. Limpus, H. Suganuma, S. Troeng, and M. Yamaguchi. 2008a. Encouraging outlook for recovery of a once severely exploited marine megaherbivore. Global Ecol. Biogeogr. 17(2):297-304.

Chaloupka, M., T.M. Work, G.H. Balazs, S.K.K. Murakawa, and R. Morris. 2008b. Cause-specific temporal and spatial trends in green sea turtle strandings in the Hawaiian Archipelago (1982-2003). Marine Biology 154(5):887-898.

Chaloupka, M., N. Kamezaki, and C.J. Limpus. 2008c. Is climate change affecting the population dynamics of the endangered Pacific loggerhead sea turtle? Journal of Experimental Marine Biology and Ecology 2008, v. 356, p.136-143.

Chaloupka, M., G.H. Balazs, and T.M. Work. 2009. Rise and fall over 26 years of a marine epizootic in Hawaiian green sea turtles. Journal of Wildlife Diseases 45(4): 1138-1142.

Cleghorn, P.L. 1988. The settlement and abandonment of two Hawaiian outposts: Nihoa and Necker Islands. Bishop Museum Occasional Papers 28: 35-49.

Dutton, P.H. and G.H. Balazs. 1996. Simple Biopsy Techniques for Sampling Skin for DNA Analysis of Sea Turtles. In: J.A. Keinath, D.E. Barnard, J.A. Musick, and B.A. Bell (compilers). Proc. 15th Annual Symp on Sea Turtle Biology and Conservation, Hilton Head, SC. NOAA Technical Memorandum NMFS-SEFSC-387. p.78-79.

Dutton, P.H., G.H. Balazs, R.A. LeRoux, S.K.K. Murakawa, P. Zarate, and L.S. Martinez. 2008. Composition of Hawaiian green turtle foraging aggregations: mtDNA evidence for a distinct regional population. Endangered Species Research 5(1): 37-44.

Eckert, K.L., K.A. Bjorndal, F.A. Abreu-Grobois, M. Donelly (Editors). 1999. Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4. 235pp.

Ehrhart, L.M. and L.H. Ogren. 1999. Studies in Foraging Habitats: Capturing and Handling Turtles. *In:* Eckert, K.L, K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly (Eds). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Forbes, G.A. 1999. Diet Sampling and Diet Component Analysis in Research and Management Techniques for the Conservation of Sea Turtles. K.L. Eckert, K.A. Bjourndal, F.A. Abreu-Grobois and M. Donnelly (editors). IUCN/SSC Marine Turtle Specialist Group Publication No. 4. 235 pp.; 1999, p. 144-148.

Forbes, G. and C. Limpus. 1993. A non-lethal method for retrieving stomach contents from sea turtles. Wildlife Research. 20:339–343.

Friedlander, A., G. Aeby, R. Brainard, A. Clark, E. DeMartini, S. Godwin, J. Kenyon, J. Maragos, R. Kosaki, and P. Vroom. 2005. The Status of the Coral Reefs of the Northwest Hawaiian Islands. *In:* J. E. Waddell (ed.). *The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States*: *2005*, pp.270-311. NOAA Technical Memorandum NOS NCCOS 11. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biography Team. Silver Spring, MD.

Friedlander, A., and E. DeMartini. 2002. "Contrasts in density, size, and biomass of reef fishes between the northwestern and main Hawaiian Islands: the effects of fishing down apex predators." Mar. Ecol. Prog. Ser., 230: 253-264.

Gilman, E., D. Kobayashi, T. Swenarton, N. Brothers, P.Dalzell, and I. Kinan-Kelly. 2007. Reducing sea turtle interactions in the Hawaii-based longline swordfish fishery. Biological Conservation 139:19-28.

Gyuris, E. 1994. The rate of predation by fishes on hatchlings of the green turtle (*Chelonia mydas*). Coral Reefs. 13:137-144.

Handy, E.G. 1972. Native planters in old Hawaii: Their life, lore, and environment. Bishop Museum Press.

Hawaii, State of. 2007. Hawaii Air Quality Data Book. Department of Health, Clean Air Branch. Pp. 45.

Howell, E.A., D.R. Kobayashi, D.M. Parker, G.H. Balazs, and J.J. Polovina. 2008. TurtleWatch: a tool to aid in the bycatch reduction of loggerhead turtles *Caretta caretta* in the Hawaii-based pelagic longline fishery. Endangered Species Research 5:267–278.

Howell, E.A., P.H. Dutton, J.J. Polovina, H. Bailey, D.M. Parker, and G.H. Balazs. 2010. Oceanographic influences on the dive behavior of juvenile loggerhead turtles (*Caretta caretta*) in the North Pacific Ocean. Marine Biology 157(5):1011-1026.

Jackson, J.B.C., M.X. Kirby, W.H. Berger, K.A. Bjorndal, J.A. Estes, T.P. Hughes, S. Kidwell, C.B. Lange, H.S. Lenihan, J.M. Pandolfi, C.H. Peterson, R.S. Steneck, M.J. Tegner, and R.R. Warner. 2001. Historical overfishing and the recent collapse of coastal ecosystems. Science 293:629-638.

Jessop, T. S., M. Hamann. 2005. Interplay between age class, sex and stress response in green turtles (*Chelonia mydas*). Australian Journal of Zoology 53(2):131-136.

Jones, T. and J. Seminoff. *In press* 2010. Determining Transmitter Drag and Best Practice Attachment Procedures for Sea Turtle Biotelemetry Studies. Bishop Museum Press, Honolulu, Hawaii. NMFS Technical Memo. SWFSC.

Kamezaki, N., L. Matsuzawa, O. Abe, H. Asakawa, T. Fukii, and K. Goto. 2003. Loggerhead turtles nesting in Japan. *In:* Bolten, A. and Witherington, B. (Eds.). Loggerhead Sea Turtles. Smithsonian Institution Press, Washington, DC, USA, pp. 210–217.

Kobayashi, D.R., J.J. Polovina, D.M. Parker, N. Kamezaki, I.J. Cheng, I. Uchida, P.H. Dutton, and G.H. Balazs. 2008. Pelagic habitat characterization of loggerhead sea turtles, *Caretta caretta*, in the North Pacific Ocean (1997-2006): Insights from satellite tag tracking and remotely sensed data. J. Exp. Mar. Biol. Ecol. 356(1-2):96-114.

Lewison, R.L. and L.B. Crowder. 2007. Putting longline bycatch of sea turtles into perspective. Conservation Biology. 21: 79-86.

Limpus, C. J. and D.J. Limpus. 2003. Loggerhead Turtle in the Equatorial and Southern Pacific Ocean: A Species in Decline. *In:* Bolten, A. B. ,Witherington, B. E. Eds., Loggerhead Sea Turtles. Smithsonian Books, Washington, D.C. 319 pp. p. 199-209.

Lotze, H.K., H.S. Lenihan, B.J. Bourque, R.H. Bradbury, R.G. Cooke, M.C. Kay, S.M. Kidwell, M.X. Kirby, C.H. Peterson, and J.B.C. Jackson. 2006. Depletion, degradation, and recovery potential of estuaries and coastal seas. Science 312:1806-1809.

McClenachan, L., J.B.C. Jackson, and M.J.H. Newman. 2006. Conservation implications of historic sea turtle nesting beach loss. Frontiers in Ecology and the Environment 4:290-296.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998a. Recovery Plan for U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998b. Recovery Plan for U.S. Pacific Populations of the Hawksbill Turtle (*Eretmochelys imbricata*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998c. Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (*Dermochelys coriacea*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998d. Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle (*Caretta caretta*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998e. Recovery Plan for U.S. Pacific Populations of the Olive Ridley Turtle (*Lepidochelys olivacea*). National Marine Fisheries Service, Silver Spring, MD.

National Research Council (2010). Sea Turtle Status and Trends: Integrating Demography and Abundance. National Academies Press, Washington, DC, 162p.

Owens, D.W. 1999. Reproductive Cycles and Endrocrinology. In: K.L. Eckert, K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donelly (Editors). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4. p.119-123.

Orth, R.J., T.J.B. Carruthers, W.C. Dennsion, C.M. Duarte, J.W. Fourqurean, K.L.M. Waycott, and S.L. Williams. 2006. A global crisis for seagrass ecosystems. Bioscience 56(12):987-996.

Parker, D.M., G.H. Balazs, C.S. King, L. Katahira, and W. Gilmartin. 2009. Short-range movements of hawksbill turtles (*Eretmochelys imbricata*) from nesting to foraging areas within the Hawaiian Islands. Pac. Sci. 63(3):371-382.

Papahanaumokuakea Maine National Monument (PMNM). 2008. Final Environmental Assessment, Management Plan. National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, and State of Hawaii. December pp. 280.

Peckham, S.H., D.M. Diaz, A. Walli, G. Ruiz, L.B. Crowder, and W.J. Nichols. 2007. Small-Scale Fisheries Bycatch Jeopardizes Endangered Pacific Loggerhead Turtles. PLoS ONE 2(10): e1041. doi:10.1371/journal.pone.0001041

Polovina, J.J., D.R. Kobayashi, D.M. Ellis, D.M., Seki, and G.H. Balazs. 2000. Turtles on the edge: Movement of loggerhead turtles (*Caretta caretta*) along oceanic fronts in the central North Pacific, 1997-1998. Fisheries Oceanography 9(1):71-82.

Polovina, J.J., E.A. Howell, D.M. Parker, and G.H. Balazs. 2003. Dive-depth distribution of loggerhead (Caretta *caretta*) and olive ridley (*Lepidochelys olivacea*) sea turtles in the central North Pacific: Might deep longline sets catch fewer turtles? Fishery Bulletin 101(1): 189-193.

Polovina, J.J., G.H. Balazs, E.A. Howell, D.M. Parker, M.P. Seki, and P.H. Dutton. 2004. Forage and migration habitat of loggerhead (*Caretta caretta*) and olive ridley (*Lepidochelys olivacea*) sea turtles in the central North Pacific Ocean. Fisheries Oceanography 13(1):36-51.

Polovina, J., I. Uchida, G. Balazs, E.A. Howell, P. Parker, and P. Dutton. 2006. The Kuroshio Extension Bifurcation Region: A pelagic hotspot for juvenile loggerhead sea turtles. Deep-Sea Research II 53(3-4):326-339.

Rauzon, M.J. 2001. Isles of refuge: wildlife and history of the northwestern Hawaiian Islands. University of Hawaii Press, Honolulu, HI. 206 pp.

Rogers, C.S. and V.H. Garrison. 2001. Ten years after the crime: lasting effects of damage from a cruise ship anchor on a coral reef in St. John, USVI. Bull. Mar. SCi 69(2):793-804.

Russell, D.J. and G.H. Balazs. 1994. Colonization by the alien marine alga *Hypnea musciformis* (Wulfen) J. Ag. (Rhodophyta: Gigartinales) in the Hawaiian Islands and its utilization by the green turtle, *Chelonia mydas*. Aquatic Botany. 47:53-60.

Schroeder, B. and S. Murphy. 1999. Population surveys (ground and aerial) on nesting beaches. In: Eckert, K.L., Bjorndal, K., F.A.Abrea-Grobrois, and M. Donnelly (eds.). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SCC Marine Turtle Specialist Group Publication No. 4, 45pp.

Sherman, K. 1991. The large marine ecosystem concept: research and management strategy for living marine resources. Ecol. Appl. 1(4):349-360.

Stewart, K.R. and J. Wyneken. 2004. Predation risk to loggerhead hatchlings at a high-density Florida nesting beach in southeast Florida. Bull. Mar. Sci. 74(2):325-335.

Tiwari, M., G.H. Balazs, S. Hargrove. 2010. Estimating carrying capacity at the green turtle nesting beach of East Island, French Frigate Shoals. Mar Ecol Prog Ser 419:289-294.

United States General Accounting Office. 1997. U.S. Insular Areas, application of the U.S. Constitution. GAO/OGC-98-5.

Van Houtan, K. 2010. Future climate impacts to marine turtle populations, with a focus on the North Pacific Ocean. PIFSC Internal Report IR-10-023.

Van Houtan, K., S.K. Hargrove, and G.H. Balazs. 2010. Land use, microalgae, and a tumor-forming disease in marine turtles. PLoS One 5(9): e12900. doi:10.1371/journal.pone.0012900.

Wabnitz, C.C.C., G. Balazs, S. Beavers, K.A. Bjorndal, A.B. Bolten, V. Christensen, S. Hargrove, and D. Pauly. 2010. Ecosystem structure and processes at Kaloko Honokōhau, focusing on the role of herbivores, including the green sea turtle *Chelonia mydas*, in reef resilience. Mar Ecol Prog Ser 420:27-44.

Western Pacific Fisheries Management Council and National Marine Fisheries Service. 2009. Toward an Ecosystem Approach for the Western Pacific Region: From Species Based Fishery Management Plans to Place-Based Fishery Ecosystem Plans, Final Environmental Impacts Statement, Honolulu, HI. http://www.wpcouncil.org/. 496 pp.

Wetherall, J.A., G.H. Balazs, and M.Y.Y.Yong. 1998. Statistical methods for green turtle nesting surveys in the Hawaiian Islands. *In:* Epperly, S.P. and J. Braun (comps.). Proceedings of the Seventeenth Annual Sea Turtle Symposium, March 4-8, 1997, Orlando, Florida, p. 278-280. U.S. Dep. Commerce, NOAA Tech. Memo. NOAA-TM-NMFS-SEFSC-415, 294 pp.

Work, T.M. and G.H. Balazs. 2002. Necropsy findings in sea turtles taken as bycatch in the North Pacific longline fishery. Fish. Bull. 100:876-880.

Work, T.M. and G.H. Balazs. 2010. Pathology and distribution of sea turtles landed as bycatch in the Hawaii-based North Pacific pelagic longline fishery. Journal of Wildlife Diseases 46(2):422-432.

Work, T.M. G.H. Balazs, R.A. Rameyer, and R.A. Morris. 2004. Retrospective pathology survey of green turtles *Chelonia mydas* with fibropapillomatosis in the Hawaiian Islands, 1993-2003. Dis. Aquat. 62:163-176.

Work, T.M., G.H. Balazs, J.L. Schumacher, and A. Marie. 2005. Epizootiology of spirorchiid infection in green turtles (*Chelonia mydas*) in Hawaii. J. Parasitol. 91(4):871-876.

Zug, G.R., G.H. Balazs, J.A. Wetherall, D.M. Parker, and S.K.K. Murakawa. 2002. Age and growth of Hawaiian green sea turtles (Chelonia mydas): An analysis based on skeletochronology. Fish. Bull. 100(1):117-127.

Appendix 8

Programmatic Environmental Assessment

Marine Turtle Assessment Program (MTAP)

June 2012

Lead Agency: **National Oceanic and Atmospheric Administration,**
National Marine Fisheries Service,
Pacific Islands Fisheries Science Center

Responsible Official: **Samuel G. Pooley, Ph.D.**
Director, Pacific Islands Fisheries Science Center

Point of Contact: **Kyle S. Van Houtan, Ph.D.**
Marine Turtle Assessment Program
Protected Species Division
National Marine Fisheries Service
Pacific Islands Fisheries Science Center
2570 Dole Street
Honolulu, Hawaii 96822
(808) 228-1112

Summary

This Programmatic Environmental Assessment (PEA) was prepared in accordance with National Environmental Policy Act of 1969 (42 U.S.C. §4321, *et seq*.), as implemented by the Council of Environmental Quality regulations (40 C.F.R. §1500-1508); and NOAA Administrative Order Series (NAO) 216-6, *Environmental Review Procedures for Implementing the National Environmental Policy Act*, of May 20, 1999.

The green, hawksbill, loggerhead, leatherback, and olive ridley sea turtles are all listed under section 4(c) of the Endangered Species Act of 1972 (16 U.S.C. §1531, *et seq*.). Under the proposed action, the Marine Turtle Assessment Program (MTAP) proposes to continue its research activities with the addition of field data collection and new studies in the U.S. Insular Areas of the Pacific Islands Region. The research activities include collecting biological and ecological data on marine turtle stocks in the U.S. Insular Area of the Pacific Islands Region, providing analytical population assessment modeling to, and collaborating with, marine turtle researchers across the Pacific Islands Region, and contributing to the scientific literature through publications relevant to the recovery of these stocks. The MTAP also includes responding to and aiding stranded turtles. The potential impacts on the human environment of the proposed action, and a range of reasonable alternatives, are discussed and analyzed in this PEA.

Contents

Acronym	Full description
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNMI	Commonwealth of the Northern Mariana Islands
DAR	State of Hawaii, Division of Aquatic Resources
DLNR	State of Hawaii, Department of Land and Natural Resources
DOI	Department of the Interior
DPS	Distinct Population Segment
EA	Environmental Assessment
EOD	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
FBSAD	Fisheries Biology and Stock Assessment Division of PIFSC
FFS	French Frigate Shoals
FONSI	Finding of No Significant Impact
FP	Fibropapillomatosis disease
GPS	Global Positioning System
IACUC	Institutional Animal Care and Use Committee
IUCN	International Union for Conservation of Nature and Natural Resources
KRF	Kewalo Research Facility
MHI	Main Hawaiian Islands
MPA	Marine Protected Area
MTAP	Marine Turtle Assessment Program of PSD/PIFSC
MTRP	Marine Turtle Research Program of PSD/PIFSC
NEPA	National Environmental Policy Act of 1969
NGO	Non-Governmental Organization
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOC	National Ocean Council
NPS	United States National Park Service
NRC	National Research Council
NWHI	Northwestern Hawaiian Islands
PEA	Programmatic Environmental Assessment
PIFSC	NMFS Pacific Islands Fisheries Science Center
PIRO	NMFS Pacific Islands Regional Office
PIT	Passive Integrated Transponder
PMNM	Papahānaumokuākea Marine National Monument
PSD	Protected Species Division of PIFSC
RIA	Radioimmunoassay
RPM	Responsible Program Manager
SPREP	South Pacific Regional Environmental Program
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1 Purpose of and Need for Action

1.1 Status of Sea Turtles in the Pacific

Green, hawksbill, loggerhead, leatherback, and olive ridley sea turtles are protected throughout United States waters under the Endangered Species Act of 1972 (ESA) . In the central and western Pacific, this includes: Hawaii, Guam, the Commonwealth of the Northern Mariana Islands (CNMI), American Samoa, Howland Island, Baker Island, Wake Island, Jarvis Island, Midway Atoll, Johnston Atoll, Palmyra Atoll, and Kingman Reef (NMFS and USFWS 1998a, 1998b, 1998c, 1998d, 1998e). Inclusion of these species into the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has made it illegal to trade any products made from these species among the U.S. and 169 other countries. Recovery plans for all U.S. Pacific populations of sea turtles were finalized in 1998 and serve as guidance in actions to recover these stocks.

The green turtle (*Chelonia mydas*) is listed as threatened under the ESA throughout its Pacific Range, except for the endangered population nesting on the Pacific coast of Mexico. The green turtle in Hawaii is a genetically distinct stock. Analysis of mitochondrial DNA demonstrates the genetic discontinuity of the Hawaii population from other green turtle populations in the Pacific (Bowen *et al.* 1992, Balazs and Chaloupka 2004b, Dutton *et al.* 2008). Furthermore, protection and management of the Hawaiian stock are not complicated by international migrations because this stock forages and nests within the jurisdiction of only one country. Foraging grounds are primarily located in the waters surrounding the Main Hawaiian Islands (MHI), whereas nesting primarily occurs on sandy beaches 500 miles to the northwest of Honolulu in the Northwestern Hawaiian Islands (NWHI), with 90% of all nesting occurring at French Frigate Shoals (FFS) (Figure 1) (Balazs 1976). The Hawaiian green turtle stock is demonstrating encouraging signs of population recovery after years of protective efforts as indicated by a steady long-term increase in the number of nesting females in the NWHI as well as increases in the number of immature green turtles residing in foraging pastures of the MHI (Balazs 1996, Balazs and Chaloupka 2004, Balazs and Chaloupka 2006, Chaloupka and Balazs 2007, Chaloupka *et al.* 2008a). However, outside of Hawaii, green turtle populations have seriously declined throughout most of the Pacific. The harvest of green turtles by humans for meat and eggs is the most serious threat. Other threats include habitat loss, incidental capture in commercial and recreational fishing gear, boat collisions, shark attack, and the tumor disease fibropapillomatosis (FP) (NMFS and USFWS 1998a, Chaloupka *et al.* 2008b).

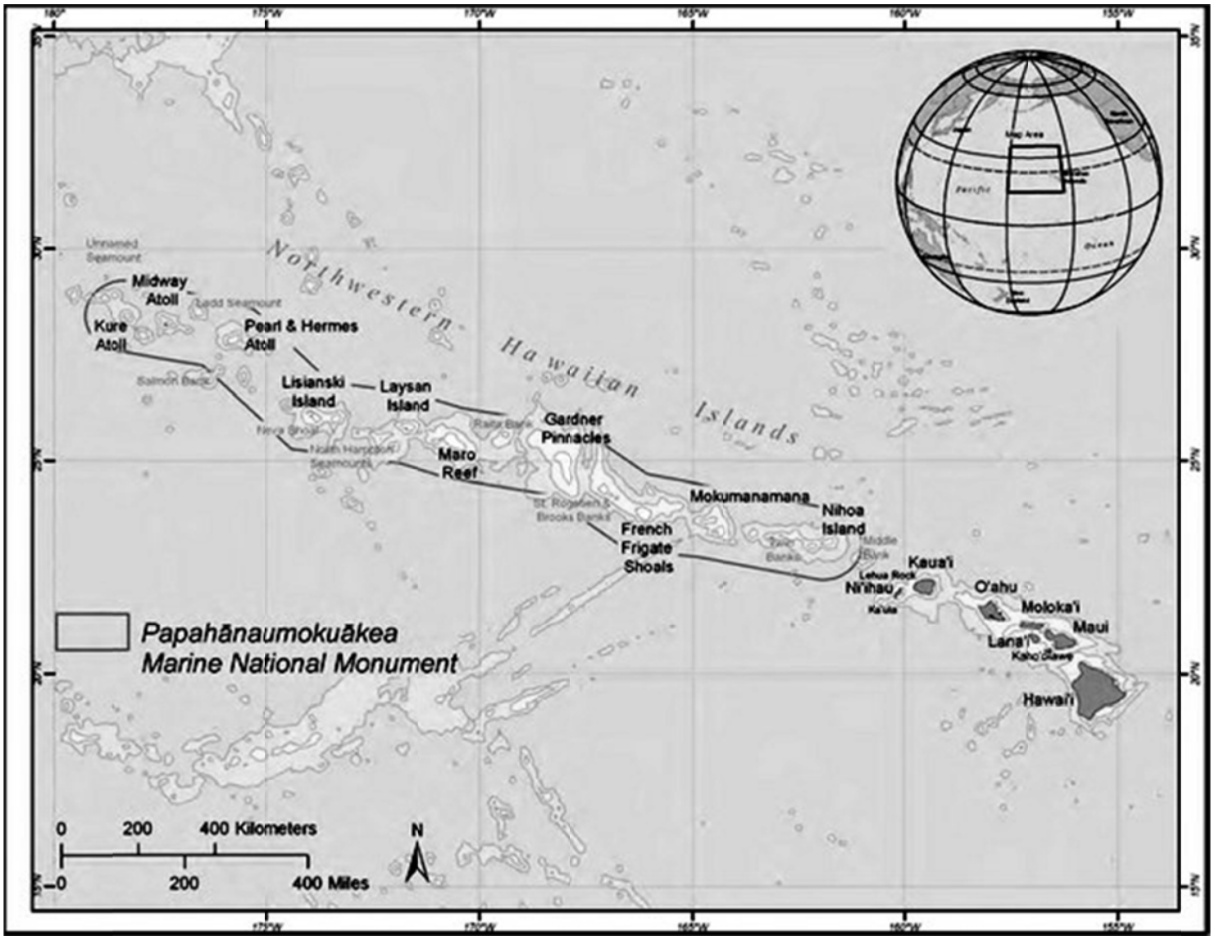

Figure 1. The Hawaiian Archipelago, showing the Northwestern Hawaiian Islands, Main Hawaiian Islands, and boundaries of the Papahanaumokuakea Marine National Monument (from noaa.gov)

The hawksbill turtle (*Eretmochelys imbricata)* is globally listed as endangered. Hawksbill populations have declined dramatically in the Pacific (Mortimer and Donnelly 2008) and the species is rapidly approaching extinction because of a number of factors. The intentional harvest of this species for meat and eggs and the illegal international trade of tortoiseshell are the greatest threats to its survival. Other threats to the continued existence of this species include beach erosion, coastal construction, habitat loss, capture in fishing nets, and boat collisions (NMFS and USFWS 1998b**)**. Hawksbills nest in small numbers and are generally rare in the MHI (Parker *et al.* 2009) but they also occur in the NWHI and likely nested their historically (Van Houtan *et al.* 2012). Hawksbills are uncommon in nearshore waters throughout the PIR, in Guam, CNMI, and American Samoa and nesting is not regularly monitored (Grant et al. 1987, Hutchinson et al. 2008). Their occurrence and distribution in the PRIAs is not well understood.

The loggerhead turtle (*Caretta caretta*) is listed as an endangered species for the North and South Pacific distinct population segments (76 FR 58868). Loggerheads in the North Pacific are derived primarily from nesting beaches in Japan (Bowen *et al.* 1995, Kamezaki *et al.* 2003); whereas, loggerheads in the South Pacific are derived primarily from nesting beaches in eastern Australia and New Caledonia (Limpus and

Limpus 2003, Boyle *et al.* 2009). These stocks are threatened primarily by incidental capture in commercial fishing gear (i.e., longline gear and nets) and loss or degradation of nesting habitat (NMFS and USFWS 1998d, Polovina *et al.* 2000, 2003, 2004, 2006, Peckham *et al.* 2007, Howell *et al.* 2008, Howell *et al.* 2010, Kobayashi *et al.* 2008, Chaloupka *et al.* 2008c).

The leatherback turtle (*Dermochelys coriacea*) is listed as endangered throughout its range. Leatherback populations in the Pacific are in decline. The decline is primarily attributed to incidental take in coastal and high seas fisheries, the killing of nesting females by humans for meat, and the collecting of eggs at nesting beaches. Leatherbacks encountered in Hawaii represent individuals in transit between nesting beaches and foraging grounds. Some of the largest nesting populations of leatherback turtles in the world border the Pacific Ocean, but no nesting occurs on beaches under U.S. jurisdiction (NMFS and USFWS 1998c).

The olive ridley turtle (*Lepidochelys olivacea*) is listed as threatened in the Pacific, except for the Mexican nesting population, which is classified as endangered. The olive ridley is widely regarded as the most abundant sea turtle in the world; however, it is rare in the central Pacific since there are no nesting beaches in the Pacific Islands. Occasionally, a wayward female is found nesting in the Hawaiian Islands, most recently in 2009 on the Island of Oahu. Individuals also occasionally strand in the MHI and are incidentally captured in the Hawaii-based deep-set longline fishery more frequently than the other species. The primary threats to this species throughout the Pacific are incidental take in fisheries and harvest of eggs and adults on Mexican and Central American nesting beaches (NMFS and USFWS 1998e).

1.2 Background of the Marine Turtle Assessment Program (MTAP)

The National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) share responsibility for the conservation and recovery of sea turtles pursuant to ESA mandates. NMFS has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and USFWS has the lead on land. Within the Pacific Islands Region, NMFS has two independent offices that carry out different aspects of the sea turtle recovery. At NMFS's Pacific Islands Fisheries Science Center (PIFSC), the duties of collecting and analyzing data are carried out. The Marine Turtle Assessment Program (MTAP) plays a key role in supporting this mandate in coordination with the Marine Turtle Research Program (MTRP). At NMFS's Pacific Islands Regional Office (PIRO), the Protected Resources Division is responsible for the management aspects of sea turtle recovery, such as writing biological opinions per Section 7 of the ESA.

The MTAP was created at PIFSC when a need for analytical modeling of turtle population dynamics was identified. Prior to the formation of the MTAP, in 1981, NMFS created the MTRP to study the biology and ecology of green sea turtles at its Honolulu Laboratory, now the PIFSC. The MTRP serves as the primary data collection and analysis entity of sea turtles in Hawaii. The MTRP has focused its data collection efforts on the Hawaiian Archipelago because of the threats posed to green sea turtles in the islands. The creation of the MTAP naturally follows the maturation of the MTRP and the databases it maintains. It also coincides with the expansion of U.S. commercial fisheries in the Pacific Ocean. The MTAP started under the direction of the stock assessment team of the Marine Mammal Research Program and became an independent program in 2005. Since its inception, the MTAP has focused on providing analytical services to resource managers. The MTAP also collaborates with researchers from around the Pacific Islands Region on data planning and gathering across the Pacific Islands Region. These tasks focus on green, hawksbill, loggerhead, and leatherback turtles, though olive ridley turtles receive attention as they are incidentally captured in commercial fisheries. The MTAP is proposing to expand the data gathering efforts and build research infrastructure in the U.S. Insular Areas because the sea turtle populations in these areas are poorly understood. These programs would be modeled after the MTRP.

1.2.1 Population Assessments, Models, and other Analytical Services

Evaluating population variability, growth, and viability are a fundamental components of wildlife ecology and management (Pimm 1991). Such assessments are useful for: (i) distinguishing how anthropogenic and natural forces regulate sea turtle populations (Van Houtan and Halley 2011, Van Houtan 2011), (ii) establishing historical baselines (Jackson et al. 2001, Lotze et al. 2006), (iii) designing recovery and management plans, (iv) conducting regular assessments of protected species as mandated by the Endangered Species Act, and (v) providing scientific advice under ESA Section 7 Consultations or EIS. As the lead analytical program for NMFS in the PIR, MTAP generates the models, assessments, and other analytical services for the PIRO, the MTRP, and other partner agencies.

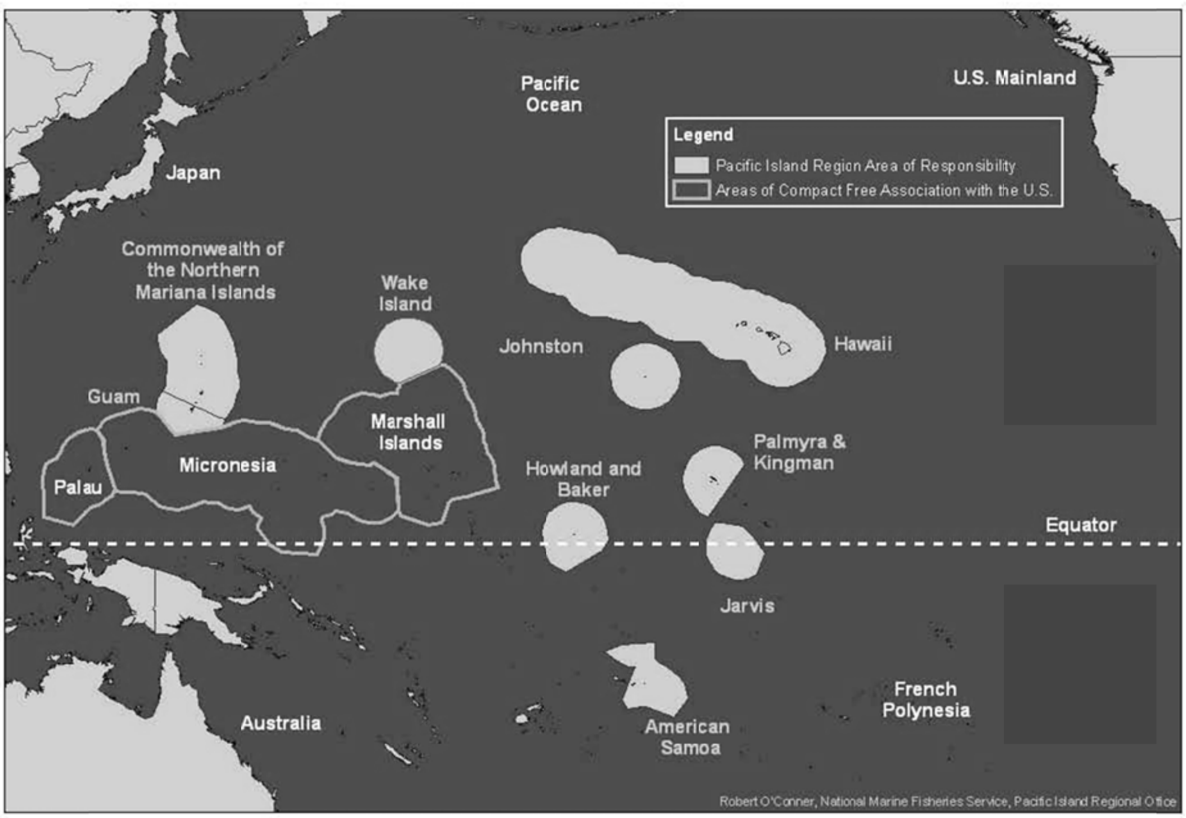

Figure 2. Pacific Islands Region, with the United States Exclusive Economic Zone shaded around each island under United States sovereignty (from noaa.gov)

1.2.2 Nesting Surveys to Assess Abundance, Trends, Survival, and Threats

Nesting surveys are the most common method used to monitor marine turtle populations. Appropriately designed nesting beach surveys can provide information on the size of the adult female population, hatchling production, and inter-annual variability in production (Schroeder and Murphy 1999). Threats to these life-stages (i.e., nesting females and hatchlings) can be quantified such as: (1) nest destruction from predation, inundation, and other females attempting to nest; (2) habitat loss from beach erosion and sea level rise; and (3) hatchling predation on land and in the water. When new turtles are identified during nesting surveys, they are tagged, measured, and sampled (e.g., tissue for genetic analysis and health), and tags of previously tagged turtles are recorded. Satellite tags, or time-depth recorders, or both are deployed on nesting green turtles to determine habitat use, migration routes between breeding and foraging grounds (Balazs and Ellis 2000), daily and seasonal use of foraging and resting habitat, and localized movements of breeding males and gravid females between nesting and breeding sites and associated basking sites. Temperature data loggers are deployed in the substrate of East Island to provide data relevant to temperature-dependent sex determination and sex ratios of green turtle hatchlings.

Recognizing the importance of these data, MTAP is focused on replicating the nesting survey efforts implemented by the MTRP on East Island at FFS (Figure 3) for the last 38 years. The MTAP will work across the Pacific Islands Region at key nesting locations for regional turtle populations, especially those known to be incidentally captured in U.S. commercial fisheries.

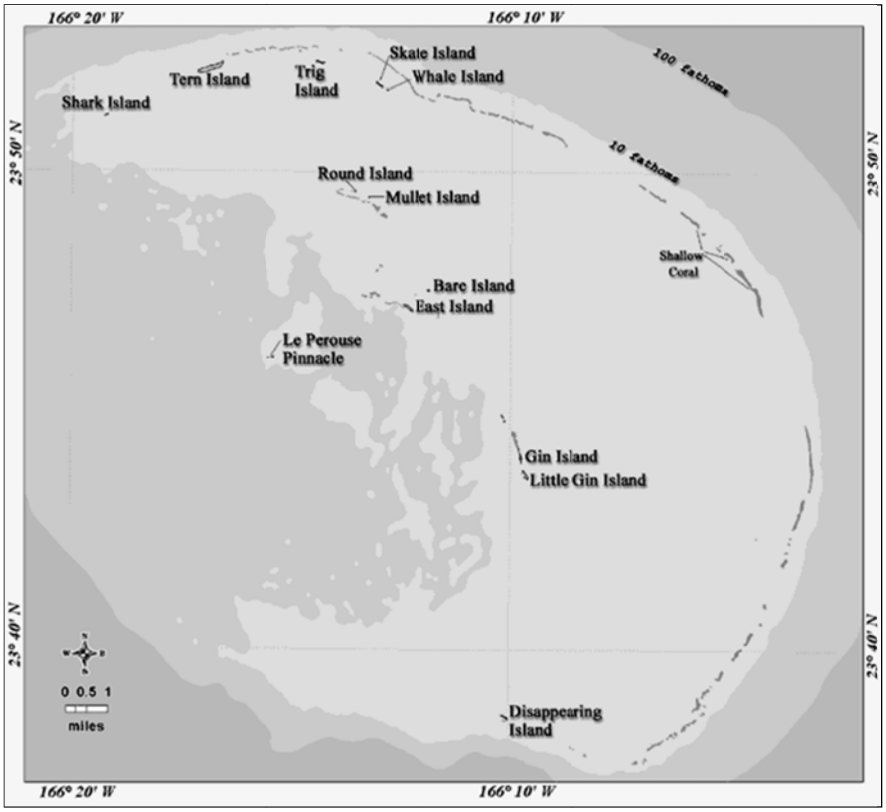

Figure 3. Map of French Frigate Shoals (from noaa.gov).

