NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7
BIOLOGICAL AND CONFERENCE OPINION

Title: Biological and Conference Opinion on the Issuance of Permit No. 20605 to Robin Baird, Cascadia Research Collective, and Permit No. 20043 to Whitlow Au, University of Hawaii, for Research on Cetaceans

Consultation Conducted By: Endangered Species Act Interagency Cooperation Division, Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Action Agencies: Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service

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1 INTRODUCTION

The Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.) establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat they depend on. Section 7(a)(2) of the ESA requires Federal agencies to insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. Federal agencies must do so in consultation with the National Marine Fisheries Service (NMFS) for threatened or endangered species (ESA-listed), or designated critical habitat that may be affected by the action that are under NMFS jurisdiction (50 C.F.R. §402.14(a)). If a Federal action agency determines that an action "may affect, but is not likely to adversely affect" endangered species, threatened species, or designated critical habitat and NMFS concurs with that determination for species under NMFS jurisdiction, consultation concludes informally (50 C.F.R. §402.14(b)).

Section 7(b)(3) of the ESA requires that at the conclusion of consultation, NMFS provides an opinion stating whether the Federal agency's action is likely to jeopardize ESA-listed species or destroy or adversely modify designated critical habitat. If NMFS determines that the action is likely to jeopardize ESA-listed species or destroy or adversely modify critical habitat, NMFS provides a reasonable and prudent alternative that allows the action to proceed in compliance with section 7(a)(2) of the ESA. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement that specifies the impact of any incidental taking and includes reasonable and prudent measures to minimize such impacts and terms and conditions to implement the reasonable and prudent measures.

The action agency for this consultation is NMFS, Office of Protected Resources, Permits and Conservation Division (hereafter the Permits Division). The Permits Division proposes to issue two scientific research permits (Appendix A and B) pursuant to section 10(a)(1)(A) of the ESA and section 104 of the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 USC 1361 et seq.). Permit No. 20605 would be issued to Robin Baird, Ph.D., Cascadia Research Collective, 218 ½ West 4th Avenue, Olympia, Washington 98501, and Permit No. 20043 would be issued to Whitlow Au, Ph.D., University of Hawaii, P.O. Box 1346, Kaneohe, Hawaii 96744. The purpose of the proposed permits is to allow an exception to the moratoria and prohibition on takes established under the ESA and MMPA in order to allow the applicants to conduct scientific research on cetaceans (both ESA-listed and non-ESA-listed).

Under the ESA take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." Harm is defined by regulation (50 C.F.R. §222.102) as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." NMFS does not have a regulatory definition of "harass." We rely on our interim guidance, which interprets harass as to "create the likelihood of

injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (NMFSPD 02-110-19).

Under the MMPA, take is defined as "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal" (16 U.S.C. 1361 et seq.) and further defined by regulation (50 C.F.R. §216.3) as "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
- the doing of any other negligent or intentional act which results in disturbing or molesting a marine mammal
- feeding or attempting to feed a marine mammal in the wild"

For purposes of this action, harassment is defined under the MMPA as any act of pursuit, torment, or annoyance which:

- has the potential to injure a marine mammal or marine mammal stock in the wild (Level A Harassment); or
- has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B Harassment). Under NMFS regulation, Level B harassment does not include an act that has the potential to injure a marine mammal or marine mammal stock in the wild.

NMFS' interim ESA harass definition does not perfectly equate to MMPA Level A or Level B harassment, but shares some similarities with both in the use of the terms "injury/injure" and a focus on a disruption of behavior patterns. Since the proposed permits would authorize take under the MMPA and ESA, our and the Permit Division's ESA analysis may result in slightly different outcomes compared to the Permit Division's MMPA analysis, depending on the action. Given that the MMPA definition of harass involves two different levels, neither of which is completely synonymous with our interpretation of harass under the ESA, there may be circumstances in which an act is considered harassment, and thus take, under one statute but not the other. NMFS intends to further explore the similarities and differences between harassment under the MMPA and ESA to determine whether additional steps should be taken relative to the interpretation of the two statutes when taking actions regarding ESA-listed marine mammals.

This consultation, biological and conference opinion (opinion), and incidental take statement, were completed by NMFS Office of Protected Resources Endangered Species Act Interagency Cooperation Division (hereafter referred to as "we") in accordance with section 7(a)(2) and 7(b)

of the statute (16 U.S.C. 1536 (a)(2)), associated implementing regulations (50 C.F.R. §402), and agency policy and guidance.

This document represents NMFS opinion on the effects of the proposed issuance of Permit Nos. 20605 and 20043 on beluga whales (*Delphinapterus leucas*, Cook Inlet Distinct Population Segment (DPS)), blue whales (*Balaena musculus*), bowhead whales (*Balaena mysticetus*), false killer whales (*Pseudorca crassidens*, Main Hawaiian Islands Insular DPS), fin whales (*Balaena physalus*), gray whales (*Eschrichtius robustus*, Western North Pacific population), Gulf of Mexico Bryde's whales (*Balaenoptera edeni*), humpback whales (*Megaptera novaeangliae*, Central America, Mexico, and Western North Pacific DPSs), killer whales (*Orcinus orca*, Southern Resident DPS), North Atlantic right whales (*Eubalaena glacialis*), North Pacific right whales (*Eubalaena japonica*), sei whales (*Balaena borealis*), sperm whales (*Physeter macrocephalus*), Hawaiian monk seals (*Neomonachus schauinslandi*), Guadalupe fur seals (*Arctocephalus townsendi*), Steller sea lions (*Eumetopias jubatus*, Western DPS), green turtles (*Chelonia mydas*, Central North Pacific, Central South Pacific, Central West Pacific, East Pacific, and North Atlantic DPSs), hawksbill turtles (*Eretmochelys imbricata*), Kemp's ridley turtles, leatherback turtles (*Dermochelys coriacea*), loggerhead turtles (*Caretta caretta*, North Pacific, Northwest Atlantic, and South Pacific DPSs), and olive ridley turtles (*Lepidochelys olivacea*, Mexico's Pacific Coast Breeding Colonies and all other areas). A complete record of this consultation is on file at NMFS Office of Protected Resources in Silver Spring, Maryland.

1.1 Background

Both Dr. Baird and Dr. Au are long-term cetacean researchers, and as such, we have previously conducted consultation on previous research permits for both applicants. Dr. Baird has previously held Permit Nos. 0731-1509 (1999-2005), 731-1774 (2005-2011), and 15330 (2010-2017) and Dr. Au has previously held permit Nos. 1000-1617 (2001-2010), and 14682 (2010-2016). Permit Nos. 20605 and 20043 are renewal of Dr. Baird and Dr. Au's previous research permits, respectively. Since the applicants' research is long-term in nature, the activities that would be authorized under the proposed permits (Section 3) are the same or similar to those the applicants have been permitted to conduct previously. Such activities include aerial surveys, vessel surveys, close approaches, and documentation, the export and import of parts, biological sampling, tagging, and active acoustics. Previous consultations considering permits to authorize Dr. Baird and Dr. Au to conduct these activities all resulted in biological opinions concluding that the issuance of the research permits was not likely to jeopardize the continued existence of ESA-listed species, nor destroy or adversely modify designated critical habitat (NMFS 2011a; NMFS 2011b). In this consultation, we build upon on our long-term evaluation of Dr. Baird and Dr. Au's research activities from these previous consultation, but here consider these previous permits as part of the environmental baseline (Section 7), and evaluate the effects of authorizing Dr. Baird and Dr. Au to continue to conduct the research under Permit Nos. 20605 and 20043 respectively.

1.2 Consultation History

This opinion is based on information provided in the applicants' permit applications (NMFS 2016a; NMFS 2016m), correspondence and discussions with the Permits Division and the applicants, previous biological opinions for research permits for Dr. Baird, Dr. Au, and other similar research activities (NMFS 2011a; NMFS 2011b; NMFS 2017a; NMFS 2017b; NMFS 2017c), annual reports from Dr. Baird's and Dr. Au's previous research (NMFS 2016f; NMFS 2016g; NMFS 2016h), and the best scientific and commercial data available from the literature. Our communication with the Permits Division regarding each permit considered in this consultation is summarized as follows:

1.2.1 Permit No. 20605

- On October 17, 2016, the Permits Division provided us a copy of the initial application for Permit No. 20605 and asked for our review.
- On November 1, 2016, we provided our review of the initial application for Permit No. 20605 and requested additional information and clarification from the applicant and the Permits Division.
- On January 4, 2017, the Permits Division sent us an updated application for Permit No. 20605 that addressed some of our questions and request for additional information.
- On January 9, 2017, we met with the Permits Division to discuss a species list and effect determinations for Permit No. 20605.
- On January 11, 2017, we provided the Permits Division our review of the updated application for Permit No. 20605 and requested only minor additional information from the applicant.
- On February 8, 2017, the Permits division sent us a memorandum requesting formal initiation on the issuance of Permit No. 20605.
- On February 23, 2017, we provided the Permits Division with our review of the initiation package for Permit No. 20605, including several minor questions. At this time we determined there to be sufficient information to initiate formal consultation.
- On February 27, 2017, the Permits Division responded to our questions on the initiation package for Permit No. 20605.
- On March 15, 2017, the Permits Division provided the applicant's responses to our questions for on Permit No. 20605.
- On May 9, 2017, we sent the Permits Division a memorandum informing them that we initiated formal consultation on the issuance of Permit No. 20605 as of as of February 8, 2017. In this memorandum we noted the agreed upon extended timeline for the completion of consultation by August 1, 2017, in order to meet the researchers need for continued permit coverage.
- On July 10, 2017, the Permits Division provided us with an updated draft for Permit No. 20605. One this day we also sent the Permits Division our exposure analysis regarding the breakdown of requested takes into specific humpback whale DPSs. They provided

they review of this analysis the same day, and we made a minor modification to the analysis based on this feedback.

- On July 12, 2017, we requested additional information from the Permits Division on sterilization procedures for biopsy sampling and tagging and clarification on the proposed takes for beluga whales (Cook Inlet DPS) under Permit No. 20605. The information was provided the same and following day.

1.2.2 Permit No. 20043

- On June 24, 2016, the Permits Division notified us they received an application for Permit No. 20043 and would likely request formal consultation.
- On October 3, 2016, we emailed the Permits Division to confirm that they would still request formal consultation on the issuance of Permit No. 20043 given that the proposed research appeared to only involve non-ESA-listed species due to the recent delisting of Hawaii DPS humpback whales. At that time, they informed us that they would likely no longer request formal consultation, and as result, we considered this action withdrawn.
- On April 24, 2017, we received a request for formal consultation from the Permits Division on the issuance of Permit No. 20043. The Permits Division informed us that previously the application only appeared to involve research on non-ESA listed species but further discussions with the applicant revealed research on ESA-listed false killer whales (Main Hawaiian Islands Insular DPS) was proposed. At this time we provided our review of the initiation package and returned it to the Permits Division as several aspects of the proposed action were unclear.
- On April 26, 2017, we received a modified request for formal consultation from the Permits Division on the issuance of Permit No. 20043. In this request, the Permits Division clarified that they planned to issue an MMPA only permit to Dr. Au for all non-ESA-listed species, and that take for ESA-listed false killer whales (Main Hawaiian Islands Insular DPS) would be added to the permit upon completion of consultation.
- On May 1, 2017, we met with the Permits Division to discuss the initiation package for Permit No. 20043, and in particular sought clarification on their effects determinations for species other than false killer whales (Main Hawaiian Islands Insular DPS). At this time we also requested several attachments that were listed in the consultation package memorandum, but were not included in the package we received.
- On May 16, 2017, the Permits Division provided us additional updates and clarification on their effects determinations and provided the remaining initiation package documents for Permit No. 20043. We reviewed the initiation package in full that day, and requested additional information and clarification.
- On June 5, 2017, the Permits Division provided the additional information we requested, and on June 5, 2017, we determined the initiation package for Permit No. 20043 to be complete.

- On June 21, 2017, we sent the Permits Division a memorandum informing them that we initiated consultation on the issuance of Permit No. 20043 on June 5, 2017.
- On July 12, 2017, we requested additional information from the Permits Division on sterilization procedures for biopsy sampling and tagging that would be used under Permit No. 20043.

2 THE ASSESSMENT FRAMEWORK

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species; or adversely modify or destroy their designated critical habitat.

"Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of an ESA-listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 C.F.R. §402.02.

"Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of designated critical habitat for the conservation of an ESA-listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 C.F.R. §402.02).

An ESA section 7 assessment involves the following steps:

Description of the Proposed Action (Section 3), *Interrelated and Interdependent Actions* (Section 4), and *Action Area* (Section 5)*:* We describe the proposed action, identify any interrelated and interdependent actions, and describe the spatial extent of the action area.

Status of Endangered Species Act Protected Resources (Section 6): We identify the ESA-listed species and designated critical habitat that are likely to co-occur with those stressors in space and time and evaluate the status of those species and habitat. In this Section, we also identify any species and designated critical habitat not likely to be adversely affected (Section 6.1).

Environmental Baseline (Section 7): We describe the environmental baseline in the action area including past and present impacts of Federal, state, or private actions and other human activities in the action area, anticipated impacts of proposed Federal projects that have already undergone formal or early section 7 consultation, and impacts of state or private actions that are contemporaneous with the consultation in process.

Effects of the Action (Section 8): We identify the stressors that are likely to result from the proposed action, any measures that will be taken to mitigate or minimize exposure of ESA-listed resources to the stressors, the number (and age or life stage, and gender, if possible) of ESA-listed individuals that are likely to be exposed to the stressors and the populations or subpopulations to which those individuals belong. We also consider whether the action "may

affect" designated critical habitat. This is our exposure analysis. We evaluate the available evidence to determine how individuals of those ESA-listed species are likely to respond given their probable exposure. We also consider how the action may affect designated critical habitat. This is our response analyses. We assess the consequences of these responses of individuals that are likely to be exposed to the populations those individuals represent, and the species those populations comprise. This is our risk analysis. The adverse modification analysis considers the impacts of the proposed action on the essential habitat features and conservation value of designated critical habitat.

Cumulative Effects (Section 9): Cumulative effects are the effects to ESA-listed species and designated critical habitat of future state or private activities that are reasonably certain to occur within the action area 50 C.F.R. §402.02. Effects from future Federal actions that are unrelated to the proposed action are not considered because they require separate ESA section 7 compliance.

Integration and Synthesis (Section 10): In this section, we integrate the preceding analyses to summarize the consequences to ESA-listed species and designated critical habitat under NMFS' jurisdiction.

Conclusion (Section 11); With full consideration of the status of the species and the designated critical habitat, we consider the effects of the action within the action area on populations or subpopulations and on essential habitat features when added to the environmental baseline and the cumulative effects to determine whether the action could reasonably be expected to:

- Reduce appreciably the likelihood of survival and recovery of ESA-listed species in the wild by reducing its numbers, reproduction, or distribution, and state our conclusion as to whether the action is likely to jeopardize the continued existence of such species; or
- Appreciably diminish the value of designated critical habitat for the conservation of an ESA-listed species, and state our conclusion as to whether the action is likely to destroy or adversely modify designated critical habitat.

If, in completing the last step in the analysis, we determine that the action under consultation is likely to jeopardize the continued existence of ESA-listed species or destroy or adversely modify designated critical habitat, then we must identify a reasonable and prudent alternative(s) to the action, if any, or indicate that to the best of our knowledge there are no reasonable and prudent alternatives. See 50 C.F.R. §402.14.

In addition, we include an incidental take statement (Section 12) that specifies the impact of the take, reasonable and prudent measures to minimize the impact of the take, and terms and conditions to implement the reasonable and prudent measures. ESA section 7 (b)(4); 50 C.F.R. §402.14 (i). We also provide discretionary conservation recommendations (Section 13) that may be implemented by the action agency. 50 C.F.R. §402.14 (j). Finally, we identify the circumstances in which reinitiation of consultation is required (Section 14). 50 C.F.R. §402.16.

To comply with our obligation to use the best scientific and commercial data available, we collected information through searches of *google scholar*, *web of science*, literature cited sections of peer reviewed articles, species listing documentation, and reports published by government and private entities. This opinion is based on our review and analysis of various information sources, including:

- Information submitted by the Permits Division and the applicant
- Government reports (including NMFS biological opinions and stock assessment reports)
- National Oceanic and Atmospheric Administration (NOAA) technical memos
- Peer-reviewed scientific literature

These resources were used to identify information relevant to the potential stressors and responses of ESA-listed species and designated critical habitat under NMFS' jurisdiction that may be affected by the proposed action to draw conclusions on risks the action may pose to the continued existence of these species and the value of designated critical habitat for the conservation of ESA-listed species.

3 DESCRIPTION OF THE PROPOSED ACTION

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies. The proposed action for this consultation is the Permits Division's issuance of two scientific research permits pursuant to the ESA and MMPA. The research permits would allow an exception to the moratoria and prohibition on takes established under the ESA and MMPA in order to allow Dr. Baird and Dr. Au to conduct scientific research on ESA-listed and non-ESA-listed cetaceans. The purpose of Dr. Baird's research is to better understand the biology and ecology of cetacean, with emphasis on obtaining information relevant to the management and conservation of populations and species and assessing responses to anthropogenic activity. The purpose of Dr. Au's research is three fold: to understand population dynamics of marine mammals around Hawaii, document the acoustic environment and the use of sound by whales around Hawaii, and track baleen whales on U.S. Navy undersea hydrophone ranges using active high frequency pinger and satellite tags.

Permit No. 20605 would authorize Dr. Baird to take ESA-listed beluga (Cook Inlet DPS), blue, bowhead, false killer (Main Hawaiian Islands Insular DPS), fin, gray (Western North Pacific population), Gulf of Mexico Bryde's, humpback (Central America, Mexico, and Western North Pacific DPSs), killer (Southern Resident DPS), North Atlantic right, North Pacific right, sei, and sperm whales (*Physeter macrocephalus*) during directed research activities, and in doing so incidentally harass Hawaiian monk seals, Guadalupe fur seals, and Steller sea lions. In addition, under Permit No. 20605 directed research takes would be authorized for several non-listed cetaceans and unidentified baleen whales that could be ESA-listed or non-ESA-listed. Permit No. 20043 would authorize Dr. Au to take ESA-listed false killer whales (Main Hawaiian Islands Insular DPS) as well as several non-listed cetaceans. Table 1 and Table 2 below displays the annual takes of ESA-listed species that would be authorized under Permit Nos. 20605 and 20043

respectively. In the case of incidental harassment of pinnipeds in Table 1, the listed takes are authorized only under the MMPA, as the Permits Division determined that no take under ESA would result from incidental harassment during cetacean research (NMFS 2016j). For research permits, the Permits Division counts one take per cetacean per day including all approaches[1] and procedure attempts, regardless of whether a behavioral response to the permitted activity is observed.

[1] An "approach" is defined as a continuous sequence of maneuvers involving a vessel, including drifting, directed toward a cetacean or group of cetaceans closer than 100 yards for baleen and sperm whales and 50 yards for all other cetaceans.

Table 1: Proposed annual takes of Endangered Species Act listed species that would be authorized under Permit No. 20605.

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
Atlantic Ocean year-round during vessel and aerial surveys. Animals over one year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of two biopsy samples per year. Includes direct takes and incidental harassment to non-target animals during directed research.						
Whale, blue; Range-wide (NMFS Endangered)	All	500	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
	Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to two of 10 animals may receive two suction-cup tags.
		10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to two of 10 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).
Whale, bowhead; Range-wide (NMFS Endangered)	Adult/ Juvenile	12	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Up to 3 of 12 animals may receive two suction-cup tags.

[2] Takes = the **maximum** number of animals, not necessarily individuals, that may be targeted for research annually for the suite of procedures in each row of the table.

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
Whale, Bryde's; Northern Gulf of Mexico stock (NMFS proposed Endangered)	All	60	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
	Non-neonate	5	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled.
	Adult/ Juvenile	5	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup tagging. Only one tag per animal.
		5	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb tagging. Only one tag per animal.
Whale, fin; Range-wide (NMFS Endangered)	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
Whale, fin; Range-wide (NMFS Endangered)	Non-neonate	15	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to two of 10 animals may receive two suction-cup tags.

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
		15	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to two of 15 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).
Whale, right, North Atlantic; Range-wide (NMFS Endangered)	All	12	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal	No biopsy or tagging.
Whale, sei; Range-wide (NMFS Endangered)	All	800	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
	Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
Whale, sei; Range-wide (NMFS Endangered)	Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to six of 10 animals may receive two suction-cup tags.
		20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to six of 20 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
Whale, sperm; Range-wide (NMFS Endangered)	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
	Non-neonate	25	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to six of 10 animals may receive two suction-cup tags.
		25	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to six of 25 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).
Whale, unidentified baleen	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	Species most likely to be involved are Bryde's and sei whales, or hybrids (e.g., fin x blue whales), which render species identification problematic.
	Non-neonate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
	Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to six of 10 animals may receive two suction-cup tags.
		10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to six of 10 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).
Pacific Ocean year-round during vessel and aerial surveys. Animals over one year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of two biopsy samples per year. Includes direct takes and incidental harassment to non-target animals during directed research.						
Sea lion, Steller; (Western US) (NMFS Endangered)	All	3,000	1	Harass	Incidental disturbance	Incidental disturbance during vessel or aerial surveys
Seal, Guadalupe fur; Range-wide (NMFS Endangered)	All	100	1	Harass	Incidental disturbance	Incidental disturbance during vessel or aerial surveys
Seal, Hawaiian monk; Hawaiian Islands (NMFS Endangered)		30				
Whale, beluga; Cook Inlet Stock (NMFS Endangered)	All	100	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging. Cook Inlet DPS.

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
Whale, blue; Range-wide (NMFS Endangered)	All	800	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
	Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to two of 10 animals may receive two suction-cup tags.
Whale, blue; Range-wide (NMFS Endangered)	Adult/ Juvenile	10	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to two of 10 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).
Whale, false killer; Hawaii Insular (NMFS Endangered)	All	3,000	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
	Non-neonate	40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
	Adult/ Juvenile	15	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to six of 15 animals may receive two suction-cup tags.
		40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to six of 40 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).
Whale, fin; Range-wide (NMFS Endangered)	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
Whale, fin; Range-wide (NMFS Endangered)	Non-neonate	60	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to two of 10 animals may receive two suction-cup tags.
		30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to two of 30 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
Whale, gray; Range-wide	All	4,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
Whale, gray; Western North Pacific (Korean) (NMFS Endangered)	Non-neonate	5	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; ; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling and tagging for Western North Pacific stock. Animals over six months old may be biopsy sampled, and repeat biopsy sampling for adults and juveniles only. Animals over one year old may be tagged, only one tag per animal.
Whale, humpback; Mexico DPS (NMFS Threatened) Central America DPS (NMFS Endangered)	All	200	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	Humpback research in California and Oregon. No biopsy or tagging. Estimated to be 90% Mexico DPS and 20% Central America DPS.
	Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Humpback research in California and Oregon. Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in California and Oregon. Suction-cup only tagging. Up to four of 10 animals may receive two suction-cup tags.

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
		20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in California and Oregon. Dart/barb and combination tagging. Up to four of 20 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).
Whale, humpback; Mexico DPS (NMFS Threatened) Central America DPS (NMFS Endangered) Hawaii DPS	All	200	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	Humpback research in Washington. No biopsy or tagging. Estimated to be 53% Hawaii DPS, 42% Mexico DPS, and 15% Central America DPS.
	Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Humpback research in Washington. Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in Washington. Suction-cup only tagging. Up to four of 10 animals may receive two suction-cup tags.

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
		20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in Washington. Dart/barb and combination tagging. Up to four of 20 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).
Whale, humpback; Mexico DPS (NMFS Threatened) Western North Pacific DPS (NMFS Endangered) Hawaii DPS	All	200	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	Humpback research in Alaska. No biopsy or tagging. Estimated to be 90% Hawaii DPS, 10% Mexico DPS, and 1% Western North Pacific DPS.
	Non-neonate	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Humpback research in Alaska. Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	10	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in Alaska. Suction-cup only tagging. Up to four of 10 animals may receive two suction-cup tags.
	Adult/ Juvenile	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in Alaska. Dart/barb and combination tagging. Up to four of 20 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
Whale, killer; Southern Resident DPS (NMFS Endangered)	All	1,000	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging for Southern Resident DPS.
Whale, killer; Southern Resident DPS (NMFS Endangered)	Adult/ Juvenile	30	1	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup tagging and biopsy for Southern Resident DPS. Only one tag per animal.
Whale, right, North Pacific; Range-wide (NMFS Endangered)	All	20	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
	Non-neonate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over one month old (based on relative size) may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 5 of 10 animals may receive two suction-cup tags.
		10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 5 of 10 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
Whale, sei; Range-wide (NMFS Endangered)	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
Whale, sei; Range-wide (NMFS Endangered)	Non-neonate	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to six of 20 animals may receive two suction-cup tags.
		20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to six of 20 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).
Whale, sperm; Range-wide (NMFS Endangered)	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
	Non-neonate	40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Species/Stock	Life Stage	No. Takes[2]	Takes Per Animal	Take Action	Procedures	Details
	Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to six of 30 animals may receive two suction-cup tags.
Whale, sperm; Range-wide (NMFS Endangered)		30	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to six of 30 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).
Whale, unidentified baleen	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging. Species most likely to be involved are Bryde's and sei whales, or hybrids (e.g., fin x blue whales) which render species identification problematic.
	Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over six months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
	Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to six of 20 animals may receive two suction-cup tags.
		20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial; Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to six of 20 animals may receive two tags (either two dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2: Proposed annual takes of Endangered Species Act listed species that would be authorized under Permit No. 20043

Species/Stock	Life Stage	No. Takes	Takes Per Animal	Take Action	Procedure
Whale, false killer; Range-wide	Adult	50	1	Harass/ Sampling	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup; Underwater photo/videography
Whale, false killer; Range-wide	All	500	1	Harass	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography
Whale, false killer; Range-wide	All	120	1	Harass	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video

The proposed research for both permits would encompass a variety of activities directed at ESA-listed and non-ESA-listed cetaceans. In addition, non-target cetaceans that are in association with target cetaceans may be incidentally harassed during these research activities. Under Permit No. 20605, aerial surveys (manned and unmanned), vessel surveys, close approaches, and documentation (behavioral observation, photography, videography, and passive acoustic recording), biological sampling (fecal, sloughed skin, prey parts, exhaled breath, and biopsy sampling), and tagging would be authorized. Under Permit No. 20043, vessel surveys, close approaches, and documentation (behavioral observation, photography, videography, and passive acoustic recording), biological sampling (fecal, sloughed skin, prey parts, and biopsy sampling), tagging, and active acoustic activities would be authorized. These activities are individually described in more detail below. In general, the activities of both researchers would be similar, but below we note where they differ.

Both researchers would also be authorized to import and export marine mammal parts, samples, and specimens, but these activities would have no effects on ESA-listed species outside of the sample collection. As such, the act of exporting and importing is not discussed further in this opinion.

3.1 Aerial Surveys

Manned aerial surveys have long been used by researchers to collect important information on the occurrence, abundance, and habitat use of cetaceans. With recent advances in unmanned aircraft systems (UAS), researchers are now also conducting unmanned aerial surveys to provide similar information, as well as collect additional data not obtainable with manned aerial surveys. Below we described the proposed manned and unmanned aerial surveys that would be authorized under Permit No. 20605. More detail on both activities can be found in the application for Permit No. 20605 (NMFS 2016m). No aerial surveys would be authorized under Permit No. 20043.

3.1.1 Manned Aerial Surveys

The Permits Division proposes to authorize Dr. Baird to take all ESA-listed cetaceans in Table 1 (any age and sex class) by means of harassment during manned aerial surveys. Manned aerial surveys serve multiple purposes including determining at what depth tagged cetaceans can be observed in the water column, assisting in finding cetaceans, making behavioral observations, and conducting photogrammetry, among others. For manned aerial surveys, Dr. Baird proposes to use helicopters or fixed-wing aircraft flown at altitudes of no less than 250 meters and airspeeds of 165 to 175 kilometers per hour. During manned aerial surveys one to three observers would search for, collect data on, and photograph cetaceans from the aircraft. Flight times would be up to two hours in length and my involve hovering over cetaceans for up to 30 minutes. Manned aerial surveys would not be undertaken around known pinniped haulouts. Despite being authorized for all cetaceans in Table 1, Dr. Baird notes in his application that manned aerial surveys would be infrequently used. Flights would only occur up to five times per field season when observing tagged whales, and on only a few days per field season when searching for cetaceans.

3.1.2 Unmanned Aerial Surveys

The Permits Division also proposes to authorize Dr. Baird to take all ESA-listed cetaceans in Table 1 (any age and sex class) by means of harassment during unmanned aerial surveys. The primary goal for these activities is to conduct photogrammetry, behavioral observations, and exhaled breath sampling (further detailed in Section 3.3.2). Given the rapidly evolving field of UAS, the exact models and flight parameters that would be used during unmanned aerial surveys may change over the course of the permit. As such, here we describe the methods that are currently proposed, and recognize that variations of these methods would be authorized under Permit No. 20605, as long as they are expected to cause similar or lower levels of harassment and disturbance to cetaceans.

The UAS that would be used during unmanned aerial surveys would likely be short endurance platforms such as a hexacopter equipped with a camera system and exhaled breath sampling equipment. Flights would be conducted from vessel platforms, within visual range of the operator, and at altitudes between six and 400 feet. Flight durations would be less than one hour, typically 10 to 15 minutes as limited by the battery life of the UAS, with the UAS possibly hovering of a cetacean for nearly the full duration of the flight. In addition, multiple flights may occur within the same day, but typically no more than three. All UAS operations would be conducted by a Federal Aviation Administration certified pilot and in compliance with existing U.S. Federal Aviation Administration regulations and the terms and conditions as specified in the proposed permit.

3.2 Vessel Surveys, Close Approaches, and Documentation

Vessel surveys are the primary means by which cetacean researchers collect data as they provide a platform to collect a wealth of information on cetacean biology. Here we describe the proposed vessel surveys, close approaches, and documentation (i.e., data collection) during these activities more generally, and then in each section below, detail additional research activities (e.g., biological sampling and tagging) that would occur during vessel surveys.

The Permits Division proposes to authorize both Dr. Baird and Dr. Au to take all age and sex classes of ESA-listed cetaceans in Table 1 and Table 2 by means of harassment as the result of close approaches and documentation during vessel surveys. The purpose of vessel surveys is to find and closely approach cetaceans for photography, videography, behavioral observation, biological sampling, and tagging. The proposed vessel surveys under Permit Nos. 20605 and 20043 would generally follow the same protocols as described below. Where differences in vessel survey protocols are proposed, they are noted.

Vessel surveys would either be conducted along pre-determined track lines or opportunistically within a particular study area depending on the project location and research focus. Primarily, small vessels (five to 11 meters in length) would be used, but on occasion larger vessels (10 to 40 meters in length) may be used, sometimes with smaller vessels being launched from larger vessels to closely approach animals once sighted. In addition, at times more than one vessel

would be used on the same day, but typically the two vessels would search for animals in different areas and/or conduct different research activities (e.g., photography and biopsy sampling from one vessel and photography and tagging from the other). During vessel surveys, two to seven observers would search for cetaceans within the vicinity of the boat while the vessel travels at speeds of approximately 18 kilometers per hour (approximately 10 knots). Typically, vessel surveys would occur during daylight hours, but may occur at night if researchers are attempting to track a tagged animal or retrieve a detached tag. In these cases, vessel speeds would be reduced to match the speed of tagged animal (e.g., one to eight kilometers per hour).

Once a cetacean or group of cetaceans is spotted, the vessel would approach the animals to a distance of at most 100 meters for species identification, and possibly less if the animals are a species of interest. For animals approached closer than 100 meters, the distance to which the vessel would approach varies by species and research activity. Generally, large cetaceans would be approached to within approximately 15 to 20 meters, whereas smaller cetaceans would be approached to within approximately five to 10 meters. On occasion, some species may come within closer proximity to the vessel on their own, for example if they attempt to ride the bow wave of the research vessel. Approaches would be conducted at slow, reducing speeds, with the exact speed depending on the behavior of the animals being approached (e.g., traveling vs. resting) such that when the vessel is at the desired distance, its speed matches or is only slightly faster than that of the target animals. During close approaches, vessels would be maneuvered so as to approach animals from behind or the side in order to minimize potential disturbance but still meet particularly research goals (e.g., fecal sampling typically requires a behind approach).

Following the close approach, researchers would be authorized to document the encounter using a variety of different methods including photography and videography, behavioral observation, and passive acoustic recording. All animals would be subject to photography and/or videography for photo-identification purposes, in which researchers rely on natural nicks, scars, and markings to identify and track individuals. Researchers would also utilize a hand-held pole camera to capture underwater or surface photographs and video. In addition, under Permit No. 20605 Dr. Baird would use Forward Looking Infrared (FLIR) imaging to assess the physiological and health impacts of tags on cetaceans (McCafferty 2007). Like standard visual wavelength photography, this imaging relies solely on energy generated by the environment (in this case the temperature differentials) and is completely non-invasive. However, FLIR imaging would require closer approaches than standard photography, to within 10 meters. On occasion researchers would enter the water with cetaceans in order to capture photographs and video for size estimates and sex determination, or to collect prey parts or fecal samples. Under such circumstances, two to three snorkelers (one always being a safety snorkeler) would enter the water in front of a slowly traveling group at a distance of 50 meters and allow the animals to approach (i.e., snorkelers would not actively approach closer than 10 meters). In addition, if cetaceans approach the boat to with or closer than 50 while it is stationary, snorkelers would slowly enter the water. Depending on the species encountered and the research objectives, researchers would also record behavioral observations ranging from short observations recorded

during photography, videography, and other research activities, including underwater efforts, to more extended dedicated focal follows. In the case of focal follows, researchers would follow an individual or group of animals from a distance at which the vessel does not disturb the animal(s) while continuously recording information on animal behavior. Finally, during vessel surveys researchers would use passive acoustic systems, consisting of one to several hydrophones towed from the research vessel or free floating with a buoy system for recovery, to record acoustic behavior of cetaceans.

The total duration that researchers would be with an animal or group of animals depends on the specific research activities being conducted and the species being studied. Typical encounters would be between 10 to 30 minutes, but may be as brief as a few minutes or as long as 12 hours. For surface photography, videography, and non-focal follow behavioral observations, encounters would fall within the 10 to 30 minute range. For underwater documentation with snorkelers, the maximum time snorkelers would be in the water would be 30 minutes, which would be in addition to any time spent with animals prior to or after the underwater encounter. Focal follow observations may last up to 12 hours if researchers are able to keep track of the animals and weather conditions are amenable. Passive acoustic recordings would occur for anywhere from one to five minutes if animals are traveling, up to 10 to 30 minutes if animals remain in the same general area for an extended period. In addition, biological sampling and tagging, as described below, would occur during vessel surveys. However, these activities would be done simultaneously with documentation and thus do not change the overall range of encounter durations.

3.3 Biological Sampling

Biological samples from free ranging cetaceans allow researchers to address numerous important questions regarding animals' ecology, physiology, health, and relatedness and population structure. The Permits Division proposes to authorize Dr. Baird and Dr. Au to collect a variety of different biological samples including feces, sloughed skin, prey parts, and skin and blubber through biopsy sampling. Methods for obtaining each of these types of samples are described below.

3.3.1 Fecal, Sloughed Skin, and Prey Part Sampling

Fecal and sloughed skin sampling are well-established noninvasive sample collection methods that can be used to assess reproductive hormones, stress, parasites, red tide effects, diet composition, energetics, nutrition, and genetics (Amos et al. 1992; Hunt et al. 2013). Similarly, the collection of prey parts that may be found near feeding animals can be an invaluable, non-invasive tool for understanding diet and foraging ecology (Hanson et al. 2010). The collection of feces, sloughed skin, and prey parts does not usually require approaching animals directly. However, fecal, sloughed skin, and prey sampling could take place in the vicinity of cetaceans, and due to this potential for close proximity, the Permits Division proposes to authorize both Dr. Baird and Dr. Au to collect these samples in the vicinity of all age and sex classes of cetaceans in Table 1 and Table 2 during vessel surveys. When feces, sloughed skin, or prey parts are observed

in the water, researchers would approach the sample (not the cetacean) and collect it with a hand held net either from the vessel or from the water if snorkelers are being used. As no particular cetacean is expected to be "taken" during fecal, sloughed skin, and prey part sampling, there is no limit on the number of samples that can be taken, but the researcher would only be authorized to take the species and number of cetaceans in Table 1 and Table 2 as a result of the close approaches that may occur during fecal, sloughed skin, and prey part sampling.

3.3.2 Exhaled Breath Sampling

A relatively new noninvasive methodology that Dr. Baird would be authorized to conduct under Permit No. 20605 is that of exhaled breath sampling. Analysis of the exhaled breath from cetaceans can be used to assess reproductive and stress hormones (Hunt et al. 2014), genetics (Frere et al. 2010), disease (Acevedo-Whitehouse et al. 2010), and likely other aspects of cetacean biology (reviewed in Hunt et al. 2013). To collect exhaled breath samples from whales, researchers would use either a UAS or a hand-held pole. UAS operations would follow those previously described for unmanned aerial surveys, with the addition that during exhaled breath sampling, the pilot would attempt to position the UAS no closer than six feet above the blowhole of a cetacean prior to it taking a breath. At no time is the UAS expected to make contact with the animal. In the event that a hand-held pole is used to collect exhaled breath samples, researchers would closely approach a cetacean as described in Section 3.2. Once the vessel is within one to six meters of the target animal and traveling at the same speed as the animal, researchers would extend a three to seven meter carbon fiber pole equipped with sampling material over the side of the vessel and attempt to collect a breath sample by position the pole above the cetacean as it surfaces, at a distance between six and 36 inches. During both UAS and pole exhaled breath sampling, the sampling material would either be media plates or a custom nylon mesh. Researchers would attempt to collect up to four exhalations per animal to maximize sample size but would be authorized to only attempt to collect breath samples from an individual up to three times per day.

3.3.3 Biopsy Sampling

Biopsy sampling is a widely used method for obtaining skin and blubber tissue from cetaceans for use in studies on genetics, contaminants, disease, foraging ecology, reproduction, and other physiological and biological processes. At least 42 species of cetacean have been biopsy sampled (33 odontocetes and nine mysticetes) since the method was initially developed in 1973 (Noren and Mocklin 2012).

The Permits Division proposes to authorize Dr. Bair and Dr. Au to biopsy sample cetaceans as identified in Table 1 and Table 2 during vessel surveys. Biopsy sampling would be authorized for both sexes. Under Permit No. 20605, Dr. Baird would be authorized to biopsy samples individuals that are at least six months of age or older except for North Pacific right whales, which could be biopsy sampled as young as one month old (based on relative size). This lower age limited for North Pacific right whales is necessarily in order to allow researchers to collect genetic data to track and monitor this

wide ranging, rare, and difficult to study species. In addition, Dr. Baird would be authorized to intentionally biopsy sample up to 20 adults/juveniles of any species in Table 1 except Gulf of Mexico Bryde's whales twice in a given year. No intentional repeat (within a year) biopsy sampling of calves of any species or adult/juvenile Gulf of Mexico Bryde's whales would be authorized. This within year repeat sample is necessary in order to allow Dr. Baird to conduct hormonal studies, where biopsy samples would be collected before and after animals are exposed to an anthropogenic stressor such as an acoustic disturbance. Under Permit No. 20043, Dr. Au would only biopsy sample animals that are at least one year of age and no intentional within year biopsy sampling would be authorized. Despite these limits on within year intentional repeat biopsy sampling, unintentional repeat sampling could occur since researchers may not always be able to identify previously biopsied animals in the field. However, researchers would attempt to avoid unintentional repeat biopsying by keeping detailed descriptive or photographic records of dorsal fins, flukes or other distinctively marked body parts aboard research vessels so that previously biopsied individuals can be identified prior to repeat biopsying.

Biopsy sampling would be authorized from both large vessels and small vessels, using a variety of different methods depending on the vessel platform, species, and behavior (reviewed in Noren and Mocklin 2012). Close vessel approaches for biopsy sampling would be the same as those described above except that vessels may get slightly closer, to within five to 30 meters of the target animal(s). Projectile biopsy sampling devices that would be used include crossbows, adjustable-pressure modified air-guns, and poles. The models Dr. Baird currently uses are a Barnett RX-150 crossbow with 67 kilogram pull, a modified Dan-Inject rifle air-gun, and seven meter long pole system with a biopsy tip on the end. Dr. Au also currently uses the Barnett crossbow and a similar pole biopsy system, and also a 0.22 caliber Paxarms rifle system (Krützen et al. 2002). Future biopsy sample collection techniques may differ slightly from the currently used methods, but would not result in increased adverse effects to cetaceans. Biopsy samples would not be taken forward of the pectoral fins and typical from the dorsal surface of the animal, just beside or just in front of the dorsal fin. Once the biopsy dart hits the animal, it would recoil, fall into the water, and float for retrieval by boat.

Biopsy dart tips would be made of stainless steel and dimensions would vary by species in order to ensure that dart tips do not penetrate into the animal's muscle layer (i.e., only skin and blubber would be collected). Penetration depth would be controlled by a cushioned stop, 25 millimeters in diameter circling the biopsy head. For small cetaceans such false killer whales (Main Hawaiian Islands Insular DPS), biopsy tips would penetrate to depths of approximately 25 millimeters or less and collect samples of approximately seven millimeters in diameter or less. For large cetaceans (baleen and sperm whales), biopsy darts would penetrate to depths of approximately six centimeters in length or less and collect samples of approximately nine

millimeters in diameter or less. Prior to field work, biopsy tips would be sterilized[3] according to an Institutional Animal Care and Use Committee (IACUC) approved procedure. Dr. Baird's current protocol involves soaking and scrub tips in warm, soapy water, rinsing them thoroughly with clean water, soaking them in a 10 percent bleach solution for 20 minutes, rinsing them thoroughly with clean water, soaking them in 70 percent isopropyl alcohol, ethyl alcohol, or acetone, allowing them to air dry, and then placing each tip into a tightly closed sterile Whirl-pack bag. Dr. Au's current protocol consists of scrubbing tips with warm soapy water, thoroughly rinsing them with clean water, soaking them in a 30 percent bleach solution overnight or a 10 bleach solution for fifteen minutes, and then rinsing them in ethyl alcohol. Under both permits, tips would be handled with surgical gloves during disinfection and then placed in individual pouches for storage. If biopsy tips become contaminated in the field and a new sterile biopsy tip is not available, researchers would re-clean biopsy tips following the above methods before they are used again.

3.4 Tagging

Recent advances in tagging technologies have provided unprecedented detail on cetacean biology, allowing researchers to better understand their physiology, foraging, ranging, diving, and sociality, and have improved efforts to protect and conserve these species (Nowacek et al. 2016).

The Permits Division proposes to authorize Dr. Baird to tag ESA-listed cetaceans as specified in Table 1 with suction-cup and/or dart/barb tags and Dr. Au to tag false killer whales (Main Hawaiian Islands Insular DPS) as specified in Table 2 with suction-cup tags. Researchers would be authorize to tag both males and females (including females with dependent calves). Under Permit No. 20605, for all species other than Western North Pacific gray whales, only adults and juveniles would be tagged and individuals may receive up to two tags simultaneously, attached during separate deployments but during the same day. For Western North Pacific gray whales, individuals greater than one year of age, which may include some calves, would be authorized for tagging, but only adults and juveniles would be authorized to be tagged with two tags. This lower age for tagging for Western North Pacific gray whales is to allow researchers to document the distribution of this small, difficult to find population, which appears to ranger further than previously thought (Weller et al. 2012). All species listed in Table 1 for Permit No. 20605 would be authorized to be tagged with either dart/barb or suction-cup tags, or both, except Southern Resident DPS killer whales, Cook Inlet DPS beluga whales, bowhead whales, and North Atlantic right whales. Southern Resident DPS killer whales and bowhead whales would only be authorized to be tagged with suction-cup tags, and no tagging of Cook Inlet DPS beluga whales or North Atlantic right whales would be authorized. Under Permit No. 20043, only adult Main Hawaiian Islands Insular DPS false killer whales would be tagged with suction-cup tags, and

[3] Sterilization = destroys or eliminates all forms of microbial life and is carried out by physical or chemical methods (Rutala and Weber 2008)

animals would only receive one tag per year. For both permits, researchers would be authorized to attempt to tag an individual up to three times a day. Under both permits, researchers would not attempt to tag an individual that appears to be compromised (e.g., appears to be in poor health, exhibiting unusual behavior). Below we describe the specifications of each proposed tag type according to the attachment mechanism, followed by a description of the methods used to attach tags and monitor cetaceans following tag attachment, which are similar across tag types.