1.2.3 Foraging and Resting Habitat Surveys to Assess Abundance, Trends, Survival, Growth, and Other Demographic Factors

Research directed towards sea turtles on foraging and aquatic resting grounds can provide a wealth of information on the abundance, trends, survival and growth of juvenile and adult turtles. Well-designed monitoring studies include animal tagging to provide information on individuals, habitat use, growth, diet, health and disease, survival, and residency. A primary goal of foraging ground research is to integrate data from genetic analysis, flipper tagging, and satellite telemetry to reveal the population structure of turtles occurring in near-shore ecosystems across the Pacific Islands Region.

Turtles are captured in shallow coastal and reef waters for these studies using various methods, including: hand net, scoop net, hand capture while snorkeling, hand capture while diving from a slowly moving boat, or entanglement net capture (Balazs *et al.* 1987, Balazs *et al.* 1998). All of these methods have been successfully and safely employed to study and tag green turtles in coastal waters of the Hawaiian Islands. Turtles are released at or very close to the capture site shortly after they have been processed.

1.2.4 Stranding Response and Research

The stranding research program of the MTRP has responded to sick, injured, or dead marine turtles in Hawaii since 1982. Necropsies of stranded turtles provide information on species distribution, stock structure, sex ratio, health and disease, diet, age and growth, and cause of mortality and have been the source of data for numerous scientific publications (Work and Balazs 2002, Work *et al.* 2004, Work *et al.* 2005, Zug *et al.* 2002, Chaloupka *et al.* 2008b). The MTAP has collaborated with the MTRP and researchers in the Hawaiian Archipelago, for example, to understand the occurrence and variability of fibropapilloma (FP) tumors, largely through interpreting data from the strandings program (Van Houtan *et al.* 2010). This study led to a new set of hypotheses involving coastal eutrophication, algae invasions, and the foraging promotion of the herpes viruses that cause FP. In this instance and others, strandings programs and the knowledge they generate are essential scientific information, which is not provided through other means.

1.3 Purpose of the Proposed Action

The purpose of the MTAP is to conduct ecological research on sea turtle populations in the Pacific Island Region specifically related to population dynamics. While the focus of the research is assessing and modeling population dynamics, original life history data will also need to be collected in underrepresented locations in the Pacific Islands Region. The objectives of the program are:

1. Conduct population assessments of green, hawksbill, loggerhead, and leatherback sea turtles in the Pacific Islands Region and develop geospatial and climate-related analytical tools.
2. Collect data on the basic biology, life history, demographics, population structure, and reproductive habits of sea turtles in their near-shore, pelagic, and nesting beach habitats. Establish, compile, and continue long-term data streams for population assessments and other relevant ecological analyses.
3. Design, implement, and monitor sea turtle stranding and salvage networks throughout the Pacific Islands Region.
4. Develop knowledge of disease ecology and disease-related population dynamics for Pacific sea turtle populations through epidemiological studies and modeling.
5. Train research personnel from various Pacific Islands and along the Pacific Rim in sea turtle research techniques, and continue to share data, analyses, experience, and information to increase international research capacity.
6. Conduct educational outreach to the public, focused on sea turtle research projects and results to build public support for sea turtle research.
7. Collaborate with federal, state, local, and non-governmental organizations on sea turtle surveys, especially for the purposes of generating data streams such as photographic individual identification methods.

1.4 Need for the Proposed Action

Research suggests marine turtle populations today are less than ten percent of their historical numbers (Lotze *et al.* 2006). The systematic human exploitation of sea turtles for eggs, meat, and shells is considered a major factor in their decline (McClenachan *et al.* 2006). These threats continue today, with the added impacts from incidental commercial fisheries capture, beach development, and climate change. Climate, for example, is the least understood threat yet may be the dominant influence on sea turtles worldwide (Van Houtan 2010, Van Houtan & Halley 2011). Additional research into the population dynamics and environmental influences is essential to ensure the recovery of these species in the region. In the U.S. Insular Areas this is especially needed because these populations are poorly understood. Therefore the MTAP will advance scientific studies, collect data, and produce new analyses to generate better understanding of the historical and current population ecology of Pacific sea turtle populations.

1.4.1 Natural Impediments to Recovery

Habitat Loss

Many sea turtle nesting beaches are located on low-lying, small, sand islands located in the central and western Pacific. Habitat loss due to sea level rise may impose the greatest risk to the continued existence of this population. Most of the land at the primary nesting grounds of FFS in the Northwestern Hawaiian Islands is less than two meters above sea level. Substantial loss of habitat has already occurred at FFS from 1963 – 2004 (Antonelis *et al.* 2006) and projected loss of habitat due to sea level rise for East Island is between 3 and 33 percent for a rise in sea level of 9 to 88 centimeters, whereas land loss at some of the other islets at FFS (Trig, Gin, Little Gin) may be as great as 99 percent (Baker *et al.* 2006). Laysan and Lisianski Islands may provide refuge for nesting turtles since their elevation is higher (Baker *et al.* 2006) provided other environmental conditions (e.g., sand temperature and ocean currents) are conducive to the survival of hatchlings.

Reproduction

Natural changes in climate affect animals, such as sea turtles, whose reproductive success is determined by environmental factors. The sex of hatchling sea turtles is determined by nest temperatures. Increasing beach temperatures may lead to skewed sex ratios and ultimately a female biased population. Additionally, if beach sand temperatures increase considerably, the overall success of each nest may decrease due to embryonic mortality at high temperatures. Changes in sea surface temperatures may also change the timing of breeding and nesting (Van Houtan 2010).

Food availability

Competition for herbivorous food resources among green turtles may lead to reduced growth rates and increased time to maturity. This population exhibits slow and declining rates of growth at several sites in the MHI (Balazs and Chaloupka 2004b). As this population continues to recover, competition for resources will increase, not only between turtles but also between turtles, herbivorous fishes, and other reef creatures. Green sea turtles are extremely resilient in harsh conditions (as are many reptilian species), so the overall impact of reduced food resources may not ultimately lead to death, however it may lead to even slower growth rates and greater age to maturity which could impact the recovery rate of the population.

Predation

Green sea turtles are preyed upon by sharks, finfish, and presumably sea birds in the marine environment. The protected status of the NWHI and the resulting elimination of fishing pressures will allow all species and stocks to recover to higher population levels. This in turn may lead to higher predation rates of hatchlings by fin-fishes off the nesting beaches and higher rates of interactions between sharks and adult turtles in the inter-nesting habitat resulting in injury and potentially death.

Disease

The tumor disease, FP, which is caused by a herpes virus, is an ongoing threat to green sea turtles in the Hawaiian Archipelago. It has been estimated that FP causes approximately 28 percent of the injuries and mortalities to green turtles in Hawaii (Chaloupka *et al.* 2009). While some individuals may contract the disease and eventually overcome it, many others are plagued with large tumors that interfere with their ability to see and forage, and eventually lead to death. At some sites in the MHI, the disease has declined in both severity and prevalence (Chaloupka *et al.* 2009). At other sites, such as around the island of Maui, the disease still affects a large proportion of the population, but the overall trend is decreasing.

1.4.2 Anthropogenic Impediments to Recovery

Commercial harvest

The Hawaiian green turtle population was listed in 1978 as a threatened species under the ESA. The listing was primarily because the stock had been over-harvested. Even though this stock is currently increasing, it has demonstrated in the past that over-harvesting will cause the stock to crash because the population is relatively small and individuals are particularly slow growing, taking 35 years or more to reach maturity.

Fishing Interactions

The incidental capture of sea turtles in commercial and recreational fishing gear is a continuing concern. The interaction between green turtles and recreational fishing gear is the second most common cause of strandings in the MHI (seven percent). Discarded monofilament fishing line, fishing hooks, and gillnets pose serious threats to green turtles including injury, flipper amputation, and death. The cause of approximately half of all strandings is undetermined. Because drowning is difficult to determine (Work and Balazs 2010), it is possible that fishing gear interactions are responsible for a greater percentage of sea turtle fatalities than we currently believe (Chaloupka *et al.* 2009). New regulations on gillnet fishing have been imposed in the MHI which should reduce the number of turtles incidentally caught and killed in gillnets.

Marine Debris

The entanglement in and ingestion of marine debris is a potential threat to this population. Such debris includes discarded or abandoned fishing gear such as nets and lines as well as plastics such as bags, six-pack rings, tar balls, Styrofoam, and other refuse that might ensnare or be consumed by a green turtle.

Entanglement in discarded nets and lines, as well as ingestion of plastics and other discarded debris may lead to injury or death.

Habitat Degradation

Green turtles depend upon algae, sea grass, and coral reef habitats for food and refuge. The degradation of these habitats poses a serious threat to the recovery of sea turtle stocks. Degradation of these habitats occurs through pollution, over-fishing, disease, anchoring, climate change, and other anthropogenic factors (Jackson *et al.* 2001, Rogers and Garrison 2001, Orth *et al.* 2006).

Climate Change

Climate is one of the least studied factors, but may have the largest influence on marine turtle populations. The accelerating pace of global greenhouse gas emissions suggests that surface temperatures will very likely increase nearly 3^{o}C this century, with extreme heat becoming more frequent (IPCC 2009). The clearest threat from these changes appears to be the direct impact of higher sand temperatures to eggs. Though empirical incubation studies are very limited across spatial and temporal scales, absolute temperature thresholds for egg survival and sex-determination appear likely with multi-year extreme heat events increasing. Changes in sea surface temperatures may also change the timing of breeding and nesting. Though island systems have dynamic geomorphology, they have a potentially greater risk of nesting beach loss due to rising sea levels. Climatic changes may inter-react synergistically with the various factors to further exacerbate population threats (Van Houtan 2010).

1.4.3 National Research Council Assessment

In 2010, the National Research Council (NRC), Committee on the Review of Sea Turtle Population Assessment Methods, published a report entitled *Assessment of Sea-Turtle Status and Trends: Integrating Demography and Abundance*. The report addressed programs from across the nation and found that current monitoring generally does not provide enough information on sea turtle populations to evaluate the effectiveness of protective measures and additional data are needed for stock assessments. A thorough population assessment needs to include a description and evaluation of change over time and space in the following areas:

- population structure (e.g., species, subspecies, distinct population segments)
- population lifecycle and demography (e.g., life stages, rates of survival, reproduction)
- population abundance and trends (e.g., evaluation and extrapolation of population indices)
- population ecology and behavior (e.g., habitat, distribution and movements, predators and prey, disease, parasites, contaminants)
- population size (e.g., numbers of individuals, age structure, sex ratio)
- current and projected threats (e.g., human-caused injury or mortality, habitat destruction, climate change)
- sources of variability (e.g., genetic, demographic, environmental, catastrophic).

To be useful in decision making, an assessment requires more than simple description of trends; the large and diffuse nature of sea turtle populations make extrapolation of trends over time, space, and generations difficult at best and potentially misleading. Observed and potential changes in sea turtle populations through time need to be assessed with age-structured models to determine population-wide status accurately and to diagnose causes of population change. As described in the Proposed Action, the MTAP has been working with the MTRP, which has been collecting these types of data for the last 38 years. The MTAP proposes to supplement these types of data collection activities in the Pacific Islands Region and to improve the sophistication of the existing population assessment models (National Research Council 2010).

1.5 Geographic Scope of Analysis

The geographical scope of MTAP activities includes the Hawaiian Archipelago and the U.S. Insular Areas of the Pacific Ocean. Together these areas constitute the Pacific Islands Region. In the State of Hawaii, the MTAP collaborates with other researchers, primarily the MTRP, on sea turtle data collection and analysis. The MTAP would expand field research and data gathering in the U.S. Insular Areas of the Pacific Ocean. The U.S. Insular Areas of the Pacific Ocean include eleven islands, reefs, and atolls (Figure 4). The United States has sovereignty (see U.S. GAO 1997) over Guam (an organized unincorporated territory), American Samoa (an unorganized unincorporated territory), and the Commonwealth of the Northern Mariana Islands (CNMI) (a commonwealth in political union with the United States). Meanwhile, Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Atoll, and Wake Island are unincorporated and unorganized territories of the United States. Palmyra Atoll is an unorganized incorporated territory of the United States, meaning that it is subject to all provisions of the U.S. Constitution (U.S. GAO 1997). This large geographical area roughly encompasses the range of the five sea turtle species being studied.

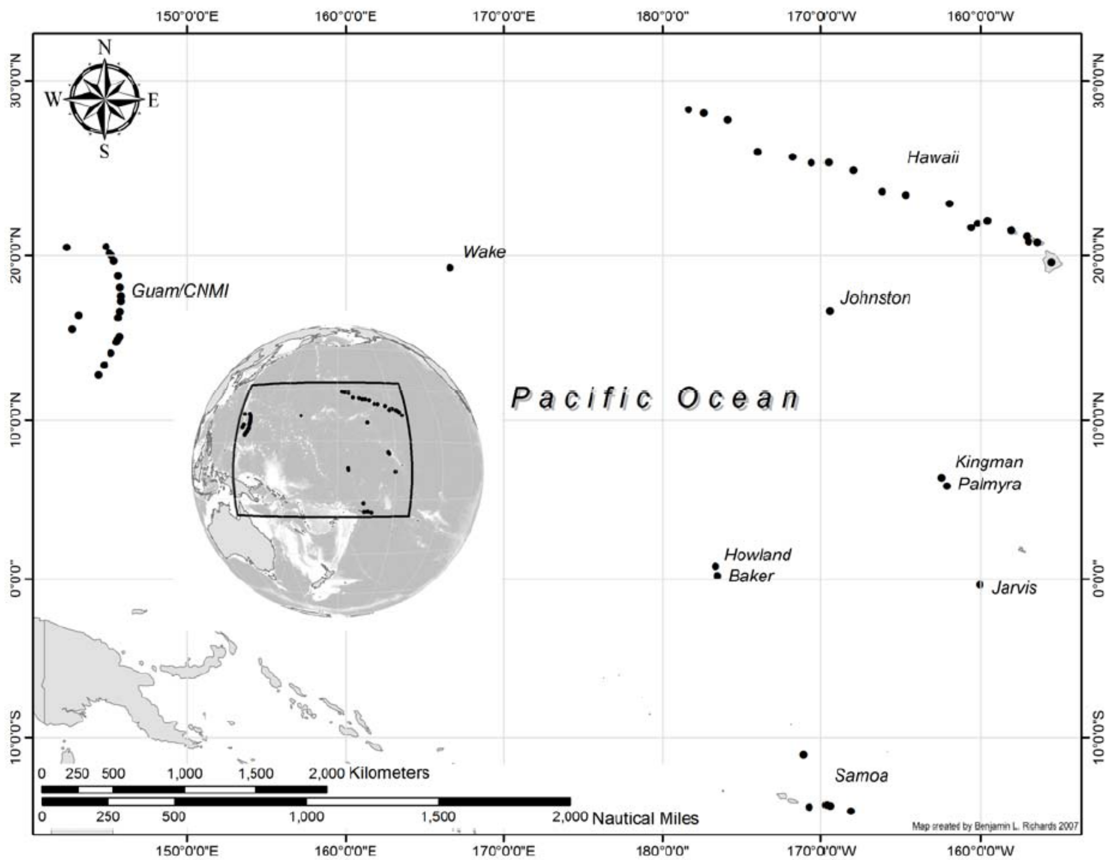

Figure 4. U.S. Insular Areas of Pacific Ocean and the State of Hawaii in the Pacific Islands Region (from noaa.gov).

The MTAP collaborates and assists other sea turtle researchers located in and around the Pacific Islands Region. Coordination, collaboration, or assistance may take the form of data collection (including technical instruction), financial support, or both. These coordinated research efforts would be conducted in a manner consistent with the Proposed Action. If future research projects are not consistent with the type or scope of activities analyzed in this document, then they will be subject to an additional and separate NEPA analysis. A listing of these persons and agencies who have been involved with the MTAP is included in Section 6. Future coordination and collaboration may include other individuals from these agencies, institutions, and non-governmental organizations, or different but related organizations.

1.5.1 Relevant Resource Issues within the Geographic Scope of Analysis

The majority of the population modeling and assessments of the proposed action would be conducted in an office setting using computers and existing data sets. The adverse impacts from working in an office setting on the human environment are negligible and therefore this aspect of the MTAP will not be discussed in detail. The relevant resource issues discussed herein will focus on the field research aspects of the MTAP.

The Hawaiian Archipelago provides habitat for the five federally threatened and endangered sea turtle species discussed in Section 1.1. It also provides habitat for the federally endangered Hawaiian monk seal (HMS). Most of the HMS population lives on the same islands and atolls in the Northwestern Hawaiian Islands were green sea turtles nest. The Northwestern Hawaiian Islands have been designated as critical habitat for HMS. The MTAP doesn't propose conducting surveys in the Northwestern Hawaiian Islands because sea turtle surveys there are already carried out by the MTRP. In the Main Hawaiian Islands, it is unlikely the MTAP would encounter an HMS, but if they did, it would be avoided. Hawaiian monk seals are also known to occur at Johnston Atoll but no field surveys are being proposed there. Therefore, the MTAP activities would not affect HMS and will not be discussed in detail.

The Hawaiian Archipelago and U.S. Insular areas are habitat for a large and diverse community of seabird species. Millions of seabirds breed, nest, roost, and forage on these islands. The proposed action will include data collection and stranding response activities on sandy beaches and in near-shore shallow waters, which will be near these seabird colonies. Therefore, these impacts will be discussed in detail.

Green sea turtles also have an important cultural relationship with Pacific Islanders. Known as *honu* in the Hawaiian language, green sea turtles are part of regional traditions, chanted in stories, and found in ancient petroglyphs. Historically, green sea turtles also provided meat and eggs for food, and shell and bone for tools and weapons. Given the important role of sea turtles to the cultures and traditions of the Pacific Islands Region, the MTRP and MTAP have worked with local communities to help in achieving the goal of recovery for all of the sea turtle species in the region. The proposed action includes a number of measures to avoid and minimize adverse effects to sea turtles and these are discussed in detail.

Given that the proposed action does not include constructing any permanent infrastructure, discharges of fill material, dredging, or using any hazardous materials that could be released into the environment, it has been determined that the potential impacts to water quality, noise, aesthetics, traffic, public access to the coastline, vegetation, air quality, are negligible. The proposed action does include the infrequent use of small quantities of over-the-counter chemicals (e.g., topical antiseptics for cleaning the site of a skin puncture, epoxy resin to attach a satellite tag) but these would be used in accordance with all relevant laws and regulations. Therefore, impacts to these resources have been considered, but will not be discussed in detail.

On July 19, 2010, concurrent with the release of the *Final Recommendations of the Interagency Ocean Policy Task Force* issued by the White House Council on Environmental Quality (CEQ), President Obama released an Executive Order (EO; rescinds EO 13366 of December 17, 2004) entitled *Stewardship of the Ocean, Our Coasts, and the Great Lakes*. This EO adopts the recommendations of the CEQ Task Force and directs executive agencies to implement the recommendations under the guidance of the National Ocean Council (NOC) created by the EO. The proposed action is consistent with these recommendations and will contribute to the scientific understanding of our ocean ecosystems.

Executive Order 12898 requires federal agencies to address actions affecting environmental justice in minority populations and low-income populations. The proposed research will take place primarily in unpopulated areas (e.g., federal monuments, public beaches) involving principally short-term temporary data collection activities. Collaboration with other researchers, agencies, and NGOs will be only a mutual basis. As such, the proposed research will have negligible environmental effects on minority and low-income communities, and therefore will not be discussed in detail.

Executive Order 13089 requires federal agencies to identify actions that may affect coral reefs, protect and enhance the condition of coral reef ecosystems through existing programs, and ensure their actions do not degrade the conditions of coral reef ecosystems. The proposed sea turtle research activities would include work in the vicinity of coral reefs and this will be discussed in detail. The proposed action does not involve any direct impacts to coral reefs.

Executive Order 13158 requires federal agencies to avoid harm of Marine Protected Areas. Parts of the proposed action would take place in MPAs (e.g., the new marine national monuments). The MTAP will avoid harm of MPAs to the maximum extent practicable while conducting the proposed action through implementation of the various avoidance and minimization measures described below.

Executive Order 12114 requires federal agencies to consider the environmental effects of their actions outside of the United States and its territories. The proposed action would be implemented in the United States, its territories, and commonwealth's in covenant with the United States. Given the wide geographic range and migration routes of sea turtles in the Pacific Islands Region, the MTAP may coordinate or collaborate with organizations in neighboring countries. These actions in foreign nations would be implemented using the same methods and materials described in this NEPA document and in accordance with all relevant foreign laws.

Within the geographic scope of analysis occur a number of archeological and cultural resources. Along with being home to a diverse range of peoples and traditions, the PIR was the setting for many battles during World War II. Consequently, there are several hundred sites listed on the National Register within the PIR and many more are eligible. The island of Guam alone has 121 sites listed on the National Register. While many of the listed structures have been identified (e.g., the Agana Spanish Bridge), some of these sites have their addresses restricted in order to protect the resources. In the State of Hawaii, the NWHI are an important cultural resource in the Hawaiian traditions. Native Hawaiian seafarers travelled frequently between the MHI and NWHI. The NWHI are home two of the most important Hawaiian archeological sites, Nihoa Island and Mokumanamana (Necker Island). These islands are both listed as archeological districts on the National Register of Historic Places. Another notable example is the World War II-related resources on Wake Atoll (i.e., Wake, Wilkes, and Peale Islands), which were designated a National Historic Landmark on September 16, 1985. The Proposed Action does not involve working on or around any structures (i.e., the sea turtle field work would be conducted on sandy beaches or in near-shore shallow waters) and does not involve erecting any structures or excavations. Therefore, impacts to these resources have been considered, but will not be discussed in detail.

2 Proposed Action and Alternatives

This analysis includes a range of reasonable alternatives that address the purpose of the MTAP and need for sea turtle research across the Pacific Islands Region (PIR). Since its establishment, the MTAP has conducted sea turtle population assessments, developed models, and collected data in collaboration with the MTRP (Status Quo - Alternative A). While related, and having overlapping geographical study areas, the two programs have separate distinct research missions. In response to increasing data and analysis needs, the MTAP is proposing to continue the sea turtle population assessments and modeling in the PIR, but will also begin collecting data from areas (i.e., the U.S. Insular Areas) and on subjects (using the same methods currently applied in the Hawaiian Archipelago by the MTRP) that have been under-represented in the past (Proposed Action - Alternative B). These data will be used to properly assess regional population dynamics of the five sea turtle species. The No Federal Action Alternative (Alternative C) has been included in the range of alternatives.

2.1 Alternative A: Status Quo – No Change to the Current Action

The MTAP, in collaboration with the MTRP, studies all five species of sea turtles occurring in the Pacific Islands Region: green, hawksbill, loggerhead, leatherback, and olive ridley. The focus of the MTAP has been providing analytical services to resource managers using data collected with the MTRP and other researchers in the Hawaiian Archipelago. The research components, techniques and methods, and standard operating procedures have been developed and refined by the MTRP over the last 38 years are described herein. The MTRP finalized a separate programmatic environmental assessment and finding of no significant impact on June 23, 2011 for their activities (NMFS 2011).

2.1.1 Components of the Current MTAP

Using the techniques and methods described below, which have been implemented using the associated standard operating procedures, the MTAP conducts investigations that can be grouped into four broad categories: (a) analytical population assessments, (b) field research associated with beach and nearshore habitats, (c) field research associated with pelagic habitat, and (d) investigations associated with technical assistance, training, international collaboration, and analytic actions.

2.1.1.1 Research on Sea Turtle Population Dynamics across the Pacific Islands Region

a. **Characterizing and explaining population variability.** Collects and analyzes existing datasets of population indices from a variety of species and locations to understand population trends and viability, demographic and environmental stochasticity, and spatial density patterns. Collaborates with foreign and domestic colleagues to expand spatial extent, species, and time series coverage of data.

b. **Assessing natural and anthropogenic population impacts.** Quantifies local population impacts – and their trends through time – using advanced climate modeling, historical data and more traditional sources, such as injury data compiled from stranded turtles and incidental bycatch and fisheries statistics.

c. **Evaluation of management and fishery activities to population recovery.** Provides scientific advice to resource managers on the population impacts from potential actions. These modeling activities are based on established population ecological dynamics and existing datasets.

d. **Epidemiology.** Researches and models the existence, distribution, and cause of turtle diseases. Analyses include data obtained from stranded turtles, remotely-sensed data (e.g., land use, human population statistics), and data from turtle capture studies.

e. **Development of statistical analyses and simulations to identify data needs.** Designs future research goals and activities based on: (i) sensitivity analyses of parameters in population analyses; (ii) known data needs resulting in analytical limitations; (iii) results from geospatial gap analyses; or (iv) anticipated future resource management needs. Essentially this is the adaptive management framework.

f. **Development of chronology analytical techniques for aging stranded turtles.** Refines, matures, and expands the MTAP aging laboratory to be a regional expert analytical lab for aging analyses of stranded and seized turtles performed by MTAP staff for both NOAA and non-NOAA collaborators. This research is largely analytical of data already collected, or is primary research on bone and shell tissue from (dead) stranded and seized turtles. Collection of turtle specimens and analyses are done in collaboration with MTRP and USFWS Offices of Law Enforcement.

2.1.1.2 Research on Sea Turtle Populations in the Hawaiian Archipelago on Beach and Shoreline Habitats

a. **Nesting Beach Surveys.** Working with the MTRP, collecting data on nesting, nest counts, locations, substrate type, vegetation cover, beach area, baseline sand temperatures, conservation management practices, and remotely sensed data.

b. **Nesting Females.** Working with the MTRP, monitoring egg laying to include recording the clutch size of nests as well as basic measurements of the nester and tissue sampling – both after the nest is laid.

c. **Nest-level Inventories.** Working with the MTRP, evaluating incubation periods, emergence rates, hatching rates, depredation activity, and assisting hatchling emergence when opportune.

d. **Stranding Response Networks.** Working with the MTRP, evaluating sea turtle strandings throughout the Hawaiian Archipelago.

e. **DNA Analysis.** Working with the MTRP, collecting skin, blood, or tissue from live or dead turtles for genetic analyses (e.g., DNA, MtDNA, microsatellites) used in stock delineation to establish distinct population segments.

f. **Stable Isotope Analysis.** Working with the MTRP, collecting of skin, blood, or tissue from live or dead turtles for stable isotope analyses used for stock structure, demographic, and dietary studies.

g. **Fibropapillomatosis**. Working with the MTRP, collecting data related to the existence, causes, extent, and progression or regression of the tumor forming disease known as fibropapillomatosis. Opportunistic collection of skin, blood, or tissue from dead turtles with tumors for genetic, virological, and histopathological analyses.

h. **Algae Luxury Consumption.** Working with the MTRP, nutrient enrichment experiments on contained aquaria at NOAA's Kewalo Research Facility (Honolulu, HI) to measure N-sequestration, storage, and growth in macroalgae species.

i. **Parasitology and Toxicology.** Working with the MTRP, collecting of epibiota (i.e., animals and plants attached to sea turtle exterior) for identification and study. Collection of blood and tissue samples from captured live and dead turtles to study internal parasites and toxin accumulation.

j. **Dietary Habits.** Working with the MTRP, collecting data from live and dead turtles, including evaluation of food found in the mouth, stomach, crop, gastrointestinal tract, feces, and esophageal or stomach lavages.

k. **Basking Sea Turtles.** Working with the MTRP, collecting data from basking green turtles regarding, when appropriate, life stage, sex, health status, tags, and DNA.

l. **Evaluation of Physical Condition.** Working with the MTRP, collecting physical dimension measurements of live captured and injured or dead stranded turtles for calculating of body mass indices.

m. **Collaborations with Authorized Hatcheries or Aquaria**. Research conducted on turtles at authorized facilities for nest and hatchling research, blood or tissue sampling, allometric growth, facial pattern recognition techniques, and educational outreach.

2.1.1.3 Research on Sea Turtle Populations in the Hawaiian Archipelago in Pelagic Habitats

a. **Capture-Mark-Recapture.** Working with the MTRP, capturing live turtles in the ocean for tagging and subsequent recapture studies.

b. **Nearshore Movements, Fidelity, and Tracking.** Working with the MTRP, installing satellite transmitters on live captured turtles to document the spatial behavior of juveniles, subadults, adults, and inter-nesting adults.

c. **Incidental Fishery Bycatch.** Manages and evaluates data collected from turtles incidentally caught in recreational or commercial fisheries (including fisheries in the Pacific Islands Region, outside of the Hawaiian Archipelago, managed by PIRO).

d. **Release of Captive-Reared Turtles into the Environment.** Provides scientific advice and assistance on the release of hatchery and captive-reared turtles into suitable offshore habitat in cooperation with local agencies and authorized local programs.

2.1.1.4 Research on Sea Turtle Stocks in the Pacific Islands Region through Technical Assistance, Training, Collaboration, and Analytic Actions

a. **International Collaboration.** Collaborates with sea turtle researchers from other Pacific Rim and Pacific Island nations and providing assistance to research programs to build research capacity, including training in research techniques, sharing information and data exchange, and providing scientific advice.

b. **Training Fishery Observers in Research Techniques.** Trains fishery observers aboard commercial fishing vessels in collection of sea turtle data from sea turtles caught incidentally by commercial fishery.

c. **Education and Outreach.** Develops and distributes written educational materials, in conjunction with on-site field activities, making presentations at adult- and children-oriented venues, publishing in periodicals and peer-reviewed journals, and providing specimens to museums on-loan and other public and educational institutions.

d. **Modeling Population Dynamics.** Stores and analyzes data in developing models of sea turtle population dynamics and population recovery. This is done in collaboration with national and international programs and collaborators.

e. **Age and Growth Rates.** Analyzes morphometric data from live turtles and and chronology and morphometric data from dead turtles to evaluate population age structure and individual growth rates.

2.1.2 Techniques and Methods Used by the MTAP for Sea Turtle Research Involving Varying Levels of Interaction with Dead and Living Sea Turtles

A. Encounter. This involves observing turtles from a distance.

1. Observe feeding and other behavior, either visually or with a camera.
2. Record presence, either visually or with a camera.
3. Count numbers, either visually or with a camera.

B. Capture. This involves the actual handling of individual turtles.

1. Capture using gear in the water, such as a scoop net, a tangle net, or trapping in a pen.
2. Capture by hand, either on land or in the nearshore waters.
3. Capture on beaches, with open “box pen.”
4. Capture of hatchlings and collection of eggs, either in the nest or on the beach.
5. Capture of dead or live stranded individuals, involving primarily capture by hand at the stranding site.
6. Incidental bycatch in commercial fisheries in the Pacific Ocean.

C. Inspect. This involves handling and manipulating the individual turtle after capture.

1. Measure for size and growth rate.
2. Weigh.
3. Attempt to determine sex visually.
4. Conduct external and oral exam for health status.
5. Search for presence of biota on the skin or carapace, such as barnacles or leeches.
6. Conduct exam for external injuries, such as evidence of attempted predation, fishing line entanglement, or boat strike.
7. Record existence of and information from tag(s).
8. Count and describe FP tumors.
9. Conduct laparoscopy for sex determination of juveniles and breeding condition of adults.

D. Sample. This involves handling and taking physical samples from individual turtles, alive and dead, after capture.

1. If animal is alive, in addition to the external inspections above, the following may be collected:

a. Blood samples for total protein, packed cell volume, serum chemistry, or parasites and other desired considerations.
b. Samples of biota living on skin or carapace, such as barnacles, leeches, and algae.
c. FP tumors (if recapture, measure for progression or regression of disease).
d. Skin or blood for DNA identification.
e. Food samples from crop or mouth, including esophageal lavage.
f. Feces.
g. Tissue for stable isotope study.

2. If the animal is dead, during external exam or necropsy, in addition to the above samples (other than blood), the following may be collected:

a. Humerii bones and other tissue samples.
b. Food from gastrointestinal tract.
c. Urine or feces.
d. Reproductive organs for sex identification and reproductive status and fertility.
e. Tumor samples (if a recapture, evaluate for progression or regression of disease).
f. Skeletal materials.
g. Skin or other tissue for DNA identification.
h. Tissue for stable isotope study.

i. Epibiota (plants and animals attached to the skin and shell of a turtle).

j. Tissues from nest remains.

E. Tag. This involves placing a physical tag either into tissue of the flipper, under the skin surface, or affixed to the shell of the individual turtle.

- Passive tags:
  - External flipper tag (metal or plastic);
  - PIT tag injected under the skin that can then be electronically scanned;
  - External shell mark (alphanumeric identification etched into shell and painted white)
- Active Tags:
  - Radio transmitter that either transmits globally using satellites or short-range using sonic and VHF frequencies attached to the shell;
  - Archival tag (collects and stores temperature, depth, time, or location data)

F. Veterinarian Care. This involves the handling and manipulation of individual turtles by licensed veterinary professionals for the purposes of rehabilitation and captive care.

1. Rehabilitate sick or injured turtles for release into the wild, including transport, holding, handling, diagnosis, observation of behavior, treatment (such as dosing with medicine and surgery performed by a licensed veterinarian), feeding and other necessary care. Veterinary procedures typically performed may include but are not limited to:
   - radiographs
   - surgical flipper amputation under gas anesthesia
   - medications administered (antibiotics, fluids, mineral oil, GasX, etc.)
   - force feeding
   - fishing line extracted from mouth or cut short at mouth if unable to extract
   - fish hook removed with or without minor surgery and local anesthetic
   - shell repaired with fiberglass/resin/epoxy/stainless steel wire
   - tumor surgically removed (cryosurgery or cutting) or treated with topical ointment (blood root) or injection (Dermex)
   - Endoscopy
2. Conduct humane euthanasia of a sick or injured sea turtle if two or more veterinarians decide it has no chance to recover or survive in the natural environment. There are only two Institutional Animal Care and Use Committee (IACUC) approved methods of euthanasia for reptiles,

barbiturate overdose and penetrating captive bolt, and the MTRP only uses barbiturate overdose.

3. Conduct a comprehensive necropsy of all euthanized turtles by a licensed veterinary pathologist.

G. Transport of Captured Turtles. This involves handling, stabilizing, and transporting living turtles.

1. Using a certified animal carrier, with the turtle covered with a wet pad for cooling on a plane, in the back of a vehicle, or on a boat if the individual is captured at sea.
2. Transport of salvaged and frozen dead turtles or turtle tissues, boxed and shipped by ground or air transport.

H. Release of Wild Turtles Back into the Natural Environment. This involves tagging, transporting to the appropriate release point, and release of individuals into suitable habitat, as defined by sea turtle experts.

I. Collection of Environmental Samples. This involves collection of information and physical samples from the environment in support of sea turtle research.