3.4.1 Tag Types

Tagging technologies for cetaceans are rapidly advancing (Nowacek et al. 2016; Szesciorka et al. 2016). As such, the suite of tags that Dr. Baird and Dr. Au would use over the five-year duration of their permits are not known at this time. However, below we describe the types of tags that are currently available, and thus could be used under Permit Nos. 20605 and 20043. Any new tags or modifications to existing tags would only be authorized if they have the same or lesser impacts to animals (i.e., smaller, lighter, reduced risk of injury, etc.) as do existing tags. Currently, Dr. Baird proposes to use two different types of tags, as distinguished by their attachment mechanism. These include partially penetrating tags (Type II, referred to as dart/barb tags in Table 1), and non-penetrating tags (Type III, referred to as suction-cup tags in Table 1) (ONR 2009). Dr. Au only proposes to use the later Type II tags (referred to as suction-cup tags Table 2). The exact tags used would vary by species and research objective. However, researchers would always attempt to use the smallest, lightest tag possible that still meets the primary research objectives.

Type II

Type II tags consist of tags in which a portion of the tag such as metal darts, barbs, or pins penetrate the animal's tissue for attachment, while the electronic package of the tag remains outside of the animal's body. These tags are designed for medium durations, lasting from a week to several months, and for use on both small and large cetaceans. Type II tags can be archival meaning researchers must recover the tag to download data, or non-recoverable with all data being transmitted via satellite. A variety of Type II tags currently exist including Low Impact Minimally Percutaneous External-electronics Transmitter (LIMPET) tags, Whale Lander tags, Dermally Attached Short-term (DASH) tags, suction-cup style tags modified to include darts to increase duration, and a variety of modified versions of these tags (Figure 1) (NMFS 2017b).

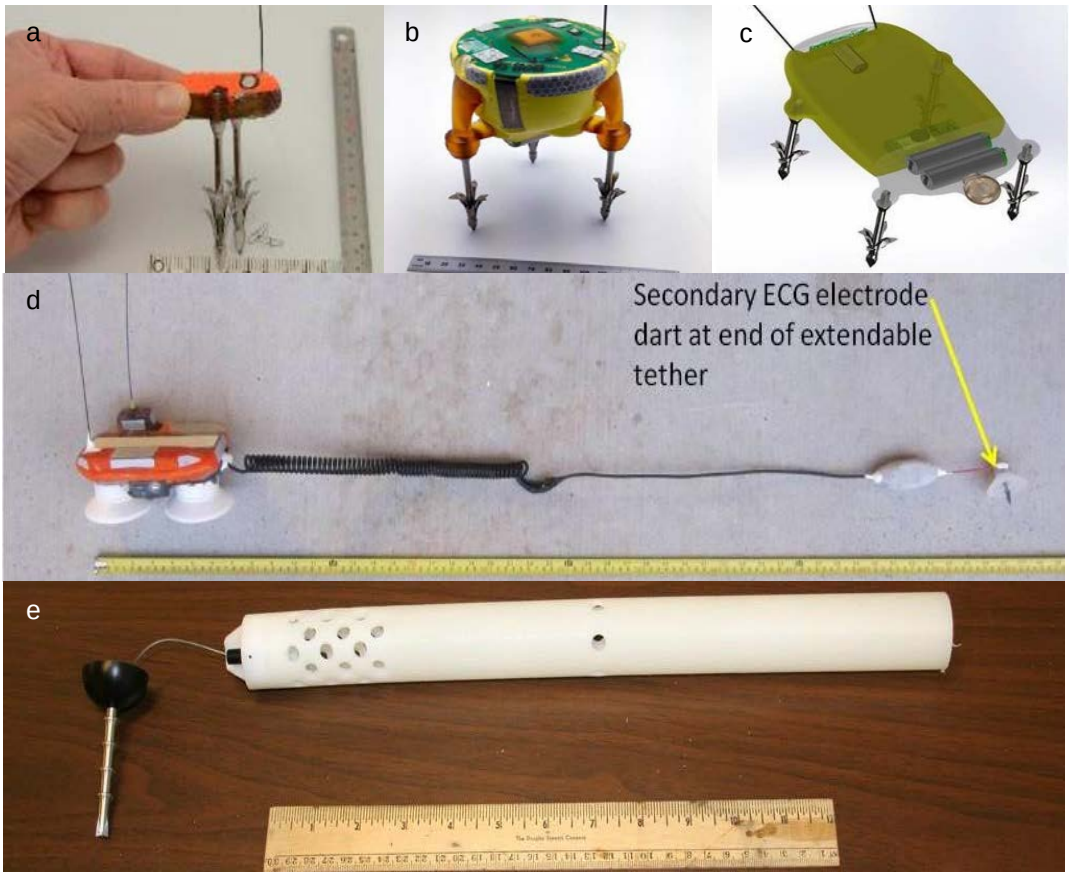

Figure 1: Example Type II tags. a) Low Impact Minimally Percutaneous External-electronics Transmitter tag, b) Whale Lander tag, c) alternate design of a Multi-sensor, Multi-dart tag with four darts, d) Multi-sensor behavioral and physiological recording tag with primary electrodes in darts of main tag body (under suction cups) and secondary electrode in dart at end of tether, e) Dermally Attached Short-term tag (NMFS 2017b).

The penetrating portions of Type II tags are typically made of surgical grade stainless steel or high-grade titanium, which are attached to the electronic portion of the tag encased in an epoxy and urethane housing. However, in the future (if approved by an IACUC and the Permits Division) they may be constructed from a biocompatible polymer, such as silicone, nylon or Delrin or other biocompatible, or bioabsorbable materials, including polyglycolic acid, polylactic acid, or hydrogels. Type II tags are designed to remain solely within the blubber layer when deployed on large cetaceans such as baleen and sperm whales, and not fully penetrate the dorsal fin when deployed on medium sized cetaceans such as false killer whales (Main Hawaiian Islands Insular DPS). Accordingly, Dr. Baird would adjust the depth of tag darts based on the species blubber/dorsal fin depth and desired tag attachment location. For most large cetaceans (blue, fin, gray [Western North Pacific population], humpback [Central America, Mexico, and Western North Pacific DPSs], North Pacific right, sei, and sperm whales), Dr. Baird would use dart lengths between four and 12 centimeters and attach tags to the dorsal fin/dorsal ridge area of animals. For Gulf of Mexico Bryde's whales, darts would be four to seven centimeters in length, and tags would similarly be attached to the animals' dorsal fin/dorsal ridge area. For false killer

whales (Main Hawaiian Islands Insular DPS), darts would also be four to seven centimeters in length, but tags would be attached instead to the animals' dorsal fins.

Given the variety of currently available Type II tags and the constant advances in tag technology, the exact size, weight, and depth and number of penetration points of Type II tags that would be used under Permit No. 20605 is not known. Thus, all current models represent examples of tag specifications that could be used. Current location-only LIMPET tags (SPOT6, Figure 1a) measure 55 millimeters by 48 millimeters by 21 millimeters and weigh 49 grams without darts (Andrews et al. 2015). They are typically attached with two or three darts measuring 65 to 100 millimeters in length, with retention barbs between five and 30 millimeters long, making for a maximum tag weight of 90 grams. Current Whale Lander tags (Figure 1b), which are archival, utilize the same dart attachment system as LIMPET tags and measure 8.9 centimeters in diameter and 6.5 centimeters tall (NMFS 2016m). An alternate design Multi-sensor, Multi-dart tag currently under development (Figure 1c) would be similar in size to LIMPET and Whale Lander tags, and attach with four LIMPET style darts. Modified Type I suction-cup style tags also exist in which LIMPET style darts (e.g., Figure 1d) are added to suction-cups to increase attachment, and or add additional physiological sensors. DASH tags (Figure 1e) differ from most other Type II tags in that they use a short needle for anchoring, which is then attached to a free-floating tag (approximately 35 millimeter in diameter and 350 grams) via a corrosive tether (Baumgartner et al. 2015). Despite having two components when attached, DASH tags are designed to be a contiguous projectile when fired at the whale, and only after attachment would the tag housing separate from the needle and float alongside the whale. Current DASH models use needles less than 10 centimeters in length and 6.4 millimeters in diameter, with raised rings or pins to prevent early detachment, and a stopper to control penetration depth.

Type II tags would contain a variety of sensors depending on the tag model and research objective. These include but are not limited to satellite transmitters, time-depth-recorders, acoustic time-depth-recorders, video cameras, accelerometers, other 3-dimensional movement sensors, and physiological sensors such as a thermistor or electrocardiogram sensors that may be contained within darts attached to a tether. Given that archival tags must be located after detaching from the whale, these tags would always have a Global Positioning System unit and/or a very high frequency radio transmitter to aid in tag recovery. While some archival Type II tags may contain remote release functions or corrosive links that can be used to detach the electronic package of the tag, the penetrating portion of the tag would always detach via natural outward foreign body migration. Type II tags typically remain within whales for only a few days or up to several months (Andrews et al. 2015; Baumgartner et al. 2015; Citta et al. 2012; Szesciorka et al. 2016). The average duration of attachment from 570 LIMPET tags deployed during Dr. Baird's previous work was 35 days, with a maximum duration of 354 days (NMFS 2016m).

Type III

Type III tags consist of tags that use a non-invasive, non-penetrating attachment systems. These tags are designed for short durations, only lasting hours up to several days, and can be used on all

cetacean species. Most Type III tags are archival and attach to cetaceans using either rigid or non-rigid rubber or silicon suction-cups. A variety of current Type III tags exist including National Geographic Crittercams, Digital Acoustic Recording tags (e.g., Figure 2), Acousonde tags, Customized Animal Tracking Solutions tags, among others.

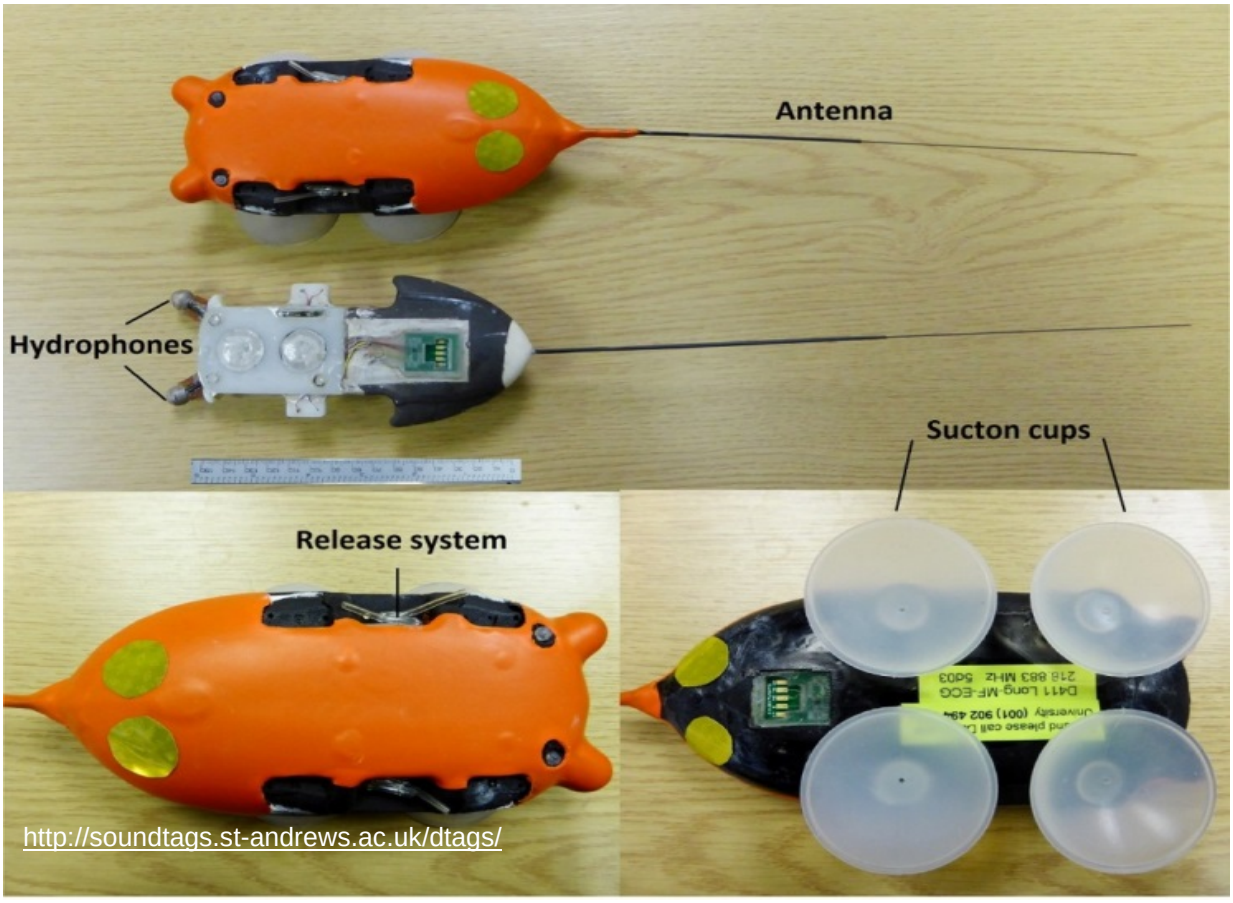

Figure 2: Example Digital Acoustic Recording Tag, Version 3.

Type III tags are typically small measuring approximately 30 centimeters by 12 centimeters by 4 centimeters or less and weighing 500 grams or less, but heavier video camera tags such as Crittercam tags weighing approximately 1100 grams exist. Type III tags usually consist of an electronic package housed in a mixture of glass microspheres and polyethylene resin encased within or attached to a non-compressible foam or plastic floatation system to aid in recovery.

Depending on the specific tag model and target species, one or several suction-cups may be used ranging in size from three to 30 centimeters in diameter, which may be lubricated with silicon grease or other non-reactive substances to improve the seal between the cup and skin. Suction-cup tags would attach passively when the cup contacts the whale or actively with a vacuum, Venturi device, or one-way valves that create suction as the whale dives. As with Type II tags, Type III tags would contain a variety of sensors including time-depth-recorders, acoustic recorders, video cameras, temperature sensors, accelerometers, pressure sensors, accelerometers, light sensors, gyroscopes, among others. Given that Type III tags are almost always archival,

they typically have a very high frequency radio transmitter, Global Positioning System unit, and/or strobe light to aide in tag recovery. Suction-cup tags mostly rely on passive release that occurs when the suction-cup seal breaks contact with the skin, but some tag models are equipped with release mechanism. Regardless, suction-cup tags only remain attached to animals for minutes up to several days before falling off (Szesciorka et al. 2016).

3.4.2 Tag Deployment

Prior to tag deployment, all dart/barb tags that would be used under Permit No. 20605 would be sterilized. Dr. Baird's current method of sterilization consists of first scrubbing darts with a small bottle brush and/or pipe cleaner in a warm soapy water mixture, then rinsing them with water and placing them in a dilute bleach solution (10%) for at least 10 minutes, followed by an additional water rinse, a soak in acetone, and a final rinse with sterile saline. Darts are then sterilized by ethylene oxide gas (gas sterilization) to manufacturers' specification for surgical instruments (CRC 2017a; CRC 2017b; NMFS 2016m). Other currently available or future methods for sterilization would only be used if they provide the same sterilization standards as those described above and are approved by an IACUC and the Permits Division. After sterilization, instruments would be kept in individual sterilization packages until use. Manipulation of darts during and after sterilization immediately before deployment would be carried out with surgical gloves or other sterilized equipment. If a tags become contaminated in the field (e.g., missed attempt), they would not be used again until they can be re-sterilized using gas sterilization or another method approved by an IACUC.

During the duration of Permit No. 20605, new tag models may become available that have topical or integrated slow-release antibiotics integrated into the penetrating portions of tags. Current tags may also be coated with topical or integrated slow-release antibiotics. The method of antibiotic coating would similar to the method used by Mate et al. (2007), which utilizes 2.5 grams of gentamicin sulfate mixed into a delayed release polymethacrylate-based copolymer, spread over a surface are of 80 square centimeters. Other more effective methods may be used when they become available as long as they are approved by an IACUC and the Permits Division.

A variety of deployment methods would be used to attach tags to cetaceans. Tag deployments would take place either when animals approach small research vessels on their own or during directed small vessel approaches as described in Section 3.2, but in some cases with closer proximity to whales (one to 30 meters). The exact method would depend on the tag type, the target species, and the vessel from which the tag is being deployed. For Type II tags, pneumatic rifles, archery bows, crossbows, black-powder guns, spear guns, hand-held poles, jab sticks or an Air-Rocket Transmitter System would be used for deployment (e.g., Figure 3) (NMFS 2016m; NMFS 2017b). With all these methods, the tag would be placed in a tag holder at the tip of an arrow/bolt, which slides into the flight groove of the crossbow or the barrel of the rifle prior to firing (e.g. Figure 3). On contact with an animal, the arrow/bolt would fall away and be retrieved, leaving only the tag attached to the animal. Type III tags, and on occasion Type II tags,

would be deployed with hand-held poles ranging in length from three to seven meters. Researchers would extend a pole over the side of small research vessels during close approaches and manually place the tag on the cetacean (e.g., Figure 3). In addition, Type III tags have recently been deployed with similar projective methods as described above for Type I tags, and Dr. Baird would be authorized to utilize these new methods for deploying Type III tags.

Figure 3: Example of crossbow equipped with Low Impact Minimally Percutaneous External-electronics Transmitter tag (left), example of suction-cup tag deployment with hand-held pole (right), example of a pneumatic rifle with bolt, tag holder, and Low Impact Minimally Percutaneous External-electronics Transmitter tag (bottom) (CRC 2017b).

Prior attempting to tag an animal, a visual assessment of the health condition of the target individuals would be undertaken. Animals that are obviously emaciated, those with unusual generalized skin conditions indicating poor health, or those with unusual wounds would not be tagged. In addition, individuals exhibiting behavior that suggests compromised health (e.g., difficulty surfacing, listing to one side) would also not be tagged.

The location tags would be placed on cetaceans would vary according to species and tag type (also see Section 3.4.1). Tags that utilize transmitters (very high frequency, GPS, Argos) would be placed on the whale's dorsal fin or dorsal surface, typically near the animal's mid-line and always behind the pectoral fins in order to maximize time above water during surfacing bouts and minimize impacts on behavior (NMFS 2016c; NMFS 2016m; Robbins et al. 2016). Non-transmitter tags such as acoustic tags or Crittercam tags would also be placed on the animal's

dorsal surface, but also other parts of an animal as long as the location of the tag would not be expected to impair the animal's ability to carry out species typical behaviors. In particular, the area near the blowhole, eyes, mouth, genitals, flippers, and flukes would be avoided.

Dr. Baird would be authorize to simultaneously deploy more than one tag on any given individual as specified in Table 1 using a combination of the methods described above. Deploying multiple tag types is necessary in order to address research objectives that span multiple time periods (e.g., short-term, day to week studies, to long-term month to year studies). In attaching multiple tags to whales, Dr. Baird would be authorized to use a maximum of two invasive tags (e.g., two Type II tags) or one invasive tag and one non-invasive tag (e.g., one Type II tag and one Type III tag). However, animals would not receive more than six darts. Dr. Au would only be authorized to tag animals with a single Type III tag.

3.4.3 Tag Monitoring

When possible, researchers would attempt to monitor tagged whales through observation, photographs, and/or video in order to document response to tagging, tag location and orientation, examine modes of tag failure, and monitor wound healing. During and immediately after tagging, animals would be photographed for identification and to document tag placement and condition of the tagging site. If conditions allow, researchers under both permits would also follow animals, possibly conducting focal follows, after tagging in order to document their response to tagging, and to collect tags (e.g., Type III tags) when the fall off. The distance at which animals would be followed would by such that it minimizes possible disturbance, but allows for documentation of potential responses (e.g., 50 meters). During these monitoring efforts, researchers would employ the various documentation methods described above in Section 3.2. When Type III tags detach, researchers would retrieve them and attempt to collect skin samples from the inner surface of the suction cups. For Type II tags under Permit No. 20605, many of which are not recovered and remain attached for more than a day, researchers would track tagged individuals via the tags satellite location system and conduct follow up observations to further monitor animals when they are encountered on subsequent days.

In addition, one of the main reasons Dr. Baird would employ FLIR imaging is to assess the physiological and health impacts of tags on cetaceans. High resolution FLIR images of the tag attachment sites and the entire dorsal fin would be taken before and after the tag has detached at several time intervals, allowing researchers to document changes in heat flow and the underlying vasculature of the animal's dorsal fin (Meagher et al. 2002). Given the proximity at which FLIR cameras need to be in order to capture high resolution images, when documenting tag sites with FLIR researchers would come to within 10 meters or less of animals.

3.5 Active Acoustics

Under Permit No. 20043, Dr. Au would be authorized to attach tags with active acoustics to non-ESA-listed humpback whales in order to acoustically track their movement. No active acoustic tags would be attached to ESA-listed Main Hawaiian Islands Insular false killer whales, nor would researchers be authorized to directly expose Main Hawaiian Islands Insular false killer whales to the sounds produced by these tags. However, due to the possibility that tagged humpback whales may come into close proximity to Main Hawaiian Islands Insular false killer whales, the Permits Division proposes to authorize Dr. Au to incidentally harass Main Hawaiian Islands Insular false killer whales as the result of tagging non-ESA-listed humpback whales with active acoustic tags.

Two different types of active acoustic tags would be used. The first type of tags would be used to track humpbacks by vessel and would consist of commercially available acoustic or "pinger" tags such as the Vemco V13 tag (https://vemco.com/products/v9-to-v16-continuous/) or the HTI 980 tag (http://www.htisonar.com/980-series-80-khz-acoustic-tags.html). These tags are programmable to source levels of 147 to 158 dB decibels relative to one micropascal root mean square at one meter (dB re: 1 µPa at 1 m [rms]), with ping frequencies between 60 to 80 kilohertz (kHz), pulse durations between 0.5 to 10 milliseconds, and repetition rates between 25 pings per second and one ping per 16 seconds. The second type of acoustic pinger tag would be custom designed in order to allow researchers to track humpback whales with bottom mounted hydrophone arrays on U.S. Navy ranges. These tags would have source levels between 160 and 180 dB re: 1 µPa at 1 m (rms), with a frequency of 45 kHz, repetition rate between one ping per second and one ping per minute, a pulse duration between 10 and 500 milliseconds, and a duty cycle no higher than 50 percent. These tags would be attached with suction-cups, and thus are expected to have attachment durations of hours up to several days.

4 INTERRELATED AND INTERDEPENDENT ACTIONS

Interrelated actions are those that are part of a larger action and depend on that action for their justification. *Interdependent* actions are those that do not have independent utility apart from the action under consideration. For this consultation, we consider all vessel transit associated with research activities as interdependent. Thus, we evaluate the effects this vessel transit on ESA-listed species and so include all waters traversed during such transits as part of the action area.

5 ACTION AREA

Action area means all areas affected directly, or indirectly, by the Federal action, and not just the immediate area involved in the action (50 C.F.R. 402.02).

The action area for Permit No. 20605 can be seen below in Figure 4. It includes all U.S. Exclusive Econimic Zone (EEZ) waters in the Central Pacific Ocean, international waters in between U.S. EEZ waters in the Central Pacific Ocean, the Gulf of Mexico, and U.S. EEZ waters in the North West Atlantic Ocean. In the Pacific Ocean, the majority of research is likely to take

place in Hawaii, with some field efforts undertaken off of Alaska (Southeast and Gulf of Alaska), Washington, Oregon, California, in other U.S. territories (e.g., Palmyra, Wake, Johnston, Guam, American Samoa) and international waters of the Pacific Ocean in between U.S. EEZ waters. In the Atlantic, researouch would primarily occur in the western Atlantic Ocean off North Carolina and Florida, but may include all U.S. EEZ waters (including the Gulf of Mexico) and international waters in the North West Atlantic ocean. Research within these areas would occur anytime throughout the year for the duration of the five-year permits.

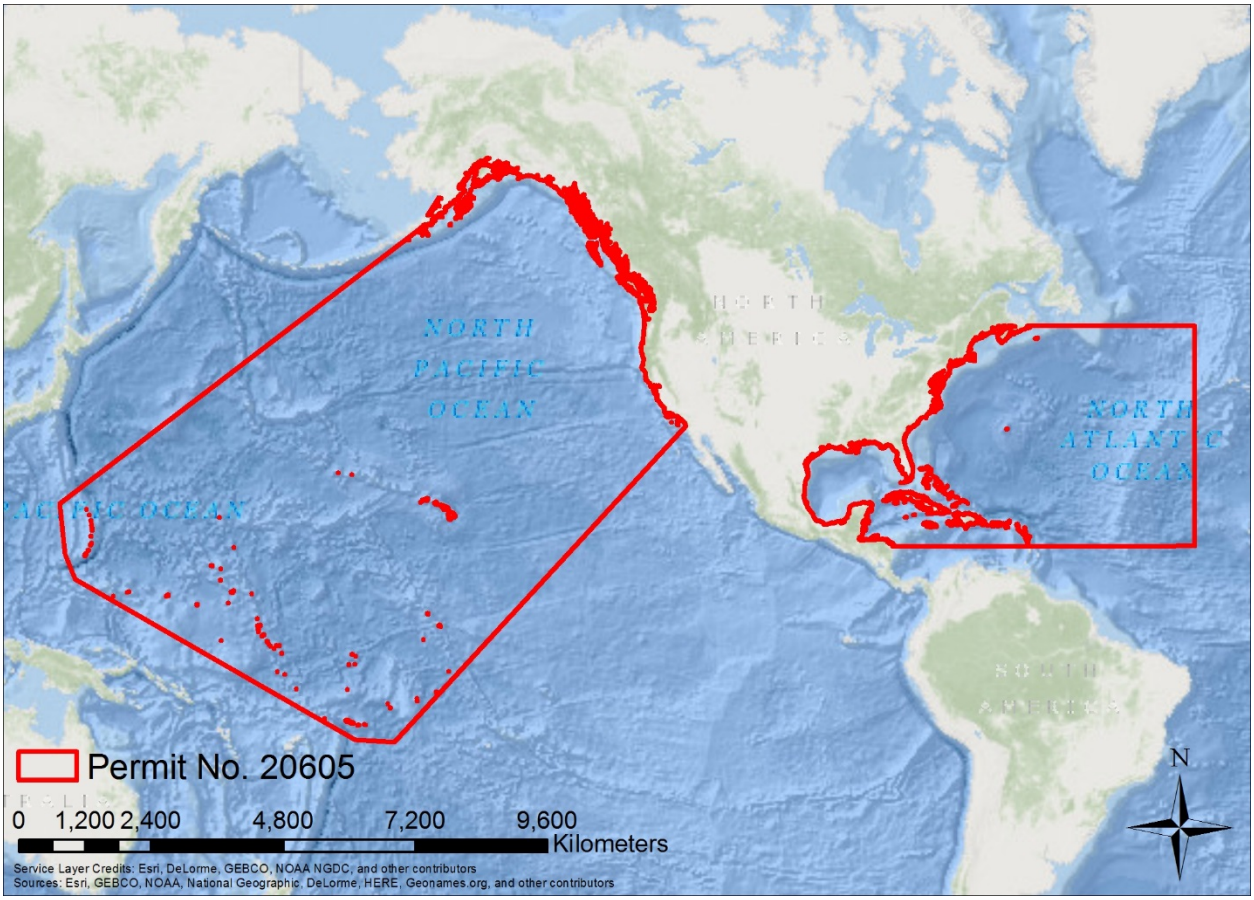

Figure 4: Action Area for Permit No. 20605 in the Pacific and Atlantic Oceans.

The action area for Permit No. 20043 can be seen in Figure 5. It includes U.S. EEZ waters off Hawaii, and nearby international waters, but most reasearch would occur in areas off the western end of Oahu, in the Au Au Channel, and in the four islands region between Maui, Molokai, Lanai, and Kahoolawe in the Main Hawaiian Islands. Research within these areas would occur anytime throughout the year for the duration of the five-year permits.

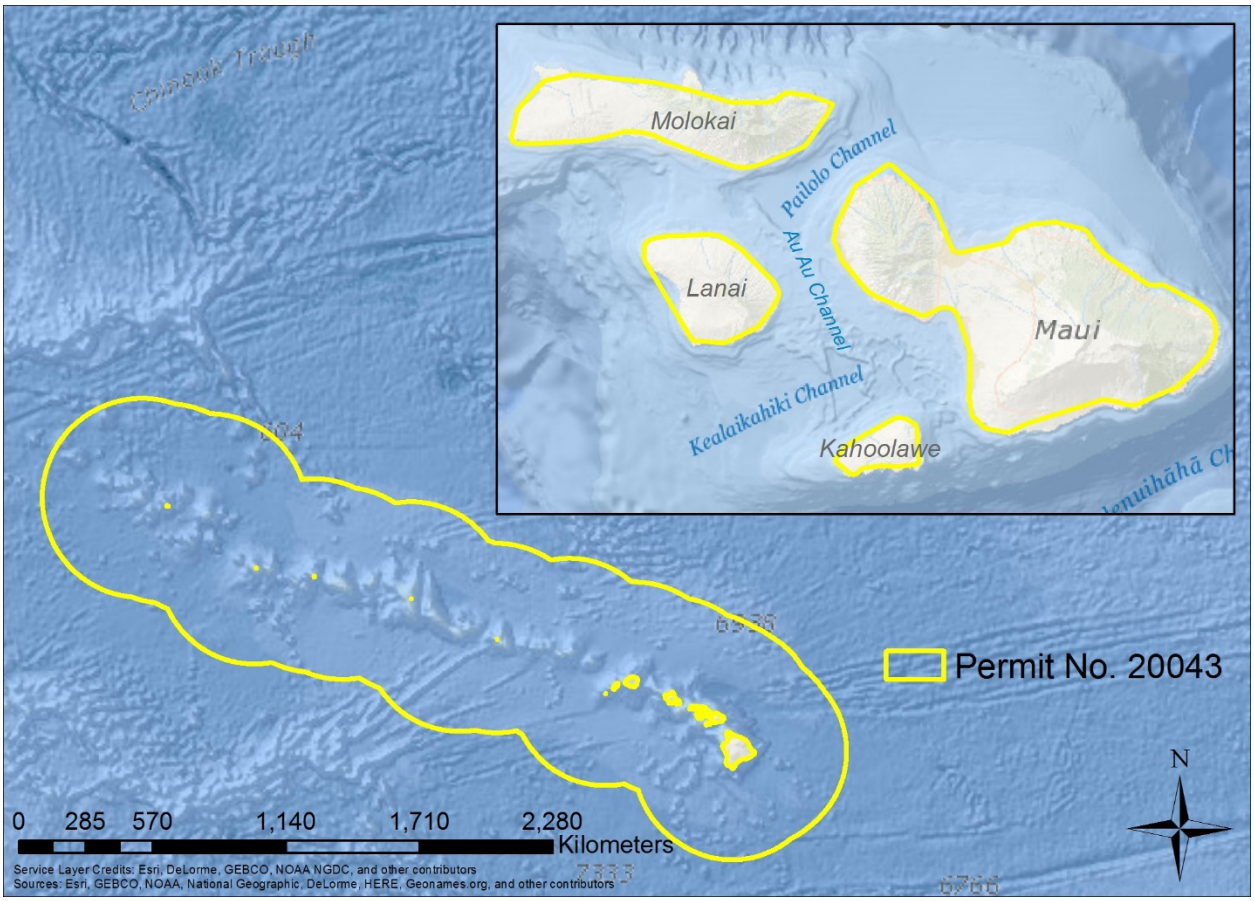

Figure 5: Action Area for Permit No. 20043 around Hawaii. Inset map shows close up of the four island region between Maui, Molokai, Lanai, and Kahoolawe, including the Au Au Channel, where the majority of research would occur.

6 STATUS OF ENDANGERED SPECIES ACT PROTECTED RESOURCES

This section identifies the ESA-listed species that potentially occur within the action areas (Figure 4 and Figure 5) that may be affected by the issuance of Permit Nos. 20605 and 20043. It then summarizes the biology and ecology of those species that may be adversely affected by the proposed action, and details information on their life histories in the action areas if known. The ESA-listed species potentially occurring within the action areas are given in Table 3, along with their regulatory status.

Table 3: Endangered Species Act-listed species and designated critical habitat that may be affected by the proposed action.

Species	ESA Status	Critical Habitat	Recovery Plan
Marine Mammals – Cetaceans			
Beluga Whale (*Delphinapterus leucas*) – Cook Inlet DPS	E – 73 FR 62919	76 FR 20179	82 FR 1325
Blue Whale (*Balaenoptera musculus)*	E – 35 FR 18319	-- --	07/1998
Bowhead Whale (*Balaena mysticetus*)	E – 35 FR 18319	-- --	-- --

Species	ESA Status	Critical Habitat	Recovery Plan
False Killer Whale (*Pseudorca crassidens*) – Main Hawaiian Islands Insular DPS	E – 77 FR 70915	-- --	-- --
Fin Whale (*Balaenoptera physalus)*	E – 35 FR 18319	-- --	75 FR 47538
Gray Whale (*Eschrichtius robustus*) Western North Pacific Population	E – 35 FR 18319	-- --	-- --
Gulf of Mexico Bryde's Whale (*Balaenoptera edeni*)	E – 81 FR 88639 (Proposed)	-- --	-- --
Humpback Whale (*Megaptera novaeangliae*) – Central America DPS	E – 81 FR 62259	-- --	11/1991
Humpback Whale (*Megaptera novaeangliae*) – Mexico DPS	T – 81 FR 62259	-- --	11/1991
Humpback Whale (*Megaptera novaeangliae*) – Western North Pacific DPS	E – 81 FR 62259	-- --	11/1991
Killer Whale (*Orcinus orca*) – Southern Resident DPS	E – 70 FR 69903	71 FR 69054	73 FR 4176
North Atlantic Right Whale (*Eubalaena glacialis*)	E – 73 FR 12024	59 FR 28805 and 81 FR 4837	70 FR 32293
North Pacific Right Whale (*Eubalaena japonica*)	E – 73 FR 12024	59 FR 28805 and 73 FR 19000	78 FR 34347
Sei Whale (*Balaenoptera borealis*)	E – 35 FR 18319	-- --	12/2011
Sperm Whale (*Physeter macrocephalus*)	E – 35 FR 18319	-- --	75 FR 81584
Marine Mammals – Pinnipeds			
Guadalupe Fur Seal (*Arctocephalus townsendi*)	T – 50 FR 51252	-- --	-- --
Hawaiian Monk Seal (*Neomonachus schauinslandi*)	E – 41 FR 51611	80 FR 50925, 53 FR 18988, and 51 FR 16047	72 FR 46966
Steller Sea Lion (*Eumetopias jubatus*) – Western DPS	E – 55 FR 49204 and T – 62 FR 24345	58 FR 45269	73 FR 11872
Marine Reptiles			
Green Turtle (*Chelonia mydas*) – Central North Pacific DPS	T – 81 FR 20057	-- --	63 FR 28359
Green Turtle (*Chelonia mydas*) – Central South Pacific DPS	E – 81 FR 20057	-- --	63 FR 28359
Green Turtle (*Chelonia mydas*) – Central West Pacific DPS	E – 81 FR 20057	-- --	63 FR 28359
Green Turtle (*Chelonia mydas*) – East Pacific DPS	T – 81 FR 20057	-- --	63 FR 28359
Green Turtle (*Chelonia mydas*) – North Atlantic DPS	T – 81 FR 20057	63 FR 46693	10/1991
Hawksbill Turtle (*Eretmochelys imbricata)*	E – 35 FR 8491	63 FR 46693	63 FR 28359 and 57 FR 38818

Species	ESA Status	Critical Habitat	Recovery Plan
Kemp's Ridley Turtle (*Lepidochelys kempii*)	E – 35 FR 18319	-- --	9/2011
Leatherback Turtle (*Dermochelys coriacea*)	E – 35 FR 8491	44 FR 17710 and 77 FR 4170	63 FR 28359 and 10/1991
Loggerhead Turtle (*Caretta caretta*) – North Pacific Ocean DPS	E – 76 FR 58868	-- --	63 FR 28359
Loggerhead Turtle (*Caretta caretta*) – Northwest Atlantic Ocean DPS	T – 76 FR 58868	79 FR 39856	74 FR 2995
Loggerhead Turtle (*Caretta caretta*) – South Pacific Ocean DPS	E – 76 FR 58868	-- --	-- --
Olive Ridley Turtle (*Lepidochelys olivacea*) All Other Areas	T – 43 FR 32800	-- --	-- --
Olive Ridley Turtle (*Lepidochelys olivacea*) Mexico's Pacific Coast Breeding Colonies	E – 43 FR 32800	-- --	63 FR 28359

6.1 Species Not Likely to be Adversely Affected

NMFS uses two criteria to identify the ESA-listed or critical habitat that are not likely to be adversely affected by the proposed action, as well as the effects of activities that are interrelated to or interdependent with the Federal agency's proposed action. The first criterion is exposure, or some reasonable expectation of a co-occurrence, between one or more potential stressors associated with the proposed activities and ESA-listed species or designated critical habitat. If we conclude that an ESA-listed species or designated critical habitat is not likely to be exposed to the proposed activities, we must also conclude that the species or critical habitat is not likely to be adversely affected by those activities.

The second criterion is the probability of a response given exposure. ESA-listed species or designated critical habitat that is exposed to a potential stressor but is likely to be unaffected by the exposure is also not likely to be adversely affected by the proposed action. We applied these criteria to the species ESA-listed in Table 3 and we summarize our results below.

An action warrants a "may affect, not likely to be adversely affected" finding when its effects are wholly *beneficial, insignificant* or *discountable*. *Beneficial* effects have an immediate positive effect without any adverse effects to the species or habitat. Beneficial effects are usually discussed when the project has a clear link to the ESA-listed species or its specific habitat needs and consultation is required because the species may be affected.

Insignificant effects relate to the size or severity of the impact and include those effects that are undetectable, not measurable, or so minor that they cannot be meaningfully evaluated. Insignificant is the appropriate effect conclusion when plausible effects are going to happen, but will not rise to the level of constituting an adverse effect. That means the ESA-listed species may be expected to be affected, but not harmed or harassed.

Discountable effects are those that are extremely unlikely to occur. For an effect to be discountable, there must be a plausible adverse effect (i.e., a credible effect that could result from the action and that would be an adverse effect if it did impact a listed species), but it is very unlikely to occur.

6.1.1 Pinnipeds

The proposed actions spatially overlap with several ESA-listed pinnipeds including Hawaiian monk seals, Steller sea lions (Western DPS), and Guadalupe fur seals. The Permits Division proposes to issue take under the MMPA for Permit No. 20605 in the form of incidental harassment that may occur as the result of incidental encounters with these species during aerial and vessel surveys. However, the Permits Division as determined that issuance of Permit No. 20605 is not likely to adversely affect these ESA-listed pinnipeds because the effects of these incidental encounters do not rise to the level of harassment under the ESA. During aerial and vessel surveys, interactions with ESA-listed pinnipeds could potentially involve disturbance and ship strikes. However, the possibility of these interactions is considered remote because the proposed research activities are directed at cetaceans.

Both aerial and vessel survey could disturb ESA-listed pinnipeds. However, researchers would be on constant lookout for cetaceans, and thus, if ESA-listed pinnipeds were spotted, researchers would be able to avoid closely approaching them. Furthermore, the permit would require researchers to leave the area if approached by ESA-listed pinnipeds, and snorkelers would not be allowed to enter the water if ESA-listed pinnipeds were in the area. In addition, researchers would not be authorize to conduct aerial surveys over pinnipeds on land. Considering the above conditions, in most cases, researchers will be able to completely avoid ESA-listed pinnipeds. Nonetheless, we recognize that short-term encounters with ESA-listed pinnipeds may occur if researchers do not spot these animals before vessels or aircraft are relatively close. Under these circumstances, we expect ESA-listed pinnipeds would respond similarly to other non-ESA-listed pinniped species and show no behavioral response or avoidance, which may be associated with a mild stress response (Andersen et al. 2012). Given these responses, and the short-term nature of the possible encounters, we do not anticipate that any disturbance from aerial and vessel surveys would have a measureable impact on ESA-listed pinniped behavior or physiology. As such, we find the effects of disturbance to ESA-listed pinnipeds from aerial and vessel surveys to be insignificant.

The likelihood of ships strikes of ESA-listed pinnipeds is expected to be extremely low given that the researchers will adhere to slow transit speeds designed to avoid ship strikes with cetaceans, many of which have less maneuverability than ESA-listed pinnipeds. In addition, observers would always be on the lookout for cetaceans to help vessels avoid collisions. Finally, we are not aware of any case of a cetacean research vessel striking a pinniped. Therefore, we find that it is extremely unlikely that a research vessel will strike an ESA-listed pinniped, and thus such effects are discountable.

In summary, we concur with the Permits Division that the issuance of Permit No. 20605 is not likely to adversely affect Hawaiian monk seals, Steller sea lions (Western DPS), and Guadalupe fur seals, and we will not discuss these species further.

6.1.2 Sea Turtles

The proposed action spatially overlaps with several ESA-listed sea turtle species and/or DPSs including green turtles (Central North Pacific, Central South Pacific, Central West Pacific, East Pacific, and North Atlantic DPSs), hawksbill turtles, Kemp's ridley turtles, leatherback turtles, loggerhead turtles (North Pacific, Northwest Atlantic, and South Pacific DPSs), and olive ridley turtles (Mexico's Pacific Coast Breeding Colonies and all other areas).

The Permits Division has determined that the issuance of Permit No. 20605 may affect, but is not likely to adversely affect these ESA-listed sea turtles. Like ESA-listed pinnipeds above, interactions with sea turtles could potentially involve disturbance and ship strikes, but the possibility of these interactions is considered remote due to the directed nature of the research activities.

Similar to above, aerial and vessel surveys could disturb sea turtles. However, researchers would constantly be on the lookout for cetaceans and thus be able to spot sea turtles at a distance (approximately 100 to 200 meters, Epperly et al. 2002), well before they would be expected to respond (Hazel et al. 2007). Furthermore, if a sea turtle were spotted, researchers would stop research activities and move to another area or wait until the turtle left the area. Based on these factors, we find that disturbance of sea turtles is extremely unlikely to occur, and thus discountable.

As with ESA-listed pinnipeds above, ships strikes of sea turtles are also expected to be extremely unlikely given the slow speeds vessels would be traveling at and the numerous observers on lookout for cetaceans. In addition, we are not aware of any case of a cetacean research vessel striking a sea turtle. For these reasons, we find it is extremely unlikely that a research vessel will strike a sea turtle, and thus such effects are discountable.

In summary, we concur with the Permits Division that the issuance of Permit No. 20605 is not likely to adversely affect green (Central North Pacific, Central South Pacific, Central West Pacific, East Pacific, and North Atlantic DPSs), hawksbill, Kemp's ridley, leatherback, loggerhead (North Pacific, Northwest Atlantic, and South Pacific DPSs), and olive ridley turtles (Mexico's Pacific Coast Breeding Colonies and all other areas), and we will not discuss these species further.