1. Collect invertebrates such as sponges, algae and sea grasses in known turtle foraging areas.
2. Collect reef fish observed to groom sea turtles, such as saddleback wrasse, surgeonfish, and tangs for presence of viruses and other pathogens.
3. Collect sediments for presence of viruses and other pathogens.
4. Record and archive seawater temperature data.
5. Record and archive sand temperature data.
6. Collect seawater for presence of viruses and other pathogens.
7. Record and archive weather data and associated oceanographic characteristics.
8. Collect beach sand for analysis of beach physiology (sand grain size, porosity, water content, etc.).
9. Collect invertebrates and non-cleaning fish from foraging habitats for presence of viruses and other pathogens.

J. Technical Assistance, Modeling, Data Analysis, Educational Outreach, and International Collaboration. This involves data storage and manipulation, developing and using population models, educational outreach, and collaborating with international sea turtle researchers from the Pacific Rim and Pacific Island nations to further research in support of the recovery of Pacific stocks of sea turtles. Technical assistance involves the transfer of specific scientific expertise to train professionals in other countries, assist in data analysis, provide supplies, and perform other noninvasive actions.

2.1.3 Standard Operating Procedures for Implementation of Methods and Techniques

2.1.3.1 Standard Operating Procedures Accepted Worldwide

The MTAP ensures the safety of research and technician personnel first and foremost in all program activities, and conducts constant training of all personnel in the implementation of techniques and methods, both in the laboratory and in the field.

All research techniques and methods are conducted consistent with accepted standards within the sea turtle research community (Eckert *et al.* 1999) based on efficacy and the experience gained through 34 years of implementation.

Eckert *et al.* (1999) incorporates standards for:

- Capturing (L.M. Ehrhart and L.H. Ogren. *Studies in Foraging Habitats: Capturing and Handling Turtles*; see also: Balazs *et al.* 1987 and Balazs *et al.* 1998);
- Tagging (S.A. Eckert. *Data Acquisition Systems for Monitoring Sea Turtle Behavior and Physiology*; G.H. Balazs. *Factors to Consider in the Tagging of Sea Turtles*; see also: Balazs *et al.* 1996);
- Collecting physical measurements (A.B. Bolten. *Techniques for Measuring Sea Turtles*);
- Diet sampling and diet component analysis, including the use of esophageal lavage (Forbes and Limpus 1993, G.H. Balazs 1992);
- Measuring growth and growth rates (R.P. Van Dam. *Measuring Sea Turtle Growth*);
- Genetic population sampling (N. FitzSimmons, C. Moritz, and B.W. Bowen. *Population Identification;* also see: Bowen *et al.* 1992);
- Determining clutch size and reproductive success (J.D. Miller. *Determining Clutch Size and Hatching Success*);
- Diagnosing sex of sea turtles in foraging habitats (T. Wibbels. *Diagnosing the Sex of Sea Turtles in Foraging Habitats*);
- Techniques for evaluating infectious diseases of sea turtles (L.H. Herbst*. Infectious Diseases of Sea Turtles*);
- Tissue sampling and biopsy techniques (E.R. Jacobsen. *Tissue Sampling and Necropsy Techniques;* see also Dutton and Balazs 1996);
- Techniques for sampling blood and conducting laparoscopy for determining reproductive cycles (D. Wm. Owens. *Reproductive Cycles and Endocrinology*);
- Conducting stranding and salvaging networks (D.J. Shaver and W.G. Teas. *Stranding and Salvage Networks*)

2.1.3.2 MTAP Standard Operating Procedures

The following standard operating procedures are incorporated into the protocols for implementing the techniques and methods described in Section 2.1.2. These standard operating procedures are designed to minimize the impact of MTAP's techniques and methods on the environment, and turtles in particular.

- Nesting females can become skittish or disturbed if a light is shined on their face during egg deposition, or if they see the researcher or the researcher's shadow. To reduce the likelihood of disturbance, flashlight use is minimized and the light is covered with the hand with the first two fingers spread slightly to focus the beam. Researchers always approach a nesting turtle slowly from the rear. Before contact is made with the turtle, her activity is noted, and an attempt to identify her by shell etching or tag is made. Based on her activity, the researcher decides if it is the appropriate time to safely tag and sample (if necessary) the turtle without disrupting the nesting process. The best time for the researcher to interact with the turtle is after egg laying is complete.
- PIT tags are best inserted directly under the skin into the hind flipper after the female has completed egg laying, when she typically goes into a trance-like state, or, secondarily, when the turtle is crawling, making a body pit, covering the eggs, or backfilling, but never while excavating the egg chamber or depositing eggs to avoid any potential for nest abandonment. Every pre-sterilized needle is used only once and disposed of properly.
- Skin sites for all activities that require puncturing the skin, such as tag application activities that require attachment to skin (physical tags or PIT tags), and collecting biopsies and blood samples, and use of tools for carapace marking and measuring, are cleaned with an antiseptic.
- Skin biopsies are taken from turtles incidentally caught in commercial fisheries, confiscated by law enforcement, captured during fieldwork, encountered on a nesting beach, and stranded turtles. The biopsy (a small plug of skin and tissue) is quickly taken from the edge of a hind flipper or from the soft skin near the hind flippers using a sharp pre-sterilized punch tool.
- When possible, satellite and VHF radio transmitters are attached, removed, and/or replaced on nesting females only when the turtle has finished nesting to avoid nest abandonment.
- All wild turtles are typically held for field research activities for periods of time varying from minutes to one to two hours, unless a satellite or radio transmitter is being attached, at which point holding could extend to three hours.
- All drugs, including topical medications, vitamins and dietary supplements, and antibiotics are administered to turtles only by trained staff under the supervision of licensed veterinarians using approved IACUC protocols.
- Release of wild turtles from anywhere in the Hawaiian Islands back into the natural environment either during research activities or after rehabilitation at the NMFS Kewalo Research Facility (KRF) in Honolulu, Hawaii includes:

- Any potentially diseased individual (known to be or potentially exposed) will not be released into areas having no known evidence of disease. When necessary, the animal is placed in quarantine for an appropriate duration, and the animal is observed for abnormal physical, physiological, or behavioral conditions; blood samples are collected to ensure absence of or an acceptable level of medical problems, as determined by a veterinary pathologist, prior to release.
- Turtles stranded in areas not known to have the FP disease (i.e., leeward coast of Hawaii) are never released back into the original stranding site because the seawater used at KRF is recycled from the Oahu coast and the turtles could have been infected during their rehabilitation. All such turtles are released at sites on Oahu.
- Turtles with or without FP tumors stranded from waters known to have the disease are released into calm waters close to the capture site, or in Kaneohe or Kailua Bays. Kaneohe Bay has the highest prevalence of FP disease in Hawaii and has calm waters; therefore, it is an appropriate release site for animals that have previously been exposed to the disease.
- Turtles with one or more flipper amputated in the wild or by surgery because of severe entanglement or physical damage are released into calm waters of Kailua Bay or Maunalua Bay on Oahu to facilitate swimming.
- Turtles are transported by truck to the release site in an approved container, covered with a wet absorbent pad, and are then carried by hand to be released near the water’s edge, or gently from a boat.
- After release, observers watch for the turtle to surface several times to breathe to ensure that the turtle is behaving normally and moving away from shore.

2.1.3.3 Standard Operating Procedures for Avoiding Disturbance to Other Species, Especially Monk Seals on Sea Turtle Nesting Beaches

Prior to going into the field to conduct MTAP activities, all personnel undergo training, study the program's standard operating procedures manual, and are prepared to adhere to all requirements.

- Monk seals typically rest facing inland, therefore researchers always scan with the flashlight from the shoreline berm towards the center of the island to avoid shining the light in the eyes of monk seals.
- If a monk seal happens to be facing the researcher, the light is turned off and the researcher slowly moves away.
- Researchers encountering monk seals remain at an appropriate distance at all times.
- Nesting research surveys would be conducted no more than once per hour to minimize disturbance to nesting turtles, seabirds, and monk seals unless a particular turtle needs to be identified or observed.

- Researchers maintain a low profile during daylight when encountering a monk seal, and whenever possible, pass it from downwind.
- Researchers attempt to keep noise or sudden sounds to a minimum.
- If a monk seal notices the researcher, the person crouches down and slowly moves away.

2.2 Alternative B: Proposed Action – Implementation and Expansion of the Current Program to include the U.S. Insular Areas of the Pacific Islands Region.

The MTAP proposes to apply the components, techniques and methods, and standard operation procedures described under Alternative A (Section 2.1) to the U.S. Insular Areas within the Pacific Islands Region that have historically been underrepresented in population assessments. For completeness, some of these components, techniques, and methods have been repeated and incorporated into this section. As described under Alternative A, the MTAP collaborates with other researchers across the Pacific Island Region. Alternative B, the Proposed Action, would expand the data collection activities (e.g., nesting surveys, deploying satellite tags) to the U.S. Insular Areas of the Pacific Islands Region in order to improve the sea turtle population assessments, while still providing collaborative analytical services in the Hawaiian Archipelago. As discussed in Section 1.1, the five sea turtle species found in the Pacific Islands Region migrate vast distances and face threats to survival everywhere they travel. The Proposed Action by the MTAP would begin to fill some of these data gaps through enhanced and improved data collection and analyzes. The MTAP would continue to collaborate with the MTRP and other researchers who collect biological and ecological data in the Hawaiian Archipelago by providing field and analytical services. Together, these sea turtle research activities will further the understanding of all five listed species that are found in NMFS Pacific Islands Region.

2.2.1 Components of the Proposed Action

Using the techniques and methods described below, which have previously been implemented under Alternative A using the associated standard operating procedures, the MTAP proposes conducting investigations that can be grouped into four broad categories: (a) analytical population assessments, (b) field research associated with beach and near-shore habitats, (c) field research associated with pelagic habitat, and (d) investigations associated with technical assistance, training, international collaboration, and analytic actions.

2.2.1.1 Research on Sea Turtle Population Dynamics across the Pacific Islands Region

a. **Characterizing and explaining population variability.** Collects and analyzes existing datasets of population indices from a variety of species and locations to understand population trends and viability, demographic and environmental stochasticity, and spatial density patterns. Collaborates with foreign and domestic colleagues to expand spatial extent, species, and time series coverage of data.

b. **Assessing natural and anthropogenic population impacts.** Quantifies local population impacts – and their trends through time – using advanced climate modeling, historical data and more traditional sources, such as injury data compiled from stranded turtles and incidental bycatch and fisheries statistics.

c. **Evaluation of management and fishery activities to population recovery.** Provides scientific advice to resource managers on the population impacts from potential actions. These modeling activities are based on established population ecological dynamics and existing datasets.

d. **Epidemiology.** Researches and models the existence, distribution, and cause of turtle diseases. Analyses include data obtained from stranded turtles, remotely-sensed data (e.g., land use, human population statistics), and data from turtle capture studies.

e. **Development of statistical analyses and simulations to identify data needs.** Designs future research goals and activities based on: (i) sensitivity analyses of parameters in population analyses; (ii) known data needs resulting in analytical limitations; (iii) results from geospatial gap analyses; or (iv) anticipated future resource management needs. Essentially this is the adaptive management framework.

f. **Development of chronology analytical techniques for aging stranded turtles.** Refines, matures, and expands the MTAP aging laboratory to be a regional expert analytical lab for aging analyses of stranded and seized turtles performed by MTAP staff for both NOAA and non-NOAA collaborators. This research is largely analytical of data already collected, or is primary research on bone and shell tissue from (dead) stranded and seized turtles. Collection of turtle specimens and analyses are done in collaboration with MTRP and USFWS Offices of Law Enforcement.

2.2.1.2 Research on Sea Turtle Populations in the Pacific Islands Region on Beach and Shoreline Habitats

a. **Nesting Beach Surveys.** Leading, training, and assisting federal, state, and local personnel with collection of data from green and hawksbill turtle nests. Dates of nesting, nest counts and locations will be recorded in addition to abiotic beach characteristics. The latter consists of describing substrate type, vegetation cover, beach area, baseline sand temperatures, conservation management practices, and remotely sensed data.

b. **Nesting Females.** Monitoring egg laying to include recording the clutch size of nests as well as basic measurements of the nester and tissue sampling – both after the nest is laid. Additionally, when conditions permit, satellite transmitters will be installed on females to track their inter-nesting spatial behavior.

c. **Nest-level Inventories.** Evaluation of incubation periods, emergence rates, hatching rates, depredation activity, and assisting hatchling emergence when opportune. Post-hatching nest inventories will include data to evaluate sex ratios (i.e., in-nest data loggers and post-mortem analysis of remaining hatchlings).

d. **Stranding Response Networks.** Initiate stranding response programs throughout the U.S. Insular Areas in partnership with local agencies. Collect data from live and dead stranded sea turtles, and support local care and rehabilitation of live animals, and necropsy of dead animals.

e. **DNA Analysis.** Collection of skin, blood, or tissue from live or dead turtles for genetic analyses (e.g., DNA, MtDNA, microsatellites) used in stock delineation to establish distinct population segments.

f. **Stable Isotope Analysis.** Collection of skin, blood, or tissue from live or dead turtles for stable isotope analyses used for stock structure, demographic, and dietary studies. For comparable isotope references, trivial amounts of reef forage (common macroalgae species) will be collected.

g. **Fibropapillomatosis**. Collection of data related to the existence, causes, extent, and progression or regression of the tumor forming disease known as fibropapillomatosis. Opportunistic collection of skin, blood, or other tissue from dead turtles with tumors for genetic, virological, and histopathological analyses.

h. **Algae Luxury Consumption.** Nutrient enrichment experiment on contained aquaria at NOAA's Kewalo Research Facility (Honolulu, HI) to measure N-sequestration, storage, and growth in macroalgae species. This research – conducted in collaboration with the UH Manoa, Botany Department – examines the potential impacts from coastal eutrophication to the distribution and nutrient content of common green turtle forage items. Algal samples will be collected for non-native, invasive, as well as non-invasive species that are known forage for green sea turtles. This work will be done in collaboration with UH Manoa.

i. **Parasitology and Toxicology.** Collection of epibiota (animals and plants attached to sea turtle exterior) for identification and study. Collection of blood and tissue samples from captured live and dead turtles to study internal parasites and toxin accumulation.

j. **Dietary Habits.** Collection of data from live and dead turtles, including evaluation of food found in the mouth, stomach, crop, gastrointestinal tract, feces, and esophageal or stomach lavages.

k. **Basking Sea Turtles.** Collection of data from basking green turtles (not at French Frigate Shoals) regarding, when appropriate, life stage, sex, health status, tags, and DNA.

l. **Evaluation of Physical Condition.** Physical dimension measurements of live captured and injured or dead stranded turtles for calculating of body mass indices. These data provide insights for nutrition, carrying capacity, general health, or geographic variation within species.

m. **Collaborations with Authorized Hatcheries or Aquaria**. Research conducted on turtles at authorized facilities for nest and hatchling research, blood or tissue sampling, allometric growth, facial pattern recognition techniques, and educational outreach.

2.2.1.3 Research on Sea Turtle Populations in the Pacific Islands Region in Pelagic Habitats

a. **Capture-Mark-Recapture.** Captures live turtles in the ocean for tagging and subsequent recapture studies. Turtles are measured, blood or tissues taken, two PIT tags inserted in rear flippers, and numerical identification etched on their shell exteriors. Less commonly satellite transmitters are installed when available.

b. **Nearshore Movements, Fidelity, and Tracking.** Installs satellite transmitters on live captured turtles to document the spatial behavior of juveniles, subadults, adults, and inter-nesting adults. Spatial location and dive behavior will be incorporated into stock structure (i.e., range and distribution) and foraging ecology studies.

c. **Incidental Fishery Bycatch.** Manages and evaluates data collected from turtles incidentally caught in recreational or commercial fisheries. When appropriate, satellite and other tracking devices are installed on healthy turtles to evaluate post-interaction survival and spatial behavior after release.

d. **Release of Captive-Reared Turtles into the Environment.** Provides scientific advice and assistance on the release of hatchery and captive-reared turtles into suitable offshore habitat in cooperation with local agencies and authorized local programs.

2.2.1.4 Research on Sea Turtle Stocks in the Pacific Islands Region through Technical Assistance, Training, Collaboration, and Analytic Actions

a. **International Collaboration.** Collaborates with sea turtle researchers from other Pacific Rim and Pacific Island nations and providing assistance to research programs to build research capacity, including training in research techniques, sharing information and data exchange, and providing scientific advice.

b. **Training Fishery Observers in Research Techniques.** Trains fishery observers aboard commercial fishing vessels in collection of sea turtle data from sea turtles caught incidentally by commercial fishery.

c. **Education and Outreach.** Develops and distributes written educational materials, in conjunction with on-site field activities, making presentations at adult- and children-oriented venues, publishing in periodicals and peer-reviewed journals, and providing specimens to museums on-loan and other public and educational institutions.

d. **Modeling Population Dynamics.** Stores and analyzes data in developing models of sea turtle population dynamics and population recovery. This is done in collaboration with national and international programs and collaborators.

e. **Age and Growth Rates.** Analyzes morphometric data from live turtles and and chronology and morphometric data from dead turtles to evaluate population age structure and individual growth rates.

2.2.2 Techniques and Methods Used by the MTAP for Sea Turtle Research Involving Varying Levels of Interaction with Dead and Living Sea Turtles

A. Encounter. This involves observing turtles from a distance.

1. Observe feeding and other behavior, either visually or with a camera.
2. Record presence, either visually or with a camera.

3. Count numbers, either visually or with a camera.

B. Capture. This involves the actual handling of individual turtles.

1. Capture using gear in the water, such as a scoop net or tangle net.
2. Capture by hand, either on land or in the nearshore waters.
3. Capture on beaches, with open “box pen.”
4. Capture of hatchlings and collection of eggs, either in the nest or on the beach.
5. Capture of dead or live stranded individuals, involving primarily capture by hand at the stranding site.
6. Incidental bycatch in commercial fisheries in the Pacific Ocean.

C. Inspect. This involves handling and manipulating the individual turtle after capture.

1. Measure for size and growth rate.
2. Weigh.
3. Attempt to determine sex visually.
4. Conduct external and oral exam for health status.
5. Search for presence of biota on skin/carapace, such as barnacles or leeches.
6. Conduct exam for external injuries, such as evidence of attempted predation, fishing line entanglement, or boat strike.
7. Record existence of and information from tag(s).
8. Count and describe FP tumors.
9. Conduct laparoscopy for sex determination of juveniles and breeding condition of adults.

D. Sample. This involves handling and taking physical samples from individual turtles, alive and dead, after capture.

1. If animal is alive, in addition to the external inspections above, the following may be collected:

   a. Blood samples for total protein, packed cell volume, serum chemistry, and/or parasites and other desired considerations.
   b. Samples of biota living on skin or carapace, such as barnacles, leeches, and algae.
   c. FP tumors (if recapture, measure for progression orregression of disease).
   d. Skin or blood for DNA identification.
   e. Food samples from crop or mouth, including esophageal lavage.
   f. Feces.
   g. Tissue for stable isotope study.

2. If the animal is dead, during external exam or necropsy, in addition to the above samples (other than blood), the following may be collected:

a. Humerii bones and other tissue samples.

b. Food from gastrointestinal tract.

c. Urine or feces.

d. Reproductive organs for sex identification and reproductive status and fertility.

e. Tumor samples (if a recapture, evaluate for progression or regression of disease).

f. Skeletal materials.

g. Skin or other tissue for DNA identification.

h. Tissue for stable isotope study.

i. Epibiota (i.e., plants and animals attached to the skin and shell of a turtle).

j. Tissues from nest remains.

E. Tag. This involves placing a physical tag either into tissue of the flipper, under the skin surface, or affixed to the shell of the individual turtle.

- Passive tags:
  - External flipper tag (metal or plastic);
  - PIT tag injected under the skin that can then be electronically scanned;
  - External shell mark (alphanumeric identification etched into shell and painted white)
- Active Tags:
  - Radio transmitter that either transmits globally using satellites or short-range using sonic and VHF frequencies attached to the shell;
  - Archival tag (collects and stores temperature, depth, time, or location data)

F. Veterinarian Care. This involves the handling and manipulation of individual turtles by licensed veterinary professionals for the purposes of rehabilitation and captive care.

1. Rehabilitate sick or injured turtles for release into the wild, including transport, holding, handling, diagnosis, observation of behavior, treatment (such as dosing with medicine and surgery performed by a licensed veterinarian), feeding and other necessary care. Veterinary procedures typically performed may include but are not limited to:
   - radiographs
   - surgical flipper amputation under gas anesthesia
   - medications administered (antibiotics, fluids, mineral oil, GasX, etc.)

- force feeding
- fishing line extracted from mouth or cut short at mouth if unable to extract
- fish hook removed with or without minor surgery and local anesthetic
- shell repaired with fiberglass/resin/epoxy/stainless steel wire
- tumor surgically removed (cryosurgery or cutting) or treated with topical ointment (blood root) or injection (Dermex)
- Endoscopy

2. Conduct humane euthanasia of a sick or injured sea turtle if two or more veterinarians decide it has no chance to recover or survive in the natural environment. There are only two Institutional Animal Care and Use Committee (IACUC) approved methods of euthanasia for reptiles, barbiturate overdose and penetrating captive bolt, and the MTRP only uses barbiturate overdose.
3. Conduct a comprehensive necropsy of all euthanized turtles by a licensed veterinary pathologist.

G. Transport of Captured Turtles. This involves handling, stabilizing, and transporting living turtles.

1. Using a certified animal carrier, with the turtle covered with a wet pad for cooling on a plane, in the back of a vehicle, or on a boat if the individual is captured at sea.
2. Transport of salvaged and frozen dead turtles or turtle tissues, boxed and shipped by ground or air transport.

H. Release of Wild Turtles Back into the Natural Environment. This involves tagging, transporting to the appropriate release point, and release of individuals into suitable habitat, as defined by sea turtle experts.

I. Collection of Environmental Samples. This involves collection of information and physical samples from the environment in support of sea turtle research.

1. Collect invertebrates such as algae or sea grasses in known turtle foraging areas.
2. Collect sediments for presence of viruses and other pathogens.
3. Record and archive seawater temperature data.
4. Record and archive sand temperature data.
5. Collect seawater for presence of viruses and other pathogens.
6. Record and archive weather data and associated oceanographic characteristics.
7. Collect beach sand for analysis of beach physiology (e.g., sand grain size, porosity, water content).

J. Technical Assistance, Modeling, Data Analysis, Educational Outreach, and International Collaboration. This involves data storage and manipulation, developing and using population models, educational outreach, and collaborating with international sea turtle researchers from the Pacific Rim and Pacific Island nations to further research in support of the recovery of Pacific stocks of sea turtles. Technical assistance involves the transfer of specific scientific expertise to train professionals in other countries, assist in data analysis, provide supplies, and perform other noninvasive actions.

2.2.3 Standard Operating Procedures for Implementation of Methods and Techniques

2.2.3.1 Standard Operating Procedures Accepted Worldwide

The MTAP ensures the safety of research and technician personnel first and foremost in all program activities, and conducts constant training of all personnel in the implementation of techniques and methods, both in the laboratory and in the field.

All research techniques and methods are conducted consistent with accepted standards within the sea turtle research community (Eckert *et al.* 1999) based on efficacy and the experience gained through 34 years of implementation.

Eckert *et al.* (1999) incorporates standards for:

- Capturing (L.M. Ehrhart and L.H. Ogren. *Studies in Foraging Habitats: Capturing and Handling Turtles*; see also: Balazs *et al.* 1987 and Balazs *et al.* 1998);
- Tagging (S.A. Eckert. *Data Acquisition Systems for Monitoring Sea Turtle Behavior and Physiology*; G.H. Balazs. *Factors to Consider in the Tagging of Sea Turtles*; see also: Balazs *et al.* 1996);
- Collecting physical measurements (A.B. Bolten. *Techniques for Measuring Sea Turtles*);
- Diet sampling and diet component analysis, including the use of esophageal lavage (Forbes and Limpus 1993, G.H. Balazs 1992);
- Measuring growth and growth rates (R.P. Van Dam. *Measuring Sea Turtle Growth*);
- Genetic population sampling (N. FitzSimmons, C. Moritz, and B.W. Bowen. *Population Identification;* also see: Bowen *et al.* 1992);
- Determining clutch size and reproductive success (J.D. Miller. *Determining Clutch Size and Hatching Success*);
- Diagnosing sex of sea turtles in foraging habitats (T. Wibbels. *Diagnosing the Sex of Sea Turtles in Foraging Habitats*);
- Techniques for evaluating infectious diseases of sea turtles (L.H. Herbst*. Infectious Diseases of Sea Turtles*);
- Tissue sampling and biopsy techniques (E.R. Jacobsen. *Tissue Sampling and Necropsy Techniques;* see also Dutton and Balazs 1996);
- Techniques for sampling blood and conducting laparoscopy for determining reproductive cycles (D. Wm. Owens. *Reproductive Cycles and Endocrinology*);

- Conducting stranding and salvaging networks (D.J. Shaver and W.G. Teas. *Stranding and Salvage Networks*)

2.2.3.2 MTAP Standard Operating Procedures

The following standard operating procedures are incorporated into the protocols for implementing the techniques and methods described in Section 2.2.2. These standard operating procedures are designed to minimize the impact of MTAP's techniques and methods on the environment, and turtles in particular.

- Nesting females can become skittish or disturbed if a light is shined on their face during egg deposition, or if they see the researcher or the researcher's shadow. To reduce the likelihood of disturbance, flashlight use is minimized and the light is covered with the hand with the first two fingers spread slightly to focus the beam. Researchers always approach a nesting turtle slowly from the rear. Before contact is made with the turtle, her activity is noted, and an attempt to identify her by shell etching or tag is made. Based on her activity, the researcher decides if it is the appropriate time to safely tag and sample (if necessary) the turtle without disrupting the nesting process. The best time for the researcher to interact with the turtle is after egg laying is complete.
- PIT tags are best inserted directly under the skin into the hind flipper after the female has completed egg laying, when she typically goes into a trance-like state, or, secondarily, when the turtle is crawling, making a body pit, covering the eggs, or backfilling, but never while excavating the egg chamber or depositing eggs to avoid any potential for nest abandonment. Every pre-sterilized needle is used only once and disposed of properly.
- Skin sites for all activities that require puncturing the skin, such as tag application activities that require attachment to skin (physical tags or PIT tags), and collecting biopsies and blood samples, and use of tools for carapace marking and measuring, are cleaned with an antiseptic.
- Skin biopsies are taken from turtles incidentally caught in commercial fisheries, confiscated by law enforcement, captured during fieldwork, encountered on a nesting beach, and stranded turtles. The biopsy (a small plug of skin and tissue) is quickly taken from the edge of a hind flipper or from the soft skin near the hind flippers using a sharp pre-sterilized punch tool.
- When possible, satellite and VHF radio transmitters are attached, removed, and/or replaced on nesting females only when the turtle has finished nesting to avoid nest abandonment.
- All wild turtles are typically held for field research activities for periods of time varying from minutes to 1 to 2 hours, unless a satellite or radio transmitter is being attached, at which point holding could extend to 3 hours.
- All drugs, including topical medications, vitamins and dietary supplements, and antibiotics are administered to turtles only by trained staff under the supervision of licensed veterinarians using approved IACUC protocols.

- Release of wild turtles from anywhere in the Hawaiian Islands back into the natural environment either during research activities or after rehabilitation at the NMFS Kewalo Research Facility (KRF) in Honolulu, Hawaii includes:
    - Any potentially diseased individual (known to be or potentially exposed) will not be released into areas having no known evidence of disease. When necessary, the animal is placed in quarantine for an appropriate duration, and the animal is observed for abnormal physical, physiological, or behavioral conditions; blood samples are collected to ensure absence of or an acceptable level of medical problems, as determined by a veterinary pathologist, prior to release.
    - Turtles stranded in areas not known to have the FP disease (i.e., leeward coast of Hawaii) are never released back into the original stranding site because the seawater used at KRF is recycled from the Oahu coast and the turtles could have been infected during their rehabilitation. All such turtles are released at sites on Oahu.
    - Turtles with or without FP tumors stranded from waters known to have the disease are released into calm waters close to the capture site, or in Kaneohe or Kailua Bays. Kaneohe Bay has the highest prevalence of FP disease in Hawaii and has calm waters; therefore, it is an appropriate release site for animals that have previously been exposed to the disease.
    - Turtles with one or more flipper amputated in the wild or by surgery because of severe entanglement or physical damage are released into calm waters of Kailua Bay or Maunalua Bay on Oahu to facilitate swimming.
    - Turtles are transported by truck to the release site in an approved container, covered with a wet absorbent pad, and are then carried by hand to be released near the water's edge, or gently from a boat.
    - After release, observers watch for the turtle to surface several times to breathe to ensure that the turtle is behaving normally and moving away from shore.

2.2.3.3 Standard Operating Procedures for Avoiding Disturbance to Other Species, Especially Monk Seals on Sea Turtle Nesting Beaches

Prior to going into the field to conduct MTAP activities, all personnel undergo training, study the program's standard operating procedures manual, and are prepared to adhere to all requirements.

- Monk seals typically rest facing inland, therefore researchers always scan with the flashlight from the shoreline berm towards the center of the island to avoid shining the light in the eyes of monk seals.
- If a monk seal happens to be facing the researcher, the light is turned off and the researcher slowly moves away.
- Researchers encountering monk seals remain at an appropriate distance at all times.

- Nesting research surveys would be conducted no more than once per hour to minimize disturbance to nesting turtles, seabirds, and monk seals unless a particular turtle needs to be identified or observed.
- Researchers maintain a low profile during daylight when encountering a monk seal, and whenever possible, pass it from downwind.
- Researchers attempt to keep noise or sudden sounds to a minimum.
- If a monk seal notices the researcher, the person crouches down and slowly moves away.

2.3 Alternative C: No Federal Action

The no Federal action alternative would stop the MTAP research activities. This would not be consistent with the recovery plans of all five species of sea turtles found in the PIR (NMFS and USFWS 1998a, 1998b, 1998c, 1998d, 1998e). Sea turtle populations have not recovered per the recovery plans, and the large-scale biological and ecological factors that have contributed to sea turtle population declines across the Pacific Islands Region are poorly understood and need to be analyzed in order to achieve the recovery goals of all five sea turtle species. Furthermore, the NRC has identified population assessments as one of the most critical research topics in sea turtle ecology.

If the MTAP stopped conducting research on sea turtles, then data would not be collected on sea turtle stocks or life history (i.e., nesting, foraging, movement, genetics), and the necessary population assessments would not be conducted. Furthermore, the program would not engage in international collaboration, training, technical assistance, education, outreach, population modeling, or data analysis. As agents and federal employees of the NMFS, MTAP staff would continue to aid stranded sea turtles in accordance with the programmatic permit described at 50 CFR § 222.310.

This alternative would fail to meet the purpose of the MTAP at the PIFSC and would fail to fulfill the data needs of the federal government as the entity responsible for sea turtle recovery. Furthermore, data that otherwise would have been collected and analyzed by the MTAP would not be published in the peer-reviewed literature and other technical reports. Therefore, it would be difficult for the federal government and related management organizations to develop or implement management strategies for sea turtle species in the Pacific Ocean because they would not have the necessary biological and ecological information about the species.

This alternative would result in a short-term reduction in minor adverse impacts to the environment (i.e., turtles and similarly affected species) because researchers would not be actively working in the field handling turtles and collecting data. Handling turtles causes a small amount of non-lethal stress to the animal, but implementation of the standard operating procedures described in minimizes these temporary effects. The long-term impact of this alternative would be a lack of data necessary to analyze population trends and make management decision to recover these species (i.e., remove them from the list of threatened and endangered species). This would have moderate direct and indirect adverse ramifications on the local cultures that identity with sea turtles, tourism, the fishing industry, and ecological services (e.g., food-web maintenance) in the Pacific Ocean region.

The lack of research staff in the field would also likely reduce the overall response to stranded turtles because there would be fewer people in locations where turtles occur. It is anticipated that non-federal governmental agencies and non-governmental agencies (NGOs) would take over some of those data collection tasks, but the extent that these agencies would fill the roles of the MTAP and MTRP is difficult to predict. Given that the MTRP serves as the primary data collecting entity in the region, it is unlikely these agencies would have the same focused purpose or level funding, staff, or expertise to meet the data needs.

3 Description of Affected Environment

The focus of the proposed MTAP data collection and population assessment activities is on the U.S. Insular Areas of the Pacific Islands Region. The MTAP would continue population assessments and modeling of data collected by the MTRP in the Hawaiian Archipelago. Because historic data collection activities in the U.S. Insular Areas have been sporadic, the MTAP would initially need to survey a number of islands and atolls in the PIR to identify appropriate long-term monitoring locations. The initial MTAP data collection activities (e.g., a nesting survey) would include: Rose Atoll, Tau, and Tutuila in American Samoa; Rota, Saipan, and Tinian in CNMI; Guam; Jarvis Island; Howland Island; Baker Island; and Palmyra Atoll. These data collection activities would take place on beaches and in near-shore shallow water habitats as described in the Section 2.2. While the exact characteristics of each beach and near-shore environment will vary from island to island, and site to site, the processes that shaped these dynamic habitats (e.g., wave action, reef-building corals, volcanoes) in the PIR are similar and therefore they will be considered in general. A detailed description of the physical, chemical, and biological conditions the PIR can be found in the Final Environmental Impact Statement *Toward and ecosystem approach for the western Pacific region: from species-based fishery management plans to place-based fishery ecosystem plans*, and is incorporated by reference here (NMFS 2009). The EIS is available at the PIRO website under the heading of Public Documents, subheading National Environmental Policy Act Documents: http://www.fpir.noaa.gov/Library/PUBDOCs/environmental_impact_statements/FPEIS_FEP/NEPA%20Final%20PEIS%20with%20Appendices%20AU71%20FEPs%20%282009-09-24%29.pdf .

Along with the natural processes of wave action, reef-building corals, and volcanoes, the PIR is subject to the forces of open-ocean tropical phenomenon such as tsunamis and typhoons (i.e., referred to as hurricanes in the Atlantic or eastern and central Pacific Ocean, and cyclones in southern Pacific Ocean). For example, in September 2009 an earthquake and resulting tsunami devastated American Samoa (CIA 2012). Tsunami waves up to 20 feet tall washed over American Samoa up to one mile inland. In November 1991 Super Typhoon Yuri, a category 5 hurricane with wind gusts up to 115 mph, devastated Micronesia and cause 33 million dollars of damage in Guam.

3.1 Hawaiian Archipelago

3.1.1 Main Hawaiian Islands

The eight main islands make up only one quarter of the Hawaiian Archipelago's area, but are home to almost all 1.3 million people that live in the state. The eight high volcanic islands include (from southeast to northwest): Hawaii, Maui, Kahoolawe, Lanai, Molokai, Oahu, Kauai, and Niihau. The islands are located approximately 2,000 nautical miles from North America and 3,000 nautical miles from Asia. Despite these distances, tourism constitutes the largest part of the Hawaiian economy. Tourists are attracted to the tropical climate and diverse marine resources including coral reefs, sandy beaches, and surf breaks. The sandy beaches are generally protected by the fringing reefs but the sediment dynamics are vulnerable to disruption of near-shore currents. Agriculture and the military are the other main sources of state income. Consequently, the marine resources of the MHI experience pressures for overuse at tourist destinations and shipping traffic at the military bases and ports. Oahu is the most populous island and one of the most densely populated areas in the United States.

The MTAP is based at the Pacific Islands Fisheries Science Center in Honolulu, Hawaii. The rehabilitation facility of sea turtles is located at the Kewalo Research Facility also in the city of Honolulu. The facility is equipped with three tanks of various sizes allowing for the rehabilitation of turtles of all sizes and conditions. Tanks have active saltwater filtration and pump systems. All tanks and equipment are thoroughly cleaned to avoid disease transfer from individuals. Furthermore one tank is dedicated for turtles with FP. The PIFSC and its facilities will be moving, with NOAA's other line offices, to the Pacific Region Center (which is started construction in 2011) located on Ford Island in Pearl Harbor beginning in approximately 2013.

3.1.2 Northwestern Hawaiian Islands

The NWHI were are an assemblage of islands, atoll, reefs, banks, pinnacles, and seamounts that stretch approximately 1,200 miles northwest of the Island of Kauai. The NWHIs are the oldest part of the Hawaiian archipelago and are also known as the Leeward Islands. There are ten main islands and atolls (from southeast to northwest): Nihoa Island, Mokumanamana (Necker Island), French Frigate Shoals, Garnder Pinnacles, Maro Reef, Laysan Island, Lisianski Island, Pearl and Hermes Atoll, Midway Atoll (Midway Islands), and Kure Atoll. The two southernmost islands, Nihoa and Mokumanamana, are basaltic islands with little beach areas. Four of the five middle landmasses are open atolls (French Frigate Shoals [FFS] and Maro Reef) and sandy islands (Laysan and Lisianski). La Perouse Pinnacle (at FFS) and Gardner Pinnacles are small basaltic outcrops, remnants of islands similar to Nihoa and Mokumanamana. The three northernmost landmasses, Pearl and Hermes, Midway, and Kure, are classical atolls. The beaches of the NWHI are highly dynamic given their low-lying topography and exposure to waves and currents from the northern and southern hemisphere. The texture of beaches ranges from fine sand to corral rubble. This emergent land is vital habitat to the 14 million resident and migratory seabirds, which rely on these islands for roosting and breeding habitat and on the surrounding waters for food and which are protected under the Migratory Bird Treaty Act (PMNM 2008). The NWHI are part of the State of Hawaii (except for Midway Atoll, which is under control by the Federal government).

The NWHI have had varying levels of legal protection since their discovery. In response to the slaughter of millions of seabirds by poachers, President Theodore Roosevelt created the Hawaiian Islands Bird Reservation in 1909. In 1940, President Franklin Delano Roosevelt renamed it the Hawaiian Islands National Wildlife Refuge. Since 1940, most of the populations of plants and animals on the islands have rebounded to their pre-exploitation levels (Rauzon 2001). The entire chain is now part of the Papahanaumokuakea Marine National Monument (U.S. President 2006 and 2007). As a National Monument, access to the islands and atolls, and activities within in 50 nautical miles of the shoreline are regulated through a permitting system co-administered by the NMFS, USFWS, and State of Hawaii.

French Frigate Shoals is the primary location of the green sea turtle nesting surveys. Occasionally, abundance surveys are also opportunistically completed on other islands as part of the PIFSC research program. FFS is the largest atoll in the chain, with approximately 9,300 hectares of coral reef habitat and only 27 hectares of emergent land. The islets within the atoll are highly dynamic systems made of coral sand and the total area of emergent land can fluctuate from year to year. The focus of the nesting surveys is East Island, a sparsely vegetated sand island. Tern Island has been modified from a naturally sand island to an airplane runway, with a number of associated permanent buildings. These buildings and associated infrastructure serve as the base for research at FFS. The modifications of Tern Island are a result of dredge and fill operations within the atoll. Aside from the USFWS and NMFS staff live on Tern Island, FFS is not inhabited by humans.

3.2 U.S. Insular Areas of the Pacific Ocean

The U.S. Insular Areas of the Pacific Ocean comprise the other portion of the Pacific Islands Region located in the central and western Pacific Ocean – an area that roughly covers the range of the sea turtles being studied by the MTAP. It coincides with the management area of the National Marine Fisheries Service, Pacific Islands Region, and includes all areas with the U.S. Exclusive Economic Zone. This includes American Samoa, Guam, the Commonwealth of the Northern Mariana Islands (CNMI), Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Atoll, Wake Island, and Palmyra Atoll.

3.2.1 American Samoa

American Samoa is an unincorporated and unorganized territory of the United States. American Samoa became a U.S. territory with the Tripartite Convention of 1899 and President McKinley's Executive Order of February 19, 1900. With the neighboring independent nation of Samoa (located to the northwest) the islands comprise the Samoan Archipelago. It is located approximately 2,500 nautical miles south of Honolulu. American Samoa includes seven islands: Tutuila, Aunu'u, Ofu, Olosega, Ta'ū, Swains Atoll, and Rose Atoll. The total surface area for American Samoa is approximately 76 square miles. Tutuila is the largest island and center of the island nation's politics and economy. The 2010 census population was 55, 519 people, with 95 percent living on Tutuila. The overwhelming majority of the population is native Samoan. The harbor in the capital city, Pago Pago, is the heart of the fishing industry. The National Park of American Samoa is located on the islands of Tutuila, Ofu, Olosega, and Ta'ū. The park includes mountain peaks, river valleys, beaches, and coral reefs.

Rose Atoll, which is also called Muliāva in Samoan, is a low-lying coral atoll located approximately 130 nautical miles east-southeast of rat the southeast from Pago Pago Harbor at the end of the archipelago. The atoll is roughly square-shaped and comprised of two islands: Rose Island and Sand Island. Rose Island is heavily vegetated with Pisonia trees and beach heliotrope shrubs (*Tournefortia argentea*). Sand Island is mostly bare sand. The total land area of the atoll is approximately 7.8 acres. The islands surround an approximately 2.5 square mile lagoon that has a mostly sandy bottom, which is up to 65 feet deep (USFWS 2000). The atoll has only been briefly inhabitated by human over the years as a fishing station and coconut plantation, and for scientific explorations (Sachet 1954).

The emergent lands of Rose Atoll were declared a National Wildlife Refuge on July 5, 1973 with an agreement between American Samoa and the U.S. (USFWS 2011a). The Rose Atoll Marine National

Monument was established on January 6, 2009 through Presidential Proclamation 8337 (U.S. President 2009c). Management of the Monument resources is shared between the Departments of the Interior and Commerce. NOAA, Office of Marine Sanctuaries, is considering adding the marine areas of Rose Atoll Marine National Monument to the Fagatele Bay National Marine Sanctuary, which will be known as the America Samoa National Marine Sanctuary (NOAA 2011).

Rose Atoll is known for containing the rare giant clam (*Tridacna gigas*) (USFWS 2011a). It is also unique for being dominated by crustose coralline algae, unlike most of the coral reefs of Samoa, which are dominated by hermatypic corals (Kenyon et al. 2010). There have been a total of 143 species of anthozoan and hydrozoan coral observed at the atoll (Kenyon et al. 2010). The atoll is home to twelve seabird species and approximately 270 reef fish species (USFWS 2011a). The atoll is used as a nesting location for green and hawksbill sea turtles.

3.2.2 Commonwealth of the Northern Mariana Islands

CNMI is a commonwealth of fourteen islands that is in political union with the United States. In 1976 the United States Congress approved the Covenant that transformed the CNMI from a United States territory to a commonwealth. The Covenant, with its legal agreements, was fully implemented in 1986. CNMI was a U.S. territory from 1947 to 1986 as part of the United Nations Trust Territory of the Pacific Islands agreement following World War II.

CNMI is located approximately 3,500 nautical miles west of Honolulu. The total land area of all the islands is approximately 180 square miles. The volcanically active northern islands include Anatahan, Sarigan, Guguan, Alamagan, Pagan, Agrihan, Ascuncion, Maug, and Farallon de Pajaros. Of the fourteen islands, only Saipan, Tinian, and Rota support a permanent population of people. Approximately 90 percent of the CNMI population lives on Saipan. The CNMI population is comprised mostly of people of Chamorro, Carolinian, Micronesian, European, and East Asian descent. The major industries of CNMI are tourism and garment production. The older, southern islands support coral reefs, seagrass beds, and some mangroves (NMFS 2009). Both green and hawksbill sea turtles are known to occur around CNMI.

On January 6, 2009 the Marianas Trench Marine National Monument was created with Presidential Proclamation 8335 (U.S. President 2009a). The Mariana Volcanic Arc is part of a subduction system where the Pacific Plate plunges beneath the Philippine Sea Plate and into the Earth's mantle, creating the Mariana Trench. The Mariana Trench is approximately 940 nautical miles long and 38 nautical miles wide within the United States' Exclusive Economic Zone. The deepest known point in the global ocean, Challenger Deep at 10,916 meters below sea level, is located within the Mariana Trench. However, this point is located just outside of U.S. jurisdiction in the neighboring waters of the Federated States of Micronesia. The monument includes the waters and submerged lands of the three northernmost Mariana Islands (the "Islands Unit") and only the submerged lands of designated volcanic sites (the "Volcanic Unit") and the Mariana Trench (the "Trench Unit") to the extent described as follows: The seaward boundaries of the Islands Unit lie approximately 50 nautical miles from the mean low water line of Farallon de Pajaros (Uracas), Maug, and Asuncion. The inland boundary of the Islands Unit of the monument is the mean low water line. The boundaries of the Volcanic Unit of the monument include a circle drawn with a one nautical mile radius centered on each of the volcanic features. The boundary of the Trench Unit of the monument extends from the northern limit of the Exclusive Economic Zone of the United States in the CNMI to the southern limit of the Exclusive Economic Zone of the United States in Guam.

3.2.3 Guam

Guam is an organized, unincorporated territory of the U.S. It was ceded by the Spanish to the U.S. in 1898 in the Treaty of Paris following the Spanish-American War. During World War II it was occupied by the Japanese for 31 months, but recaptured by the U.S. in 1944 during the second Battle of Guam. It is located immediately south of the CNMI and is the fifteenth island in the Mariana Archipelago (the entire Mariana Archipelago is approximately 480 miles long). Tourism is the largest sector of the economy followed by the military. The U.S. military occupies approximately one-third of the land area on Guam. Apra Harbor is the major deep water port.

The land area of Guam is approximately 212 square miles. It supports one of the largest populations of people in the region, approximately 160,000 people based on the 2010 Census. The indigenous language and people of Guam are Chammoro. The island is surrounded by coral reefs, which range in health from degraded, in the south, to good condition, in the north. The major threats to the health of the reef are overfishing and sedimentation. Both green and hawksbill sea turtles nest on Guam.

3.2.4 Pacific Remote Island Areas

The Pacific Remote Island Areas (PRIAs) include Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Wake Island, and Palmyra Atoll. They are usually grouped together because they are under the jurisdiction of U.S. and are small, sparsely populated islands and atolls set in the central and western Pacific Ocean. They are grouped together in spite of the fact they span an area that is approximately 3,000 miles by 1,500 miles (or roughly the same area as the continental United States). All seven islands and atolls make up the Pacific Remote Islands Marine National Monument, which was created on January 6, 2009 through Presidential Proclamation 8336 (U.S. President 2009b). Management of the Monument resources is shared between the Departments of the Interior and Commerce. These islands are also sometimes referred to as the U.S. Minor Outlying Islands for statistical purposes.

3.2.4.1 Johnston Atoll

Johnston Atoll is an unorganized, unincorporated territory of the United States. Johnston Atoll is located approximately 700 nautical miles west-southwest of Honolulu. The atoll was created by volcanic action and natural coral reef building. The atoll is comprised of four islands: Johnston, Sand, North (Akua), and East (Hikina). The islands make up approximately one square mile of land. North and East Islands were created entirely by dredge and fill operations, while Johnston and Sand were natural islands that have been expanded by filling the lagoon around the island. Johnston Island includes a 6,100-foot-long runway, a dock, and numerous buildings. The atoll also features a nine-mile-long emergent reef located on the northwest side the islands.

On July 29, 1926, President Coolidge established the Johnston Atoll federal bird refuge, through Executive Order 4467, and placed it under the control of the U.S. Department of Agriculture. On December 29, 1934, control of Johnston Atoll was transferred to the U.S. Navy, through Executive Order 6935, and an air station was established. Through the same order, management of the bird refuge was transferred to the Department of the Interior. In 1936, the U.S. Navy began developing a military facility on the atoll. On February 14, 1941, the atoll was designated as a Naval Defensive Sea Area and Airspace Reservation by Executive Order 8682. The Secretary of the Navy agreed to transfer operational control of Johnston Atoll to the U.S. Air Force on July 1, 1948. A LORAN station was built on Johnston Island in 1957, and then transferred onto Sand Island in 1959. The Department of the Air Force signed an agreement with the Defense Nuclear Agency (now called the Defense Threat Reduction Agency) on July 1, 1973, to administer host-management of the island. (OIA 2012). The military facilities are in the process of being dismantled and the area remediated, and ultimately will be turned over to the U.S. Fish and Wildlife Service (USFWS 2011). Currently the atoll is managed as both the Johnston Atoll National Wildlife Refuge (formally the bird refuge) and Pacific Remote Islands Marine National Monument.

Johnston Atoll is unique because it is the only landmass and shallow-water reef system for hundreds of miles in any direction of the central Pacific Ocean. The atoll is home to fourteen species of seabirds, five species of wintering shorebirds, the federally endangered Hawaiian monk seal, and a nesting population of green sea turtles. Surveys of the reef system in 2000 identified 668 taxa of macroalgae, invertebrates, and fishes (Coles *et al.* 2001). Of these, less than 2% were found to be non-indigenous.

Genetic studies of the coral-eating crown-of-thorns sea star have shown that Johnston Atoll and the Hawaiian Archipelago are connected in terms of gene flow (Timmers *et al.* 2011). Other studies of reef fish have shown that this connectivity may be unique, as species found in both locations are genetically different than related species in the rest of the central or eastern Pacific Ocean (Lessios and Robertson 2006). Approximately 90 percent of the aquatic species found at Johnston Atoll during a survey in 2000 were also known to occur in the Hawaii Archipelago (Cole *et al.* 2001).

The physical and biological resources at Johnston Atoll occur in spite of the fact that the island been subjected to many stressors over the year. From the 1850s through the 1900s the atoll was heavily disturbed through guano mining activities. Military activities at the atoll included airplane operations, submarine refueling, nuclear testing, missile launching, and chemical weapons incineration. During the height of activity at the atoll, approximately 1,300 people lived on Johnston Island. The lingering effects of all of these activities include soil and water contamination from nutrients, dioxin, plutonium, PCBs, and petroleum (USFWS 2011a).

3.2.4.2 Wake Atoll

Wake Atoll (also known as Wake Island) is an unorganized, unincorporated territory of the U.S. The atoll consists of three coral islands (Wake, Peale, and Wilkes) with a large central lagoon. The lagoon is approximately thirteen square kilometers in area and five meters deep at its deepest. It is located approximately 2,000 nautical miles west of Honolulu. The total land area of all three islands is approximately three acres. Wake atoll is the northern most atoll in the Marshall Islands geological ridge.

The atoll was claimed by the U.S. on January 17, 1899 (Bryan 1959). In 1935 Pan American Airways established an airport and small hotel on the atoll (Bryan 1959). During World War II the atoll was the site of many battles because of its strategic location. It was captured by the Japanese in 1941 and surrendered to the U.S. on September 7, 1945. The U.S. military currently supports approximately 300 people on the atoll, a 9,800-foot-long runway on Wake Island, a missile launch facility, a series of roads and bridges, and a retired LORAN station on Peale Island (DOI 2012). The infrastructure on the atoll has been severely damaged (and repaired) several times by typhoons.

While the atoll lacks a freshwater supply it supports colonies of twelve species of nesting seabirds and six species of migratory shorebirds (U.S. President 2009a). The native flightless bird, the Wake Island rail, went extinct in the 1940's. The atoll has been infested with both rats and mosquitoes since it was discovered (Bryan 1959). The lagoon and waters around Wake Atoll support over 300 species of fish and 100 species of corals (USFWS 2011a). In particular, the atoll is home to one of the last healthy populations of bumphead parrotfish in the Pacific Ocean. The fact that Wake Atoll may be the oldest living atoll in the world contributes to its diversity.

3.2.4.3 Howland Island

Howland Island is an unorganized, unincorporated territory of the United States. Howland Island is located approximately 1,800 nautical miles southwest of Honolulu, and 40 miles north of Baker Island. The island is part of the Phoenix Islands group. The island is approximately two miles long and half a mile wide, covering approximately 450 acres. The island has been administered by the U.S. Fish and Wildlife Service since June 27, 1974 as a National Wildlife Refuge (USFWS 2011a).

The island is currently uninhabited and has no natural freshwater supply. It is believed that Polynesians and Micronesians have sporadically visited the island since 1000 B.C.E. It was originally claimed in 1857 by the United States under the Guano Islands Act of 1856. From 1858 through the early 1900s the island was mined for guano. After being reclaimed by the United States from the United Kingdom on March 26, 1935, the Department of Interior established a colony on the island. From 1935 to 1942 the colonists, mostly young men from Kamehameha School of Honolulu, Hawaii, lived on the island in a settlement known as Itascatown. A lighthouse and runway were constructed on Howland Island and were to be used during Amelia Earhart's fateful around-the-world flight of 1937. The island was abandoned on January 31, 1942 in response to a Japanese attack as World War II waged. U.S. Marines occupied the island the island through 1944. Since then it has been episodically visited, mostly by scientists. Aside from a lighthouse-shaped day beacon, few remnants of its past infrastructure remain on the island, which is sometimes washed over by storm surges (USFWS 2011a).

Howland Island is covered with low-growing vegetation such as Pisonia trees. A narrow fringing reef surrounds the island (DOI 2012). Howland Island is one of the few islands in the world exposed to the Equatorial Undercurrent, which creates localized nutrient-rich upwelling in its shallows. These nutrients sustain a diverse and abundant fish population around the island (U.S. President 2009b). Howland Island also supports approximately a dozen seabird colonies and eight shorebird colonies. A feral cat and rat population (that was established by the guano miners) was completely removed by 1990. The climate is equatorial with scant rainfall, constant wind, and intense sunshine (CIA 2011). The fringing reef surrounding the island supports approximately 109 coral species, including table and staghorn corals. Approximately 50 percent of the reef terrace is covered by live coral. Hawksbill and green sea turtles are known to forage in the near-shore waters (USFWS 2011a).

3.2.4.4 Baker Island

Baker Island is an unorganized, unincorporated territory of the United States. Baker Island is located approximately 1,800 nautical miles southwest of Honolulu. Like Howland Island, Baker Island is part of the Phoenix Island Archipelago. The total land area of the island is approximately 500 acres. The island has been administered by the U.S. Fish and Wildlife Service since June 27, 1974 as a National Wildlife Refuge.

The island is currently uninhabited and has no natural freshwater supply. It is believed that Polynesians and Micronesians have sporadically visited the island since 1000 B.C.E. It was originally claimed in 1857 by the United States under the Guano Islands Act of 1856. From 1858 through the early 1900s the island was mined for guano. After being reclaimed by the United States from the United Kingdom on March 26, 1935, the Department of Interior established a colony on the island. From 1935 to 1942 the colonists, mostly young men from Kamehameha School of Honolulu, Hawaii, lived on the island in a settlement known as Meyerton. A lighthouse and runway were constructed on Baker Island. The island was abandoned on January 31, 1942 in response to a Japanese attack as World War II waged. U.S. Marines occupied the island the island through 1944. Since then it has been episodically visited, mostly by scientists. Aside from a lighthouse-shaped day beacon, a derelict runway, a LORAN station, crashed airplanes, and abandoned bulldozers, few remnants of its past infrastructure remain on the island, which is sometimes washed over by storm surges (USFWS 2011a).

Baker Island is covered with low-growing vegetation and a small patch of introduced coconut palms. A narrow fringing reef surrounds the island (DOI 2012). Baker Island is one of the few islands in the world exposed to the Equatorial Undercurrent, which creates localized nutrient-rich upwelling in shallows. These nutrients sustain a diverse and abundant fish population around the island (U.S. President 2009b). Baker Island also supports approximately a dozen seabird colonies and eight shorebird colonies. A feral cat and rat population (that was established by the guano miners) was completely removed in 1965. The climate is equatorial with scant rainfall, constant wind, and intense sunshine (CIA 2011). The fringing reef surrounding the island supports approximately 62 coral species, including table and staghorn corals. Approximately 50 percent of the reef terrace is covered by live coral. Hawksbill and green sea turtles are known to forage in the near-shore waters (USFWS 2011).

3.2.4.5 Jarvis Island

Jarvis Island is an unorganized, unincorporated territory of the United States. Jarvis Island is located approximately 1300 nautical miles south of Honolulu. The island has been administered by the U.S. Fish and Wildlife Service since June 27, 1974 as a National Wildlife Refuge. The island is one of the chain of Line Islands. The island is approximately two miles long and one mile wide. A narrow fringing reef surrounds the island.

The island is currently uninhabited. It was originally claimed by the United States under the Guano Islands Act in March 1857. From 1858 through the early 1900s the island was mined for guano. After being reclaimed by the United States from the United Kingdom on March 26, 1935, the Department of Interior established a colony on the island. From 1936 to 1942 the colonists, mostly young men from Hawaii, lived on the island in a settlement known as Millersville. The island was abandoned on February 7, 1942 in response to a Japanese attack as World War II waged. Since then is episodically visited, mostly by scientists. Aside from a lighthouse-shaped day beacon, few remnants of its past infrastructure remain on the island, which is sometimes washed over by storm surges.

Jarvis Island supports colonies of seabirds. A feral cat and rat population (that was established by the guano miners) was completely removed in 1990. The fringing reef surrounding the island supports approximately 62 coral species, including table and staghorn corals. Approximately 50 percent of the reef terrace is covered by live coral (USFWS 2011).

3.2.4.6 Kingman Reef

Kingman Reef is an unorganized, unincorporated territory of the United States. It is located approximately 930 nautical miles southwest of Honolulu. The coral atoll is approximately 18,000 acres in size, but has less than 3 acres of emergent land area (i.e., coral rubble). These islands do not support permanent vegetation and are routinely washed over by ocean swells. Kingman Reef is the northernmost island in the Line Islands chain, and located approximately 36 nautical miles northwest of Palmyra Atoll.

Kingman Reef was annexed by the U.S. in 1922 under the Guano Act (CIA 2012). The lagoon in the atoll was used by seaplanes as a shelter during Hawaii-to-American Samoa flights. The U.S. Navy also used the lagoon during World War II and still maintains jurisdiction over the atoll as a Naval Defensive Sea Area and Airspace Reservation by Executive Order (OIA 2012). The island has been administered by the U.S. Fish and Wildlife Service since January 18, 2001 as a National Wildlife Refuge (USFWS 2011a).

The waters around Kingman Reef are renowned for their diverse and abundant life. It has been reported that the reef supports 168 species of fish, 102 species of coral, giant clams, and green sea turtles. In 2001, the reef and waters out to 12 nautical miles were declared a National Wildlife Refuge (USFWS 2001a).

3.2.4.7 Palmyra Atoll

Palmyra Atoll is an unorganized, incorporated Territory of the United States. It is located approximately 960 nautical miles southwest of Honolulu. The classic Darwinian atoll consists of approximately 50 islands with a land area of approximately 1000 acres (4.6 square miles). It is part of the Line Islands chain. The island has been administered by the U.S. Fish and Wildlife Service since January 18, 2001 as a National Wildlife Refuge (USFWS 2001b).

The Kingdom of Hawaii took possession of the atoll in 1862. After the overthrow of the Hawaiian Kingdom in 1893, the U.S. annexed Hawaii on July 7, 1898. The new Territory of Hawaii included

Palmyra Atoll. However, on August 21, 1959 when Hawaii became a state, Palmyra Atoll was excluded from the statehood boundaries and remained an incorporated Territory. Most of the lands of Palmyra Atoll are currently privately owned by the Nature Conservancy. The atoll's landscape has been modified by infrastructure development projects, including: two runways, boat docks, roads, causeways connecting the islands, and other buildings.

Unlike the other islands and atolls of the PRIA, Palmyra Atoll receives up to 200 inches of rain per year, which supports a lush terrestrial vegetation community (CIA 2012). The plants are divided into three distinct habitat types: (1) native wet Pisonia forest, (2) introduced coconut forest, and (3) native beach naupaka. Pisonia trees are a distinctive feature in the region because they can reach 100 feet tall and provide roosting habitat for a variety of seabirds. The atoll supports tens of thousands of birds, including ten species of seabirds, and four species of migratory shorebirds. The coconut crab (*Birgus latro*), the world's largest terrestrial arthropod, also lives at Palmyra Atoll (USFWS 2011a).   A rat eradication project was implemented in 2011 by the USFWS at the atoll using bait pellets containing the anticoagulant rodenticide brodifacoum (USFWS 2011b). The purpose of project is to restore the natural plant and animal communities of the atoll by eliminating rat predation of birds and native plant seedlings. The three lagoons and waters around the atoll support over 200 species of corals, fish, and marine mammals. The circulation of water through the lagoons was adversely affected by dredge and fill operations conducted before and after World War II. Green sea turtles are known to nest at Palmyra Atoll (USFWS 2011a).

4 Environmental Impacts of the Proposed Action and Alternatives

The proposed action (Alternative B) involves primarily short-term, temporary research actions (i.e., collection of small amounts of biological and ecological data at any one time or location) and stranding response activities. Alternative A represents the status quo and continuation of the current research program (i.e., no change to the current action). Alternative C is the no Federal action alternative, which means the MTAP's current research activities would stop. Because the five species of sea turtles being studied are listed under the ESA, the direct, indirect, and cumulative effects of the research on the turtles is focus of this part of the assessment. As described in Section 2, the MTAP has worked with the MTRP in the development of many avoidance and minimization measures for handling and working with sea turtles. As described in Section 3, the existing baseline conditions within the geographic scope of analysis vary from place to place and with the level of human activity (i.e., from an uninhabited island to a heavily developed beachfront city). This section will discuss the impacts of the proposed action and alternatives on each relevant resource component. These impacts will be compared to the existing baseline conditions by rating them as negligible, minor, moderate, or major. These ratings are made by taking into consideration the context, intensity, and likelihood of the impact.

4.1 Impacts to Sea Turtles

4.1.1 Impacts of Capturing and Handling Sea Turtles

As with any marine habitat capture program, there is a possibility that captured turtles could experience short- and long-term adverse impacts from capture. These adverse impacts range from near-drowning to actual drowning by entanglement. To minimize the potential for adverse impacts, when nets are in the water to capture turtles, they are constantly monitored and turtles are immediately retrieved from the net (Ehrhart and Ogren 1999). Additionally, several field personnel are in the water during all capture activities to ensure that stress to the animal is minimized. A veterinarian is on call during capture activities in the event consultation is required. If a turtle is encountered during capture activities in a comatose state, resuscitation is attempted. Handling time is minimized to reduce the potential for additional stress. Turtles are only handled for the amount of time necessary to complete sampling, measuring, examination, and tagging. Capture and handling generally takes a matter of minutes, but sometimes up to one or two hours. No stranded tagged turtles have been determined to have died from capture-related activities over the past 24 years (Balazs, pers. comm.).

For the propose action (Alternative B), capturing sea turtles would have short-term temporary direct minor adverse impacts to any sea turtle that is captured. These impacts would be in the form of non-lethal stress to the wild animal. The MTAP has applied for ESA research permits to capture up to 220 green and 165 hawksbill sea turtles over the next five years (i.e., approximately 44 and 33 sea turtles per year, respectively) for the entire PIR with a focus on the U.S. Insular Areas. The indirect adverse impacts would be negligible because the sea turtles are captured, handled, sampled, and then released on-site in a short period of time. The long-term minor beneficial indirect impact of capturing sea turtles would be the increased understanding of the sea turtle populations of the PIR though additional data collection.

For Alternative A, the MTAP would not capture any sea turtles in the U.S. Insular Areas of the Pacific Islands Region, hence there would be no direct adverse impacts to sea turtles in those areas. The MTAP would continue to collaborate with the MTRP in the Hawaiian Archipelago (mainly in the form of analytical services). These collaborations may include capturing sea turtles. Capturing sea turtles would have short-term temporary direct minor adverse impacts to any sea turtle that is captured. These impacts would be in the form of non-lethal stress to the wild animal. The indirect adverse impacts would be negligible because the sea turtles are captured, handled, sampled, and then released on-site in a short period of time. However, there would be a long-term minor indirect adverse effect from not collecting data on these poorly understood sea turtle populations in the U.S. Insular Areas of the Pacific Islands Region.

For Alternative C, no sea turtles would be captured in the PIR by the MTAP, hence there would be no direct or indirect adverse impacts to sea turtles. However, there would be a long-term minor indirect adverse effect from not collecting data on these poorly understood sea turtle populations.

4.1.2 Impacts of Handling and Transporting Stranded Sea Turtles

Handling and transport of live sea turtles is essential for diagnosis and treatment, but due to logistical constraints in the PIR, will be only rarely employed by the MTAP under the proposed action. All live stranded sea turtles – other than individuals that are lightly entangled (i.e., not injured) in fishing gear and can be disentangled and released on site – are captured by trained staff and collaborators and when logistically possible transported to a facility for diagnosis and treatment by a licensed veterinarian. Given the remote nature of our proposed study sites, such access or facilities are frequently not possible. In these instances, the highest level of treatment possible would be administered on-site, and the sea turtle would not be transported. Whenever possible, turtles are rehabilitated and ultimately released back into their natural environment.

For the propose action (Alternative B), it is anticipated that fewer than five stranded sea turtles would be handled and transported per year at each of the islands within the PIR. Handling and transporting sea turtles will have a minor short-term temporary direct adverse impact on the animal's condition because they are wild animals not accustomed to being restrained by humans. Direct minor adverse impacts of transporting sea turtles, such as over-heating, are minimized through a variety of techniques, such as, covering the turtle with a wet pad during transport. The long-term minor beneficial indirect impacts of handling and transporting stranded turtles would be the enhanced survival of individual sea turtles that would have succumb to treatable injuries (e.g., entangled in fishing line), and analytical or predictive models for sea turtle stranding.

For Alternative A, the MTRP, not the MTAP, conducts the response activities of the sea turtle stranding response program in the Hawaiian Archipelago. Therefore the MTAP would have no direct impacts on stranded sea turtles. The MTAP would have a minor beneficial indirect impact on the environment from analyzing the data collected by the MTRP and by creating predictive stranding models for the Hawaiian Archipelago.

For Alternative C, no stranded sea turtles would be encountered or treated by the MTAP in the PIR because the MTAP would not be in the field collecting data, hence there would be no direct adverse impacts. However, there would be a long-term minor adverse effect from not treating stranded turtles in the PIR. Still, as agents and federal employees of the NMFS, MTAP staff during their normal course of activities would continue to aid stranded sea turtles in accordance with the programmatic permit described at 50 CFR § 222.310.

4.1.3 Impacts of Collecting Biological Samples from Sea Turtles

For a complete understanding of sea turtle population dynamics and life history, it is necessary to identify individuals and obtain biological samples for genetics, diet, disease, and habitat use. Turtles are flipper tagged with metal inconel tags and PIT using standard techniques (Balazs 1999); blood samples are taken using a medical grade needle and syringe (Bolten 1999, Owens 1999); diet samples are safely obtained by esophageal lavage (Forbes and Limpus 1993); and tissue biopsies are taken using a biopsy punch (Dutton and Balazs 1996). All methods used are performed by trained personnel and have been peer-reviewed and used by sea turtle researchers worldwide. The MTRP does not perform unnecessary sampling on sick or injured animals unless a veterinarian determines the animal is sufficiently healthy for samples to be taken. No mortality is expected from tagging, blood sampling, or tissue biopsy. Esophageal lavage, when implemented as proposed will have no long-term adverse impacts to the turtle. Many individual turtles have been lavaged multiple times without any known detrimental effect. Individuals have been recaptured from the day after the procedure up to many years later and appear to be healthy and feeding (Forbes and Limpus 1993).

For the propose action (Alternative B), it is anticipated that collecting biological samples from sea turtles would have short-term temporary direct minor adverse impacts to that sea turtle. The MTAP has applied for ESA research permits to collect biological samples from up to 220 green and 165 hawksbill sea turtles over the next five years (i.e., approximately 44 and 33 sea turtles per year, respectively) for the entire PIR with a focus on the U.S. Insular Areas. These would be the same sea turtles that are captured on land or in the water as described at section 4.1.1. These impacts would be in the form of non-lethal stress to the wild animal. The indirect adverse impacts would be negligible because the sea turtles are captured, handled, sampled, and then released on-site in a short period of time. The long-term minor beneficial indirect impact of capturing sea turtles would be the increased understanding of the sea turtle populations of the PIR though additional data collection.

For Alternative A, the MTAP would not collect biological samples from any sea turtles in the U.S. Insular Areas of the Pacific Islands Region, hence there would be no direct adverse impacts to sea turtles in those areas. The MTAP would continue to collaborate with the MTRP in the Hawaiian Archipelago (mainly in the form of analytical services). These collaborations may include collecting biological samples from sea turtles. Sampling sea turtles would have short-term temporary direct minor adverse impacts to any sea turtle that is captured. These impacts would be in the form of non-lethal stress to the wild animal. The indirect adverse impacts would be negligible because the sea turtles are captured, handled, sampled, and then released on-site in a short period of time. However, there would be a long-term minor indirect adverse effect from not collecting data on these poorly understood sea turtle populations in the U.S. Insular Areas of the Pacific Islands Region.

For Alternative C, no sea turtles would be sampled in the PIR by the MTAP, hence there would be no direct adverse impacts to sea turtles. However, there would be a long-term minor indirect adverse effect from not collecting data on these poorly understood sea turtle populations.

4.1.4 Stress from capturing sea turtles with FP that are already immunosuppressed because of the disease

Both sea turtles with and without FP are captured and sampled to document the prevalence of FP disease, though at the present FP is only known to occur in Hawaii and not in the rest of the PIR. The progression or regression of the disease is also studied for previously captured individuals and evaluated at the population level. It has been documented that all turtles experience some minor level of stress when captured (Jessop and Hamann 2005). However, behavioral indications of capture-related stress have been found to be temporary (T. Work, DVM, USGS, pers. comm. May 2006).

Green sea turtles severely afflicted with FP were determined to be immunosuppressed and chronically stressed prior to capture (Aguirre *et al.* 1995). Because capture methods are identical for diseased and non-diseased turtles, any observed differences in blood chemistry are likely related to disease and not attributed to stress from capture.

Turtles that are lightly or moderately afflicted with the disease appear to function at normal levels once returned to the ocean. (Unfortunately, turtles with severe tumor burdens are in a health condition that is often beyond our ability to remedy.) This has been documented through the subsequent recapture of many of these individuals. In many instances, turtles initially captured with mild to moderate FP tumors have been recaptured with reduced tumor load or no evidence of tumors at all, further indicating that capture stress was not detrimental to the animal's health and well-being. Turtles with severe FP are removed from the study site and evaluated by two veterinarians, a clinical vet and a wildlife disease pathologist. This is not only done for the welfare of the animal, it also removes potentially infectious agents from the water. Additionally, both tumored and non-tumored turtles have been captured and held in captivity, and no behavioral differences were observed. (T. Work, DVM, USGS, pers. comm. May 2006). These impacts are the same for all the alternatives.

4.1.5 Impacts of Nesting Surveys

During nesting surveys, researchers walk the beach to record data, including: identification of the female, date of encounter or nest deposition, date of nest hatching, location of nest, and nest density. Surveys are conducted no more than once per hour to minimize disturbance. Nesting females can become skittish or disturbed if a light is shined on their face during egg deposition, or if they see the researcher or the researcher's shadow. To reduce the likelihood of disturbance, flashlight use is minimized and the light is covered with the hand with the first two fingers spread slightly to focus the beam. Researchers always approach a nesting turtle slowly from the rear. Before contact is made with the turtle, her activity is noted, and an attempt to identify her by shell etching or tag is made. Based on her activity, the researcher decides if it is the appropriate time to safely tag and sample (if necessary) the turtle without disrupting the nesting process. The best time for the researcher to interact with the turtle is after egg laying is complete to minimize adverse impacts. PIT tags are best inserted directly under the skin into the hind flipper after the female has completed egg laying, when she typically goes into a trance-like state. Alternatively, PIT tags are inserted when the turtle is crawling, making a body pit, covering the eggs, or backfilling, but never while excavating the egg chamber or depositing eggs to avoid any potential for nest abandonment. Every pre-sterilized needle used to install the tag is used only once and disposed of properly after the work. PIT tags are minute, and have negligible long-term adverse impacts to the turtle. The presence of researchers conducting the nesting surveys has a negligible impact on turtles while they rest on the beach prior, during, and after nesting as a result of these avoidance and minimization measures.