6.2 Species Likely to be Adversely Affected

This opinion examines the status of each species that would be affected by the proposed action. The status is determined by the level of risk that the ESA-listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. The species status section helps to inform the description of the species' current "reproduction,

numbers, or distribution" as described in 50 C.F.R. 402.02. More detailed information on the status and trends of these ESA-listed species, and their biology and ecology can be found in the listing regulations and critical habitat designations published in the Federal Register, status reviews, recovery plans, and on NMFS Web site: http://www.nmfs.noaa.gov/pr/species/esa/listed.htm.

Below we describe the status of the species that are likely to be adversely affected by the proposed action. When available, we also describe that status of the species specifically within the action area.

6.2.1 Beluga Whale (Cook Inlet Distinct Population Segment)

Cook Inlet beluga whales reside in Cook Inlet (Figure 6) year-round, which makes them geographically and genetically isolated from other beluga whale stocks in Alaska (Allen et al. 2011). Within Cook Inlet, they generally occur in shallow, coastal waters, often in water barely deep enough to cover their bodies (Harrison and Ridgway 1981).

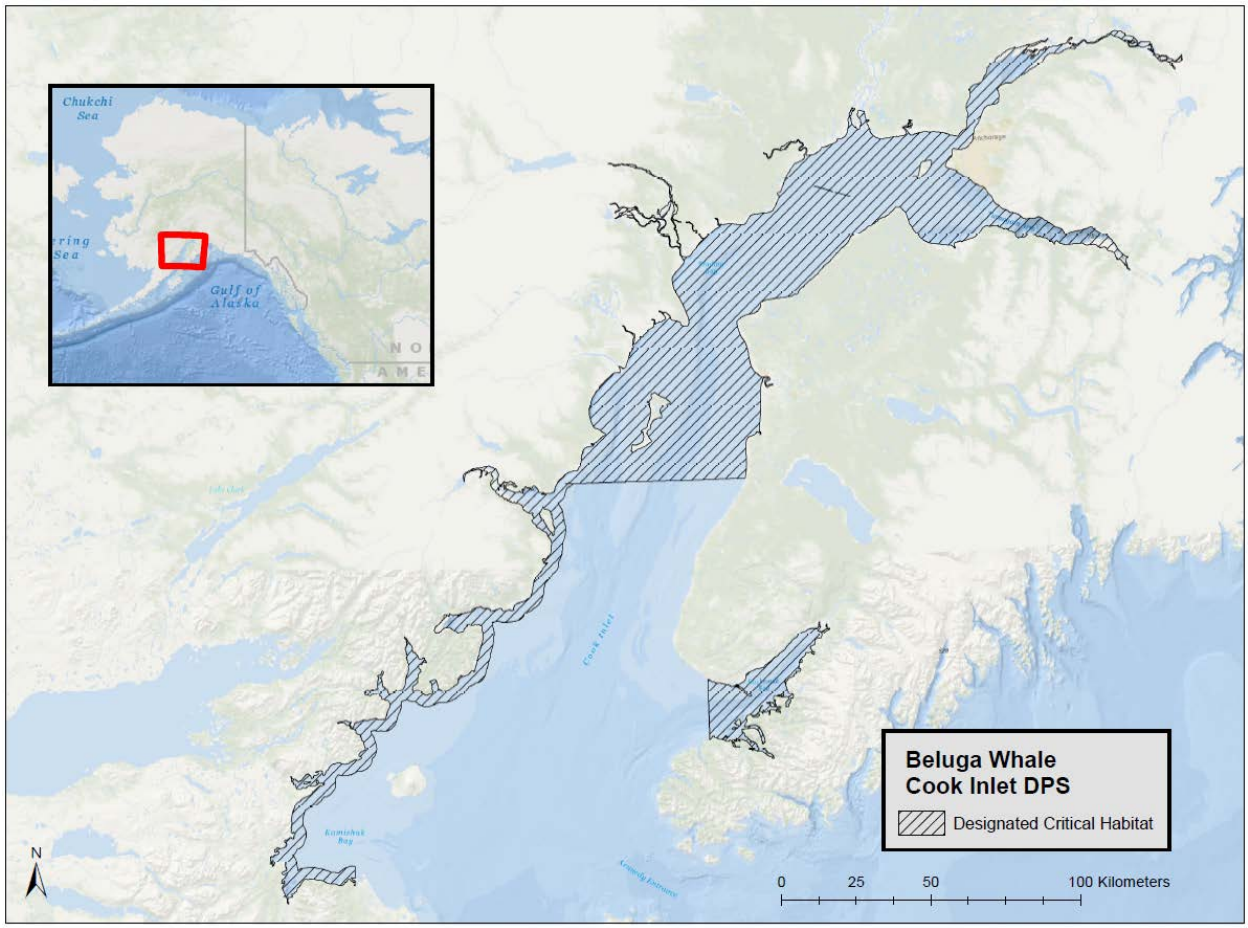

Figure 6. Beluga Whale Cook Inlet distinct population segment general range and designated critical habitat.

The beluga, or "white whale," is a small, white odontocete. Belugas have a stocky body, flexible neck, small rounded head, short beak, and conical teeth (Figure 7). The flippers are relatively small but broad and spatulate, with edges that tend to curl with age. Their flukes are broad and notched with convex trailing edges (NMFS 2016i). The Cook Inlet DPS of beluga whales was listed as endangered under the ESA effective October 22, 2008 (Table 4).

Figure 7: Beluga whale. Photo: National Oceanic and Atmospheric Administration

Table 4: Cook Inlet beluga whale status summary and information links.

Species	Common Name	Distinct Population Segments	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Delphinapterus leucas	Beluga Whale	Cook Inlet	Endangered	2017	73 FR 62919	2017	76 FR 20180

Information available from the recovery plan (NMFS 2016i), recent stock assessment reports (Carretta et al. 2017), and the status review (NMFS 2017e) were used to summarize the life history, population dynamics and status of the species as follows.

6.2.1.1 Life history

Belugas are long-lived (60 to 70 years) and have a relatively slow reproductive cycle; sexual maturity is believed to be attained at four to 10 years for females and at eight to 15 for males (Nowak 1991; Suydam et al. 1999). Females typically produce a single calf every two to three years following a 14-month gestation. Most calving in Cook Inlet is assumed to occur from mid-May to mid-July (Calkins 1984).Young beluga whales are nursed for two years and may continue to associate with their mothers for a considerable time thereafter (Reeves et al. 2002).

Belugas in Cook Inlet appear to feed extensively on concentrations of spawning eulachon in the spring and then shift to foraging on salmon species as eulachon runs diminish and salmon return to spawning streams. In winter, Cook Inlet belugas forage opportunistically on benthic and pelagic species including octopi, squids, crabs, shrimps, clams, mussels, snails, sandworms, and a variety of fishes including eulachon and salmon (NMFS 2016i).

6.2.1.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the Cook Inlet beluga whale.

The best available historical abundance estimate of 1,293 Cook Inlet beluga whales was obtained from an aerial survey conducted in 1979 (Calkins 1989). NMFS has adopted 1,300 as the value for the carrying capacity to be used for management purposes. Cook Inlet belugas experienced a decline in abundance of nearly 50 percent between 1994 and 1998, from an estimate of 653 whales to 347 whales. This period of rapid decline was associated with a substantial, unregulated subsistence hunt. With the regulation of hunting beginning in 1999 (a total of five whales hunted from 1999 to 2014, 16 years), NMFS anticipated that the population would begin to increase at a growth rate of between two and six percent per year (NMFS 2016i). The 2014 abundance estimate was 340 belugas, with a declining trend for both the most recent 10-year time period (–0.4 percent per year; standard error = 1.3 percent) and since the hunt was managed in 1999 (–1.3 percent per year, standard error = 0.7 percent) (Shelden et al. 2015). Thus, the population is not growing as expected despite the regulation of the subsistence harvest.

The degree of genetic differentiation between the Cook Inlet DPS and the other four Alaska beluga stocks indicates the Cook Inlet DPS is the most isolated (O'Corry-Crowe et al. 2002). This suggests that the Alaska Peninsula has long been an effective physical barrier to genetic exchange and that migration of whales into Cook Inlet from other stocks is unlikely. NMFS concluded that the Allee effect is not a relevant concern for Cook Inlet belugas unless the population size is smaller than 50 animals (Hobbs et al. 2008). Similarly, inbreeding depression and loss of genetic diversity do not pose a significant risk to Cook Inlet belugas unless the population is reduced to fewer than 200 whales (Hobbs et al. 2008).

Multiple data sources indicate that belugas exhibit seasonal shifts in distribution and habitat use within Cook Inlet; however, belugas in Cook Inlet do not migrate out of Cook Inlet. Generally,

Cook Inlet belugas spend the ice-free months in the upper Inlet (often at discrete high-use areas), then expand their distribution south and into more offshore waters of the middle Inlet in winter (Hobbs et al. 2008), although they may be found throughout the Inlet at any time of year. The summer distribution of beluga whales in Cook Inlet has experienced a significant contraction since the 1970s (Hobbs et al. 2008; Rugh et al. 2010; Speckman and Piatt 2000). While the exact reasons for the contraction remain unknown, the reduction in range has resulted in belugas in close proximity to Anchorage during summer months, where there is an increased potential for disturbance from human activities (NMFS 2016i).

6.2.1.3 Status

Cook Inlet beluga whales experienced a decline in abundance of nearly 50 percent between 1994 and 1998. Although this rapid decline stopped after hunting was regulated in 1998, beluga numbers have not increased (Hobbs et al. 2008). In the past, there have been both natural and anthropogenic sources of mortality or injury of Cook Inlet belugas. Although the cause of death for most Cook Inlet belugas remains unknown, natural sources include predation by "transient" killer whales, live strandings, and potentially disease; anthropogenic sources include subsistence harvest, poaching or intentional harassment, and mortalities or injuries incidental to other human activities. Climate change has also been identified as a potential threat to Cook Inlet beluga recovery (NMFS 2016i).

6.2.1.4 Critical Habitat

NMFS designated critical habitat for the Cook Inlet beluga whale on April 11, 2011. Two specific areas were designated comprising 7,809 square kilometers of marine habitat (Figure 6). Area 1 encompasses 1,918 square kilometers of Cook Inlet northeast of a line from the mouth of Threemile Creek to Point Possession. This area contains shallow tidal flats, river mouths or estuarine areas and is important as foraging and calving habitats. Area 1 has the highest concentrations of beluga whales in the spring through fall as well as the greatest potential for adverse impact from anthropogenic threats. Area 2 includes near and offshore areas of the mid and upper Inlet, and nearshore areas of the lower Inlet. Area 2 includes Tuxedni, Chinitna, and Kamishak Bays on the west coast and a portion of Kachemak Bay of the east coast. Dive studies indicate that beluga whales in this area dive to deeper depths and are at the surface less frequently than they are when they inhabit Area 1.

The physical and biological features (formerly called primary constituent elements) essential to the conservation of Cook Inlet beluga whales found in these areas include: (1) intertidal and subtidal waters of Cook Inlet with depths less than 30 feet (mean lower low water) and within five miles of high and medium flow accumulation anadromous fish streams; (2) primary prey species consisting of four species of Pacific salmon (Chinook, coho, sockeye, and chum salmon), Pacific eulachon, Pacific cod, walleye pollock, saffron cod, and yellowfin sole; (3) the absence of toxins or other agents of a type or amount harmful to beluga whales; (4) unrestricted passage within or between the critical habitat areas; and (5) absence of in-water noise at levels result in the abandonment of habitat by Cook Inlet beluga whales.

6.2.1.5 Recovery Goals

The 2016 Cook Inlet Beluga recovery plan (NMFS 2016i) contains complete demographic and threat-based downlisting and delisting criteria. A general summary of the criteria is provided in Table 5 below.

Table 5: Criteria for considering reclassification (from endangered to threatened, or from threatened to not listed) for Cook Inlet beluga whales.

Status	Demographic criteria		Threats-Based criteria
Reclassified from Endangered to Threatened (i.e., downlisted)	The abundance estimate for CI belugas is greater than or equal to 520 individuals, and there is a 95 percent or greater probability that the most recent 25-year population abundance trend (where 25 years represents one full generation) is positive.	AND	The 10 downlisting threats-based criteria are satisfied.
Reclassified to Recovered (i.e., delisted)	The abundance estimate for CI belugas is greater than or equal to 780 individuals, and there is a 95 percent or greater probability that the most recent 25-year population abundance trend (where 25 years represents one full generation) is positive.	AND	The 10 downlisting and nine delisting threats-based criteria are satisfied

6.2.2 Blue Whale

The blue whale is a widely distributed baleen whale found in all major oceans (Figure 8).

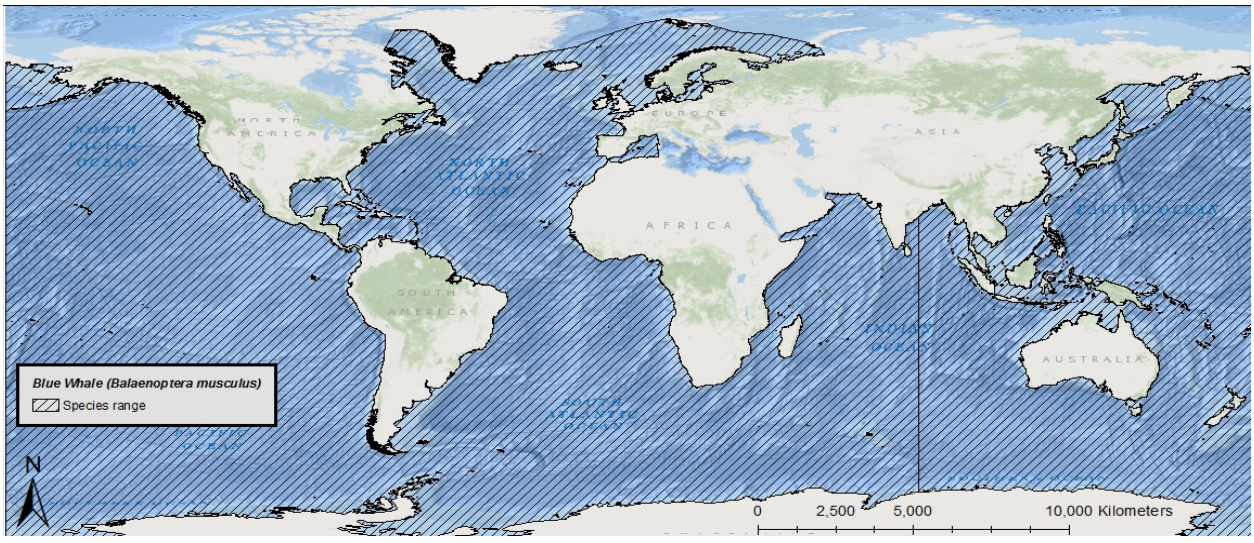

Figure 8: Map identifying the range of the blue whale.

Blue whales are the largest animal on earth and distinguishable from other whales by a long-body and comparatively slender shape, a broad, flat "rostrum" when viewed from above, a proportionally smaller dorsal fin, and a mottled gray coloration that appears light blue when seen through the water (Figure 9). Most experts recognize at least three subspecies of blue whale, *B.*

m. musculus, which occurs in the Northern Hemisphere, *B. m. intermedia* or Antarctic blue whales, which occurs in the Southern Ocean, and *B. m. brevicauda*, a pygmy species found in the Indian Ocean and South Pacific. The blue whale was originally listed as endangered on December 2, 1970 (Table 6).

Figure 9: Blue whale. Photo: National Oceanic and Atmospheric Administration

Table 6: Blue whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Balaenoptera musculus	Blue whale	None	Endangered	None	35 FR 18319	1998 Intent to update (77 FR 22760)	None Designated

Information available from the recovery plan (NMFS 1998), recent stock assessment reports (Carretta et al. 2017; Hayes et al. 2017; Muto et al. 2017), and the status review (COSEWIC 2002) were used to summarize the life history, population dynamics and status of the species as follows.

6.2.2.1 Life History

The average life span of blue whales is eighty to ninety years. They have a gestation period of ten to twelve months, and calves nurse for six to seven months. Blue whales reach sexual maturity between five and fifteen years of age with an average calving interval of two to three

years. They winter at low latitudes, where they mate, calve and nurse, and summer at high latitudes, where they feed. Blue whales forage almost exclusively on krill and can eat approximately 3,600 kilograms daily. Feeding aggregations are often found at the continental shelf edge, where upwelling produces concentrations of krill at depths of 90 to 120 meters.

6.2.2.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the blue whale.

The global, pre-exploitation estimate for blue whales is approximately 181,200 (IWC 2007). Current estimates indicate approximately 5,000 to 12,000 blue whales globally (IWC 2007). Blue whales are separated into populations by ocean basin in the North Atlantic, North Pacific, and Southern Hemisphere. There are three stocks of blue whales designated in U.S. waters: the Eastern North Pacific [current best estimate N = 1,647, N_{min} = 1,551; (Mann 1999)] Central North Pacific (N = 81 N_{min} = 38), and Western North Atlantic (N = 400 to 600 N_{min} = 440). In the southern hemisphere, the latest abundance estimate for Antarctic blue whales is 2,280 individuals in 1997/1998 (95 percent confidence intervals 1,160-4,500) (Branch 2007). While no range-wide estimate for pygmy blue whales exists (Thomas et al. 2016), the latest estimate for pygmy blue whales off the west coast of Australia is 662 to 1,559 individuals based on passive acoustics (McCauley and Jenner 2010), or 712 to 1,754 individuals based on photographic mark-recapture (Jenner et al. 2008).

Current estimates indicate a growth rate of just under three percent per year for the eastern North Pacific stock (Calambokidis et al. 2009). An overall population growth rate for the species or growth rates for the two other individual U.S. stocks are not available at this time. In the southern hemisphere, population growth estimates are available only for Antarctic blue whales, which estimate a population growth rate of 8.2 percent per year (95 percent confidence interval 1.6–14.8 percent) (Branch 2007).

Little genetic data exist on blue whales globally. Data from Australia indicates that at least populations in this region experienced a recent genetic bottleneck, likely the result of commercial whaling, although genetic diversity levels appear to be similar to other, non-threatened mammal species (Attard et al. 2010). Consistent with this, data from Antarctica also demonstrate this bottleneck but high haplotype diversity, which may be a consequence of the recent timing of the bottleneck and blue whales long lifespan (Sremba et al. 2012). Data on genetic diversity of blue whales in the Northern Hemisphere are currently unavailable. However, genetic diversity information for similar cetacean population sizes can be applied. Stocks that have a total population size of 2,000 to 2,500 individuals or greater provide for maintenance of genetic diversity resulting in long-term persistence and protection from substantial environmental variance and catastrophes. Stocks that have a total population 500 individuals or less may be at a greater risk of extinction due to genetic risks resulting from inbreeding. Stock populations at low densities (less than 100) are more likely to suffer from the 'Allee' effect, where inbreeding and

the heightened difficulty of finding mates reduces the population growth rate in proportion with reducing density.

In general, blue whale distribution is driven largely by food requirements; blue whales are more likely to occur in waters with dense concentrations of their primary food source, krill. While they can be found in coastal waters, they are thought to prefer waters further offshore (Figure 8). In the North Atlantic Ocean, the blue whale range extends from the subtropics to the Greenland Sea. They are most frequently sighted in waters off eastern Canada with a majority of sightings taking place in the Gulf of St. Lawrence. In the North Pacific Ocean, blue whales range from Kamchatka to southern Japan in the west and from the Gulf of Alaska and California to Costa Rica in the east. They primarily occur off the Aleutian Islands and the Bering Sea. In the northern Indian Ocean, there is a "resident" population of blue whales with sightings being reported from the Gulf of Aden, Persian Gulf, Arabian Sea, and across the Bay of Bengal to Burma and the Strait of Malacca. In the Southern Hemisphere, distributions of subspecies (*B. m. intermedia* and *B. m. brevicauda*) seem to be segregated. The subspecies *B. m. intermedia* occurs in relatively high latitudes south of the "Antarctic Convergence" (located between 48° South and 61° South latitude) and close to the ice edge. The subspecies *B. m. brevicauda* is typically distributed north of the Antarctic Convergence.

6.2.2.3 Status

The blue whale is endangered as a result of past commercial whaling. In the North Atlantic, at least 11,000 blue whales were taken from the late nineteenth to mid-twentieth centuries. In the North Pacific, at least 9,500 whales were killed between 1910 and 1965. Commercial whaling no longer occurs, but blue whales are threatened by vessel strikes, entanglement in fishing gear, pollution, harassment due to whale watching, and reduced prey abundance and habitat degradation due to climate change. Because populations appear to be increasing in size, the species appears to be somewhat resilient to current threats; however, the species has not recovered to pre-exploitation levels.

6.2.2.4 Critical Habitat

No critical habitat has been designated for the blue whale.

6.2.2.5 Recovery Goals

See the 1998 Final Recovery Plan for the Blue whale for complete down listing/delisting criteria for each of the following recovery goals.

1. Determine stock structure of blue whale populations occurring in U.S. waters and elsewhere
2. Estimate the size and monitor trends in abundance of blue whale populations
3. Identify and protect habitat essential to the survival and recovery of blue whale populations
4. Reduce or eliminate human-caused injury and mortality of blue whales

5. Minimize detrimental effects of directed vessel interactions with blue whales
6. Maximize efforts to acquire scientific information from dead, stranded, and entangled blue whales
7. Coordinate state, federal, and international efforts to implement recovery actions for blue whales
8. Establish criteria for deciding whether to delist or downlist blue whales.

6.2.3 Bowhead Whale

The bowhead whale is a circumpolar baleen whale found throughout high latitudes in the Northern Hemisphere (Figure 10).