For the propose action (Alternative B), conducting nesting surveys would have short-term temporary direct minor adverse impacts to any sea turtle that is studied. These impacts would be in the form of non-lethal stress to the wild animal, but as described above would be mitigated through flashlight control and approaching the animal from the rear. The indirect adverse impacts would be negligible because the nesting surveys would be conducted within a matter of minutes. The long-term minor beneficial indirect impact of capturing sea turtles would be the increased understanding of the sea turtle populations of the PIR though additional data collection.

For Alternative A, the MTAP would not conduct nesting surveys in the U.S. Insular Areas of the Pacific Islands Region, hence there would be no direct adverse impacts to sea turtles in those areas. The MTAP would continue to collaborate with the MTRP in the Hawaiian Archipelago (mainly in the form of analytical services). These collaborations may include conducting nesting surveys. Conducting nesting surveys would have short-term temporary direct minor adverse impacts to any sea turtle that is studied. These impacts would be in the form of non-lethal stress to the wild animal. The indirect adverse impacts would be negligible because the nesting surveys would be conducted within a matter of minutes. However, there would be a long-term minor indirect adverse effect from not collecting data on these poorly understood sea turtle populations in the U.S. Insular Areas of the Pacific Islands Region.

For Alternative C, no sea turtle nesting surveys would be conducted in the PIR by the MTAP, hence there would be no direct adverse impacts to sea turtles. However, there would be a long-term minor indirect adverse effect from not collecting data on these poorly understood sea turtle populations.

4.1.6 Public Perception of Adverse Impacts to Sea Turtles during Research Activities

To prevent misconception by the public of potential harm inflicted on sea turtles during research activities, the MTAP has an active public outreach and education program providing pamphlets and literature at all active field sites. Informal and formal presentations at public events, schools, and hospitals are an active and continuous part of the program. The MTAP also supports an extensive marine turtle stranding network and the MTRP stranding hotline phone number is made available to the public through magnets, mailings, newspaper advertisements, phonebook listing, television public service announcements, and through long-term cooperation with state agencies. All persons who call the stranding hotline or who are encountered in the field are offered a full explanation of research and conservation activities and their purpose, as well as educational sea turtle literature. As a result of directed outreach effort on turtle research activities, we anticipate minimal, if any, adverse public opinion associated with these activities. These impacts are the same for all alternatives.

4.1.7 Impacts of Satellite Tags

The attachment of satellite tags to the shell of a sea turtle may potentially interfere with mating or cause increased drag to sea turtles that affect migration. Females with satellite tags from previous years have been observed nesting, however, and post hatching nest inventories indicated these nests contained fertilized eggs (S. Hargrove, pers. comm., July 2010). Certain transmitters, if improperly attached, because of their size, position, and weight increase drag and may substantially interfere with normal migration patterns, disrupting mating (Jones and Seminoff *in press*). To avoid these adverse indirect impacts, the Proposed Action would implement the recommendations of Jones (2010): use an array of smaller transmitters (no larger than 6cm x 3cm x 10cm), and apply attachment methods to reduce additional drag. Specifically, the proposed action includes using only Wildlife Computers SPOT5 and MK10 style tags, which are within the recommendations of Jones (2010). Satellite tags remain on a turtle for a maximum of three years, but most likely for only several months.

For the proposed action (Alternative B), the process of attaching a satellite tag may take up to three hours and result in short-term temporary adverse impacts to the animal. These impacts would be in the form of non-lethal stress. The actual satellite tag on the sea turtles would result in minor long-term temporary direct and indirect adverse impacts to sea turtles from having a small foreign object attached to its shell for several months before falling off. The MTAP has applied deploy a maximum of 20 satellite tags on green sea turtles and an additional 15 tags to hawksbill sea turtles per year in the entire PIR.

For Alternative A, the MTAP would not attach satellite tags to sea turtles in the U.S. Insular Areas of the Pacific Islands Region, hence there would be no direct adverse impacts to sea turtles in those areas. The MTAP would continue to collaborate with the MTRP in the Hawaiian Archipelago (mainly in the form of analytical services). These collaborations may include attaching satellite tags to sea turtles. The process of attaching a satellite tag may take up to three hours and result in short-term temporary adverse impacts to the animal. These impacts would be in the form of non-lethal stress. The actual satellite tag on the sea turtles would result in minor long-term temporary direct and indirect adverse impacts to sea turtles from having a small foreign object attached to its shell for several months before falling off.

For Alternative C, no satellite tags would be attached to sea turtles in the PIR by the MTAP, hence there would be no direct adverse impacts to sea turtles. However, there would be a long-term minor indirect adverse effect from not collecting data on these poorly understood sea turtle populations.

4.1.8 Euthanizing Individual Sea Turtles

Humane euthanasia is only performed by a licensed veterinarian if he determines that an individual cannot survive or function in the wild. These animals are typically in extremely poor health and in a condition beyond treatment. Examples of such cases include animals severely afflicted with FP for which there is no cure, or animals with severe physical trauma beyond repair because of shark attack or boat strike. In such cases, euthanasia is performed for humane reasons and the animal is used for furthering scientific understanding of marine turtle disease and basic biology. For the propose action (Alternative B) and Alternative A, the impacts of humanely euthanizing sea turtles that are beyond treatment and incapable of surviving in the wild is negligible. For alternative C, no turtles would be euthanized by licensed veterinarian during MTAP activities in the PIR, hence there would be no direct adverse impacts.

4.2 Impacts to the Environment

4.2.1 Impacts to Beach Environments

The proposed action (Alternative B) includes a number of activities on beaches (e.g., nesting surveys, stranding response, the collection of biological or physical samples). The impacts of carrying out the proposed action on beach environments would be negligible because the activities would involve walking, sitting, and standing on beaches while collecting data on the sea turtles. The proposed action does not involve erecting any structures or conducting any excavations. A handful of substrate may be collected next to or in a former nest to evaluate grain size distribution of the beach, but this would be a negligible amount of material. In remote locations where no other accommodations are available, MTAP staff may camp overnight during surveys. These camping activities would be conducted in accordance with standard backcountry best management practices (e.g., packing out all waste). These beach activities would take up to several days, per year, at any particular beach within the PIR.

For Alternative A, the MTAP would not conduct any activities on beaches in the U.S. Insular Areas of the Pacific Islands Region, hence there would be no direct or indirect adverse impacts to these resources in those areas. The MTAP would continue to collaborate with the MTRP in the Hawaiian Archipelago (mainly in the form of analytical services). These collaborations may include activities on beaches. The impacts of carrying out the research activities on beach environments would be negligible because the activities would involve walking, sitting, and standing on beaches while collecting data on the sea turtles.

For Alternative C, no activities would be conducted on beaches in the PIR, hence there would be no direct or indirect adverse impacts to beach environments.

4.2.2 Impacts to Near-shore Shallow Water Environments

The proposed action (Alternative B) includes, in part, capturing sea turtles in near-shore shallow water environments. These capture activities would either be conducted by wading on foot, snorkeling, or from a small boat. During wading and snorkeling activities, the MTRP staff would target working in sandy substrates, and avoid touching all coral reefs. Coral reefs would be avoided because they are an important part of the sea turtles habitat and touching corals can result in an unpleasant skin infection. If a coral reef was accidently stepped during capture activities, the adverse impacts would be short-term and minor because the magnitude of the activity is limited to a few individuals on-foot. The proposed action involves using small boats to access the remote beaches of the PIR and to capture sea turtles. Small boats would be operated by trained individuals. When operating small boats, coral reefs would be avoided because the risk of damaging the boat or propeller in a remote location is undesirable.

For Alternative A, the MTAP would not conduct any activities in near-shore shallow water environments in the U.S. Insular Areas of the Pacific Islands Region, hence there would be no direct or indirect adverse impacts to these resources in those areas. The MTAP would continue to collaborate with the MTRP in the Hawaiian Archipelago (mainly in the form of analytical services). These collaborations may include activities in near-shore shallow water environments. The impacts of carrying out the research activities in near-shore shallow water environments would be negligible because the activities would involve only short-term small-scale activities such as wading and snorkeling.

For Alternative C, no activities would be conducted by the MTAP in the PIR, hence there would be no direct or indirect adverse impacts to near-shore shallow water environments.

4.2.3 Impacts to Algae and Sea Grass populations

Green sea turtles in the PIR feed primarily on algae and, to a lesser degree, sea grass. Sampling algae and sea grass from foraging grounds is useful for studies such as diet, growth rates, and FP disease. For the proposed action (Alternative B), samples collected would amount to less than 1 kg km^{-2} day^{-1} during the study. Algae samples are hand-clipped as required by the regulations, not taken by the holdfast, causing only short-term temporary adverse impacts to the algal population. Algae found in green turtle diets can grow at least 10-12% per day, easily replacing any loss from collecting activities (Russell and Balazs 1994). Therefore, the direct adverse impacts of collecting algae samples are minor. The indirect adverse impacts of collecting small amounts of algae and sea grass are negligible.

For Alternative A, the MTAP would not collect any algae or sea grass samples in the U.S. Insular Areas of the Pacific Islands Region, hence there would be no direct or indirect adverse impacts to these resources in those areas. The MTAP would continue to collaborate with the MTRP in the Hawaiian Archipelago (mainly in the form of analytical services). These collaborations may include collecting algae or sea grass. Samples collected would amount to less than 1 kg km^{-2} day^{-1} during the study. Algae samples are hand-clipped as required by the regulations, not taken by the holdfast, causing only short-term temporary adverse impacts to any algal population. Algae found in green turtle diets can grow at least 10-12% per day, easily replacing any loss from collecting activities (Russell and Balazs 1994). Therefore, the direct adverse impacts of collecting algae samples are minor. The adverse indirect impacts of collecting small amounts of algae and sea grass are negligible

For Alternative C, the MTAP would not collect any samples in the PIR, hence there would be no direct or indirect adverse impacts to algae or sea grass.

4.2.4 Potential to Spread Invasive Species

A number of plant and animal species have previously become established on various islands in the PIR. Non-native invasive species can have an adverse impact on the native flora and fauna of islands by outcompeting, preying on, and replacing native species, as well as providing habitat for non-native species, requiring large-scale efforts to eradicate these species, although with mixed results.

The proposed action (Alternative B) and Alternative A use strict procedures to minimize the potential introduction of non-native invasive species by research activities conducted at the remote field sites. All tents are placed and all work is done on the perimeter of the island, generally seaward of the vegetation zone. Stringent protocols are used to ensure that no species are introduced to the islands. These protocols include:

- 48-hour freezing of all non-sensitive food and equipment,
- removal of all packaging materials which may harbor foreign plants or animals;
- packing all food, personal effects, and small equipment in plastic bags which are in turn placed in sterilized 5-gallon plastic buckets;
- packing all large equipment in either plastic cases or pallet tubs, all of which are fumigated prior to landing;
- all soft gear (e.g., daypacks, straps, nets, bags, bedding, tents, clothing, footwear) used at each field site is either new or has not been used at any other location; and No use of any fresh food item which either may become established (tomatoes, sunflower, mustard, or alfalfa seeds) or foods which may harbor molds or fungi will be used.

Therefore, for the proposed action (alternative B) and alternative A the direct and indirect adverse impacts from potentially introducing non-native invasive species are negligible.

For Alternative C, the MTAP would not spread any invasive species in the PIR because there would be no activities in the PIR.

4.2.5 Impacts on Fish

The proposed action (alternative B) may use large-mesh entanglement nets to capture sea turtles in near-shore waters. These nets are constructed of two mm diameter nylon twine with a stretched diagonal mesh of 46 cm (23 cm^2 mesh). The lengths of the nets range from 20 to 100 m and the depths range from 1.5 to 8.0 m. The nets are set at the surface extending vertically through the water column. Floats are embedded in the top line of the net and the bottom line is weighted. Nets are deployed close to shore (< 100 m) in shallow, sandy or muddy (estuarine) habitats, generally of seagrass or macro-algae, and continuously monitored (hand checked every half hour) by boat (with four crew members at a minimum). No more than two nets are ever set at one time and these are set in series. Entangled turtles are promptly removed from the net and brought to shore or placed inside the boat as described above (Balazs et al. 1987; Seminoff et al. 2002, 2003; Seminoff and Jones 2006). Set times vary by location, but typically do not exceed 12 hours (nets monitored every 30 min). Typical capture for a twelve hour soak time is two to six sea turtles. If many turtles are caught within the first couple hours the nets will be pulled to allow adequate time for the researchers to mark, measure, and release the turtles. In addition to sea turtles we do expect to capture stingrays (family Dasyatidae, not threatened) but the large mesh avoids catching most fish. All bycatch will be removed from the net and released alive.

The proposed action (Alternative B), would have short-term temporary adverse impacts to near-shore fish that are accidently caught in the net and then released. These impacts would be in the form of non-lethal stress to the animal. The use of scoop nets and the hand capture of turtles would have no direct or indirect impacts on fish in the area as these animals are not targeted. Because the use of nets under the proposed action would be for short periods of time there are no long-term adverse impacts to fish.

For Alternative A, the MTAP would not conduct any net capture activities in the U.S. Insular Areas of the Pacific Islands Region, hence there would be no direct or indirect adverse impacts to these resources in those areas. The MTAP would continue to collaborate with the MTRP in the Hawaiian Archipelago (mainly in the form of analytical services). These collaborations may include net capture activities. These activities would have short-term temporary adverse impacts to near-shore fish that are accidently caught in the net and then released. These impacts would be in the form of non-lethal stress to the animal. The use of scoop nets and the hand capture of turtles would have no direct or indirect impacts on fish in the area as these animals are not targeted. Because the use of nets under Alternative A would be for short periods of time there are no long-term adverse impacts to fish.

For Alternative C, no net capture activities would be conducted by the MTAP in the PIR, hence there would be no direct or indirect adverse impacts to fish.

4.2.6 Impacts on Seabirds

The proposed action (Alternative B) would occur along the coast and in the ocean in the PIR where seabirds would be encountered. However, the proposed action does not involve killing, capturing, or intentionally disturbing any seabirds. Seabirds may be indirectly and temporarily adversely affected by researchers conducting sea turtle survey activities. Generally, these activities include a few researchers walking along a beach where seabirds may be roosting or nesting, or during small boat activities. These indirect adverse impacts would be limited to a bird moving from one area of the beach, or water surface, to another several meters away. Surveys and stranding response activities would avoid seabird nests to the maximum extent practicable. Overall, these adverse impacts will be short-term, temporary, and minor because any bird flushed by such activities would either return to the site after the researcher has passed, or the bird would occupy another section of beach.

For Alternative A, the MTAP would not conduct any activities in the U.S. Insular Areas of the Pacific Islands Region, hence there would be no direct or indirect adverse impacts to these resources in those areas. The MTAP would continue to collaborate with the MTRP in the Hawaiian Archipelago (mainly in the form of analytical services). These collaborations may include activities that could indirectly adversely affect seabirds. Seabirds may be indirectly and temporarily adversely affected by sea turtle survey activities that involve a few researchers walking along a beach where seabirds may be roosting or nesting. These indirect adverse impacts would be limited to a bird moving from one area of the beach, or water surface, to another several meters away. Surveys and stranding response activities would avoid seabird nests to the maximum extent practicable. Overall, these adverse impacts will be short-term, temporary, and minor because any bird flushed by such activities would either return to the site after the researcher has passed, or the bird would occupy another section of beach.

For alternative C, the MTAP would not conduct any activities in the PIR, hence there would be no direct or indirect adverse impacts to seabirds.

4.2.7 Impacts on Cultural and Historic Resources

Island and coastal communities in the PIR are intricately connected with the coral reef ecosystems that surround them. Much of the mythology, legends, and customs of native islanders encompass the surrounding marine environment as crucial components of life, especially sea turtles. Local coral reef resources provide food, cultural activities, subsistence, and revenue through artisanal, recreational, and commercial fisheries. Indigenous Pacific Island communities have a strong cultural and economic dependence on the marine environment. For example, traditional Hawaiian fishery management activities centered on strictly enforced social and cultural controls on fishing. These fishery management activities were based on time or area closures to keep fisheries from disturbing natural processes and habitats of food resources considered important. Recently, the cultural focus has been reinforced when the state of Hawaii supported the development of community-based subsistence fisheries areas in a few communities. Fisheries management plans have been prepared by these communities and are based on integrating traditional observational methods and modern scientific techniques. Traditional fishing activities are used to restore community values and stewardship while revitalizing a locally sanctioned code of fishing conduct.

Ancient Hawaiians developed a special relationship with the land and sea, which provided them with sustenance and recreation, molded their cultural values, and cultivated their deep connection to ecosystems. Fishing, gathering of ocean algae (*limu*), and subsistence use of ocean resources have been a traditional way of life for native Hawaiians. Fishes also provided the primary source of protein in the Hawaiian diet. The strict enforcement of traditional *kapu* system (forbidden or taboo) was an effective control to prevent overharvesting of ocean resources. *Kuleana* (responsibility), which interweaves honor and duty, describes the approach to Hawaiian resource management, and reinforces the idea of resource stewardship as opposed to resource management.

The longest recorded traditional Hawaiian chant, the *Kumulipo* (source of deep darkness) is a history of how all life forms came and evolved, beginning with the coral polyp as the building block of all life. This creation chant tells the story of Native Hawaiians' ancestral connection with the gods who created the coral polyps, the NWHI, which are seen as *kūpuna* (or respected elders), and everything else in the Hawaiian Archipelago, including Native Hawaiians. The symbolism of the union of earth mother, Papahānaumoku, and sky father, Wākea, is the foundation for the name of the Papahānaumokuākea Marine National Monument.

Punalu'u beach on the island of Hawaii has been an MTRP study location and is the setting for the most well known Hawaiian sea turtle legend (Balazs *et al.* 1994). As documented by Hawaiian historian Mary Kawena Pukui, in ancient time two sea turtles (honu-po'o-kea and honu-'ea) came to Punalu'u beach where the mother gave birth to an egg she buried in the sand. With her digging, the mother released a freshwater spring that is seen today. Later, the mother's egg hatched becoming the "turtle girl" named Kauila. Kauila the turtle was able to assume human form and play with local children, but would change into a turtle again before going back into the water. "Children used to catch fish and shrimp in the spring, and Kauila watched lest the little ones fall in. The people loved Kauila for this and because her spring gave them drinking water" (Handy *et al.* 1972). Local Hawaiians believe Kauila's presence can still be felt at Punalu'u today and that Kauila is the "mystical mother" of all Hawaiian sea turtles.

Historic fishing methods in American Samoa were documented in a 2008 PIFSC report (Herdrich and Armstrong 2008). Throughout the Samoan islands, common fishing techniques included gleaning, diving, rod and line, netting and trapping (including communal fish drives), and boat fishing, but there were slight differences in practices according to particular village rules and techniques related to the habits of marine resources. The village has been, and remains, an important organizing unit in Samoan society (Keesing 1934), and the village customarily controlled the usage rights to a lagoon and its produce. While individual and family fishing occurred on an almost daily basis, there were times when the village organized a communal drive for certain fish or when men fished outside the lagoons under the leadership of a fishing expert, a *tautai.* There were rules that certain fish were to be given to the chiefs, and restrictions were occasionally made regarding the lagoon and its produce. All of these practices were, in essence, under the control of the village and its decision-making body, the village *fono*.

The first people to arrive in the Mariana Archipelago about 3500 years ago were skilled fishermen. The aboriginal culture of Guam and the CNMI was based on fishing, agriculture, and gathering. A 2008 PIFSC report and a 1989 Western Pacific Regional Fishery Management Council report (Allen and Bartram 2008; Amesbury *et al.* 1989) describe the dependence on and engagement in fishing activities of the people of Guam and the CNMI, respectively, throughout history. Prior to the arrival of Europeans in the Mariana Archipelago, the indigenous Chamorro people possessed large sailing canoes, *proas*, which they used for fishing on offshore banks. A noble caste of deep-sea fishermen and interisland traders within Chamorro communities, the *matua*, monopolized the manufacture of these canoes. Over the centuries of acculturation, beginning with the Spanish conquest in the late 17th century, many elements of traditional Chamorro culture were lost. Despite dramatic changes in marine resources and ecosystems, human populations, and food sources, many of the indigenous people of Guam and the CNMI and their immigrant communities continue to depend on fishing and locally caught seafood to reinforce and perpetuate cultural traditions such as community sharing of food. Although fishing has made and continues to make economic contributions to these territories, the socio-cultural influences of fishing are far deeper.

Given that the proposed action (Alternative B) would take place primarily in an office setting, or in the case of field activities, along beaches or in near-shore waters all the historic properties in uplands will be avoided. Given that the context of the proposed action is observing, handling, and modeling population of sea turtles on computers, there will be no construction, earth-moving, or other land-use activities along the beaches or in near-shore waters that would have the potential to affect historic properties. The intensity of the field activities is extremely low, and involves infrequently visiting the nesting beaches and foraging areas used by sea turtles and walking or swimming through their habitats. These low intensity field activities would also be spread out over the vast geographic area of the PIR.

The MTAP recognizes the importance of marine turtles and near-shore ecosystems to Pacific Island cultures. All Federal and contracted MTAP staff are briefed according to local cultural histories and practices to raise appropriate awareness and sensitivity. The MTAP works with the public and local volunteers to avoid and minimize any misconception of the research that the public may have. While the proposed action involves field research and stranding response activities, which will have minor short-term, temporary direct adverse impacts on individual sea turtles, the long-term beneficial effects of a greater scientific understanding of the species will contribute to their recovery and therefore be considered a moderate beneficial effect on this resource. The proposed action (Alternative B) and Alternative A will avoid all impacts to historic properties. There would be no adverse impacts on these resources from Alternative C because there would be no field work associated with this alternative.

4.3 Cumulative Impact Analysis

The Council on Environmental Quality (CEQ) defines cumulative effects as "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" (40 CFR 1508.7). The size of the Pacific Islands Regions is enormous – the U.S. Exclusive Economic Zone within the Pacific Islands Region covers approximately 1.5 million square nautical miles. While the proposed action includes research, stranding response, and technical collaboration within this entire region, each activity is implemented on a small-scale (e.g., only a few researchers at any one time capturing and measuring a single sea turtle) and for a short time period (e.g., a stranding response may take a couple of hours). Still, the five federally listed sea turtle species have not met their recovery goals.

4.3.1 Impacts of Past Actions within the Scope of Analysis

The first human inhabitants of the PIR were Polynesian explorers more than thousands of years ago. When Captain James Cook arrived in Hawaii in 1778 several hundred thousand Hawaiians lived in the MHI. At that time, the NWHI were unpopulated (Cleghorn 1988). However, prior to Cook's arrival, the islands of Nihoa and Mokumanamana in the NWHI were visited by people from the MHI. Most notably, people sailed frequently between communities located on Niihau, Kauai, and Nihoa Islands (PMNM 2008). It is believed that Nihoa supported a permanent population for several hundred years as evidenced by archeological sites that include substantial habitation sites and agricultural terraces (Cleghorn 1988). Meanwhile, Mokumanamana was believed to be only temporarily inhabited for cultural and religious purposes (Cleghorn 1988). Both islands contain many religious structures such as heiau (places of worship) and platform foundations with upright stones that mark the important journey of the sun through the seasons (PMNM 2008). Nihoa and Mokumanamana Islands also provided valuable natural resources such as birds, bird eggs, loulu palm wood, makiukiu grass, and fish (PMNM 2008).

Since their discovery, the shallow coral atolls of the NWHI have been the sites for many shipwrecks (PMNM 2008). Often stranded sailors slaughtered and ate green sea turtles and Hawaiian monk seals to survive, and early records suggest hawksbills were harvested there in large numbers (Van Houtan et al. 2012). The first shipwreck on FFS was in 1786. The most recent shipwreck occurred at Pearl and Hermes Atoll on July 2, 2005 (DOC et al. 2011). The 145-foot-long research vessel M/V Casitas ran aground on the reef while working in PMNM on a marine debris removal mission. The grounding of the vessel, and its ultimate removal, damaged approximately 0.42 acres of reef, of which 0.11 was coral (DOC et al. 2011). Other early inhabitants of the atoll included feather hunters, sealers, whalers, guano miners, and fishermen. More recently East Island, and then Tern Island, was home to a Coast Guard long-range navigation transmission (LORAN) station. A runway was constructed on Tern Island by the Navy in 1940. After the Navy's departure, the runway was used to transport sea turtles to market. Sea turtles were actively harvested for their meat and shells until 1978 when they were listed on the Endangered Species List. Since 1978 the number of nesting female green sea turtles at FFS has continued to increase (Figure 4).

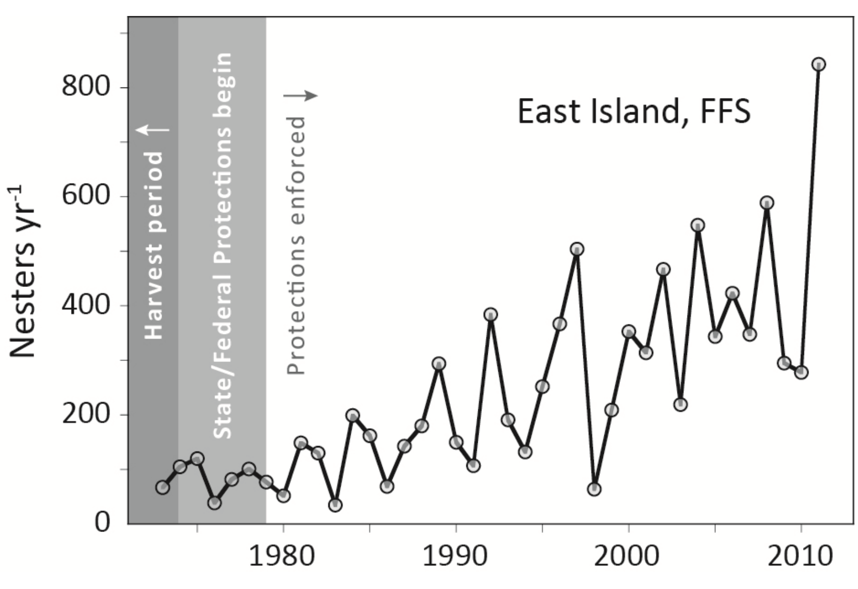

Figure 4. Nester counts at French Frigate Shoals, Northwestern Hawaiian Islands. Nesting green turtles from annual surveys at East Island, from 1973-2011. The increasing trend documents the ongoing population recovery since the prohibition of harvests in the mid-1970s. Shaded areas represent different management regimes during the study period (from Van Houtan et al. *in review*).

These data document the steady increase in the green sea turtle population. The MTRP has conducted nesting surveys on East Island at FFS for 38 consecutive years and provides a critical index of abundance for the Hawaiian green turtle stock. New turtles are tagged, measured, and sampled (i.e., tissues are taken for genetic analysis and health assessments such as FP tumors), and tags of previously tagged turtles are recorded. Research on the MHI has similarly captured, tagged, measured and sampled thousands of green sea turtles in the MHI (Figure 5).

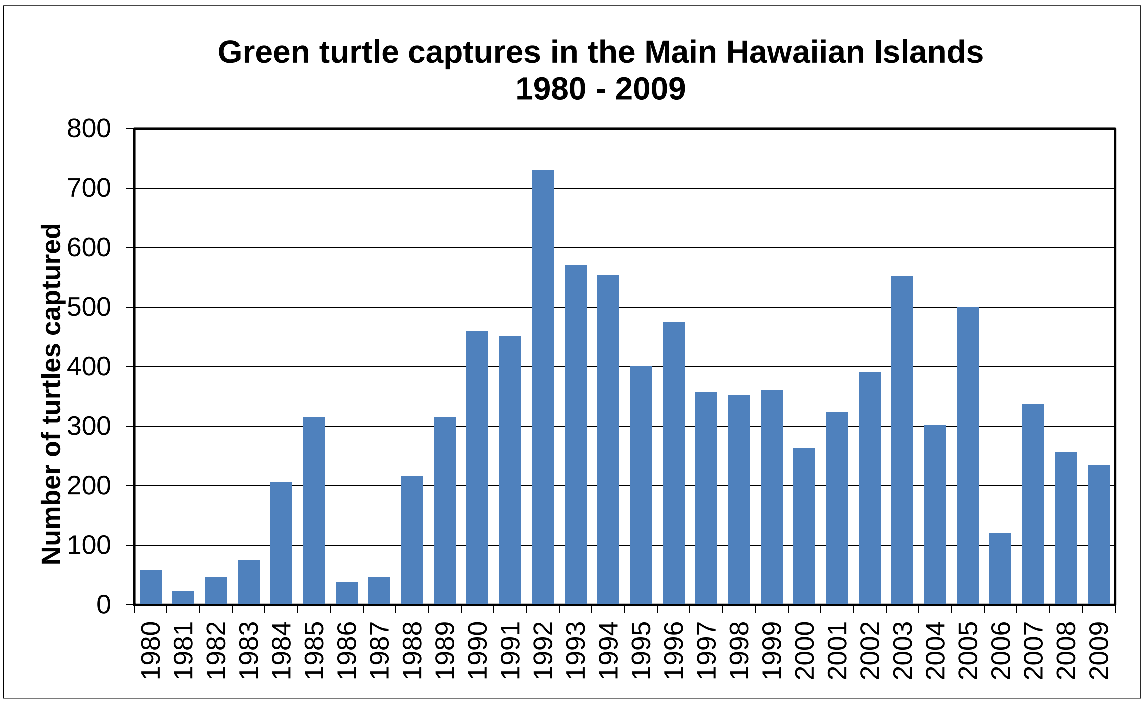

Figure 5. Number of green sea turtle captured during the year (some caught more than once per year).

As a complement to the nesting, foraging, and resting habitat research surveys, the MTRP has responded to sick, injured, and dead sea turtle strandings in the Hawaiian Archipelago. From 1982 through February 2006, the MTRP collected information from 4,451 stranded turtles. Of these individuals, 135 (3 %) were previously tagged by the MTRP. The most common cause of mortality among tagged turtles was FP (21%). Recent trends in the diversity and abundance of sea turtles cared for in the stranding response program is shown in Table 4. Green turtles make up the largest proportion of strandings in Hawaii, with only incidental strandings of hawksbill, olive ridley, loggerhead, and leatherback turtles, which is assumed to be representative of their presence.

Table 4. The number and species of sea turtles stranded in the Hawaiian Islands.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Green turtle	260	250	269	274	263	288	256	267	237	245
Hawksbill	5	4	5	3	4	7	6	9	6	5
Olive ridley	6	0	1	4	3	0	1	1	1	0
Loggerhead	1	0	0	0	1	0	0	0	0	0
Total	271	254	275	281	270	295	263	277	244	250

The U.S. Insular Areas of the Pacific have had a similar series of historical impacts as the Hawaiian Archipelago but with unique characteristics. Ranging from exploration, colonization, resource extraction, infrastructure expansion, to militarization, the islands and atolls have experienced actions that have changed their natural setting. A brief description of the historical events that shaped the landscape are described in Section 3.2. As the setting for many battles during World War II the reefs and beaches of the U.S. Insular Areas of the Pacific were modified by bombs and bulldozers. Many of the enduring sites are listed on the National Register of Historic Places, but many of the other sites located along the coast have faded away with beach and wave erosion.

In 1993, a 135-foot-long Taiwanese longline fishing vessel grounded on Rose Atoll in 1993 and spilled oil approximately 100,000 gallons of oil into refuge waters (USFWS 2000). By 2007, approximately 37 tons of metal from the ship wreckage were removed from the reef. The grounding of the ship and the oil spill directly killed many organisms on the reef. The slow release of iron from the wreckage into the water column contributed algal blooms that have indirectly inhibited natural reef regeneration.

4.3.2 Impacts of Present Actions within the Scope of Analysis

PIFSC currently conducts a number of research projects in the Pacific Islands Region. The research is divided over several disciplines including oceanography, fisheries, coral reefs, marine mammals, and sea turtles. Given the long-distance migrations of many pelagic species, and the vital ecological and commercial role that marine resources serve, the PIFSC works with a number of local (e.g., fisherman, universities), national (e.g., U.S. Fish and Wildlife Service), and international (e.g., foreign educational institutes) collaborators.

PIFSC oceanographic research spans the Pacific Islands Region and includes both insular and pelagic habitat and ecological research. Oceanographic data collection generally involves measuring ocean and atmospheric variables using several different platforms. Ship-based instruments, such as CTD systems and echosounders, are used to measure ocean conditions ranging from temperature to micronekton density. Submersibles and remotely operated vehicles are used to collect data in remote parts of the Pacific Ocean. The majority of oceanographic research has negligible direct impact on marine resources because it conducted using remote sensing technology. The collection of small amounts of ocean water, such as samples used to study plankton, have minimal, localized, and only temporary adverse impacts on the ocean and negligible impacts on sea turtles.

PIFSC fisheries research involves collecting and analyzing data on the regional fisheries. Data are collected from the log books of fishing vessels, during targeted fishing surveys, and through socio-economic studies of the fishing industry. One of these programs specifically measures the bycatch of sea turtles, seabirds, and marine mammals in the regional fisheries and identifies methods to minimize this incidental capture. These bycatch reduction efforts have a small though beneficial effect on the environment in general and sea turtles in particular. The largest potential for direct and indirect adverse impacts to the environment is from the active fishing data collection component. However, these fishing activities are conducted infrequently, on a very limited scale, and targeted to the species being studied thereby resulting in only short-term temporary adverse impacts to marine resources. The potential direct and indirect adverse impacts of the fisheries research on sea turtles is negligible.

PIFSC coral reef research focuses on long-term ecological monitoring surveys, biodiversity research, and marine debris removal. These activities occur across the Pacific Islands Region. Surveys are conducted from research ships using echosounders, autonomous underwater vehicles, and cameras, or underwater by SCUBA divers and snorkelers. In general, research cruises range for couple days to couple months in length, and occur a few times per year. A number of instruments are also temporarily deployed on the ocean floor to remotely study coral reef communities and ecological processes. These include: ecological acoustic recorders, autonomous reef monitoring structures, calcification acidification units, acoustic Doppler current profilers, wave and tide recorders, ocean data platforms, and transect markers. These instruments may be temporarily secured to the substrate using metal stakes or heavy weights. During monitoring surveys voucher specimens of algae, invertebrates, substrate, fish, and coral are collected for identification and genetic analysis. The voucher samples are collected on a small scale and represent a fraction of the biomass being studied. Occasionally, cores of corals are collected and analyzed using computed tomography (CT or CAT) scans. These cores are only taken from massive corals by skilled biologist to analyze growth patterns to minimize impacts. Marine debris removal has a short-term adverse on coral reefs because pieces of the reef may be broken when derelict fishing nets and fishing line are removed, however there is long-term beneficial effect on the coral reefs and marine life after the debris is removed from the ecosystem. Sea turtles may be encountered during the monitoring surveys, but the direct and indirect adverse impacts of coral reef research on sea turtles will be negligible.

PIFSC marine mammal research focuses on cetaceans (i.e., whales and dolphins) of the central and western Pacific Ocean, as well as Hawaiian monk seals in the Hawaiian Archipelago. Cetacean abundance and distribution surveys are conducted aboard ships and boats using visual and acoustic scan. Passive acoustic surveys of cetaceans are conducted by temporarily deploying a high-frequency acoustic recording package on the ocean floor. Genetic samples are episodically collected by taking a small piece of skin without long-term harm to the animal. The Hawaiian monk seal research includes field camps in the NWHI and surveys in the MHI. Sea turtles have been and will be encountered during the marine mammal monitoring surveys. These encounters result in no greater than short-term disturbance and it is unlikely the research will have any long-term or indirect adverse affects to sea turtles because the biologist are trained to minimize interactions with sea turtles.