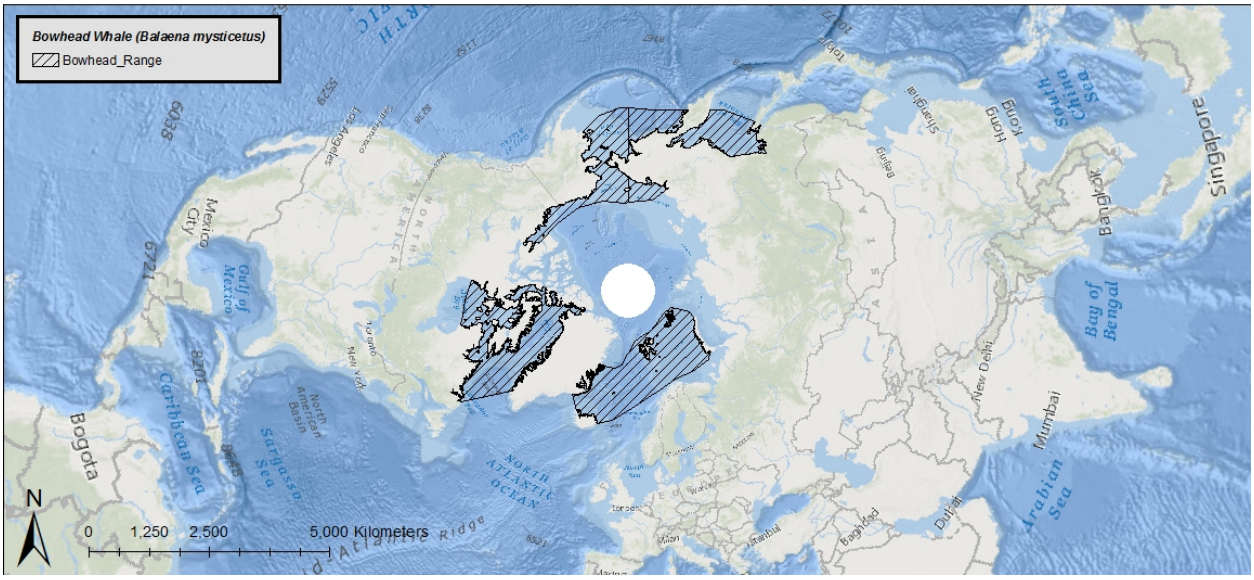

Figure 10: Map identifying the range of bowhead whales.

Bowheads are baleen whales distinguishable from other whales by a dark body with distinctive white chin, no dorsal fin, and a bow-shaped skull that takes up about thirty-five percent of their total body length (Figure 11). The bowhead whale was originally listed as endangered on December 2, 1970 (Table 7).

Figure 11: Bowhead whales. Photo: National Oceanic and Atmospheric Administration

Table 7. Bowhead whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Balaena mysticetus	Bowhead whale	None	Endangered	1995	35 FR 18319	None	None Designated

Information available from the recent stock assessment report (Muto et al. 2017) and the scientific literature was used to summarize the life history, population dynamics and status of the species as follows.

6.2.3.1 Life History

The average lifespan of bowheads is unknown; however, some evidence suggests that they can live for over one hundred years. They have a gestation period of 13 to 14 months and it is unknown how long calves nurse. Sexual maturity is reached around 20 years of age with an average calving interval of three to four years. They spend the winter associated with the southern limit of the pack ice and move north as the sea ice breaks up and recedes during spring. Bowheads use their large skull to break through thick ice and feed on zooplankton (crustaceans like copepods, euphausiids and mysids), other invertebrates and fish.

6.2.3.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the bowhead whale.

The global, pre-exploitation estimate for bowhead whales is 30,000 to 50,000. There are currently four or five recognized stocks of bowheads, the Western Arctic (or Bering-Chukchi-Beaufort) stock, the Okhotsk Sea stock, the Davis Strait and Hudson Bay stock (sometimes considered separate stocks), and the Spitsbergen stock (Rugh and Shelden 2009). The only stock thought to be found within U.S. waters is the Western Arctic stock. The 2011 ice-based abundance estimate puts this stock, the largest remnant stock, at over 16,892 (N_{min}= 16,091) individuals. Prior to commercial whaling, there may have been 10,000 to 23,000 whales in this stock (Rugh and Shelden 2009). Historically the Davis Strait-Hudson Bay stock may have contained over 11,000 individuals, but now it is thought to number around 7,000 bowheads (Cosens et al. 2006). In the Okhotsk Sea, there were originally more than 3,000 bowheads, but now there are only about 300 to 400. The Spitsbergen stock originally had about 24,000 bowheads and supported a huge European fishery, but today is thought to only contain tens of whales (Shelden and Rugh 1995).

Current estimates indicate approximately 16,892 bowhead whales in the Western Arctic stock, with an annual growth rate of 3.7 percent (Givens et al. 2013). While no quantitative estimates exist, the Davis Strait and Hudson Bay stock is also thought to be increasing (COSEWIC 2009). We could find no information on population trends for the Okhotsk Sea stock. Likewise, no information is available on the population trend for the Spitsbergen stock, but it is thought to be nearly extinct.

Genetic studies conducted on the Western Arctic stock of bowhead whales revealed sixty-eight different haplotypes defined by forty-four variable sites (Leduc et al. 2008) making it the most diverse stock of bowheads. These results are consistent with a single stock with genetic heterogeneity related to age cohorts and indicate no historic genetic bottlenecks (Rugh et al. 2003). In the Okhotsk Sea stock, only four to seven mitochondrial DNA (mtDNA) haplotypes have been identified, three of which are shared with the Western Arctic Stock, indicating lower genetic diversity, as might be expected given its much small population size (Alter et al. 2012; LeDuc et al. 2005; MacLean 2002). The Davis Strait-Hudson Bay stock has 23 mtDNA haplotypes, making it more diverse than the Okhotsk but less diverse than the large Western Arctic stock (Alter et al. 2012). Based on historic mtDNA, the Spitsbergen stock previously had at least 58 mtDNA haplotypes, but its current genetic diversity remains unknown (Borge et al. 2007). However, given its near extirpation, it likely has low genetic diversity.

The Western Arctic stock is found in waters around Alaska, the Okhotsk Sea stock in eastern Russia waters, the Davis Strait and Hudson Bay stock in northeastern waters near Canada, and the Spitsbergen stock in the northeastern Atlantic (Rugh and Shelden 2009) (Figure 10).

6.2.3.3 Status

The bowhead whale is endangered as a result of past commercial whaling. Prior to commercial whaling, thousands of bowhead whales existed. Global abundance declined to 3,000 by the 1920s. Bowhead whales may be killed under "aboriginal subsistence whaling" provisions of the IWC. Additional threats include vessel strikes, fisheries interactions (including entanglement), contaminants, and noise. The species' large population size and increasing trends indicate that it is resilient to current threats.

6.2.3.4 Critical Habitat

No critical habitat has been designated for the bowhead whale.

6.2.3.5 Recovery Goals

Currently, there is no recovery plan available for the bowhead whale.

6.2.4 False Killer Whale (Main Hawaiian Islands Insular Distinct Population Segment)

False killer whales are distributed worldwide in tropical and temperate waters more than 1,000 meters deep. The Main Hawaiian Islands Insular DPS of false killer whales is found in waters around the Main Hawaiian Islands (Figure 12).

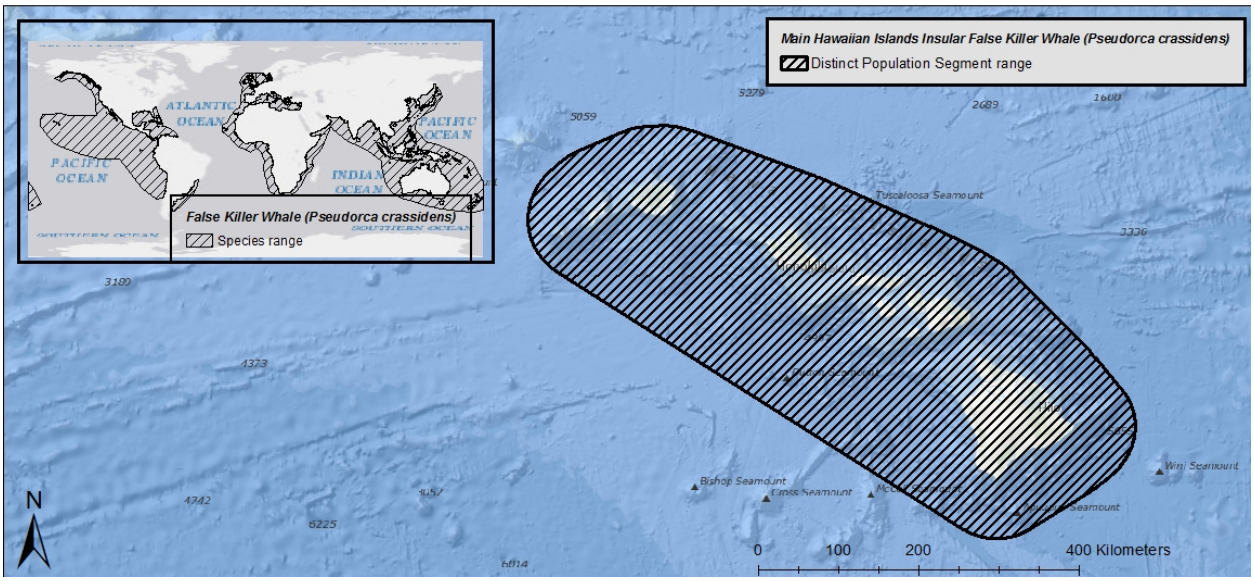

Figure 12: Map identifying the range of false killer whales and the Main Hawaiian Islands Insular distinct population segment of false killer whale.

The false killer whale is a toothed whale and large member of the dolphin family. False killer whales are distinguishable from other whales by having a small conical head without a beak, tall dorsal fin, and a distinctive bulge in the middle of the front edge of their pectoral fins (Figure 13). The Main Hawaiian Islands Insular DPS of false killer whale was originally listed as endangered on November 28, 2012 (Table 8).

Figure 13: False killer whale. Photo: National Oceanic and Atmospheric Administration.

Table 8. Main Hawaiian Islands Insular distinct population segment false killer whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Pseudorca crassidens	False killer whale	Main Hawaiian Islands Insular	Endangered	2010	77 FR 70915	None	None Designated

Information available from the most recent status review (Oleson et al. 2010) and recent stock assessment (Carretta et al. 2017) were used to summarize the status of the species as follows.

6.2.4.1 Life History

False killer whales can live, on average, for 60 years. They have a gestation period of 14 to 16 months, and calves nurse for 1.5 to two years. Sexual maturity is reached around 12 years of age with a very low reproduction rate and calving interval of approximately seven years. False killer whales prefer tropical to temperate waters that are deeper than 1,000 meters. They feed during the day and at night on fishes and cephalopods, and are known to attack other marine mammals, indicating they may occasionally feed on them.

6.2.4.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the Main Hawaiian Islands Insular DPS of false killer whales.

Recent, unpublished estimates of abundance for two time periods, 2000 to 2004 and 2006 to 2009, were 162 and 151 respectively. The minimum population estimate for the Main Hawaiian Islands Insular DPS of false killer whale is the number of distinct individuals identified during the 2011 to 2014 photo-identification studies, or 92 false killer whales (Baird et al. 2015).

A current estimated population growth rate for the Main Hawaiian Islands Insular DPS of false killer whales is not available at this time. Reeves et al. (2009) suggested that the population may have declined during the last two decades, based on sighting data collected near Hawaii using various methods between 1989 and 2007. A modeling exercise conducted by Oleson et al. (2010) evaluated the probability of actual or near extinction, defined as fewer than 20 animals, given measured, estimated, or inferred information on population size and trends, and varying impacts of catastrophes, environmental stochasticity and Allee effects. A variety of alternative scenarios were evaluated indicating the probability of decline to fewer than 20 animals within 75 years as greater than 20 percent. Although causation was not evaluated, all models indicated current declines at an average rate of negative nine percent since 1989.

The Main Hawaiian Islands Insular DPS of false killer whale is considered resident to the Main Hawaiian Islands and is genetically and behaviorally distinct compared to other stocks. Genetic data suggest little immigration into the Main Hawaiian Islands Insular DPS of false killer whale (Baird et al. 2012). Genetic analyses indicated restricted gene flow between false killer whales sampled near the Main Hawaiian Islands, the Northwestern Hawaiian Islands, and pelagic waters of the Eastern and Central North Pacific.

NMFS currently recognizes three stocks of false killer whales in Hawaiian waters: the Main Hawaiian Islands Insular, Hawaii pelagic, and the Northwestern Hawaiian Islands. All false killer whales found within forty kilometers of the Main Hawaiian Islands belong to the insular stock and all false killer whales beyond 140 kilometers belong to the pelagic stock. Animals belonging to the Northwest Hawaiian Islands stock are insular to the Northwest Hawaiian Islands (Bradford et al. 2012), however, this stock was identified by animals encountered off Kauai.

6.2.4.3 Status

The exact causes for the decline in the Main Hawaiian Islands Insular DPS of the false killer whale are not specifically known, but multiple factors have threatened and continue to threaten the population. Threats to the DPS include small population size, including inbreeding depression and Allee effects, exposure to environmental contaminants, competition for food with commercial fisheries, and hooking, entanglement, or intentional harm by fishermen. Recent photographic evidence of dorsal fin disfigurements and mouthline injuries suggest a high rate of fisheries interactions for this population compared to others in Hawaiian waters (Baird et al. 2015).

6.2.4.4 Critical Habitat

No critical habitat has been designated for the Main Hawaiian Islands Insular DPS of the false killer whale.

6.2.4.5 Recovery Goals

There is currently no Recovery Plan available for the Main Hawaiian Islands Insular DPS of the false killer whale.

6.2.5 Fin Whale

The fin whale is a large, widely distributed baleen whale found in all major oceans and comprised of three subspecies: *B. p. physalus* in the Northern Hemisphere, and *B. p. quoyi* and *B. p. patachonica* (a pygmy form) in the Southern Hemisphere (Figure 14).

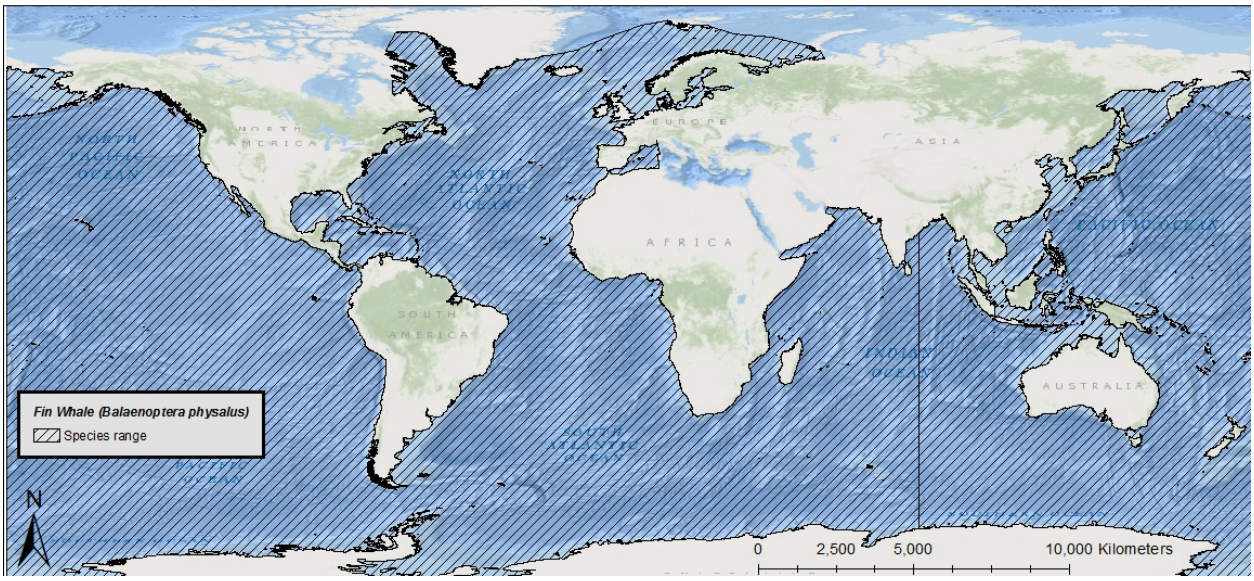

Figure 14: Map identifying the range of the fin whale.

Fin whales are distinguishable from other whales by a sleek, streamlined body with a V-shaped head, a tall, falcate dorsal fin, and a distinctive color pattern of a black or dark brownish-gray body and sides with a white ventral surface (Figure 15). The fin whale was originally listed as endangered on December 2, 1970 (Table 9).

Figure 15: Fin whale. Photo: National Oceanic and Atmospheric Administration

Table 9: Fin whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Balaenoptera physalus	Fin whale	None	Endangered	2011	35 FR 18319	2010	None Designated

Information available from the recovery plan (NMFS 2010b), recent stock assessment reports (Carretta et al. 2017; Hayes et al. 2017; Muto et al. 2017), and the status review (NMFS 2011c) were used to summarize the life history, population dynamics and status of the species as follows.

6.2.5.1 Life History

Fin whales can live, on average, eighty to ninety years. They have a gestation period of less than one year, and calves nurse for six to seven months. Sexual maturity is reached between six and ten years of age with an average calving interval of two to three years. They mostly inhabit deep, offshore waters of all major oceans. They winter at low latitudes, where they calve and nurse, and summer at high latitudes, where they feed, although some fin whales appear to be residential to certain areas. Fin whales eat pelagic crustaceans (mainly euphausiids or krill) and schooling fish such as capelin, herring, and sand lice.

6.2.5.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the fin whale.

The pre-exploitation estimate for the fin whale population in the North Pacific was 42,000 to 45,000 (Ohsumi and Wada 1974). In the North Pacific, at least 74,000 whales were killed between 1910 and 1975. In the North Atlantic, at least 55,000 fin whales were killed between 1910 and 1989. Approximately 704,000 whales were killed in the Southern Hemisphere from 1904 to 1975. Of the three to seven stocks in the North Atlantic (approximately 50,000 individuals), one occurs in U.S. waters, where the best estimate of abundance is 1,618 individuals (N_{min}=1,234); however, this may be an underrepresentation as the entire range of stock was not surveyed (Palka 2012). There are three stocks in U.S. Pacific waters: Northeast Pacific [minimum 1,368 individuals], Hawaii [approximately 58 individuals (N_{min}=27)] and California/Oregon/Washington [approximately 9,029 (N_{min}=8,127 individuals), (Nadeem et al. 2016)]. The IWC also recognizes the China Sea stock of fin whales, found in the Northwest Pacific, which currently lacks and abundance estimate (Reilly et al. 2013). Abundance data for the Southern Hemisphere stock are limited; however, there were assumed to be somewhat more than 15,000 in 1983 (Thomas et al. 2016).

Current estimates indicate approximately 10,000 fin whales in U.S. Pacific Ocean waters, with an annual growth rate of 4.8 percent in the Northeast Pacific stock and a stable population abundance in the California/Oregon/Washington stock (Nadeem et al. 2016). Overall population growth rates and total abundance estimates for the Hawaii stock, China Sea stock, western north Atlantic stock, and southern hemisphere fin whales are not available at this time.

Archer et al. (2013) recently examined the genetic structure and diversity of fin whales globally. Full sequencing of mtDNA genome for 154 fin whales sampled in the North Atlantic, North Pacific, and Southern Hemisphere, resulted in 136 haplotypes, none of which were shared among ocean basins suggesting differentiation at least at this geographic scale. However, North Atlantic fin whales appear to be more closely related to the Southern Hemisphere population, as compared to fin whales in the North Pacific, which may indicate a revision of the subspecies delineations is warranted. Generally speaking, haplotype diversity was found to be high both within ocean basins, and across. Such high genetic diversity and lack of differentiation within ocean basins may indicate that despite some population's having small abundance estimates, the species may persist long-term and be somewhat protected from substantial environmental variance and catastrophes.

There are over 100,000 fin whales worldwide, occurring primarily in the North Atlantic, North Pacific, and Southern Hemisphere (Figure 15), where they appear to be reproductively isolated. The availability of prey, sand lice in particular, is thought to have a strong influence on the distribution and movements of fin whales.

6.2.5.3 Status

The fin whale is endangered as a result of past commercial whaling. Prior to commercial whaling, hundreds of thousands of fin whales existed. Fin whales may be killed under "aboriginal subsistence whaling" in Greenland, under Japan's scientific whaling program, and Iceland's formal objection to the IWC ban on commercial whaling. Additional threats include vessel strikes, reduced prey availability due to overfishing or climate change, and noise. The species' overall large population size may provide some resilience to current threats, but trends are largely unknown.

6.2.5.4 Critical Habitat

No critical habitat has been designated for the fin whale.

6.2.5.5 Recovery Goals

See the 2010 Final Recovery Plan for the fin whale for complete down listing/delisting criteria for both of the following recovery goals.

1. Achieve sufficient and viable population in all ocean basins.
2. Ensure significant threats are addressed.

6.2.6 Gray Whale (Western North Pacific Population)

The gray whale is a baleen whale and the only species in the family Eschrichtiidae. There are two isolated geographic distributions of gray whales in the North Pacific Ocean: the Eastern North Pacific stock, found along the west coast of North America, and the Western North Pacific or "Korean" stock, found along the coast of eastern Asia (Figure 16).