The U.S. Fish and Wildlife Service and State of Hawaii, Department of Land and Natural Resources, also staff field camps in the NWHI to collect ecological data and conduct other management activities. The U.S. Fish and Wildlife Service works on FFS, Midway Atoll, and Laysan Island in conjunction with NMFS. The USFWS also conducts seabird and plant research projects in each of their other refuges located in the PIR. The focus of USFWS research is seabirds, while the focus of their ecological restoration is the re-vegetation of native plant communities. Seabirds are a natural predator of newly hatch sea turtles. The State activities are based on Kure Atoll and they work with both the USFWS and NMFS to collect ecological data, conduct re-vegetation activities, and remove marine debris. These activities in the NWHI are regulated by the Papahanaumokuakea Marine National Monument. Access to the Monument and each research site is by ship, small boat, or airplane (i.e., to runways located on Tern Island at FFS and on Sand Island at Midway Atoll). The principle ships used as a platform for the research are NOAA research vessels Oscar Elton Sette and Hi'ialakai. Occasionally chartered ships are used to conduct the necessary support trips. Small boats (approximately 20 feet in length) transport people and gear from the ships at sea to the islands when there are not dock facilities. Each NOAA ship spends approximately 100 days per year in the PMNM. The diesel-powered ships operate as efficiently as possible (i.e., drives directly from point to point) to minimize fuel consumption because supplies are limited in this remote area. Consequently, the amount of diesel air pollution (e.g., NOx, SOx, particulate matter) is negligible, especially considering the vast size of the Pacific Ocean and lack of other air pollution emitters in the island region. Furthermore, the State of Hawaii is considered to have one of the best air quality records in the nation, with criteria pollutant levels below state and federal ambient air quality standards (Hawaii 2007). The contribution of these few research ships to greenhouse gas emissions is negligible relative to other emitters. Given that the ships rarely anchor when stopped to conduct small boat operations (e.g., on- and off-loading supplies), impacts to coral reef habitat is avoided. The ships are equipped with Type 2 marine sanitation device wastewater treatment systems. To minimize the short-term adverse impacts to water quality, treated wastewater is discharged outside of Special Preservation Areas and Special Management Areas (PMNM 2008). These direct adverse impacts to water quality are negligible considering the relatively small size of the ships, limited number of sea days, and volume of water in the Pacific Ocean. The number of ship days in the MHI is small fraction of the commercial and recreation shipping industry ship days. The ships are relatively slow, cruising at less than 10 knots. The small boats similarly operate at slow speeds and are required to look for sea turtles swimming in their path so that they can be avoided. There are approximately 70 flights into the Monument per year by airplane. Researchers that live on each island for one to six month periods are required to abide by strict conditions. All food and most of the water is imported. The remaining water is generated by reverse-osmosis. The researchers burn a limited supply amount of propane to cook and generate electricity. The direct and indirect adverse impacts of non-MTRP research activities in the NWHI on sea turtles is minor.

Within the Pacific Ocean a number of other public and private organizations also conduct sea turtle research under the jurisdiction of NMFS. A review of the NMFS Authorizations and Permits for Protected Species (APPS) website (accessed May 11, 2011, last updated February 2, 2011) identified a total of eight permits (Table 5). Stretching approximately 6,000 miles from CNMI to California, these permits cover all five listed sea turtle species.

Table 5. NMFS APPS active listed sea turtle research permits in the Pacific Ocean.

File Number	Project Title	Organization	Location	Expiration	Species
10027	Research in the Palmyra Atoll National Wildlife Refuge	American Museum of Natural History	Palmyra Atoll	7/31/2013	Green and hawksbill sea turtles
14097	NMFS SWFSC pinniped, cetacean, and sea turtle studies	SWFSC	North Pacific Ocean	6/30/2015	Green, hawksbill, leatherback, loggerhead, and olive ridley sea turtle
14381	Sampling sea turtle bycatch in the Hawaiian longline fisheries	PIRO	Hawaiian and American Samoa longline fishery	3/1/2015	Green, hawksbill, leatherback, loggerhead, and olive ridley sea turtle
14510	Scientific research in Sam Gabriel River and Los Alamitos Bay, CA; strandings; and power plant entrainments	SWFSC	Coastal California	4/30/2015	Green, hawksbill, leatherback, loggerhead, and olive ridley sea turtle
1556	Scientific Research	CNMI	Saipan, Tinian, and Rota	6/1/2011	Green and hawksbill sea turtles
1581	Scientific Research	PIFSC	Hawaiian Islands	12/31/2011	Green and hawksbill sea turtles
1591	Scientific Research	SWFSC	San Diego Bay, CA	10/31/2011	Green, loggerhead, and olive ridley sea turtle
1596	Scientific Research	SWFSC	Pacific Ocean	2/1/2012	Leatherback sea turtle

Non-research activities within the Pacific Islands Region that occur in vicinity of the proposed action range from commercial fisheries, to trans-Pacific commercial shipping, to recreational activities such as fishing, boating, and snorkeling. In particular, the incidental capture (i.e., bycatch) and mortality of sea turtles in commercial fisheries has been well documented (Lewison and Crowder 2007). Sea turtles are either caught directly in fishing gear by hooks or in nets (both gillnets and trawl nets), or indirectly in derelict fishing gear floating in the ocean. Commercial fisheries in the Pacific Ocean for highly migratory species (e.g., tunas and billfish) are managed by the Western and Central Pacific Fisheries Commission because they cross international boundaries. Commercial domestic fisheries (i.e., fisheries within the U.S. Exclusive Economic Zone) are managed by the NMFS Pacific Islands Regional Office with the Western Pacific Regional Fisheries Management Council. Currently, the Hawaii-based longline shallow-set fishery has an annual limit of sea turtle interactions that are permissible before the fishery is closed. For the calendar year 2012, the limit is 16 leatherback sea turtles and 17 loggerhead sea turtles (50 CFR 665.813). The number of past interactions for this fishery ranged from 0 to 17 (Table 6). The incidental capture of sea turtles by foreign vessels on the high seas and in foreign waters is difficult to quantify because of the lack of comprehensive onboard observers and inconsistent reporting (NMFS 2012). However, NMFS has estimated that in 2009, for just part of the western Pacific region, international fisheries interacted with thousands of loggerhead, leatherback, olive ridley, green, and hawksbill sea turtles and the mortalities numbered in the hundreds of sea turtles (NMFS 2012). Loggerhead and leatherback sea turtles have the highest interaction rates with the pelagic longline fisheries of the central and western Pacific.

Table 6. Historical number of interactions between the Hawaii-based longline shallow-set fishery and sea turtles (www.fpir.noaa.gov/SFD/SFD_turtleint.html).

	Leatherback Sea Turtles	Loggerhead Sea Turtles
2011	16	12
2010	8	7
2009	9	3
2008	2	0
2007	5	15
2006	1	17
2005	8	12
2004	1	1

Historically, fisheries in the Western Pacific Region were managed with species-specific Fishery Management Plans (FMP) (i.e., Pelagics, Bottomfish and Seamount Groundfish, Crustaceans, Precious Corals, and Coral Reefs), but beginning in 2010 are being managed under Fishery Ecosystem Plans (FEP) (WPRFMC 2009). These FEPs include: the Hawaii Archipelago, American Samoa Archipelago, Mariana Archipelago, Pacific Remote Islands Areas, and the Pacific Pelagic. These FEP are intended to accomplish the objectives of the Magnuson-Stevens Act through the incorporation of ecosystem science and principles. Furthermore, each of these organizations has implemented measure to reduce the bycatch of sea turtles. For example, in Hawaii sea turtle bycatch was reduced in the longline swordfish fishery by replacing traditional J-hooks with circle, and squid bait with fish bait, while maintaining target species catch rates (Gilman *et al.* 2007). Furthermore, the WPRFMC has banned the use of drift gillnets and increased the number of trained observers on fishing boats. PIFSC and PIRO also actively search for and remove marine debris from within the Pacific Islands Region. Together, these management activities and the MTRP stranding response program have reduced the unintentional mortality of sea turtle compared with historical levels.

Within the PIR, sea turtles are still poached for their meat, eggs, and shells (NMFS 2009). While illegal, these activities persist out of the sight of law enforcement. Another continuing threat to sea turtles in the region is the destruction or degradation of foraging and nesting habitats. In many parts of the PIR, near-shore reefs, seagrass beds, and beaches have been either dredged or filled as part of coastal development projects. The accumulation of sediments on near-shore habitats is another slow but relentless threat, especially in tropical high-rainfall areas.

4.3.3 Reasonably Foreseeable Actions in Scope of Analysis

This level of PIFSC research will likely continue into the near future given the existing statutory requirements and Executive Orders for fisheries, coral reefs, marine mammals, and sea turtles. It is also anticipated that the same non-federal actions will continue into the future. No information is available to suggest these actions will change substantially in the reasonably foreseeable future that would be related to sea turtles.

On Guam, the U.S. military is proposing to expand the existing military facilities to house an additional 8,600 Marines and 9,000 of their dependents (Department of the Navy 2010). While most of this development would take place in uplands, outside of the scope of analysis, Apra Harbor is proposed to be dredged and modified to create a new aircraft carrier berth. The harbor dredging would potentially impact approximately 100 acres of submerged lands in and adjacent to the existing naval base. This build-up and transfer has been delayed and may not take place until 2020.

5 Environmental Permits and Regulatory Requirements

MTAP activities conducted within the land and waters in the jurisdictions of marine protected areas, marine national monuments, wildlife refuges, or areas managed by federal, state, or local agencies will be conducted under established scientific research and collection permits issued by the responsible managing agencies. These include:

5.1 Activities in the United States, the U.S. Insular Areas, or upon the high seas

5.1.1 Endangered Species Act

Research that would "take" (i.e., harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct) a federally threatened or endangered species for scientific purposes or to enhance the propagation or survival of listed species:

- Section 10(a)(1)(A) Permit from NMFS or USFWS.

Any federal action that may affect a federally listed threatened or endangered species or its designated critical habitat:

- Section 7 Consultation with the National Marine Fisheries Service or U.S. Fish and Wildlife Service. An action that may adversely affect a listed species requires formal consultation, which concludes with a biological opinion (BO; states the opinion of the Service as to whether or not the Federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat). A BO may include an incidental take statement for an otherwise legal action.

5.1.2 Animal Welfare Act

Research that would use live marine mammals or sea turtles may require a:

- Approved Protocol and Assurance from the NMFS regional Animal Care and Use Committee (IACUC).

5.1.3 Marine Mammal Protection Act

Research that would "take" (i.e., harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal) an ESA-listed marine mammal or involve Level A Harassment (i.e., has the potential to injure a marine mammal or marine mammal stock in the wild) of a non-ESA-listed marine mammal for scientific or enhancement purposes:

- Scientific Research and Enhancement Permit from the NMFS.

Research that would involve Level B Harassment (i.e., has the potential to disturb a 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) of a non-ESA-listed marine mammal:

- General Authorization from the NMFS.

For maritime activities that may result in the incidental take of a marine mammal:

- Incidental Take Authorization or Letter of Authorization (LOA) from NMFS.

For maritime activities that may incidentally take small numbers of marine mammals by harassment (i.e., any act of pursuit, torment, or annoyance).

- Incidental Harassment Authorization (IHA) from NMFS.

5.1.4 Migratory Bird Treaty Act

Regarding birds included in the respective international conventions between the U.S. and Great Britain, the U.S. and Mexico, the U.S. and Japan, and the U.S. and the Russia, research that would take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter any migratory bird, or the parts, nests, eggs, or product may require a:

- Scientific Collecting or Special Purposes Permit from USFWS.

5.1.5 Magnuson-Stevens Fishery Conservation and Management Act

Research that may adversely affect Essential Fish Habitat (EFH) in the U.S. Exclusive Economic Zone requires consultation with NMFS. EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH has been designated for the Pelagics, Bottomfish and Seamount Groundfish, Crustaceans, Precious Corals, and Coral Reef Ecosystems Management Unit Species. Within the Pacific Islands Region, this designated EFH includes the water column down to 1,000 meters and other specific habitats within that range, and may require a:

- Consultation and EFH Conservation Recommendations from NMFS.

5.1.6 Clean Water Act

Research that involves discharging dredged and/or fill material (e.g., placing rock or concrete) into waters of the U.S. may require a:

- Section 404 permit from the U.S. Army Corps of Engineers.

5.1.7 River and Harbor Act

Research that involves work (e.g., placing equipment on the sea floor or in the water column) that could affect navigation, or the construction or maintenance of structures such as any permanent mooring structure may require a:

- Section 10 Permit from the U.S. Army Corps of Engineers.

5.1.8 National Historic Preservation Act

Per Section 106, research that has the potential to affect properties listed on, or eligible for, the National Register of Historic Places may require a:

- Section 106 consultation with a SHPO or TPHO.

5.2 Activities in the Hawaiian Islands

5.2.1 Hawaii Revised Statutes and Administrative Rules

Research in Hawaii state waters that collects aquatic life or uses certain fishing gear and methods may require a:

- Special Activity Permit from Hawaii Department of Land and Natural Resources, Division of Aquatic Resources.

5.2.2 Coastal Zone Management Act

Research in the coastal zone that would cause coastal effects may require a:

- Concurrence with a Consistency Determination from the Hawaii Coastal Zone Management Program.

5.2.3 Papahānaumokuākea Marine National Monument (PMNM)

All activities within the PMNM require a permit and must be categorized under one of six permit types: research, education, conservation and management, Native Hawaiian practice, special ocean use, and recreational (Midway only). Research within the PMNM may require a:

- Research, or Conservation and Management Permit issued by Co-Trustees of the PMNM.

5.2.4 Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS)

The HIHWNMS encompasses approximately 1,218 square nautical miles of coastal and ocean waters around the main Hawaiian Islands. The sanctuary extends seaward from the shoreline to the 100-fathom isobath. It includes areas around the islands of Maui, Lana`i, and Moloka`i, and parts of O`ahu, Kaua`i and Hawai`i. The following activities are prohibited within the HIHWNMS:

1. Approaching, or causing a vessel or other object to approach, within the sanctuary, by any means, within 100 yards of any humpback whale except as authorized under the Marine Mammal Protection Act (MMPA);
2. Operating any aircraft above the sanctuary within 1,000 feet of any humpback whale;
3. Taking any humpback whale in the sanctuary except as authorized under the MMPA and the Endangered Species Act (ESA);
4. Possessing within the sanctuary (regardless of where taken) any living or dead humpback whale or part thereof taken in violation of the MMPA or the ESA;
5. Discharging or depositing any materials or other matter in the sanctuary; altering the seabed of the sanctuary, or discharging and depositing any material or other matter outside of the sanctuary if the discharge or deposit subsequently enters and injures a humpback whale or humpback whale habitat; and
6. Interfering with, obstructing, delaying, or preventing an investigation, search, seizure, or disposition of seized property in connection with enforcement with either of the Acts.

Research that involves a prohibited activity or collection of materials in the Sanctuary may require a:

- General or Special Use Permits issued by the NOAA National Marine Sanctuary.

5.3 Activities in American Samoa

Research in the territorial waters of American Samoa may require a:

- Federal Consistency Review of all projects by the American Samoa Coastal Management Program.
- Scientific Collection Permit to undertake any of a number of prohibited marine activities. Note that use of scuba to take marine organisms is prohibited. Also, annually, the government issues a proclamation that articulates restricted fishing areas and other fishing restrictions.

5.3.1 American Samoa National Parks

The National Park is divided into three units Tutuila Unit , Ta'u Unit, and Ofu, Olosega Unit. Research in the park may require a:

- Scientific Research and Collection Permit from National Park Service, DOI.

5.3.2 Fagatele Bay National Marine Sanctuary (FBNMS)

FBNMS is a 0.25 square mile coastal embayment on the island of Tutuila, Territory of American Samoa. A proposed rule has been published (76 FR 65566) that would expand the FBNMS to include other areas, including Rose Atoll (also called Muliava). Research in FBNMS that involves collecting plants, animals, or other materials such as corals may require a:

- Permit from NOAA, Office of Ocean and Coastal Resource Management

5.3.3 Rose Atoll Marine National Monument (RAMNM)

In the Pacific Ocean approximately 130 nautical miles east-southeast of Pago Pago Harbor, American Samoa, lies Rose Atoll – the easternmost Samoan island and the southernmost point of the United States. This atoll includes the Rose Atoll National Wildlife Refuge with about 20 acres of land and 1,600 acres of lagoon. The monument includes all lands and interests in lands owned or controlled by the Government of the United States within the boundaries that lie approximately 50 nautical miles from the mean low water line of Rose Atoll. This is equivalent to approximately 13,451 square miles of emergent and submerged lands and waters of and around Rose Atoll in American Samoa.

- The Proclamation establishing the monument specifically provides that scientific exploration or research by or for the Secretaries of Commerce and Interior shall not need a permit. The Proclamation provides the national marine monument shall be dominant over any other existing Federal withdrawal, reservation, or appropriation.

5.4 Activities in Pacific Remote Island Areas

5.4.1 Pacific Remote Islands Marine National Monument

The monument includes the waters and submerged and emergent lands of the Pacific Remote Islands approximately 50 nautical miles from the mean low water lines of Wake, Baker, Howland, and Jarvis Islands, Johnston Atoll, Kingman Reef, and Palmyra Atoll. The Federal land and interests in land reserved consists of approximately 86,888 square miles.

- The Proclamation establishing the monument specifically provides that scientific exploration or research by or for the Secretaries of Commerce and Interior shall not need a permit. The Proclamation provides the national marine monument shall be dominant over any other existing Federal withdrawal, reservation, or appropriation.

5.4.2 Pacific Reefs National Wildlife Refuge Complex

The Pacific Reefs National Wildlife Refuge Complex is encompassed by the Pacific Remote Island Marine National Monument. As provided in Presidential Proclamation 8336 (2009b), "the national monument shall be dominant over any other existing federal withdrawal, reservation, or appropriation." Therefore, research conducted by or for the Secretaries of Commerce and Interior in the national wildlife refuges of Howland Island, Baker Island, Jarvis Island, Palmyra Atoll, Kingman Reef, the terrestrial areas and waters out to 12 nautical miles; and the land areas of Johnston Atoll (the waters were not part of the original bird refuge established in 1926) shall not need a permit. Research not conducted by or for the Secretaries of Commerce and Interior may require a:

- Special Use Permit issued by the National Wildlife Refuge, U.S. Fish and Wildlife Service.

5.5 Activities in Commonwealth of Northern Mariana Islands (CNMI)

5.5.1 Marianas Trench Marine National Monument (MTMNM)

The monument includes the waters and submerged lands of the three northernmost Mariana Islands (the "Islands Unit") and only the submerged lands of designated volcanic sites (the "Volcanic Unit") and the Mariana Trench (the "Trench Unit") to the extent described as follows: The seaward boundaries of the Islands Unit lie approximately 50 nautical miles from the mean low water line of Farallon de Pajaros (Uracas), Maug, and Asuncion. The inland boundary of the Islands Unit of the monument is the mean low water line. The boundary of the Trench Unit of the monument extends from the northern limit of the Exclusive Economic Zone of the United States in the Commonwealth of the Northern Mariana Islands to the southern limit of the Exclusive Economic Zone of the United States in Guam. The boundaries of the Volcanic Unit of the monument include a circle drawn with a 1 nautical mile radius centered on each of the volcanic features.

- The Proclamation establishing the monument specifically provides that scientific exploration or research by or for the Secretaries of Commerce and Interior shall not need a permit. The Proclamation provides the national marine monument shall be dominant over any other existing Federal withdrawal, reservation, or appropriation.

5.5.2 Mañagaha Marine Conservation Area (MMCA)

Mañagaha Island is a small (4 ha) reef-island located 2.5 kilometers (1.6 miles) off the west coast of Saipan in the CNMI. MMCA encompasses 500 ha (1,235 ac) within the Tanapag Lagoon and the adjacent reef slope. MMCA is a fully protected no-take area. Research that involves the collection of plants, animals, or materials in the MMCA may require:

- Scientific Research License from the CNMI, Department of Lands and Natural Resources, Division of Fish and Wildlife.

5.5.3 Forbidden Island Marine Sanctuary (FIMS)

The Forbidden Island Marine Sanctuary is located on the east-central coast of Saipan, Commonwealth of the Northern Mariana Islands (CNMI). FIMS encompasses 265 ha (655 ac) of marine environment extending 1,000 feet seaward from low tide line, including Forbidden Island, which is 3 ha (8 ac). FIMS is a fully protected no-take area. Research that involves the collection of plants, animals, or materials in the FIMS may require:

- Scientific Research License from the CNMI, Department of Lands and Natural Resources, Division of Fish and Wildlife.

5.5.4 Bird Island Marine Sanctuary (BIMS)

The Bird Island Wildlife Conservation Area and the Bird Island Marine Sanctuary are adjoining (and overlapping) conservation areas encompassing 268 ha (662 ac) of land and ocean on the northeastern coast of Saipan, CNMI. The Bird Island Sanctuary covers from Lichan Point to Bird Island Lookout, including Grotto, Bird Island, and Bird Island Bay. The sanctuary extends 1,000 feet from the low tide line seaward and 500 feet up the face of the cliff line. BIMS is a fully protected no-take area. Research that involves the collection of plants, animals, or materials in the BIMS may require:

- Scientific Research License from the CNMI, Department of Lands and Natural Resources, Division of Fish and Wildlife.

5.5.5 Sasanhaya Bay Fish Reserve (SBFR)

The Sasanhaya Bay Fish Reserve is located on the Island of Rota, CNMI. SBFR encompasses 81.3 acres between Mushroom Rock and Puňa Point. SBFR is a fully protected no-take area. Research that involves the collection of plants, animals, or materials in the BIMS may require:

- Scientific Research License from the CNMI, Department of Lands and Natural Resources, Division of Fish and Wildlife.

5.5.6 Tinian Marine Reserve Area

The Tinian Marine Reserve is located on the Island of Tinian between Southwest Carolinas Point to Puntan Diablo Point, specifically encompassing all the areas from Tachogna Beach, Taga Beach, YCC Beach, Kammer Beach, Tinian Harbor, Breakwater area to Leprosarium Beach (aka Nasarinu) and Barcinas Bay, from the high tide line to one-half mile out to the reef. SBFR is a fully protected no-take area. Research that involves the collection of plants, animals, or materials in the BIMS may require:

- Scientific Research License from the CNMI, Department of Lands and Natural Resources, Division of Fish and Wildlife.

5.6 Activities in Guam

5.6.1 Marine Preserves

The Tumon Bay, Piti Bomb Holes, Sasa Bay, Achang Reef Flat, and Pati Point Marine Preserves are located on Guam and prohibit shell collecting, the use of gaffs, and removal of sand and rocks. Fishing is prohibited except for bottom fishing in the Tumon Bay Preserve from the 100 foot depth seaward and trolling for pelagic fishes from the reef margin seaward. The use of SCUBA to collect specimens is prohibited. Research that includes collecting specimens may require:

- Permit from Division of Aquatic and Wildlife Resources, Guam.

Research within the coastal zone (i.e., the entire island and seaward to 3 nmi) may require:

- Concurrence with Federal Consistency from Guam Coastal Management Program, Bureau of Planning.

6 List of Agencies and Persons Consulted

6.1 Federal Agencies

6.1.1 National Oceanic and Atmospheric Administration

- Dr. Malia Chow, Superintendent, HIHWNMS
- Ms. Patty Miller, HIHWNMS: Coordinates Maui stranding response volunteers.
- Mr. Justin Vizbeicke, HIHWNMS: Coordinates Kona stranding response volunteers.
- Ms. Sarah Courbis and Ms. Lisa White, HIHWNMS and State of Hawaii.

6.1.2 U.S. Geological Survey

- Dr. Thierry Work: Veterinarian, Wildlife Disease Specialist; conducts necropsies, performs euthanasia, participates in ocean capture research.

6.1.3 U.S. Fish and Wildlife Service

- Mr. Frank Pendleton, Manager, Rose Atoll National Wildlife Refuge
- Ms. Susan White, PMNM, Mr. Mike Silbernagle and Mr. David Ellis, James Campbell NWR: coordination of nesting research activities in either the NWHI or MHI.
- Ms. Joy Browning, and Mr. Ray Born, hawksbill research and recovery team.

6.1.4 National Park Service

- Ms. Sallie Beavers, Kaloko-Honokohau National Historic Park: Long-term collaborator in ocean capture research.

- Mr. Will Seitz, Hawaii Volcanoes National Park: Manages Hawksbill nesting beach project on the Big Island. Provides MTRP with biological samples from nest remains and strandings.

6.1.5 Department of the Navy

- Mr. Sean Hanser and Ms. Kate Winters, Naval Facilities Engineering Command Pacific
- Mr. Paul Wenninger, Natural Resources Specialist, Guam

6.2 State and U.S. Insular Areas Agencies

6.2.1 State of Hawaii

- Dr. Celia Smith, Department of Botany, University of Hawaii at Manoa.
- Mr. Alton Miyasaki, Department of Land and Natural Resources, Division of Aquatic Resources (DAR), Oahu: Provides assistance with State of Hawaii permitting.
- Mr. Skippy Hau, DAR, Maui: Strandings and nesting beach research on Maui.
- Mr. Don Heacock, DAR, Kauai: Strandings and nesting beach research on Kauai.
- Mr. John Coney and Dr. Jason Turner, University of Hawaii (UH) at Hilo: Big Island stranding response.
- Mr. Jeffrey Kuwabara, UH at Manoa, Marine Option Program: Coordinates student employees for after hours, weekend, and holiday stranding response on Oahu.
- Ms. Donna Brown, UH, Maui College, Marine Option Program: Coordinates student employees for stranding response on Maui.
- Dr. David Hyrenbach, Hawaii Pacific University: Collaborator on ocean capture research.

6.2.2 U.S. Insular Areas Agencies

- Mr. Alden Tagarino, American Samoa Department of Marine & Wildlife Resources
- Mr. Arnold Palacios, CNMI Department of Fisheries and Wildlife
- Mr. Richard Dela Cruz Farrell, CNMI Department of Fish and Wildlife, Tinian
- Ms. Marianne Teregeyo, CNMI Department of Land and Natural Resources
- Mr. Tino Aguon, Mr. Jay Guitierrez, and Mr. Shawn Wusstig Division of Aquatic and Wildlife Resources, Guam

6.3 Non-governmental Agencies

- Dr. William Gilmartin, Hawaii Wildlife Fund, Hawaii
- Ms. Cheryl King, Hawaii Wildlife Fund, Maui
- Mr. Jeffrey Pawlowski, Sea Life Park Hawaii: Collaborator on research related to captive-bred and reared green turtles.
- Mr. Alan Hong, Hanuama Bay, Manager: Collaborator on ocean capture research.
- Ms. Joanne Pettigrew, Malama na Honu (MnH): Non-profit group providing education outreach at Laniakea Beach on Oahu’s north shore.
- Dr. Robert Morris, DVM: Contract veterinarian, provides veterinary care/treatment for sick or injured marine turtles.

7 List of Preparers

Kyle S. Van Houtan, Ph.D.
Marine Turtle Assessment Program
NOAA Research Ecologist, Program Leader
NMFS, PIFSC

Matthew Vandersande, D.Env.
Director's Office
NEPA and Permits Coordinator
NMFS, PIFSC

Stacy Hargrove, M.Sc.
Marine Turtle Research Program
NOAA Research Biologist
NMFS, PIFSC

Judith Lee, M.Sc.
President, Senior Analyst
Environmental Planning Strategies, Inc.
Davenport, IA

8 References

Aguirre, A.A., G.H. Balazs, T.R. Spraker, T.S. Gross. 1995. Adrenal and hematological responses to stress in juvenile green turtles (*Chelonia mydas*) with and without fibropapillomas. Physiol. Zool. 68(5):831-854.

Aguirre, A.A. and P.L. Lutz. 2004. Marine Turtles as Sentinels of Ecosystem Health: Is fibropapillomatosis an indicator? EcoHealth 1: 275–283.

Allen, S. and P. Bartram. 2008. Guam as a fishing community. NMFS PIFSC, Honolulu, HI. Pacific Islands Fisheries Science Center Administrative Report H-08-01. 61pp.

Amesbury, J.R., R.L. Hunter-Anderson, and E.F. Wells. 1989. Native fishing rights and limited entry in the CNMI. Prepared for the Western Pacific Regional Fishery Management Council, Honolulu, HI. Micronesian Archaeological Research Services, Guam.

Antonelis, G.A., J.D. Baker, T.C. Johanos, R.C. Braun, and A.L. Harting. 2006. Hawaiian monk seal (*Monachus schauinslandi*): Status and conservation issues. Atoll Research Bulletin. 543:75-101.

Baker, J.D., C.L. Littnan, and D.W. Johnston. 2006. Potential effects of sea level rise on the terrestrial habitats of endangered and endemic megafauna in the Northwestern Hawaiian Islands. Endangered Species Research 4:1-10.

Balazs, G.H. 1976. Green turtle migrations in the Hawaiian Archipelago. J. Biol. Conser. 9:125-140.

Balazs, G.H. 1980. Synopsis of biological data on the green turtle in the Hawaiian Islands. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWFC-7 and University of Hawaii Sea Grant Cooperative Report UNIHI-SEAGRANT CR-81-02, 141 p.

Balazs, G. H., R. G. Forsyth, A. K. H. Kam. 1987. Preliminary assessment of the habitat utilization by Hawaiian green turtles in their resident foraging pastures. NOAA Tech Memo NMFS-SWFSC 71: 1-107.

Balazs, G.H. 1992. Innovative techniques to facilitate field studies of the green turtle, *Chelonia mydas*. In: Proc. 12th Annual Workshop on Sea Turtle Biology and Conservation. 25-29 February 1992, Jekyll Island, GA. NOAA Technical Memorandum NMFS-SEFSC-361. pp.158-161.

Balazs, G.H. 1996. Behavioral changes within the recovering Hawaiian green turtle population. *In:* J.A. Keinath, D.E. Barnard, J.A. Musick, and B.A. Bell (comps.), Proceedings of the Fifteenth Annual Symposium on Sea Turtle Biology and Conservation, February 20-25, 1995, Hilton Head, South Carolina, p. 16-21. U.S. Dept. Commerce NOAA Tech. Memo. NMFS-SEFSC-387.

Balazs, G.H. Factors to Consider in the Tagging of Sea Turtles. 1999. *In:* Eckert, K.L, K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly (Eds). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Balazs, G.H. and M. Chaloupka. 2004. Thirty-year recovery trend in the once depleted Hawaiian green sea turtle stock. Biological Conservation. 117(2004):491-498.

Balazs, G.H. and M. Chaloupka. 2006. Recovery trend over 32 years at the Hawaiian green sea turtle rookery of French Frigate Shoals. Atoll Research Bulletin 543:147-158.

Balazs, G.H. and D.M. Ellis. 2000. Satellite telemetry of migrant male and female green turtles breeding in the Hawaiian Islands. *In:* F.A. Abreu-Grobois, R. Briseno-Duenas, R. Marquez-Millan, and L.

Sarti0martinez (comps.), 16th Symp. Proc. Addendum in the Proc. Of the 18th International Sea Turtle Symposium, March 3-7, 1998, Mazatlan, Sinaloa, Mexico, p. 281-283. US Dept. of Commerce, NOAA Tech. Memop. NMFS-SEFSC-436.

Balazs, G.H., R.G. Forsyth, A.K.H. Kam. 1987. Preliminary assessment of the habitat utilization by Hawaiian green turtles in their resident foraging pastures. NOAA Technical Memorandum NMFS-SWFSC. 71:1-107.

Balazs, G.H.,W.C. Dudley, L.E. Hallacher, J.P. Coney, and S.K. Koga. 1994. Ecology and cultural significance of sea turtles at Punalu'u, Hawaii. *In:* Bjorndal KA, Bolten AB, Johnson DA, Eliazar PJ (comps). Proc. 14th Ann. Symp. on Sea Turtle Biology and Conservation, March 1-5, 1994, Hilton Head, South Carolina, p. 10-13. U.S. Dept. Commerce, NOAA Tech. Memo. NOAA-TM-NMFS-SEFSC-351, 306 p.

Balazs, G.H., R.K. Miya, S.C. Beaver. 1996. Procedures to Attach a Satellite Transmitter to the Carapace of an Adult Green Turtle, *Chelonia mydas*. In: J.A. Keinath, D.E. Barnard, J.A. Musick, and B.A. Bell (compilers). Proc. 15th Annual Symp on Sea Turtle Biology and Conservation, Hilton Head, SC. NOAA Technical Memorandum NMFS-SEFSC-387. pp.21-26.

Balazs, G.H., W. Puleloa, E. Medeiros, S.K.K. Murakawa, D.M. Ellis. 1998. Growth Rates and Incidence of fibropapillomatosis in Hawaiian Green Turtles Utilizing Coastal Foraging Pastures at Pala'au, Moloka'i. In: Epperly, S.P., J. Braun, Eds. Proc. 17th Ann. Symp. Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-415, pp.131-132.

Bolten, A.B. 1999. Techniques for Measuring Sea Turtles. *In:* Eckert, K.L, K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly (Editors). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Bowen, B.W., A.B. Meylan, J.P. Ross, C.J. Limpus, G.H. Balazs, J.C. Avise. 1992. Global population structure and natural history of the green turtle (*Chelnois mydas*) in terms of matriarchal phylogeny. Evolution. 46(4):865-881.

Bowen, B.W., F.A. Abreugrobois, G.H. Balazs, N. Kamezaki, C.J. Limpus, and R. Ferl. 1995. Trans-Pacific migrations of the loggerhead turtle (*Caretta Caretta*) demonstrated with mitochondrial-DNA markers. Proceedings of the National Academy of Sciences of the United States of America 92:3731–3734.

Boyle, M.C. N.N. FitzSimmons, C.J. Limpus, S. Kelez, X. Velez-Zuazo, and M. Waycott. 2009. Evidence for transoceanic migrations by loggerhead sea turtles in the southern Pacific Ocean. Proc. Royal Soc. B. 276:1993-1999.

Bryan, Jr., E.H. 1959. Notes on the geography and natural history of Wake Island. Atoll Research Bulletin, No. 66. National Academy of Sciences, National Research Council May 15, 1959.

Chaloupka, M. and G. Balazs. 2007. Using Bayesian state-space modeling to assess the recovery and harvest potential of the Hawaiian green sea turtle stock. Ecological Modeling 205(1-2):93-109.

Chaloupka, M, K.A. Bjorndal, G.H. Balazs, A.B. Bolten, L.M. Ehrhart, C.J. Limpus, H. Suganuma, S. Troeng, and M. Yamaguchi. 2008a. Encouraging outlook for recovery of a once severely exploited marine megaherbivore. Global Ecol. Biogeogr. 17(2):297-304.

Chaloupka, M., T.M. Work, G.H. Balazs, S.K.K. Murakawa, and R. Morris. 2008b. Cause-specific temporal and spatial trends in green sea turtle strandings in the Hawaiian Archipelago (1982-2003). Marine Biology 154(5):887-898.

Chaloupka, M.; N. Kamezaki,and C.J. Limpus. 2008c. Is climate change affecting the population dynamics of the endangered Pacific loggerhead sea turtle? Journal of Experimental Marine Biology and Ecology 356:p.136-143.

Chaloupka, M., G.H. Balazs, and T.M. Work. 2009. Rise and fall over 26 years of a marine epizootic in Hawaiian green sea turtles. Journal of Wildlife Diseases 45(4): 1138-1142.

Central Intelligence Agency (CIA). 2012. The world factbook. www.cia.gov/library/publications/the-world-factbook/index.html. Last updated April 30, 2012.

Coles, S.L., R.C. DeFelice, and D. Minton. 2001. Marine species survey of Johnston Atoll, Central Pacific Ocean, June 2000. Bishop Museum Technical Report No. 19.