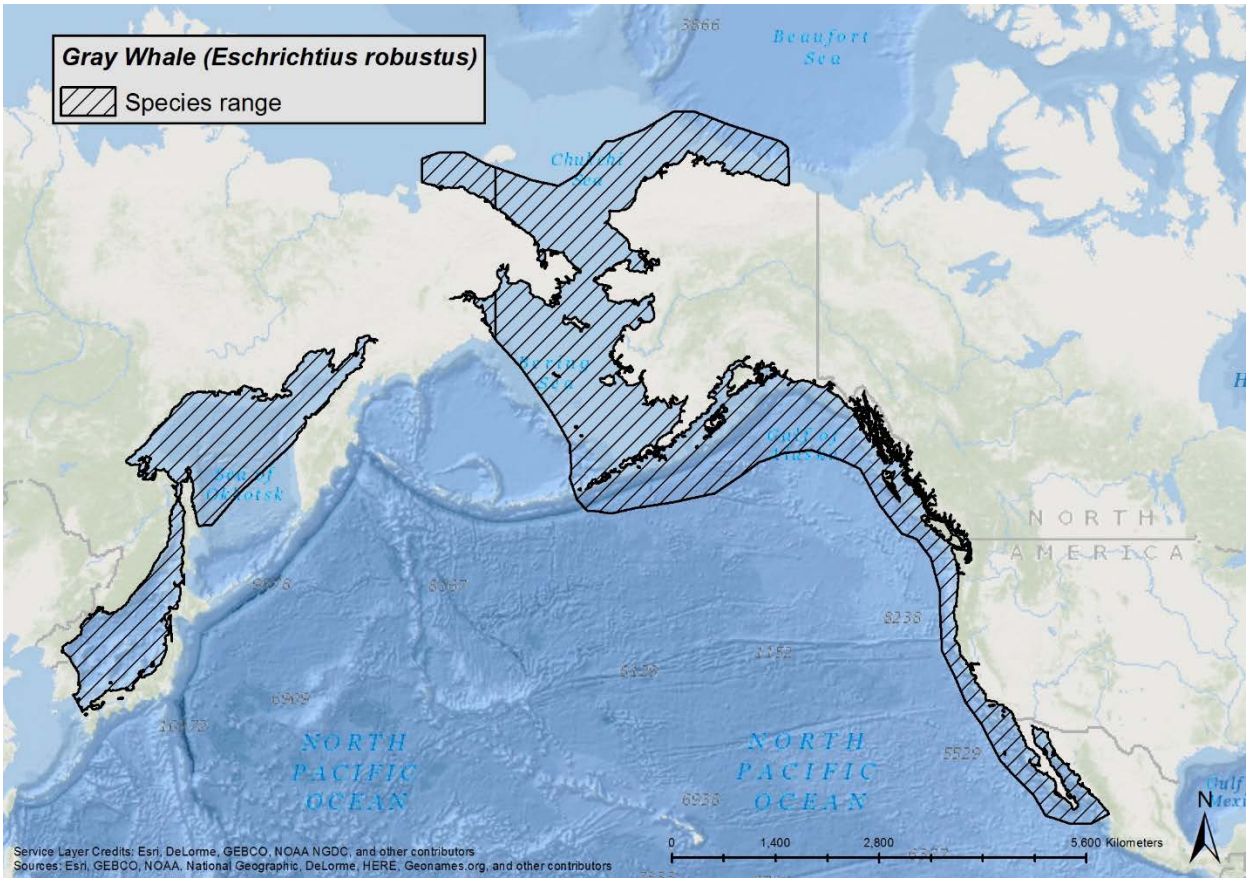

Figure 16: Map identifying the range of the gray whales.

Gray whales are distinguishable from other whales by a mottled gray body, small eyes located near the corners of their mouth, no dorsal fin, broad, paddle-shaped pectoral fins and a dorsal hump with a series of eight to fourteen small bumps known as “knuckles” (Figure 17). The gray whale was originally listed as endangered on December 2, 1970. The Eastern North Pacific stock was officially delisted on June 16, 1994 when it reached pre-exploitation numbers. The Western North Pacific population of gray whales remained listed as endangered (Table 10).

Figure 17: Gray whale. Photo: National Oceanic and Atmospheric Administration.

Table 10. Gray whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Eschrichtius robustus	Gray whale	Western North Pacific Population	Endangered	None	35 FR 18319	None	None Designated

Information available from the recent stock assessment reports (Carretta et al. 2016b; Muto et al. 2016; Waring et al. 2016) were used to summarize the life history, population dynamics and status of the species as follows.

6.2.6.1 Life History

The average life span of gray whales is unknown, but it is thought to be as long as eighty years. They have a gestation period of twelve to thirteen months, and calves nurse for seven to eight months. Sexual maturity is reached between six and twelve years of age with an average calving interval of two to four years (Weller et al. 2009). Gray whales mostly inhabit shallow coastal waters in the North Pacific Ocean. Some Western North Pacific gray whales winter on the west coast of North America while others migrate south to winter in waters off Japan and China, and

summer in the Okhotsk Sea off northeast Sakhalin Island, Russia, and off southeastern Kamchatka in the Bering Sea (Burdin et al. 2013). Gray whales travel alone or in small, unstable groups and are known as bottom feeders that eat "benthic" amphipods.

6.2.6.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the gray whale.

Photo-identification data collected between 1994 and 2011 on the Western North Pacific gray whale summer feeding ground off Sakhalin Island were used to calculate an abundance estimate of 140 whales for the non-calf population size in 2012 (Cooke et al. 2013). The minimum population estimate for the Western North Pacific stock is 135 individual gray whales on the summer feeding ground off Sakhalin Island.

The current best growth rate estimate for the Western North Pacific gray whale stock is 3.3 percent annually.

There are often observed movements between individuals from the Eastern North Pacific stock and Western North Pacific stock; however, genetic comparisons show significant mitochondrial and nuclear genetic differences between whales sampled from each stock indicating genetically distinct populations (Leduc et al. 2002). A study conducted between 1995 and 1999 using biopsy samples found that Western North Pacific gray whales have retained a relatively high number of mtDNA haplotypes for such a small population. Although the number of haplotypes currently found in the Western North Pacific stock is higher than might be expected, this pattern may not persist into the future. Populations reduced to small sizes, such as the Western North Pacific stock, can suffer from a loss of genetic diversity, which in turn may compromise their ability to respond to changing environmental conditions (Willi et al. 2006) and negatively influence long-term viability (Frankham 2005; Spielman et al. 2004).

Gray whales in the Western North Pacific population are thought to feed in the summer and fall in the Okhotsk Sea, primarily off Sakhalin Island, Russia and the Kamchatka peninsula in the Bering Sea, and winter in the South China Sea (Figure 16). However, tagging, photo-identification, and genetic studies have shown that some whales identified as members of the Western North Pacific stock have been observed in the Eastern North Pacific, which may indicate that not all gray whales share the same migratory patterns.

6.2.6.3 Status

The Western North Pacific gray whale is endangered as a result of past commercial whaling and may still be hunted under "aboriginal subsistence whaling" provisions of the IWC Commission. Current threats include ship strikes, fisheries interactions (including entanglement), habitat degradation, harassment from whale watching, illegal whaling or resumed legal whaling, and noise.

6.2.6.4 Critical Habitat

No critical habitat has been designated for the Western North Pacific gray whale. NMFS cannot designate critical habitat in foreign waters.

6.2.6.5 Recovery Goals

There is currently no Recovery Plan for the Western North Pacific gray whale. In general, listed species, which occur entirely outside U.S. jurisdiction, are not likely to benefit from recovery plans (55 FR 24296; June 15, 1990).

6.2.7 Gulf of Mexico Bryde's Whale

The Bryde's whale is a widely distributed baleen whale found in tropical and subtropical oceans. The Gulf of Mexico subspecies of Bryde's whale is found in the northeastern Gulf of Mexico near De Soto Canyon (Figure 18). From historical whaling records and several recent sightings, there some evidence of a former distribution of these whales in waters of north-central and southern Gulf of Mexico.

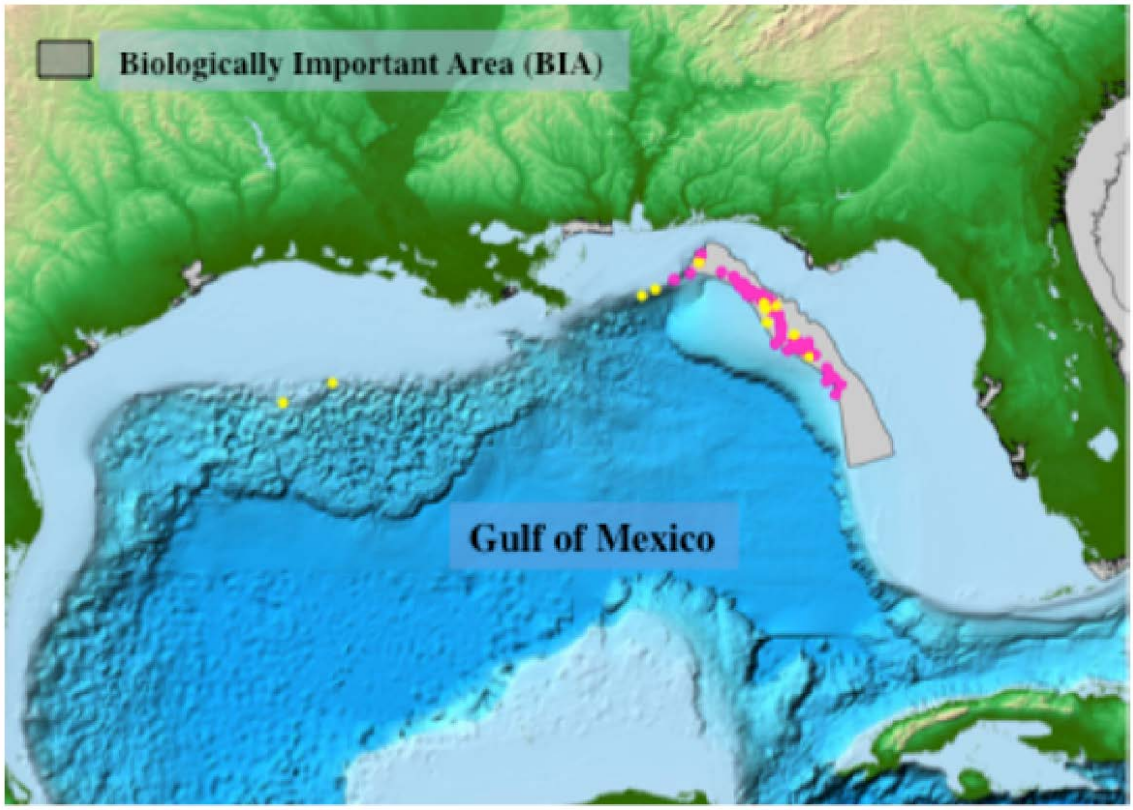

Figure 18: Map identifying the biologically important area and known range of Gulf of Mexico Bryde's whales. From (Rosel et al. 2016).

Bryde's whales are baleen whales that grow to lengths of 13 to 16.5 meters. Bryde's whales in the Gulf of Mexico are a taxonomically distinct subspecies. Gulf of Mexico Bryde's whales have a gray dorsal surface, streamlined body, and pointed, flat rostrum with three prominent ridges

(Figure 19). The Gulf of Mexico stock of Bryde's whale was proposed for listing under the ESA as endangered on December 8, 2016 (Table 11).

Figure 19: Bryde's whale surfacing in the Gulf of Mexico. Photo: National Oceanic and Atmospheric Administration.

Table 11: Gulf of Mexico Bryde's whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Balaenoptera edeni	Gulf of Mexico Bryde's whale	N/A	Endangered	2016	81 FR 88639 (Proposed)	N/A	None Designated

Information available from the status review (Rosel et al. 2016), the proposed listing, and available literature were used to summarize the life history, population dynamics, and status of the species as follows.

6.2.7.1 Life History

The life expectancy of Gulf of Mexico Bryde's whales is unknown. They have a gestation period of 11 to 12 months, give birth to a single calf, which is nursed for six to 12 months. Age of sexual maturity is not known for Gulf of Mexico Bryde's whales specifically, but Bryde's whales are thought to be sexually mature at eight to 13 years. Peak breeding and calving probably occurs in the fall. Females breed every second year. Gulf of Mexico Bryde's whales

exhibit a typical diel dive pattern, with deep dives in the daytime, and shallow dives at night. Bryde's whales generally feed on schooling fishes (e.g., anchovy, sardine, mackerel, and herring) and small crustaceans (Rosel et al. 2016).

6.2.7.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the Gulf of Mexico Bryde's whale.

The Gulf of Mexico Bryde's whale population is very small; the most recent estimate from 2009 places the population size at 33 individuals. A second estimate incorporating visual survey data from 1992 to 2009 estimated 44 individuals (Rosel et al. 2016). There is no population trend information available for the Gulf of Mexico Bryde's whale.

Genetic diversity within the Gulf of Mexico Bryde's whale population is very low, with genetic analyses indicating only two mtDNA haplotypes (compared to five haplotypes for North Atlantic right whales and 51 in fin whales across the same control region sequence) (Rosel and Wilcox 2014). Examination of 42 nuclear microsatellite loci found that 60 percent were monomorphic, meaning no genetic variability was seen for the 21 Gulf of Mexico Bryde's whales sampled (Rosel et al. 2016).

The range of Gulf of Mexico Bryde's whales is primarily in a small, biologically important area in the northeastern Gulf of Mexico near De Soto Canyon, in waters 100 to 400 meters deep along the continental shelf break (Figure 18). It inhabits the Gulf of Mexico year round, but its distribution outside of this biologically important area is unknown.

6.2.7.3 Status

Historically, commercial whaling did occur in the Gulf of Mexico, but the area was not considered prime whaling grounds. Bryde's whales were not specifically targeted by commercial whalers, but the "finback whales" which were caught between the mid-1700s and late 1800s were likely Bryde's whales (Reeves et al. 2011). Noise from shipping traffic and seismic surveys in the region may impact Gulf of Mexico Bryde's whales' ability to communicate. Vessel traffic from commercial shipping and the oil and gas industry also poses a risk of vessel strike for Gulf of Mexico Bryde's whales. Entanglement from fishing gear is also a threat, and several fisheries operate within the range of the species. The Deepwater Horizon oil spill severely impacted Bryde's whales in the Gulf of Mexico, with an estimated 17 percent of the population killed, 22 percent of females exhibiting reproductive failure, and 18 percent of the population suffering adverse health effects (DWHTrustees 2016). Because the Gulf of Mexico Bryde's whale population is so small size and has low genetic diversity, it is highly susceptible to further perturbations.

6.2.7.4 Critical Habitat

No critical habitat has been designated for Gulf of Mexico Bryde's whales as the species is currently proposed for listing under the ESA.

6.2.7.5 Recovery Goals

No Recovery Plan has been prepared for Gulf of Mexico Bryde's whales as the species is currently proposed for listing under the ESA.

6.2.8 Humpback Whale (Central America, Mexico, and Western North Pacific Distinct Population Segments)

The humpback whale is a widely distributed baleen whale found in all major oceans (Figure 20).

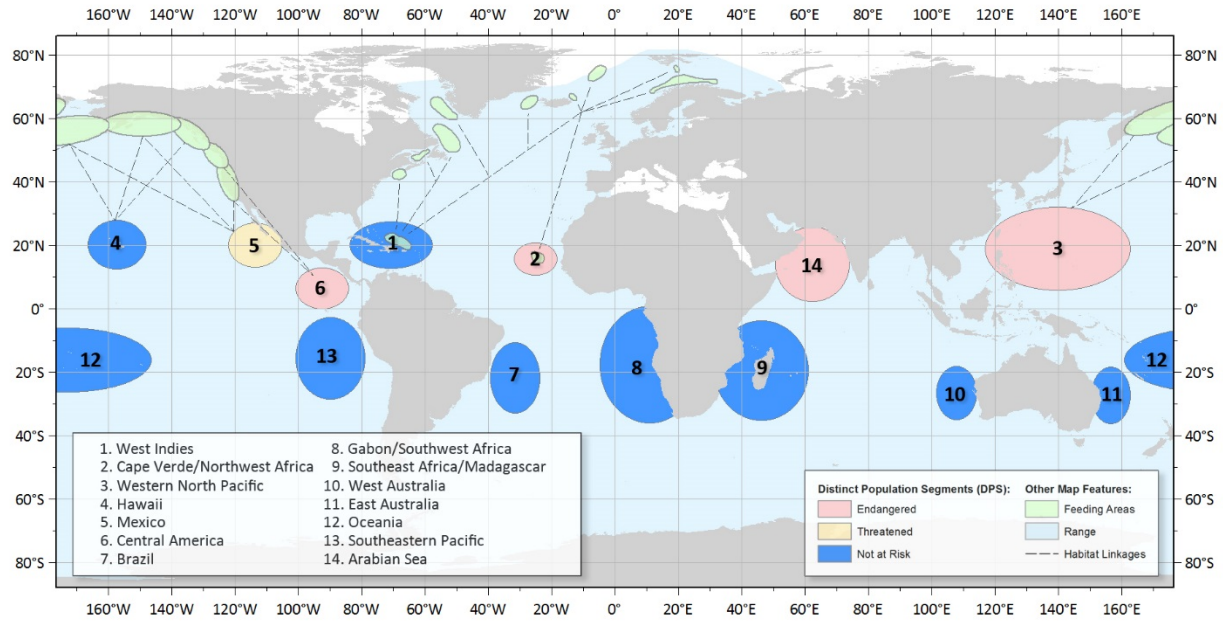

Figure 20: Map identifying 14 distinct population segments with 1 threatened and 4 endangered, based on primary breeding location of the humpback whale, their range, and feeding areas (Bettridge et al. 2015).

Humpbacks are distinguishable from other whales by long pectoral fins and are typically dark grey with some areas of white (Figure 21). The humpback whale was originally listed as endangered on December 2, 1970. Since then, NMFS has designated 14 distinct population segments (DPSs) with four identified as endangered (Cape Verde Islands/Northwest Africa, Western North Pacific, Central America, and Arabian Sea) and one as threatened (Mexico) (Table 12). The only ESA-listed DPSs of humpbacks found with the action area of Permit No. 20605 are the Central America, Mexico, and Western North Pacific DPSs, and no ESA-listed humpback whales are found within the action area of Permit No. 20043.

Figure 21: Humpback whale. Photo: National Oceanic and Atmospheric Administration

Table 12. Humpback whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Megaptera novaeangliae	Humpback whale	Central America	Endangered	2015	81 FR 62259	1991	None Designated
		Mexico	Threatened				
		Western North Pacific	Endangered				

Information available from the recovery plan (NMFS 1991), recent stock assessment reports (Carretta et al. 2016b; Muto et al. 2016; Waring et al. 2016), the status review (Bettridge et al. 2015), and the final listing were used to summarize the life history, population dynamics and status of the species as follows.

6.2.8.1 Life History

Humpbacks can live, on average, fifty years. They have a gestation period of eleven to twelve months, and calves nurse for one year. Sexual maturity is reached between five to eleven years of age with an average calving interval of two to three years. Humpbacks mostly inhabit coastal and continental shelf waters. They winter at low latitudes, where they calve and nurse, and summer at high latitudes, where they feed. Humpbacks exhibit a wide range of foraging behaviors and feed

on a range of prey types, including: small schooling fishes, euphausiids, and other large zooplankton.

6.2.8.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the humpback whale.

The global, pre-exploitation estimate for humpback whales is 1,000,000 (Roman and Palumbi 2003). The abundance and population trends of ESA-listed humpback whale DPSs in the action area for Permit No. 20605 is summarized in Table 13. Population growth rates are currently unavailable for all ESA-listed humpback whale DPSs (Table 13).

Table 13: Abundance and population trend estimates for humpback whale distinct population segments as listed under the Endangered Species Act.

Distinct Population Segment	ESA Status	Abundance	Population Trend
Central America	Endangered	411	Unknown
Mexico	Threatened	3,264	Unknown
Western North Pacific	Endangered	1,059	Unknown

For humpback whales, distinct population segments that have a total population size of 2,000 to 2,500 individuals or greater provide for maintenance of genetic diversity resulting in long-term persistence and protection from substantial environmental variance and catastrophes. Distinct population segments that have a total population 500 individuals or less may be at a greater risk of extinction due to genetic risks resulting from inbreeding. Populations at low densities (less than 100) are more likely to suffer from the 'Allee' effect, where inbreeding and the heightened difficulty of finding mates reduces the population growth rate in proportion with reducing density.

The Central America DPS has just below 500 individuals and so may be subject to genetic risks due to inbreeding and moderate environmental variance. The Mexico DPS is estimated to have more than 2,000 individuals and should have enough genetic diversity for long-term persistence and protection from substantial environmental variance and catastrophes. The Western North Pacific DPS has less than 2,000 individuals total and is made up of two subpopulations, Okinawa/Philippines and the Second West Pacific. Thus, while its genetic diversity may be protected from moderate environmental variance, it could be subject to extinction due to genetic risks due to low abundance.

The Central America DPS is composed of humpback whales that breed along the Pacific coast of Costa Rica, Panama, Guatemala, El Salvador, Honduras and Nicaragua. This DPS feeds almost exclusively offshore of California and Oregon in the eastern Pacific, with only a few individuals identified at the northern Washington – southern British Columbia feeding grounds (Figure 20).

The Mexico DPS consists of humpback whales that breed along the Pacific coast of mainland Mexico, and the Revillagigedos Islands and transit through the Baja California Peninsula coast. The DPS feeds across a broad geographic range from California to the Aleutian Islands, with concentrations in California-Oregon, northern Washington – southern British Columbia, northern and western Gulf of Alaska and Bering Sea feeding grounds (Figure 20).

The Western North Pacific DPS consists of humpback whales breeding/wintering in the area of Okinawa and the Philippines, another unidentified breeding area (inferred from sightings of whales in the Aleutian Islands area feeding grounds) and those transiting from the Ogasawara area. These whales migrate to feeding grounds in the northern Pacific, primarily off the Russian coast (Figure 20).

6.2.8.3 Status

Humpback whales were originally listed as endangered as a result of past commercial whaling, and the DPSs that remain listed have likely not yet recovered from this. Prior to commercial whaling, hundreds of thousands of humpback whales existed. Global abundance declined to the low thousands by 1968, the last year of substantial catches (IUCN 2012). Humpback whales may be killed under "aboriginal subsistence whaling" and "scientific permit whaling" provisions of the IWC. Additional threats include ship strikes, fisheries interactions (including entanglement), energy development, harassment from whale watching, and noise. The species' large population size and increasing trends indicate that it is resilient to current threats, but individual DPSs face varying risks of extinction.

6.2.8.4 Critical Habitat

No critical habitat has been designated for the humpback whale.

6.2.8.5 Recovery Goals

See the 1991 Final Recovery Plan for the Humpback whale for complete down listing/delisting criteria for each of the four following recovery goals.

1. Maintain and enhance habitats used by humpback whales currently or historically.
2. Identify and reduce direct human-related injury and mortality.
3. Measure and monitor key population parameters.
4. Improve administration and coordination of recovery program for humpback whales.