Conant, T. A., P. H. Dutton, T. Eguchi, S. P. Epperly, C. C. Fahy, M. H. Godfrey, S. L. MacPherson, E. E. Possardt, B. A. Schroeder, J. A. Seminoff, M. L. Snover, C. M. Upite, and B. E. Witherington. 2009. Loggerhead sea turtle (*Caretta caretta*) 2009 status review under the U.S. Endangered Species Act. Report of the Loggerhead Biological Review Team to the National Marine Fisheries Service, 222 p.

DeMartini E.E., F.A. Parrish, J.D. Parrish. 1996. Interdecadal change in reef fish populations at French Frigate Shoals and Midway Atoll, Northwestern Hawaiian Islands: statistical power in retrospect. Bull. Mar. Sci. 58:804–825.

Department of Commerce, National Oceanic and Atmospheric Administration; Department of the Interior, U.S. Fish and Wildlife Service, and State; State of Hawaii, Department of Land and Natural Resources. 2011. Final damage assessment and restoration plan and environmental assessment for the July 2, 2005, M/V Casitas grounding at Pearl and Hermes Atoll, northwestern Hawaiian Islands, Hawaiian Islands National Wildlife Refuge, Papahanaumokuakea Marine National Monument. Prepared by The Natural Resources Trust. March 2011. 111 pages. Available at http://www.gc.noaa.gov/gc-rp/030111_casitas_Final_DARP_EA.pdf .

Department of Interior (DOI). 2012. Office of Insular Affairs. http://www.doi.gov/oia/ last updated 2/14/2012.

Department of the Navy. 2010. Final Environmental Impact Statement. Guam and the Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation. Relocating Marines from Okinawa, visiting aircraft carrier berthing, and Army air and missile defense task force. http://www.guambuildupeis.us .

Dutton, P.H. and G.H. Balazs. 1996. Simple Biopsy Techniques for Sampling Skin for DNA Analysis of Sea Turtles. In: J.A. Keinath, D.E. Barnard, J.A. Musick, and B.A. Bell (compilers). Proc. 15th Annual Symp on Sea Turtle Biology and Conservation, Hilton Head, SC. NOAA Technical Memorandum NMFS-SEFSC-387. p.78-79.

Dutton, P.H., G.H. Balazs, R.A. LeRoux, S.K.K. Murakawa, P. Zarate, and L.S. Martinez. 2008. Composition of Hawaiian green turtle foraging aggregations: mtDNA evidence for a distinct regional population. Endangered Species Research 5(1): 37-44.

Eckert, K.L., K.A. Bjorndal, F.A. Abreu-Grobois, M. Donelly (Editors). 1999. Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4. 235pp.

Ehrhart, L.M. and L.H. Ogren. 1999. Studies in Foraging Habitats: Capturing and Handling Turtles. *In:* Eckert, K.L, K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly (Eds). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Forbes, G. and C. Limpus. 1993. A non-lethal method for retrieving stomach contents from sea turtles. Wildlife Research. 20:339–343.

Grant, G. S., P. Craig, and G. H. Balazs. 1997. Notes on juvenile hawksbill and green turtles in American Samoa. Pacific Science 51:48-53.

Handy, E.G. 1972. Native planters in old Hawaii: Their life, lore, and environment. Bishop Museum Press.

Herdich, D., and K. Armstrong. 2008. Historic fishing methods in American Samoa. Final report submitted to NOAA Fisheries, Pacific Islands Fisheries Science Center, Fishery Monitoring and Socioeconomics Division, Honolulu, HI. 75pp.

Howell, E. A., D. R. Kobayashi, D. M. Parker, G. H. Balazs, and J. J. Polovina. 2008. TurtleWatch: a tool to aid in the bycatch reduction of loggerhead turtles Caretta caretta in the Hawaii-based pelagic longline fishery. Endangered Species Research 5:267-278.

Howell, E.A., P.H. Dutton, J.J. Polovina, H. Bailey, D.M. Parker, and G.H. Balazs. 2010. Oceanographic influences on the dive behavior of juvenile loggerhead turtles (*Caretta caretta*) in the North Pacific Ocean. Marine Biology 157(5):1011-1026.

Hutchinson, A., B. J. Hutchinson, and K. Koenig. 2008. The global hawksbill nesting map. SWOT Report III:11-13.

IPCC, editor. 2007. Climate Change 2007: Synthesis Report. Cambridge University Press, Cambridge, UK.

Jackson, J.B.C., M.X. Kirby, W.H. Berger, K.A. Bjorndal, J.A. Estes, T.P. Hughes, S. Kidwell, C.B. Lange, H.S. Lenihan, J.M. Pandolfi, C.H. Peterson, R.S. Steneck, M.J. Tegner, and R.R. Warner. 2001. Historical overfishing and the recent collapse of coastal ecosystems. Science 293:629-638.

Jones, T. and J. Seminoff. *In press* 2010. Determining Transmitter Drag and Best Practice Attachment Procedures for Sea Turtle Biotelemetry Studies. Bishop Museum Press, Honolulu, Hawaii. NMFS Technical Memo. SWFSC.

Kamezaki, N., L. Matsuzawa, O. Abe, H. Asakawa, T. Fukii, and K. Goto. 2003. Loggerhead turtles nesting in Japan. *In:* Bolten, A. and Witherington, B. (Eds.). Loggerhead Sea Turtles. Smithsonian Institution Press, Washington, DC, USA, pp. 210–217.

Keesing, F.M. 1934. The changing life of native peoples in the Pacific area: A sketch in cultural dynamics. An. J. of Sociology 39(4):443-458.

Kenyon, J.C., J.E. Maragos, S. Cooper. 2010. Characterization of coral communities at Rose Atoll, American Samoa. Atoll Research Bulletin No. 586, December 1, 2010.

Kobayashi, D.R., J.J. Polovina, D.M. Parker, N. Kamezaki, I.J. Cheng, I. Uchida, P.H. Dutton, and G.H. Balazs. 2008. Pelagic habitat characterization of loggerhead sea turtles, *Caretta caretta*, in the

North Pacific Ocean (1997-2006): Insights from satellite tag tracking and remotely sensed data. J. Exp. Mar. Biol. Ecol. 356(1-2):96-114.

Lessios, H.A. and D.R. Robertson. 2006. Crossing the impassable: genetic connections in 20 reef fishes across the eastern Pacific barrier. Proc. R. Soc. B. 273:2201-2208.

Limpus, C.J. 1985. A study of the loggerhead sea turtle, *Caretta caretta*, in eastern Australia. PhD dissertation. University of Queensland, Brisbane, Australia.

Limpus, C.J., and P.C. Reed. 1985. The green turtle, *Chelonia mydas*, in Queensland: a preliminary description of the population structure in a coral reef feeding ground, p.47-52. *In*: G. Grigg, R. Shine and H. Ehmann (Editors), Biology of Australiasian Frogs and Reptiles. Surrey Beatty and Sons, Chipping Norton, Australia.

Limpus, C. J. and D.J. Limpus. 2003. Loggerhead turtle in the Equatorial and Southern Pacific Ocean: A species in decline. *In:* Bolten, A. B. ,Witherington, B. E. Eds., Loggerhead Sea Turtles. Smithsonian Books, Washington, D.C. 319 pp. p. 199-209.

Lotze, H., H. S. Lenihan, B. J. Bourque, R. H. Bradbury, R. G. Cooke, M. C. Kay, S. M. Kidwell, M. X. Kirby, C. H. Peterson, and J. B. C. Jackson. 2006. Depletion, degradation, and recovery potential of estuaries and coastal seas. Science 312:1806-1809.

McClenachan, L., J.B.C. Jackson, and M.J.H. Newman. 2006. Conservation implications of historic sea turtle nesting beach loss. Frontiers in Ecology and the Environment 4:290-296.

Morris, Y.A. 1982. Steroid dynamics in immature sea turtles. Master's Thesis, Texas A&M University, College Station, Texas.

Mortimer, J. A. and M. Donnelly. 2008. Eretmochelys imbricata. IUCN Red List of Threatened Species 2011.1:www.iucnredlist.org.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998a. Recovery Plan for U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998b. Recovery Plan for U.S. Pacific Populations of the Hawksbill Turtle (*Eretmochelys imbricata*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998c. Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (*Dermochelys coriacea*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998d. Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle (*Caretta caretta*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998e. Recovery Plan for U.S. Pacific Populations of the Olive Ridley Turtle (*Lepidochelys olivacea*). National Marine Fisheries Service, Silver Spring, MD.

National Marine Fisheries Service. 2009. Toward an ecosystem approach for the Western Pacific Region: from species-based fishery management plans to place-based fishery ecosystem plans. Final programmatic environmental impact statement, Pacific Islands Regional Office, and Western Pacific Regional Fishery Management Council, September 24, 2009. 496 pages.

National Marine Fisheries Service. 2011. Programmatic Environmental Assessment and FONSI, Marine Turtle Research Program. Pacific Islands Fisheries Science Center. PIFSC-20100034. June 2011. 66 pages.

National Marine Fisheries Service. 2012. Continued operation of the Hawaii-based shallow-set longline swordfish fishery – under Amendment 18 to the Fishery Management Plan for pelagic fisheries of the western Pacific region. Endangered Species Act, Section 7 Consultation, Biological Opinion, Pacific Islands Region, Protected Resources Division. January 30, 2012.

National Research Council. 2010. Sea Turtle Status and Trends: Integrating Demography and Abundance. National Academies Press, Washington, DC, 162p.

Office of National Marine Sancuaries (ONMS). 2011. Expansion of Fagatele Bay National Marine Sanctuary, Regulatory Changes, and Sanctuary Name Change. Federal Register v. 76, no. 204, (October 21, 2011) 65566-65577.

Orth, R.J., T.J.B. Carruthers, W.C. Dennsion, C.M. Duarte, J.W. Fourqurean, K.L.M. Waycott, and S.L. Williams. 2006. A global crisis for seagrass ecosystems. Bioscience 56(12):987-996.

Owens, D.W., J.R. Henderickson, V. Lance, I.P. Callard. 1978. A technique for determining sex of immature *Chelonia mydas* using radioimmunoassay. Herpetologica 34:270-273.

Owens, D.W. 1999. Reproductive Cycles and Endrocrinology. In: K.L. Eckert, K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donelly (Editors). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4. p.119-123.

Parker, D.M., G.H. Balazs, C.S. King, L. Katahira, and W. Gilmartin. 2009. Short-range movements of hawksbill turtles (*Eretmochelys imbricata*) from nesting to foraging areas within the Hawaiian Islands. Pac. Sci. 63(3):371-382.

Peckham, S.H., D.M. Diaz, A. Walli, G. Ruiz, L.B. Crowder, and W.J. Nichols. 2007. Small-scale fisheries bycatch jeopardizes endangered Pacific loggerhead turtles. PLoS ONE 2(10): e1041.

Pimm, S. L. 1991. The balance of nature? ecological issues in the conservation of species and communities. University of Chicago Press.

Plotkin, P., R. Byles, D.C. Rostal, D.W. Owens. 1995. Independent versus socially facilitated oceanic migrations of the olive ridley *Lepidochelys olivacea*. Marine Biology 122:137-142.

Polovina, J.J., D.R. Kobayashi, D.M. Ellis, D.M., Seki, and G.H. Balazs. 2000. Turtles on the edge: Movement of loggerhead turtles (*Caretta caretta*) along oceanic fronts in the central North Pacific, 1997-1998. Fisheries Oceanography 9(1):71-82.

Polovina, J.J., E.A. Howell, D.M. Parker, and G.H. Balazs. 2003. Dive-depth distribution of loggerhead (Caretta *carretta*) and olive ridley (*Lepidochelys olivacea*) sea turtles in the central North Pacific: Might deep longline sets catch fewer turtles? Fishery Bulletin 101(1): 189-193.

Polovina, J.J., G.H. Balazs, E.A. Howell, D.M. Parker, M.P. Seki, and P.H. Dutton. 2004. Forage and migration habitat of loggerhead (*Caretta caretta*) and olive ridley (*Lepidochelys olivacea*) sea turtles in the central North Pacific Ocean. Fisheries Oceanography 13(1):36-51.

Polovina, J., I. Uchida, G. Balazs, E.A. Howell, P. Parker, and P. Dutton. 2006. The Kuroshio Extension Bifurcation Region: A pelagic hotspot for juvenile loggerhead sea turtles. Deep-Sea Research II 53(3-4):326-339.

Rogers, C.S. and V.H. Garrison. 2001. Ten years after the crime: lasting effects of damage from a cruise ship anchor on a coral reef in St. John, USVI. Bull. Mar. SCi 69(2):793-804.

Russell, D.J. and G.H. Balazs. 1994. Colonization by the alien marine alga *Hypnea musciformis* (Wulfen) J. Ag. (Rhodophyta: Gigartinales) in the Hawaiian Islands and its utilization by the green turtle, *Chelonia mydas*. Aquatic Botany. 47:53-60.

Sachet, M.H. 1954. A summary of information on Rose Atoll. Atoll Research Bulletin No. 29, May 31, 1954.

Schroeder, B. and S. Murphy. 1999. Population surveys (ground and aerial) on nesting beaches. In: Eckert, K.L., Bjorndal, K., F.A.Abrea-Grobrois, and M. Donnelly (eds.). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SCC Marine Turtle Specialist Group Publication No. 4, 45pp.

Seminoff, J.A., A. Resendiz, W.J. Nichols, and T.T. Jones. 2002. Foraging of wild green turtles (Chelonia mydas) at a temperate foraging area in the Gulf of California, México. Copeia 2002(3):610-617.

Seminoff, J.A., T. T. Jones, A. Resendiz, W.J. Nichols, and M.Y. Chaloupka. 2003. Monitoring green turtles (Chelonia mydas) at a coastal foraging area in Baja California, Mexico: multiple indices describe population status. J. Mar. Biol. Ass. U.K. 83:1355-1362.

Seminoff, J.A. and T.T. Jones. 2006. Diel movements and activity ranges of green turtles (Chelonia Mydas) at a temperate fraging area in the Gulf of California, Mexico. Herp. Cons. Biol. 1(2):81-86.Snover M.L. 2008. Assessment of the population-level impacts of potential increases in marine turtle interactions resulting from a Hawaii Longline Association proposal to expand the Hawaii-based shallow-set fishery. PIFSC/NMFS Internal Report 08-010, May 2008.

Snover M.L., Heppell S.S. 2009. Application of diffusion approximation for risk assessments of sea turtle populations. Ecological Applications. 19 (3): 774-785.

Timmers, M.A., K.R. Andrews, C.E. Bird, M. J. deMaintenton, R.E. Brainard, and R.J. Toonen. 2011. Widespread Dispersal of the Crown-of-Thorns Sea Star, Acanthaster planci, across the Hawaiian Archipelago and Johnston Atoll. Journal of Marine Biology, vol. 2011, Article ID 934269, 10 pages, 2011.

U.S. Fish and Wildlife Service. 2001a. Notice. Establishment of the Kingman Reef National Wildlife Refuge. Federal Register v. 66, no. 16 (January 24, 2001), 7660.

U.S. Fish and Wildlife Service. 2001b. Notice. Establishment of the Palmyra Atoll National Wildlife Refuge. Federal Register v. 66, no. 16 (January 24, 2001), 7660-7661.

U.S. Fish and Wildlife Service and Department of Marine and Wildlife Resources, The Government of American Samoa. 2000. Draft Restoration Plan for Rose Atoll, National Wildlife Refuge. Available at http://www.gc.noaa.gov/gc-rp/rose1-rp.pdf

U.S. Fish and Wildlife Service. 2011a. Pacific Island Refuges. www.fws.gov/pacificislandrefuges/ . Last updated March 24, 2011.

U.S. Fish and Wildlife Service. 2011b. Draft Environmental Impact Statement, Palmyra Atoll National Wildlife Refuge, Rat Eradication Project. February 2011. 494 pages.

U.S. President. 1941. Executive Order 8682. Establishing Naval Defensive Sea Areas around and Naval Airspace Reservations over the islands of Palmyra, Johnston, Midway, Wake, and Kingman Reef. Federal Register v. 6 (February 18, 1941), 1015.

U.S. President. 2007. Proclamation 8112. Amending Proclamation 8031 of June 15, 2006, to read “Establishment of the Papahanaumokuakea Marine National Monument”. Federal Register v. 72, no. 43 (March 6, 2007), 10031.

U.S. President. 2006. Proclamation 8031. Establishment of the Northwestern Hawaiian Islands Marine National Monument. Federal Register v. 71, no. 122 (June 15, 2006), 36443.

U.S. President. 2009a. Proclamation 8335. Establishment of the Marianas Trench Marine National Monument. Federal Register v. 74, no. 7(January 12, 2009), 1557.

U.S. President. 2009b. Proclamation 8336. Establishment of the Pacific Remote Islands Marine National Monument. Federal Register v. 74, no. 7 (January 12, 2009), 1564.

U.S. President. 2009c. Proclamation 8337. Establishment of the Rose Atoll Marine National Monument. Federal Register v. 74, no. 7 (January 12, 2009), 1577.

Van Houtan, K. 2010. Future climate impacts to marine turtle populations, with a focus on the North Pacific Ocean. PIFSC Internal Report IR-10-023.

Van Houtan, K. S. 2011. Assessing the impact of fishery actions to marine turtle populations in the North Pacific using classical and climate-based models, Internal Report IR-11-024. NOAA Fisheries, Pacific Islands Science Center, Honolulu, HI USA.

Van Houtan, K. S., G. H. Balazs, and S. Hargrove. *in review*. Skeletochronology doubles the maturity age of Hawaiian green turtles. Endangered Species Research

Van Houtan, K. S. and J. M. Halley. 2011. Long-Term Climate Forcing in Loggerhead Sea Turtle Nesting. PLoS ONE 6:e19043.

Van Houtan, K. S., J. N. Kittinger, A. L. Lawrence, C. Yoshinaga, R. Born, and A. Fox. 2012. Hawksbill sea turtles in the Northwestern Hawaiian Islands. Chelonian Conservation & Biology 11.

Van Houtan, K. S. and O.L. Bass. 2007. Stormy oceans are associated with declines in sea turtle hatching. Curr. Biol. 17, R590-R591.

Van Houtan, K. S., S. K. Hargrove, and G. H. Balazs. 2010. Land Use, Macroalgae, and a Tumor-Forming Disease in Marine Turtles. PLoS ONE 5:e12900.

Van Houtan, K. S. and S.L. Pimm. 2007. Assessment of the Dry Tortugas National Park Sea Turtle Monitoring Program 1982–2006: Ecological trends and conservation recommendations. Report H5299-05-1010. National Park Service, Homestead, Florida.

Weishampel, J. F., D.A. Bagley,.and N.M. Ehrhardt. 2004. Earlier nesting by loggerhead sea turtles following sea surface warming. Global Change Biology 10:1424-1427.

Wetherall, J.A., G.H. Balazs, and M.Y.Y.Yong. 1998. Statistical methods for green turtle nesting surveys in the Hawaiian Islands. *In:* Epperly, S.P. and J. Braun (comps.). Proceedings of the Seventeenth

Annual Sea Turtle Symposium, March 4-8, 1997, Orlando, Florida, p. 278-280. U.S. Dep. Commerce, NOAA Tech. Memo. NOAA-TM-NMFS-SEFSC-415, 294 p.

Wibbels, T. 1988. Gonadal steroid endocrinology of sea turtle reproduction. PhD thesis, Texas A&M University, College Station, Texas.

Wibbels, T., D.W. Owens, Y. Morris, M. Amoss, Jr. 1987. Sex techniques and sex ratios for immature loggerhead sea turtles captured along the Atlantic coast of the U.S., p.59-64. *In*: W.N. Witzell (Editor), Ecology of East Florida Sea Turtles. NOAA Technical Report NMFS 53. U.S. Dept. Commerce.

Wood, J.R., F.E. Wood, K.H. Critchley, D.E. Wildt, M. Bush. 1983. Laparascopy of the green sea turtle. British Journal of Herpetology. 6:323-327.

Work, T.M. and G.H. Balazs. 2002. Necropsy findings in sea turtles taken as bycatch in the North Pacific longline fishery. Fish. Bull. 100:876-880.

Work, T.M. and G.H. Balazs. 2010. Pathology and distribution of sea turtles landed as bycatch in the Hawaii-based North Pacific pelagic longline fishery. Journal of Wildlife Diseases 46(2):422-432.

Work, T.M. G.H. Balazs, R.A. Rameyer, and R.A. Morris. 2004. Retrospective pathology survey of green turtles *Chelonia mydas* with fibropapillomatosis in the Hawaiian Islands, 1993-2003. Dis. Aquat. 62:163-176.

Work, T.M., G.H. Balazs, J.L. Schumacher, and A. Marie. 2005. Epizootiology of spirorchiid infection in green turtles (*Chelonia mydas*) in Hawaii. J. Parasitol. 91(4):871-876.

Zug, G.R., G.H. Balazs, J.A. Wetherall, D.M. Parker, and S.K.K. Murakawa. 2002. Age and growth of Hawaiian green sea turtles (*Chelonia mydas*): An analysis based on skeletochronology. Fish. Bull. 100(1):117-127.

Appendix 9

MTBAP PEA Public Comment Period Contact List

	Oragnization	POC	Email address
1	HI DLNR Chairperson	Dawn Chang	dawn.chang@hawaii.gov
2	HI DLNR DAR, administrator	Brian Neilson	brian.j.neilson@hawaii.gov
3	HI DLNR	Mimi Olry	mimi.olry@hawaii.gov
4	HI DLNR	David Sakoda	David.Sakoda@hawaii.gov
5	HI DLNR	Jeannine Rossa	jeannine.rossa.researcher@hawaii.gov
6	HI DLNR - Special Activity Permits/Technical Review	Catherine A Gewecke	Catherine.A.Gewecke@hawaii.gov
7	HI DLNR - Division of Conservation and Resources Enforcement	Norine H Oyasato	Norine.H.Oyasato@hawaii.gov
8	WPFMC	Asuka Ishizaki	Asuka.Ishizaki@noaa.gov
9	Hawai'i Longline Association	Eric Kingma	eric.k.kingma@gmail.com
10	Director of the Department of Agriculture, Guam	Chelsa Muna-Brecht	Chelsa.MunaBrecht@doag.guam.gov
11	Guam DAWR	Jay Gutierrez	jaytgutierrez@yahoo.com
12	Guam DAWR	Jason Biggs	Jason.Biggs@doag.guam.gov
13	Guam DAWR	Brent Tibbatts	brent.tibbatts@gmail.com
14	Guam DAWR	Celestino Aguon	tino_aguon@hotmail.com
15	Guam Department of Agriculture	Diane Vice	dianevice@gmail.com
16	American Samoa DMWR	Alphina Liusamoa	pfuimaono19@gmail.com
17	AS (DMWR), Director	Taotasi Archie Soliai	archie.soliai@gmail.com
18	AS DMWR, Wildlife Division Chief	Adam Miles	wildlife.amsam@gmail.com
19	AS DMWR	Domingo Ochavillo	ochavill@gmail.com
20	AS DMWR	Selaina Tuimavave	selaina.tuimavave@gmail.com
21	AS DMWR	Selaina Vaitautolu	selaina.tuimavave@dmwr.as.gov
22	National Park American Samoa, Superintendant	Scott Burch	Scott_Burch@nps.gov
23	Am Sam NPS biologist	Eric Brown	eric_brown@nps.gov
24	CNMI DLNR	Christina Tudela	ct.dlnr@gmail.com
25	CNMI DLNR	Augustin Kaipat	kaipat.dlnr@gmail.com
26	CNMI DLNR (new Secretary)	Sylvan Igisomar	sylvanoi@gmail.com
27	CNMI Department of Fish and Wildlife, Director	Manuel Pangelinan	mpangelinan.cnmidfw@gmail.com
28	CNMI DLNR, Manager, Endangered Species Program	Carey Demapan	cdemapan.dlnr@gmail.com
29	Saipan USFWS	Jason Beatty	jason_beatty@fws.gov
30	OHA	Kealoha Pisciotta	kealohap@oha.org
31	USFWS	Joy Browning	joy_browning@fws.gov
32	USFWS	Sheldon Plentovich	sheldon_plentovich@fws.gov
33	USFWS - Maui	James Yrigoyen	james_yrigoyen@fws.gov
34	USFWS	Kelly Goodale	kelly_goodale@fws.gov
35	FWS NWR in Pacific	Ric Lopez	ricardo_lopez@fws.gov
36	FWS NWR in Pacific	Susan White	susan_white@fws.gov
37	Papahanaumokuakea	Jared Underwood	jared_underwood@fws.gov
38	Papahanaumokuakea	Amanda Boyd	amanda_j_boyd@fws.gov
39	Midway Atoll NWR	Tammy Summers	tammy_summers@fws.gov
40	Oahu /Maui NWR Complex	Joshua Ream	joshua_ream@fws.gov
41	Rose Atoll NWR (AmSa)	Brian Peck	brian_peck@fws.gov
42	Palmyra Atoll	Stefan Kropidlowski	stefan_kropidlowski@fws.gov
43	Remote Islands NWR	Dan Link	Daniel_Link@fws.gov
44	FWS Pacific Islands Fish and Wildlife Office	Earl Campbell	Pifwoadmin@fws.gov
45	NOAA Sanctuaries	Valerie Brown	valerie.brown@noaa.gov
46	USGS Wildlife Health Center	Thierry Work	thierry_work@usgs.gov
47	Naval Facilities Pearl Harbor	Christina Coppenrath	christina.m.coppenrath.civ@us.navy.mil
48	Navy Joint Region Marianas	Jennifer Horeg	jennifer.a.horeg.civ@us.navy.mil
49	Navy Pacific Fleet	Julie Rivers	julie.rivers@navy.mil
50	HMAR	Jon Gelman	jon.gelman@h-mar.org
51	MOCMI	Tommy Cutt	tcutt@mocmarineinstitute.org
52	HPA	Marc Rice	mrice@hpa.edu
53	HPA	Laura Jim	Laura.Jim@hpa.edu
54	UH Hilo MOP	Jen Sims	jlsims@hawaii.edu
55	UH Manoa MOP	Jeff Kuwabara	manoamop@hawaii.edu
56	HWF	Hannah Bernard	wild@aloha.net
57	HWF	Cheryl King	shezking@yahoo.com
58	HWF/DAR	Megan Lamson	lamson@hawaii.edu
59	MinH	Don Porter	donporter@ltol.com
60	MinH	Debbie Herrera	debbie@malamainahonu.org
61	WTT/HAVO	John Lindelow	cybernet9@gmail.com
62	UH Manoa, Pacific Cooperative Studies Unit	Shaya Honavar	honarvar@hawaii.edu
63	ICAPO	Ingrid Yanez	ingrid@hawksbill.org
64	TMMC	Megan McGinnis	mcginnism@tmmc.org
65	TMMC Ke Kai Ola	Sophie Whoriskey	whoriskeys@tmmc.org
66	TNC	Generic Email for Hawaii TNC	hawaii@tnc.org
67	TNC	Kim Hum	khum@tnc.org
68	University of Hawaii	Donna Brown	donnabro@hawaii.edu
69	Jessy's Tag Services	Jessy Hapdei	Jessyhapdei@yahoo.com
70	NOAA Contract veterinarian	Gregg Levine	glevinedvm@gmail.com
71	Golden Honu Services	George Balazs	itsahonuworldinhawaii@hotmail.com
72	Hawai'i Volcanoes - National Park Service	Rhonda Loh	Rhonda_Loh@nps.gov
73	Hawai'i Volcanoes - National Park Service	Joan Yoshioka	joanyosh@hawaii.edu
74	NPS	Sallie Beavers	sallie_beavers@nps.gov
75	PIFSC PSD	PSD	nmfs.pic.psd@noaa.gov
76	PIRO PRD	Dawn Golden	dawn.golden@noaa.gov
77	PIRO PRD	Irene Kelly	irene.kelly@noaa.gov
78	PIRO PRD	Jeff Walters	Jeff.Walters@noaa.gov
79	Lanai contact	Rachel Sprague	RSprague@pulamalanai.com
80	Bellows	Craig Gorsuch	craig.gorsuch.ctr@us.af.mil
81	HFACT	Phil Fernandez	phil@philfernandez.com
82	Cturtle listserv		CTURTLE@lists.ufl.edu

Appendix 10

Review Comments by George Balazs on the Draft Programmatic Environmental Assessment (PIFSC Turtles)

1 message

George Balazs <itsahonuworldinhawaii@hotmail.com> Sun, May 14, 2023 at 10:32 PM
To: "Laura McCue (PEA MTBAP)" <laura.mccue@noaa.gov>
Cc: George Balazs <itsahonuworldinhawaii@hotmail.com>

Dear Ms. Laura McCue- Please give consideration to my following review comments and questions on the Draft Programmatic Environmental Assessment for the NOAA Pacific Islands Fisheries Science Center's (PIFSC) Marine Turtle Biology and Assessment Program (MTBAP). For the record, please know that I retired from the PIFSC in late 2017 after 34 years of service as a sea turtle researcher. From 1971-1981 I was professionally employed primarily as a sea turtle biologist at the University of Hawaii's Hawaii Institute of Marine Biology (HIMB). During most all of these years (1971-2017) I was the leader of sea turtle research and conservation activities throughout Hawaii. My program at the PIFSC was known as the Marine Turtle Research Program (MTRP), predecessor of the MTBAP. Since retiring from NOAA I have remained active in all things relating to sea turtles in Hawaii/Oceania and East Asia. I am the Co-Chair of the Marine Turtle Specialist Group of the Oceania Region. Here is my CV:

https://georgehbalazs.com/george-h-balazs-cv/

And here is my web page used as an informational, archival, and educational 'springboard' to promote the well-being of sea turtles linked culturally and in other ways to the people of Polynesia, Melanesia, Micronesia, and East Asia (mainly China, Taiwan & Japan).

www.GeorgeHBalazs.com

I apologize if, in the above, I've provided an excess of information about myself. However, since others outside of Hawaii may be reading these comments, I thought it useful to provide background.

1) In my view, the draft PEA can be improved considerably in terms of clarity, cohesion and explanation as to what research is being focused upon, why, and how. Including how the results of the work will be useful to managers in NOAA and the USFWS and the State of Hawaii in achieving PIRO and ESA recovery objectives- especially in the Hawaiian Islands, but everywhere referred to in the document where MTBAP is working and/or proposes to work. MTBAP became the program it is at the PIFSC in 2015. A formal External Program Review, led by Dr. David Helweg USGS, was held at that time. Perhaps that Review should be referred to in the draft PEA, including major publications and reports providing results of research achieved since 2015.

2) In 2011 a PEA was prepared and approved for MTRP. Please see:
2011- Marine Turtle Research Program (MTRP)- Programmatic Environmental Assessment (PEA) by Stacy Hargrove, George Balazs et al.
The list of preparers appears on page 60 of the above. Please note that a professional consulting company (Environmental Planning Strategies, Inc) was contracted to provide professional assistance so that the PEA would be of the highest standards possible. In addition, the PIFSC had a NEPA and Permits Coordinator (as part of the Director's Office) to assist in the PEA preparation. I recommend that the 2011 PEA serve as a model for substantially improving your draft document.

3) There is no Summary/Executive Summary to your draft PEA.

4) Chapter 2, 2.1.- "With continuous data collection since 1973, the MTBAP provides technical insight, ..." Please know that neither MTBAP, nor NOAA, provided continuous data collection since 1973. Continuous green turtle data collection was started in 1973 at the French Frigate Shoals nesting colony and elsewhere in Hawaii by HIMB. NOAA did not have a sea turtle program until 1981, when NMFS Lab Director Richard Shomura created the MTRP. This same error in fact appears at the top of page 14 e.g., "...experience gained by MTBAP since 1973." Historical accuracy is important so that future generations can understand what was done, where, and by what agency. So please kindly correct.

5) The proposed relocation "..of any nest for conservation/management purposes" (Table 3, 2.2.2 & elsewhere) is far too broad and really needs to specify where and why in the document. Will egg nests be relocated from French Frigate Shoals to the Main Hawaiian Islands? If so, why and how? Ship? Helicopter? The request is very "blanket" all encompassing. Who will do the oversight, checks and balances? Including by the Hawaiian community?

6) Concerning the proposed use of nest probing, while this methodology may be used within certain other nations globally, I'm not convinced it's needed nor appropriate for conditions in the Hawaiian Islands. There is the real risk of breaking an egg or two during probing, hence leakage of fluid contents onto other eggs of the clutch causing contamination. Eggs can be located expeditiously, if in absolute need for relocation to high ground on the same beach or nearby beach, through careful excavation without the need for probing.

7) Is the probing of nests, such as being proposed in the draft PEA, approved in any other sea turtle research or management permit issued in the USA?

8) Table 4 page 14- It seems odd (e.g. incorrect) to describe offshore waters (commercial fishing vessels) as a Research Category titled "Stranding Response and Research". Should not this be re-worded?

9) Table 4 on page 15- Research Category "Nesting and Basking Beach Monitoring"- Is there basking in "Guam, CNMI, American Samoa, PRIA" as seems to be indicated?

10) Page 16- "...previously undocumented occurrence." Olive ridleys have been previously documented at several sites in the Main Hawaiian Islands. Ms. Joy Browning USFWS is aware of a nest (at Pyramid Beach) a few years back at the Marine Corps Base in Kaneohe. Also, please see:
Balazs and Hau (1986) Lepidochelys olivacea, Olive Ridley, Maui. Herpetological Review.
and
2021- Rare Turtles Rescued in Ka'u. West Hawaii Today 2-9-21.

11) Re 2.3 Alternatives Considered-- Was the Alternative considered to experimentally restore sand to one or more of the islets at French Frigate Shoals through pumping of submerged sand in areas where corals and other living bottom habitat would not be adversely impacted? If not why not, please?

12) page 30 top- Re "Rose Atoll Marine National Monument"- including Rose Atoll. Is this location Co-Managed equally at present by the USFWS and the Indigenous Government of American Samoa? If yes, please include. If not, please indicate when change officially occurred.

13) Table 11 Page 42 Re "Oxytetracycline Injection"- requesting 500 green turtles in the CNP (Hawaiian Islands)- What is the purpose of these injections given that the validation of the annual nature of Arrested Lines of Growth (ALG) using Oxytetracycline injections in Hawaii over past decades of research has already been elucidated in two major journal publications. Please see:
Goshe et al. 2016.Validation of back-calculated body lengths and timing of growth mark deposition in Hawaiian green sea turtles. Ecology and Evolution.

and
Snover, Hahn, Goshe and Balazs (2011) Validation of annual skeletal marks in green sea turtles using tetracycline labeling. Aquatic Biology.

14) Satellite tracking involving breeding females and males originating in, or return to, the Main Hawaiian Islands from French Frigate Shoals is mentioned in the draft PEA. However, no mention nor citing is included of the highly relevant journal paper:
Balazs et al. 2017. Ocean pathways and residential foraging locations for satellite tracked green turtles breeding in Hawaii. Micronesica Please kindly consider incorporating.

15) Page 20 Re discussion of green turtle sex ratios in Hawaii- Please consider including **N=2411** turtles necropsied for gender determination showing no male/female bias. Please consider doing this to provide proper perspective to the statement in the following sentence- "..preliminary results (n=35) showing a female bias.."

Thank you for the opportunity to submit comments and questions.
Respectfully and Sincerely,
George Balazs
Submitted 5/14/2023 Sunday Night 1032pm.

From: Summer Martin - NOAA Federal <summer.martin@noaa.gov>
Sent: Friday, April 14, 2023 3:07 AM
To: Summer Martin - NOAA Federal <summer.martin@noaa.gov>
Subject: Programmatic Environmental Assessment (PIFSC Turtles)

Aloha kākou,

NOAA Fisheries' Pacific Islands Fisheries
Science Center (PIFSC) Marine Turtle Biology and Assessment Program (MTBAP) has published a draft programmatic environmental assessment (PEA) on our region's
NEPA
website.This PEA analyzes the
effects of MTBAP's ongoing research activities on sea turtles and the environment, including monitoring population trends, exploring the use of advanced technology for research and monitoring, developing the application of simulation modeling of population
dynamics using long-term datasets, stranding response and research, training and capacity building, and education and outreach efforts to inform and build support from the public. New research activities in this PEA include nest probing and nest relocations.

We are sending this email to alert you to
its publication and the associated 30 day public comment period. If
you choose to review the document and would like to submit comments, please send them to:
laura.mccue@noaa.gov
between April 13 and May 12, 2023.

Please share with others you think might be
interested in this document.

Thank you,
Summer Martin

--
Summer L. Martin, Ph.D. (she/her)
Supervisory Research Biologist
Leader, Marine Turtle Biology & Assessment Program
Protected Species Division
Pacific Islands Fisheries Science Center
NOAA Fisheries

Appendix 11

Draft Programmatic Environmental Assessment for Marine Turtle Biology and Assessment Program

1 message

Skoruppa, Mary Kay <mary_kay_skoruppa@fws.gov>
To: "laura.mccue@noaa.gov" <laura.mccue@noaa.gov>
Cc: "Gardiner, Dawn" <dawn_gardiner@fws.gov>

Wed, May 3, 2023 at 9:36 AM

Dear Laura McCue,

The U.S. Fish and Wildlife Service, Texas Coastal Ecological Service (FWS) reviewed NOAA Fisheries' Pacific Islands Fisheries Science Center Marine Turtle Biology and Assessment Program's published draft programmatic environmental assessment (PEA). The FWS recognizes the vital efforts put forth by NOAA Fisheries to protect five species of sea turtles from multiple distinct population segments and offers the following information relative to sea turtle nest probing and site-specific nest relocations.

Procedures described in the PEA are similar to those conducted on sea turtle nests found on the Gulf of Mexico coast in Texas. The FWS supports the preferred alternative (Alternative 2 - Continuation of Current Research Activities with the Addition of Nest Relocations of Non-Doomed Nests and Nest Probing). Alternative 2 provides flexibility in deciding what is best for individual nests as inundation and beach erosion are not the only threats to sea turtle nests incubating *in-situ* or even the only reasons to relocated nests as is described in the PEA. The following publication may provide additional useful information about nest relocation:

- Shaver, D.J., H.R. Frandsen, J. Shelby Walker, J.A. George, and C. Gredzens. 2020. Threats to Kemp's ridley sea turtle (*Lepidochelys kempii*, Garman, 1880) nests incubating in situ on the Texas coast. Herpetology Notes 13:907-923.

Both probing to find sea turtle nests and relocation of sea turtle nests to protected corrals or incubation facility have been employed in Texas for over four decades with success. For further information on the long-term use of these techniques please see these published materials:

- Frey, A., P.H. Dutton, D.J. Shaver, J. Shelby Walker, and C. Rubio. 2014. Abundance of nesting Kemp's ridley turtles (*Lepidochelys kempii*) in Texas: a novel approach using genetics to improve population census. Endangered Species Research 23:63-71.

- Gallaway, B.J., W.J. Gazey, C.W. Caillouet, Jr., P.T. Plotkin, F.A. Abreau Grobois, A.F. Amos, P.M. Burchfield, R.R. Carthy, M.A. Castro Martinez, J.G. Cole, A.T. Coleman, M. Cook, S. DiMarco, S.P. Epperly, M. Fujiwara, D. Gomez Gamez, G.L. Graham, W.L. Griffin, F. Illescas Martinez, M.M. Lamont, R.L. Lewison, K.J. Lohmann, J.M. Nance, J. Pitchford, N.F. Putman, S.W. Rayborn, J.K. Rester, J.J. Rudloe, L. Sarti Martinez, M. Schexnayder, J.R. Schmid, D.J. Shaver, C. Slay, A.D. Tucker, M. Tumlin, T. Wibbels, and B.M. Zapata Najera. 2016. Development of a Kemp's ridley sea turtle stock assessment model. Gulf of Mexico Science 33(2):138-157.

- Shaver, D.J., C. Rubio, J. Shelby Walker, J. George, A.F. Amos, K. Reich, C. Jones, and T. Shearer. 2016. Kemp's ridley sea turtle (*Lepidochelys kempii*) nesting on the Texas coast: Geographic, temporal, and demographic trends through 2014. Special Issue of Gulf of Mexico Science 33(2):158-178.

- Shaver, D.J. 2007. An attempt to re-establish a nesting colony of endangered Kemp's ridley sea turtles (Lepidochelys kempii) through experimental imprinting and head-starting. In: Marine Turtles Recovery of Extinct Populations, p. 145-173. L.F. Lopez Juardo and A. Lira Loza (editors). Instituto Canario de Ciencias Marinas.

- Shaver, D.J. 2007. Texas Sea Turtle Nesting and Stranding 2006 report. NPS, DOI. 30 pp.

Thank you for the opportunity to review and provide comments.

Sincerely,

Mary Kay Skoruppa

Mary Kay Skoruppa
U.S. Fish and Wildlife Service
Texas Coastal Ecological Services Field Office
4444 Corona Dr., Suite 215
Corpus Christi, TX 78411
Office (Friday) 361-225-7314; Mobile (M-Th) 346-815-0009
Email: mary_kay_skoruppa@fws.gov
https://www.fws.gov/office/texas-coastal-ecological-services

Appendix 12

BEST MANAGEMENT PRACTICES (BMPS) FOR TERRESTRIAL BIOSECURITY

Papahānaumokuākea Marine National Monument

The following conditions and rules aim to conserve and protect biologically unique terrestrial environments in Papahānaumokuākea Marine National Monument (Monument or PMNM). These unique uplands, shorelines, and shallow reef habitats provide refuge for many rare and endemic wildlife found nowhere else on Earth. Many of these species are formally listed as endangered or threatened under the Endangered Species Act. Endemic and listed plants, animals and arthropods are especially vulnerable to competition or habitat degradation from invasive or non-native species. These potential introductions may cause the extinction of endemic wildlife species and the destruction of entire terrestrial ecosystems or coral reef communities. Notable local examples include: the introduction of rabbits to Laysan Island (Kamole) in 1902, which caused the extinction of numerous plant and arthropod species, and three endemic land bird species; the introduction of the annual grass, common sandbur to Laysan Island (Kamole) where it has crowded out native bunch grass (kawelu) thus, eliminating nesting habitat for the endangered ‘Ekupu‘u (Laysan finch, *Telespiza cantans*) the introduction of rats to many Pacific Islands causing the extirpation of many burrowing seabird colonies as well as native plant communities; and, the introduction and proliferation of numerous ant species throughout the Pacific Islands to the widespread detriment of endemic plant and arthropod species.

Several of the islands within the Monument are pristine, and as a result are rich in rare and endemic plants and animals. Nihoa Island has at least 17 endemic and rare insect species, 5 endangered plants and 2 endangered birds. Mokumanamana has endangered plants and 11 endemic insects. Laysan Island (Kamole) has endangered plants, 9 endemic arthropods and 3 endangered birds. Kure Atoll (Hōlanikū) has endangered plants and 2 endangered birds. Other islands in the Monument such as Lisianski (Kapou), and islets in Atolls such as Pearl and Hermes Atoll (Manawai) and French Frigate Shoals (Lalo) provide homes for a variety of endemic and endangered species that require special protection from alien species.

Other Pacific Islands such as the “high islands” (O`ahu, Hawai`i, Maui, Kaua`i, etc.) as well as, certain islands within Midway Atoll (Kuaihelani), Pearl and Hermes Atoll (Manawai), French Frigate Shoals (Lalo) and Kure Atoll (Hōlanikū) have plants and animals that are of high risk for introduction to the relatively pristine islands discussed above. Of special concern are snakes, rats, mice, invasive marine algae, cats, dogs, amphibians, ants and a variety of other arthropods, plant species (and associated diseases) and microorganism and virus diseases such as Newcastle disease. Harmful plant species of highest concern that we know of are *Verbesina encelioides, Cenchrus echinatus, Pluchea indica, 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. The following restrictions on the movement of personnel and materials throughout the Monument exist because of the above concerns.

Definitions:

new: off-the-shelf and never-used-anywhere but the island in question.
clean: the item has been closely inspected for plant material, seeds and arthropods, paying close attention to seams and laces. All footwear must be 100% free of encrusted mud, dirt, or sand.
disinfect: the item has been (1) rinsed and is 100% free of encrusted mud, dirt, and sand, (2) closely inspected for seeds and insects, (3) soaked or wiped with an appropriate disinfecting solution as outlined in BMP011, and (4) rinsed if directed.
disinfect solution: When directed to use disinfect solution there are three acceptable solutions to choose from:1- a 1:32 dilution of commercial bleach in freshwater (1/2 cup bleach per gallon of freshwater), 2-yielding a 1000 ppm dilution of sodium hypochlorite, or 3- 3% free chlorine solution.
clothing: is all apparel, shoes, socks, gaiters, hats, gloves, over and under garments. **soft gear**: is all gear such as books, office supplies, 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, fiber, paper or material capable of harboring seeds or insects.
footwear: is anything worn on the foot that makes contact with the substrate. Once you stand up, a dive booty is considered footwear (footwear with spikes are prohibited). Examples: shoes, slippers, socks, tabis, etc.
island specific gear: dedicated gear are items that are purchased new, and have ONLY ever been used on a specific island, and nowhere else. When it is not being used on the specific island, gear should be quarantined and stored separated from all other gear.
hard gear: is … both "sensitive gear" and "non-sensitive" such as:

> **sensitive gear:** computers, optical equipment, and other sensitive equipment.
> **non-sensitive equipment and construction materials:** building materials, power and hand tools, generators, and other machinery.

Intertidal Zone: the area of substrate emergent during low tide and fully submerged during high tide, extending upwards from the mean low low-tide mark to the top of the splash zone during winter months (areas that are impacted by wave action, not including tsunamis)

Suitable Plastic Packing Container: Packing containers must be constructed of smooth, durable plastic which can be easily cleaned and will not harbor seeds or insects.

- Suitable: 5-gallon plastic buckets and plastic totes constructed with a single layer and having a smooth surface. All appropriate packing containers must have tight fitting plastic lids (with gaskets preferred).

- Not-suitable: Mail totes, cardboard boxes, untreated wooden boxes. These containers are porous and may provide a multi-layered surface allowing seeds and arthropods to be unintentionally transported.

The Following Conditions and Rules apply to the all islands within the Monument with the exception of those at Midway Atoll (Kuaihelani):

1. Any personnel who will be landing boats, and staying within the boats, on quarantine enforced islands (Nihoa, Mokumanamana (Necker), French Frigate Shoals (Lalo), Laysan (Kamole), Gardner Pinnacles (Nā ʻŌnū), Lisianski (Kapou), Pearl and Hermes Atoll (Manawai), and Kure Atoll (Hōlanikū)) must have clean clothes and shoes.

2. Any personnel going ashore, including the intertidal area 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. To avoid transport of seeds from within small boats, the following protocol must be followed when landing ashore: hose out small boat and inspect for vegetative matter including seeds, amphibians and insects before departing the main vessel. Quarantine shoes may be worn in small boats that have been cleaned and inspected. Make sure that non quarantine shoes are put in a sealed container if taken ashore.

4. Non-island specific Personal Protective Equipment (PPE) that is worn while landing on an island (such as helmets or life jackets) must be inspected and cleaned prior to accessing land. After landing, PPE must either be immediately put back in the small boat, or placed into a clean/sealed container or bag after landing. The sealed container, if clean on the outside, may go ashore, but should not be opened ashore. PPE should at no time touch the ground.

5. Soft gear may not be moved between islands. Hard gear, both sensitive and non-sensitive, must be thoroughly disinfected, inspected, and if applicable for non-sensitive hard gear, frozen for at least 48 hours between islands.

6. During transit, clothing and gear coming off the Main Hawaiian Islands, or Midway Atoll (Kuaihelani) 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 arthropods from these islands.

7. Regardless of origin or destination, all equipment and supplies must be cleaned just prior to any trip to quarantine enforced islands. Carefully clean all clothing, footwear and soft gear following use to minimize risk of cross contamination of materials between islands.

8. Pack supplies in suitable plastic packing containers such as, 5-gallon buckets with fitted lids or other sealable metal or plastic containers, such as Rubbermaid type totes or pallet tubs, since they can be thoroughly disinfected inside and out.

Non-wooden pallets, plastic boxes and cases, and plastic buckets may be reused for multiple deployments, however, before transporting these items to the quarantine islands, they must be thoroughly cleaned. Disinfect all exterior and interior parts of the container with a disinfect solution (bleach, hypochlorite or active chlorine). Follow this up with a comprehensive high pressure rinse to ensure that no arthropods or seeds are stuck in small crevices of the cargo transport containers.

Non-suitable containers are not permitted at any of the quarantine islands, such as cardboard boxes, because these 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 arthropods and seeds and therefore are only allowed if well-constructed (tight fitting seams, no rotten or termite-damaged sections). 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. **Wooden pallets are not permitted** due to the high amount of crevices and cracks that could harbor insects, seeds, and microbes. Acceptable alternatives include plastic, galvanized steel, or aluminum pallets.

During pre-deployment logistics and packing, purchased items (once removed from any cardboard packaging) shall be transferred directly into sealed pallet tubs or other containers. Clean all transport vessels before loading. Minimize, as much as possible, the amount of time that items are left sitting in a warehouse yard or in the back of a truck. Leave the lids of packing containers tightly sealed when they are not in use.

9. Just prior to departure, non-sensitive equipment and supplies (books, tents, generators, pumps, hoists, everything) must be frozen or tarped and fumigated. Food and cooking items need not be fumigated but should be cleaned and frozen, if freezable. Sensitive gear, such as cameras, binoculars, radios, and other electronic equipment that cannot be frozen or fumigated must be thoroughly cleaned and inspected, including internal inspection whenever possible, just prior to departure. All suitable containers must contain new, clean packing materials and be frozen or fumigated.

10. For larger mechanical or motorized equipment such as generators, outboard engines, and mechanical hoists which are periodically returned to Honolulu for servicing, remove the outer housings and engine covers to visually inspect for seeds and insects. Use compressed air with a fine-tipped air-gun attachment to air clean all crevices and enclosed spaces within. Full tear down of the motors and pumps for biosecurity is not feasible, however best efforts to remove outer covers and casings and inspect and clean underneath is a minimum precaution.

Replace all air filters, including outer foam pre-filter elements on any relevant piece of equipment shortly before being returned to the quarantine islands.

11. Remove, inspect and clean all lines on small boats between islands that have different island

specific biosecurity. Pressure-wash the exterior and interior of the vessel, including the inside of bilge wells, anchor wells, and any other enclosed compartments. Carefully inspect the inside of consoles to ensure that they are clean and free of plant and animal material. Tarp and fumigate the entire boat shortly before departure, ensuring the inside of the console unit is also treated.

Additional Special Conditions for Food:

Fresh foods such as fruits, vegetables, leafy vegetables and tubers are not permitted on quarantine enforced islands (Nihoa, Mokumanamana, French Frigate Shoals (Lalo), Laysan (Kamole), Garner Pinnacles (Nā ʻŌnū), Lisianski (Manawai), Pearl and Hermes Atoll

(Manawai), and Kure Atoll (Hōlanikū)). Fresh foods may be consumed on vessels operating within the atoll, provided that materials are properly contained and disposed of with other shipboard organic waste. Concern is that certain species, such as tomatoes, could easily become established and decomposing organic waste can harbor microbes and arthropods and act as an introduction vector. Fresh foods such as tomatoes and berries should not be eaten 48 hours before going ashore during transit. Soil can contain 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 airtight containers just as all other gear and frozen for 48 hours.

Additional Special Conditions for Travel to Nihoa and Mokumanamana Islands:
Nihoa and Mokumanamana are the most pristine terrestrial locations in the Monument, with Nihoa being home to the largest number of federally listed endangered species.

Please read and follow **BMP# 16** when accessing Nihoa and **BMP # 19** when accessing Mokumanamana.

Additional Special Conditions for Travel within Pearl and Hermes Atoll (Manawai):
Recently *Verbesina encelioides* has been introduced to Southeast and North Islands/islets within Pearl and Hermes Atoll (Manawai). This noxious weed has taken over a large portion of Southeast 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 separate quarantine gear and clothing for Southeast Island, North Islands (islets when separated), and for all the other islets in the atoll (3 total sets of quarantine clothing).** For instance the same clothing, and if needed camping gear, may be used at Grass and Seal-Kittery islands, but anything used at Southeast needs to stay off all the other islets in the atoll. Do not use the North Island clothing and gear on the other islets (Grass, Seal-Kittery and Bird Islands).

2. Carefully inspect small boats and their associated equipment when traveling between islets at Pearl and Hermes Atoll (Manawai). Since one anchor is placed ashore and one anchor is placed

in the water there is potential for seed dispersal on anchor lines as well as from within the small boats.

In 2019, *Chondria tumulosa* (red alga) was discovered within Pearl and Hermes Atoll causing extensive damage to coral reefs. Extreme caution is being taken to prevent the spread of this alga to other areas within Hawaii.

Please reference the current *Chondria tumulosa* BMP for Pearl and Hermes and BMP#11 Marine Biosecurity for any activities planned at Pearl and Hermes Atoll.

Additional Special Conditions for Travel within French Frigate Shoals Atoll (Lalo):

French Frigate Shoals (Lalo) supports one of the most diverse and dense assemblages of tropical seabirds and marine life in the North Pacific Ocean boasting the nesting habitat to over 90% of the Hawaiian green sea turtle population, one of the largest subpopulation of Hawaiian monk seals, and over a half million breeding seabirds of 18 different species. Although not “pristine”, Tern Island’s 26 acres support approximately 97% of the atoll’s 500,000 breeding seabirds, many of which depend on a specific assemblage of plant species to raise their young each year. The island’s plant community and habitat conditions are very fragile. One new species introduction, such as mice, yellow crazy ants, or *Verbesina*, could devastate the entire community.

In 2018, Hurricane Walaka hit French Frigate Shoals (Lalo) as a category 4-5 storm that washed most of East Island away. Since 2018, East Island has reformed naturally with no invasive species present. **Every person should have one set of separate island specific quarantine gear and clothing for Tern Island and for the other islets in the atoll including East Island (2 total sets of quarantine clothing/gear).** For instance the same clothing, and if needed camping gear, may be used at Gin, Trig and East islands, but anything used at Tern Island needs to remain separate from the other islets in the atoll. Tern Island has introduced weeds and insects that the other islands in the atoll do not have. Do not use Tern Island gear/clothing on East Island.

When anchoring on East Island, ensure the rope of the anchor is free of vegetation, seeds or insects by providing a good saltwater rinse before anchoring on island.

6 Updated 8 June 2021

Appendix 13

FINDING OF NO SIGNIFICANT IMPACT

I. Purpose of Finding of No Significant Impact (FONSI): The National Environmental Policy Act (NEPA) requires the preparation of an Environmental Impact Statement (EIS) for any proposal for a major federal action significantly affecting the quality of the human environment. 42 U.S.C. § 4332(C). The Council on Environmental Quality (CEQ) Regulations direct agencies to prepare a Finding of No Significant Impact (FONSI) when an action not otherwise excluded will not have a significant impact on the human environment. 40 CFR §§ 1500.4(b), 1500.5(b), & 1501.6. To evaluate whether a significant impact on the human environment is likely, the CEQ regulations direct agencies to analyze the potentially affected environment and the degree of the effects of the proposed action. 40 CFR § 1501.3(b). In doing so, agencies should consider the geographic extent of the affected area (i.e., national, regional or local), the resources located in the affected area (40 CFR § 1501.3(b)(1)), and whether the project is considered minor or small-scale (NAO 216-6A CM, Appendix A-2). In considering the degree of effect on these resources, agencies should examine, as appropriate, short- and long-term effects, beneficial and adverse effects, and effects on public health and safety, as well as effects that would violate laws for the protection of the environment (40 CFR § 1501.3(b)(2)(i)-(iv); NAO 216-6A CM Appendix A-2 - A-3), and the magnitude of the effect (e.g., negligible, minor, moderate, major). CEQ identifies specific criteria for consideration. 40 CFR § 1501.3(b)(2)(i)-(iv). Each criterion is discussed below with respect to the proposed action and considered individually as well as in combination with the others.

In preparing this FONSI, we reviewed the Programmatic Environmental Assessment (PEA) for the National Marine Fisheries Service (NMFS) Pacific Islands Fisheries Science Center (PIFSC) Marine Turtle Biology and Assessment Program's (MTBAP) continued sea turtle research**,** which evaluates the affected area, the scale and geographic extent of the proposed action, and the degree of effects on those resources (including the duration of impact, and whether the impacts were adverse and/or beneficial and their magnitude). The PEA is hereby incorporated by reference, per 40 CFR § 1501.6(b).

II. Approach to Analysis:

The scale of the proposed action (Alternative 2 of the PEA) is not considered to meaningfully contribute to a significant impact to the environment. Most activities are expected to have a beneficial impact to the species (i.e., sea turtles) and their environment, and any adverse impacts would be temporary and are considered minor since they are not expected to have population-level impacts. For assisted migrations, the environmental impact to the new location of the relocated nest would be minimal, and may not be greater than the impact of a sea turtle laying a clutch of eggs in that same location. The only additional impact would be human presence at this location, which is mitigated through stringent protocols. For these reasons, we have determined that the scale of the project is minor.

The proposed action will not meaningfully contribute to significant impacts to specific resources because the impacts are considered negligible or minor. Research activities are generally considered to have a positive impact to the species. A minor impact to the terrestrial environment may occur at the location of the 'assisted migration' of sea turtle nests, but would not be greater than the impact of a sea turtle laying a clutch of eggs in that same location. Regardless, this will not occur without stakeholder (e.g., USFWS, Papahānaumokuākea Marine National Monument Management Board) concurrence and permit approval; the 'assisted migration' action is not considered to meaningfully contribute to a significant impact. A description of the impacts can be found in the PEA, Section 4.2.

The proposed action is not connected to other actions that have caused or may cause effects to the resources in the affected area, and there is then no potential for the effects of the proposed action to add to the effects of other projects, such that the effects taken together could be significant.

III. Geographic Extent and Scale of the Proposed Action: The PEA describes the action area in section 1.4. Research activities primarily occur in open ocean, near shore, and terrestrial (sea turtle nesting/basking) areas, and may occur in water or on land, including beaches or other coastal adjacent areas. The geographic scope of the proposed action includes the Pacific Islands Region (PIR) and internationally in locations or with aggregations of turtles that are relevant to populations with PIR connections. The USFWS permit TE-72088A-3 describes the locations in more detail for each turtle species (PEA Appendix 3). The international areas where MTBAP conducts sea turtle research include Papua New Guinea, Indonesia, the Solomon Islands, Japan, Philippines, Thailand, Vietnam, Malaysia, Federated States of Micronesia, Fiji, Cook Islands, French Polynesia, Palau, and Marshall Islands. These areas are described in depth in the PIRO EA for the MTMCP (PEA section 3.1).

IV. Degree of Effect:

A. *The potential for the proposed action to threaten a violation of Federal, state, or local law or requirements imposed for environmental protection.*

This proposed action will not threaten a violation of any Federal, state, or local law, or requirement imposed for the protection of the environment. The proposed action is designed to be consistent with the Marine Mammal Protection Act, the Endangered Species Act, the Migratory Bird Treaty Act, and other Federal laws (PEA section 3.2.2). In addition, NMFS provided opportunities for the public to review and comment on the PEA by publishing the draft PEA to the Pacific Islands Region NEPA website at [*https://www.fisheries.noaa.gov/pacific-islands/laws-and-policies/national-environmental-policy-act-pacific-islands*](https://www.fisheries.noaa.gov/pacific-islands/laws-and-policies/national-environmental-policy-act-pacific-islands), and provided a 30-day public review starting on April 13, 2023. NMFS also notified the public of the availability of the draft PEA by the following methods:

- Emails sent directly to over 80 relevant stakeholders, partners, and other interested parties. A list of the contacts can be found in Appendix 10

- Posting the announcement on the C-Turtle listserv, an email information network to improve communication and provide information on sea turtle biology and conservation around the world.
- An announcement on NMFS' Sea Turtle Updates webpage, a publicly available website that provides updates on all things related to sea turtles in the PIR when available: *https://www.fisheries.noaa.gov/pacific-islands/endangered-species-conservation/sea-turtles-pacific-islands-updates*.

NMFS did not receive any comments indicating that the proposed action has the potential to violate a Federal, State, or local law imposed for environmental protection (PEA section 1.8.1).

B. *The degree to which the proposed action is expected to affect public health or safety.*

The proposed action will not have a significant impact on public health or safety because the proposed action follows standard operating procedures and best management practices which ensures the safety of research and technician personnel through regular training of all personnel in the implementation of techniques and methods, both in the laboratory and in the field (PEA section 2.1.1.7).

C. *The degree to which the proposed action is expected to affect a sensitive biological resource, including:*

a. *Federal threatened or endangered species and critical habitat;*

The proposed action will not have a significant impact on other endangered species or critical habitat. All species of sea turtles that occur within the action are protected under the ESA and research activities will have a negligible impact to these populations (PEA section 4.1.2). There are over 30 cetacean species (i.e., whales and dolphins) that occur within the PIR, with even fewer within the nearshore waters where sea turtle research activities occur within action area. Only six cetacean species or a distinct population segments within the action area are listed under the ESA. Activities will rarely overlap with any cetaceans within their habitat; cetaceans are more commonly offshore, or are only encountered during boat transits, not during research activities. Therefore, negligible effects to cetaceans are expected from MTBAP activities (PEA section 4.1.3.1). The Hawaiian monk seal often hauls out on the same beaches where MTBAP research activities occur. The temporary disturbance of research activities is expected to be of short duration, and have a negligible impact to individuals and the population (PEA section 4.1.2.3). There are 28 bird species protected under the ESA and/or MBTA. Any impacts to listed seabirds from sea turtle research activities would be temporary and indirect, which is considered negligible. In addition, mitigation measures to avoid nests/burrows and reduce impacts to individuals are in place and followed (see question (d) below) and PEA section 4.1.3.3). Impacts to endangered yellow-faced bees are expected to be temporary and indirect and therefore considered negligible (PEA section 4.1.3.4.1). The proposed activities are expected to have a minor impact on the 7 ESA listed corals within the action area and mitigation measures in place to reduce any potential impact (PEA section 4.1.3.4.2). ESA listed plants may occur within the action area and mitigation measures are put in place to avoid contacting these plants. However, it would be highly unlikely that research biologists would frequently encounter coastal ESA-listed plant species or, if encountered, they would be easily avoidable to minimize impacts (PEA section 4.1.3.5).

MTBAP research activities may occur in designated critical habitat for two ESA-listed marine mammal species (PEA section 3.2.3.2). When these areas are encountered, MTBAP will not adversely modify the critical habitat and any impacts are expected to be minor, short-term, and sporadic in time (PEA section 4.1.4). Any specified regulations in these areas would be adhered to during any research activities conducted in this critical habitat. MTBAP activities generally do not occur within the Hawaiian Islands insular false killer whale critical habitat and, therefore, would not destroy or adversely modify this habitat (PEA section 4.1.4). MTBAP activities would not destroy or adversely modify Hawaiian monk seal critical habitat (PEA section 4.1.4). Critical habitat for five species of corals is currently under consideration. MTBAP activities would not destroy or adversely modify the proposed coral critical habitat and would consult with NMFS as applicable if the critical habitat is designated (PEA 4.1.4).

Based on this information, MTBAP expects that research activities would not result in adverse modification in behavior and/or habitat disruption. MTBAP expects these impacts to be minor because MTBAP does not anticipate measurable changes to PIR sea turtle populations or impacts to reproductive areas, feeding grounds, and other areas of similar significance. MTBAP expects no long-term or substantial adverse effects on sea turtles, their habitats, or their role in the environment.

b. *stocks of marine mammals as defined in the Marine Mammal Protection Act;*

The MTBAP activities have been evaluated for impacts on marine mammals and are managed in compliance with the requirements of the Marine Mammal Protection Act. MTBAP activities would rarely encounter cetaceans (i.e., dolphins and whales), but may potentially overlap with these marine mammals during in-water monitoring (e.g., Uncrewed Aerial System surveys, boat surveys) (PEA section 3.2.2.1.1). On shore, the most commonly encountered marine mammal during sea turtle research is the endangered Hawaiian monk seal (PEA section 3.2.2.1.2). While Hawaiian monk seals spend most of their time in the water, they also use the terrestrial environment to haul-out on beaches, shores, and reefs, some of which overlap with the sea turtle nesting and basking areas. Best practices have been developed by MTBAP along with the Hawaiian Monk Seal Research Program to minimize disturbance of Hawaiian monk seals, which are always followed during sea turtle research (see question (a) above).

c. *essential fish habitat identified under the Magnuson–Stevens Fishery Conservation and Management Act*

The proposed action would not affect Essential Fish Habitat or Habitat Area of Particular Concern (PEA section 4.1.4). PIFSC established a programmatic Essential Fish Habitat (EFH) agreement with NMFS PIRO (Dated February 24, 2020). Under the programmatic agreement PIFSC will notify PIRO using a standard reporting form of proposed research actions as they arise (including MTBAP's activities that may impact EFH (i.e., small boat operations)) and any relevant conservation recommendations in the agreement that will be followed to mitigate impacts to EFH.

d. bird species protected under the Migratory Bird Treaty Act;

The proposed action will not have a significant impact on bird species (see question (a) above). Unintentional impacts will be temporary and minor (PEA section 4.1.3.3). Mitigation measures have been established around birds:

- Looking for nests or for adults flushing from inconspicuous nests when approaching seabird colonies;
- Not disturbing any bird colonies 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 terrestrial trails to avoid subsurface nests; and
- Digging out shearwaters or petrels if nests are stepped on (See PEA section 4.1.3.3).

e. national marine sanctuaries or monuments;

The proposed action will not have a significant impact on national marine sanctuaries or monuments because the proposed sea turtle research activities are short term and will not permanently alter any habitat (PEA section 4.1.4). While research is occurring inside a sanctuary or monument (including future designations), MTBAP follows all applicable rules guidelines and best practices. MTBAP has developed an extensive protocol to minimize disturbance while in the Papahānaumokuākea Marine National Monument (PMNM) with the co-managers.

f. vulnerable marine or coastal ecosystems, including, but not limited to, shallow or deep coral ecosystems;

The proposed action will not have a significant impact on vulnerable marine, coastal or coral ecosystems (PEA section 4.1.4)

g. biodiversity or ecosystem functioning (e.g., benthic productivity, predator-prey relationships, etc.)

The proposed activity would not significantly affect biodiversity or ecosystem functioning. Research activities have minimal impact on other species, and all impacts would be minor, temporary, and considered negligible (PEA sections 4.1.2 and 4.1.3). Habitat impacts are also considered negligible, and would be temporary in nature (PEA sections 4.1.1 and 4.1.4). We do not anticipate impacts to predator-prey relationships, benthic productivity, or other ecosystem and biodiversity functioning due to these negligible impacts to species and habitats.

D. The degree to which the proposed action is reasonably expected to affect a cultural resource: properties listed or eligible for listing on the National Register of Historic

Places; archeological resources (including underwater resources); and resources important to traditional cultural and religious tribal practice.

The proposed action will not have a significant impact on cultural resources because there are no known National Register of Historic Places or archeological sites located in the action area where the proposed research would take place (PEA section 4.1.4). PMNM is a culturally important resource to the native Hawaiian community and MTBAP works closely with PMNM cultural practitioners to have annual cultural briefings prior to each field season to understand how to best respect the cultural significance of the place in tandem with conducting our research activities.

E. The degree to which the proposed action has the potential to have a disproportionately high and adverse effect on the health or the environment of minority or low-income communities, compared to the impacts on other communities (EO 12898).

The proposed action will not disproportionately impact the health or environment of minority or low-income communities as compared to other communities (PEA section 4.1). Research activities occur on a variety of habitats, including public and private lands, in water, and in remote settings. No specific community is impacted more than others. Cultural significance of sea turtles to indigenous communities was considered and incorporated (PEA section 4.1.4).

F. The degree to which the proposed action is likely to result in effects that contribute to the introduction, continued existence, or spread of noxious weeds or nonnative invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of the species.

The proposed action is not expected to import, introduce, or contribute to the spread of noxious weeds or nonnative invasive species (PEA section 4.1.3). Mitigation measures include:

- Traveling on marked trails to minimize impact to terrestrial plants
- Minimizing disturbance to sand dunes, and
- Minimizing pollution (e.g., marine debris, light, noise)

Strict biosecurity protocols are followed in the Marine National Monuments, which were designed to eliminate the potential of any introduction or spread of nonnative species in the monument. These can be found in Appendix 12. Elsewhere, state and local laws regarding invasive species are followed.

G. The potential for the proposed action to cause an effect to any other physical or biological resources where the impact is considered substantial in magnitude (e.g., irreversible loss of coastal resource such as marshland or seagrass) or over which there is substantial uncertainty or scientific disagreement.]

The proposed action is not expected to cause a substantial impact to any other physical or biological resources, nor is there substantial uncertainty or scientific disagreement on the impacts of the proposed action. In general, the impacts are considered beneficial to the species and habitat, and are directly related to the five U.S. sea turtle recovery plans. The effects of the proposed action, as analyzed in the PEA, are not controversial. NMFS provided opportunities for the public to review and comment on the PEA and did not receive any comments that indicated scientific disagreement. Risks associated with the proposed action are therefore not unique or unknown, and potential outcomes are informed by the best available scientific information.

V. Other Actions Including Connected Actions: Impacts from MTBAP's research activities are expected to be positive in nature. While the proposed action would add more, albeit short-term and sporadic, mandated research activities in the PIR, these actions are directly related to the conservation and recovery of sea turtle species. The direct and indirect environmental consequences of the proposed research programs are expected to be minimal, as research design, methodologies, and standard operating procedures for working with endangered species in sensitive habitats are specifically formulated to minimize any negative impacts on the environment and sea turtles in particular. The proposed action does not automatically trigger other actions that may require an environmental impact statement, is not contingent on other actions that are taken previously or simultaneously, and are not part of a larger action for this justification. Therefore, the effects of the proposed action are not expected to add to the effects of other actions and the analysis documented in the PEA revealed no past, present, or reasonably foreseeable actions that would combine or interact with the effects from the proposed action to result in cumulatively significant impacts.

VI. Mitigation and Monitoring: Under the proposed action, MTBAP will continue to engage in mitigation strategies, follow best management practices, and adhere to the requirements under the ESA and other applicable laws in order to have the least amount of impact to sea turtles, their habitats, and other resources while achieving the goals of each sea turtle recovery plan. Specific mitigation measures can be found in section 4 of the PEA.

DETERMINATION

The CEQ NEPA regulations, 40 CFR § 1501.6, direct an agency to prepare a FONSI when the agency, based on the PEA for the proposed action, determines not to prepare an EIS because the action will not have significant effects. In view of the information presented in this document and the analysis contained in the supporting PEA prepared for NMFS PIFSC MTBAP's sea turtle research, it is hereby determined that the NMFS PIFSC MTBAP's sea turtle research will not significantly impact the quality of the human environment. The PEA for NMFS PIFSC MTBAP continued sea turtle research is hereby incorporated by reference. In addition, all beneficial and adverse impacts of the proposed action as well as mitigation measures have been evaluated to reach the conclusion of no significant impacts. Accordingly, preparation of an EIS for this action is not necessary.

LITTNAN.CHARLES.LOUIS.1100552074
Digitally signed by LITTNAN.CHARLES.LOUIS.1100552074
Date: 2024.04.01 14:29:23 -10'00'

Charles Littnan, Ph.D. — Date
Director, Pacific Islands Fisheries Science Center