6.2.9 Killer Whale (Southern Resident Distinct Population Segment)

Killer whales are distributed worldwide, but populations are isolated by region and ecotype. Killer whales have been divided into DPSs on the basis of differences in genetics, ecology, morphology and behavior. The Southern Resident killer whale DPS can be found along the Pacific Coast of the United States and Canada, and in the Salish Sea, Strait of Juan de Fuca and Puget Sound (Figure 22).

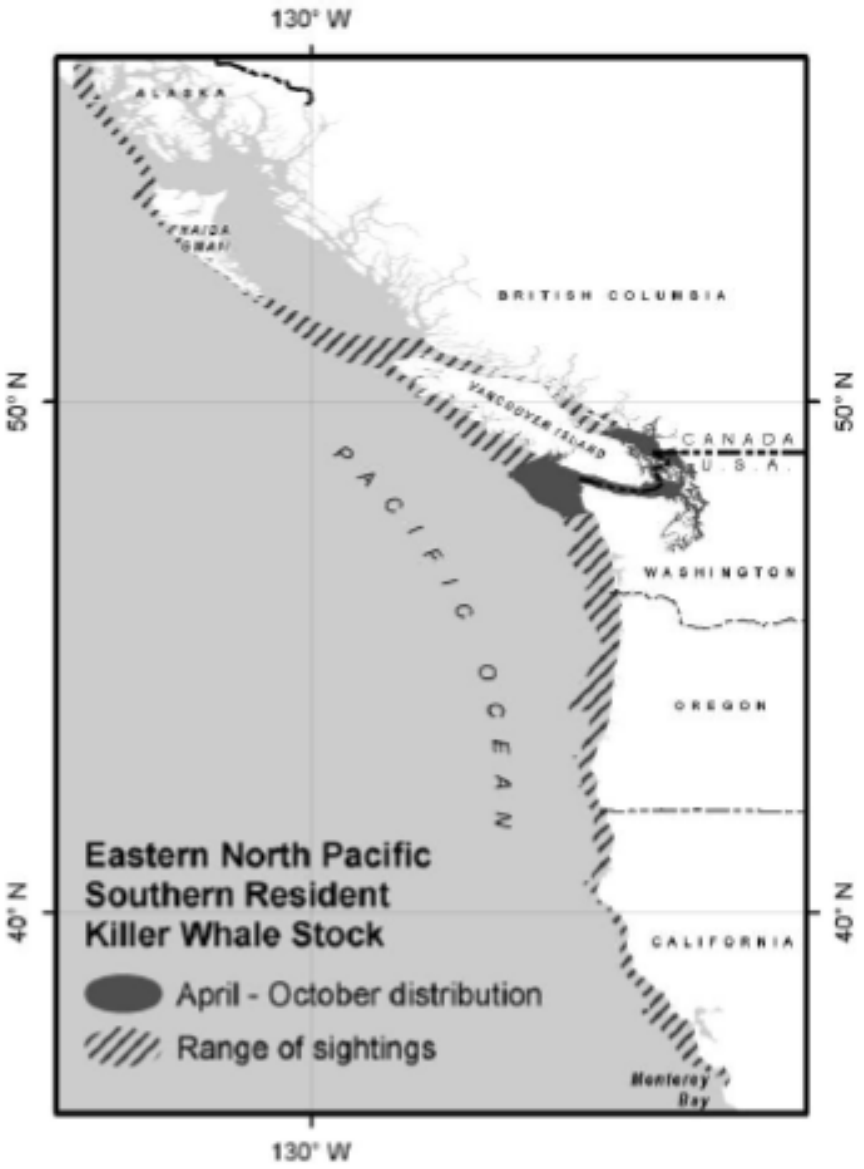

Figure 22. Map identifying the range of the Southern resident killer whale. Approximate April to October distribution of the Southern Resident killer whale (shaded area) and range of sightings (diagonal lines) (Carretta et al. 2016b).

Killer whales are odontocetes and the largest delphinid species with black coloration on their dorsal side and white undersides and patches near the eyes. They also have a highly variable gray or white saddle behind the dorsal fin (Figure 23). The Southern Resident DPS of killer whales was listed as endangered under the ESA on November 18, 2005 (Table 14).

Figure 23: Southern Resident killer whales. Photo: National Oceanic and Atmospheric Administration

Table 14. Southern Resident killer whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Orcinus orca	Killer Whale	Southern Resident	Endangered	2016	70 FR 69903	73 FR 4176	71 FR 69054

We used information available in the final rule, the Recovery Plan (NMFS 2008), the 2016 Status Review (NMFS 2016l) and the 2015 Stock Assessment Report (Carretta et al. 2017) to summarize the life history, population dynamics and status of this species, as follows.

6.2.9.1 Life History

Southern Resident killer whales are geographically, matrilineally, and behaviorally distinct from other killer whale populations. The DPS includes three large, stable pods (J, K, and L), which occasionally interact (Parsons et al. 2009). Most mating occurs outside natal pods, during temporary associations of pods, or as a result of the temporary dispersal of males (Pilot et al. 2010). Males become sexually mature at ten to seventeen years of age. Females reach maturity at twelve to sixteen years of age and produce an average of 5.4 surviving calves during a reproductive life span of approximately 25 years. Mothers and offspring maintain highly stable,

life-long social bonds, and this natal relationship is the basis for a matrilineal social structure. They prey upon salmonids, especially Chinook salmon (Hanson et al. 2010).

6.2.9.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the Southern Resident killer whale.

The most recent abundance estimate for the Southern Resident DPS is 81 whales in 2015 (Carretta et al. 2017). This represents a decline from just a few years ago, when in 2012, there were 85 whales. Population abundance has fluctuated over time with a maximum of approximately 100 whales in 1995 (Carretta et al. 2017), with an increase between 1974 and 1993, from 76 to 93 individuals. As compared to stable or growing populations, the DPS reflects lower fecundity and has demonstrated little to no growth in recent decades (NMFS 2016l).

For the period between 1974 and the mid-90s, when the population increased from 76 to 93 animals, the population growth rate was 1.8 percent (Ford et al. 1994). More recent data indicate the population is now in decline (Carretta et al. 2017).

After thorough genetic study, the Biological Review Team concluded that Southern Resident killer whales were discrete from other killer whale groups (NMFS 2008). Despite the fact that their ranges overlap, Southern Resident killer whales do not intermix with Northern Resident killer whales. Southern Resident killer whales consist of three pods, called J, K, and L. Low genetic diversity within a population is believed to be in part due to the matrilineal social structure (NMFS 2008).

Southern Resident killer whales occur in the inland waterways of Puget Sound, Strait of Juan de Fuca, and Southern Georgia Strait during the spring, summer and fall. During the winter, they move to coastal waters primarily off Oregon, Washington, California, and British Columbia (Figure 22).

6.2.9.3 Status

The Southern Resident killer whale DPS was listed as endangered in 2005 in response to the population decline from 1996 to 2001, small population size, and reproductive limitations (i.e., few reproductive males and delayed calving). Current threats to its survival and recovery include contaminants, vessel traffic, and reduction in prey availability. Chinook salmon populations have declined due to degradation of habitat, hydrology issues, harvest, and hatchery introgression; such reductions may require an increase in foraging effort. In addition, these prey contain environmental pollutants. These contaminants become concentrated at higher trophic levels and may lead to immune suppression or reproductive impairment. The inland waters of Washington and British Columbia support a large whale watch industry, commercial shipping, and recreational boating; these activities generate underwater noise, which may mask whales' communication or interrupt foraging. The factors that originally endangered the species persist

throughout its habitat: contaminants, vessel traffic, and reduced prey. The DPS's resilience to future perturbation is reduced as a result of its small population size. The recent decline, unstable population status, and population structure (e.g., few reproductive age males and non-calving adult females) continue to be causes for concern. The relatively low number of individuals in this population makes it difficult to resist or recover from natural spikes in mortality, including disease and fluctuations in prey availability.

6.2.9.4 Critical Habitat

On November 29, 2006, NMFS designated critical habitat for the Southern Resident killer whale. The critical habitat consists of approximately 6,630 square kilometers in three areas: the Summer Core Area in Haro Strait and waters around the San Juan Islands; Puget Sound; and the Strait of Juan de Fuca (Figure 24). It provides the following physical and biological features essential to the conservation of Southern Resident killer whales: water quality to support growth and development; prey species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth; and inter-area passage conditions to allow for migration, resting, and foraging.

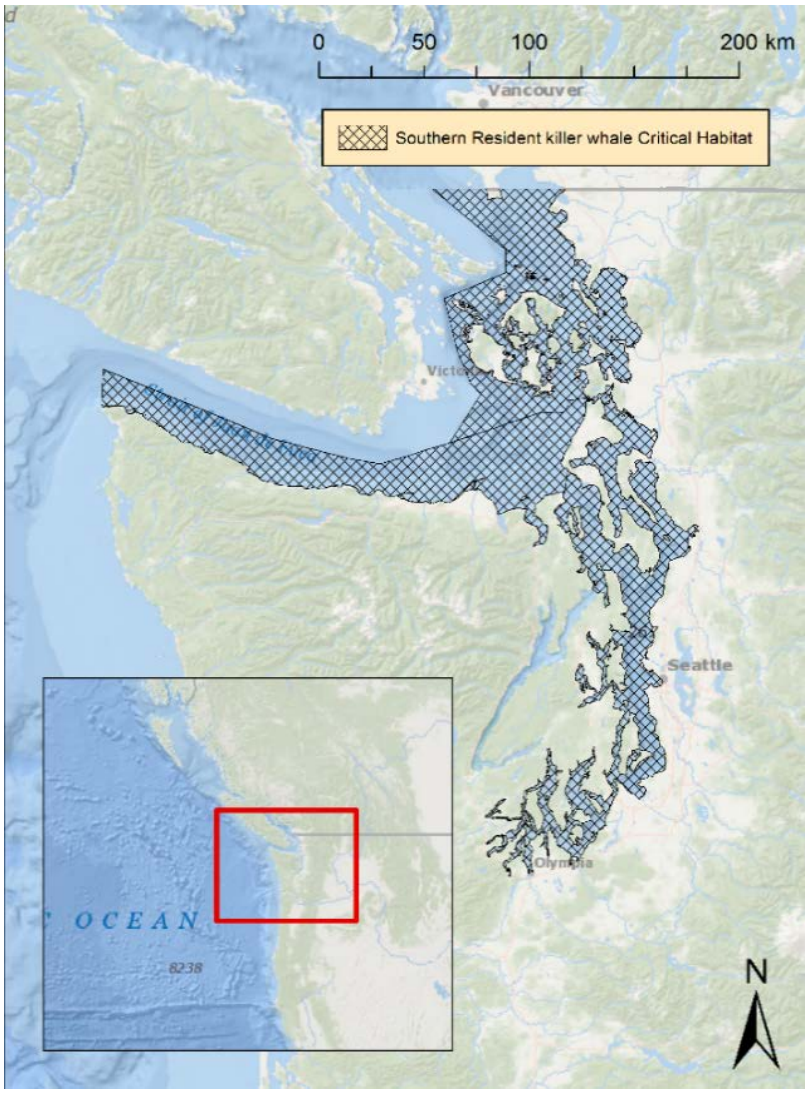

Figure 24: Map depicting designated critical habitat for the Southern Resident killer whale.

6.2.9.5 Recovery Goals

See the 2008 Final Recovery Plan for the Southern Resident killer whale for complete down listing/delisting criteria for each of the following recovery goals.

1. Prey Availability: Support salmon restoration efforts in the region including habitat, harvest and hatchery management considerations and continued use of existing NMFS authorities under the ESA and Magnuson-Stevens Fishery Conservation and Management Act to ensure an adequate prey base
2. Pollution/Contamination: Clean up existing contaminated sites, minimize continuing inputs of contaminants harmful to killer whales, and monitor emerging contaminants.
3. Vessel Effects: Continue with evaluation and improvement of guidelines for vessel activity near Southern Resident killer whales and evaluate the need for regulations or protected areas.

4. Oil Spills: Prevent oil spills and improve response preparation to minimize effects on Southern Residents and their habitat in the event of a spill.
5. Acoustic Effects: Continue agency coordination and use of existing ESA and MMPA mechanisms to minimize potential impacts from anthropogenic sound.
6. Education and Outreach: Enhance public awareness, educate the public on actions they can participate in to conserve killer whales and improve reporting of Southern Resident killer whale sightings and strandings.
7. Response to Sick, Stranded, Injured Killer Whales: Improve responses to live and dead killer whales to implement rescues, conduct health assessments, and determine causes of death to learn more about threats and guide overall conservation efforts.
8. Transboundary and Interagency Coordination: Coordinate monitoring, research, enforcement, and complementary recovery planning with Canadian agencies, and Federal and State partners.
9. Research and Monitoring: Conduct research to facilitate and enhance conservation efforts. Continue the annual census to monitor trends in the population, identify individual animals, and track demographic parameters.

6.2.10 North Atlantic Right Whale

The North Atlantic right whale is a narrowly distributed baleen whale found in temperate and sub-polar latitudes in the North Atlantic Ocean (Figure 25).

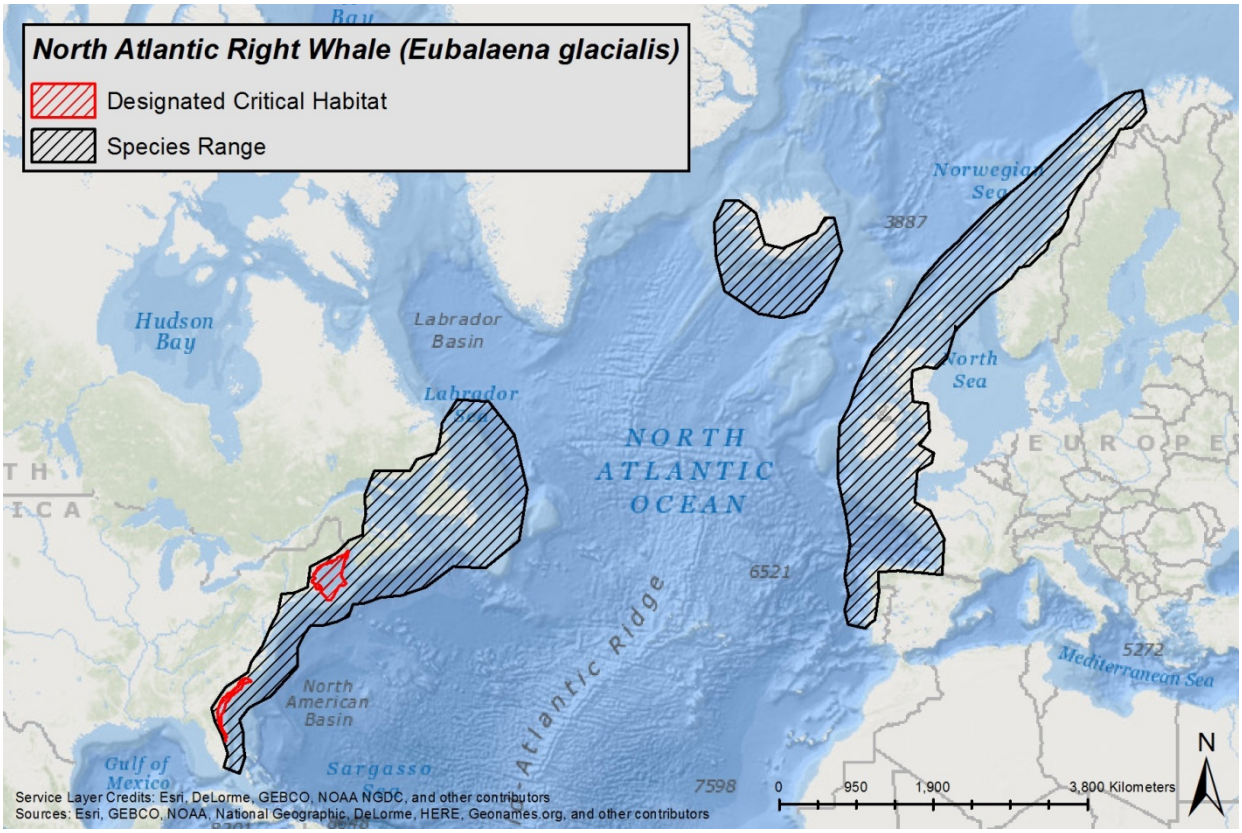

Figure 25: Map identifying range and critical habitat of the North Atlantic right whale.

The North Atlantic right whale is a narrowly distributed baleen whale, distinguished by its stocky body and lack of a dorsal fin (Figure 26). The species was originally listed as endangered on December 2, 1970 (Table 15).

Figure 26: North Atlantic right whale. Photo: National Oceanic and Atmospheric Administration.

Table 15. North Atlantic right whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Eubalaena glacialis	North Atlantic right whale	None	Endangered	2012	73 FR 12024	2005	81 FR 4837

We used information available in the five-year review (Colligan et al. 2012), the most recent stock assessment report (Hayes et al. 2017), and the scientific literature to summarize the life history, population dynamics and status of the species, as follows.

6.2.10.1 Life history

The lifespan of North Atlantic right whales is unknown, but some individuals appear to live to be at least fifty years old (Kenney 2009). Their gestation is twelve to thirteen months, and calves are nursed for eight to seventeen months. The average calving interval is three to five years and they reach sexual maturity at nine years of age. They migrate to low latitudes during the winter to give birth in shallow, coastal waters and in summer, feed on large concentrations of copepods in the high latitudes (Colligan et al. 2012).

6.2.10.2 Population dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the North Atlantic right whale.

There are currently two recognized populations of North Atlantic right whales, a western and an eastern population. There are at least 440 individuals in the western North Atlantic population (Hayes et al. 2017). This estimate is based on a review of the photo-identification recapture database as it existed in October 2013 and represents a minimum population size. Less than twenty individuals exist in the eastern North Atlantic, and as such, this population may be functionally extinct (Colligan et al. 2012)**.** Pre-exploitation abundance is not available for the species. The western population may have numbered fewer than one hundred individuals by 1935 when international protection for right whales came into effect (Kenney et al. 1995). Little is known about the population dynamics of right whales in the intervening years.

In the western North Atlantic, the species demonstrated overall growth rates of 2.5 percent over the period 1990 to 2010, despite two periods of increased mortality during that time span (Hayes et al. 2017). However, data from 2012 may indicate that the population is now in decline (Hayes et al. 2017; Kraus et al. 2016).

Analysis of mtDNA from North Atlantic right whales has identified seven mtDNA haplotypes in the western North Atlantic. This is significantly less diverse than southern right whales (*Eubalaena australis*) and may indicate inbreeding. While analysis of historic DNA taken from museum specimens indicates that the eastern and western populations were likely not genetically distinct, the lack of recovery of the eastern North Atlantic population indicates at least some level of population segregation. Overall, the species has low genetic diversity as would be expected based on its low abundance (Hayes et al. 2017).

Today, North Atlantic right whales are primarily found in the western North Atlantic, from their breeding grounds in lower latitudes off the coast of the southeastern U.S. to their feeding grounds in higher latitudes off the coast of Nova Scotia (Hayes et al. 2017). Very few, if any, individuals are thought to make up the population in the eastern Atlantic (Hayes et al. 2017). However, in recent years a few known individuals from the western population have been seen in the eastern Atlantic, suggesting some individuals may have wider ranges than previously thought (Kenney 2009).

6.2.10.3 Status

The North Atlantic right whale is listed under the ESA as endangered. With whaling now prohibited, the two major threats to the survival and recovery of the species are ship strikes and entanglement in fishing gear. Substantial progress has been made in mitigating ship strikes by regulating vessel speeds (78 FR 73726) (Conn and Silber 2013; Waring et al. 2016), but entanglement in fishing gear remains a major threat (Kraus et al. 2016). In addition, while population trends have been positive since its original listing, the species may now be in decline and its resilience to future perturbations is low due to its small population size.

6.2.10.4 Critical Habitat

Critical habitat for North Atlantic right whales was designated in 1994 and expanded in 2016. It includes two major units: Unit 1 located in the Gulf of Maine and Georges Bank Region and

Unit 2 located off the coast of North Carolina, South Carolina, Georgia, and Florida (Figure 25). Unit 1 consists of important foraging area and contains the following physical and biological features essential to the conservation of the species: the physical oceanographic conditions and structures of the Gulf of Maine and Georges Bank region that combine to distribute and aggregate the zooplankton species *Calanus finmarchicus* for right whale foraging, namely prevailing currents and circulation patterns, bathymetric features (basins, banks, and channels), oceanic fronts, density gradients, and temperature regimes; low flow velocities in Jordan, Wilkinson, and Georges Basins that allow diapausing *C. finmarchicus* to aggregate passively below the convective layer so that the copepods are retained in the basins; late stage *C. finmarchicus* in dense aggregations in the Gulf of Maine and Georges Bank region; and diapausing *C. finmarchicus* in aggregations in the Gulf of Maine and Georges Bank region. Unit 2 consists of an important calving area and contains the following physical and biological features essential to the conservation of the species: sea surface conditions associated with Force 4 or less on the Beaufort Scale, sea surface temperatures of 7 to 17 °Celsius, and water depths of 6 to 28 meters, where these features simultaneously co-occur over contiguous areas of at least 231 nautical square-miles of ocean waters during the months of November through April.

6.2.10.5 Recovery Goals

See the 2005 updated Recovery Plan for the North Atlantic right whale for complete down listing criteria for the following recovery goals:

1. The population ecology (range, distribution, age structure, and gender ratios, etc.) and vital rates (age-specific survival, age-specific reproduction, and lifetime reproductive success) of right whales are indicative of an increasing population;
2. The population has increased for a period of thirty-five years at an average rate of increase equal to or greater than two percent per year;
3. None of the known threats to Northern right whales are known to limit the population's growth rate; and
4. Given current and projected threats and environmental conditions, the right whale population has no more than a one percent chance of quasi-extinction in one hundred years.

6.2.11 North Pacific Right Whale

North Pacific right whales are found in temperate and sub-polar waters of the North Pacific Ocean (Figure 27).

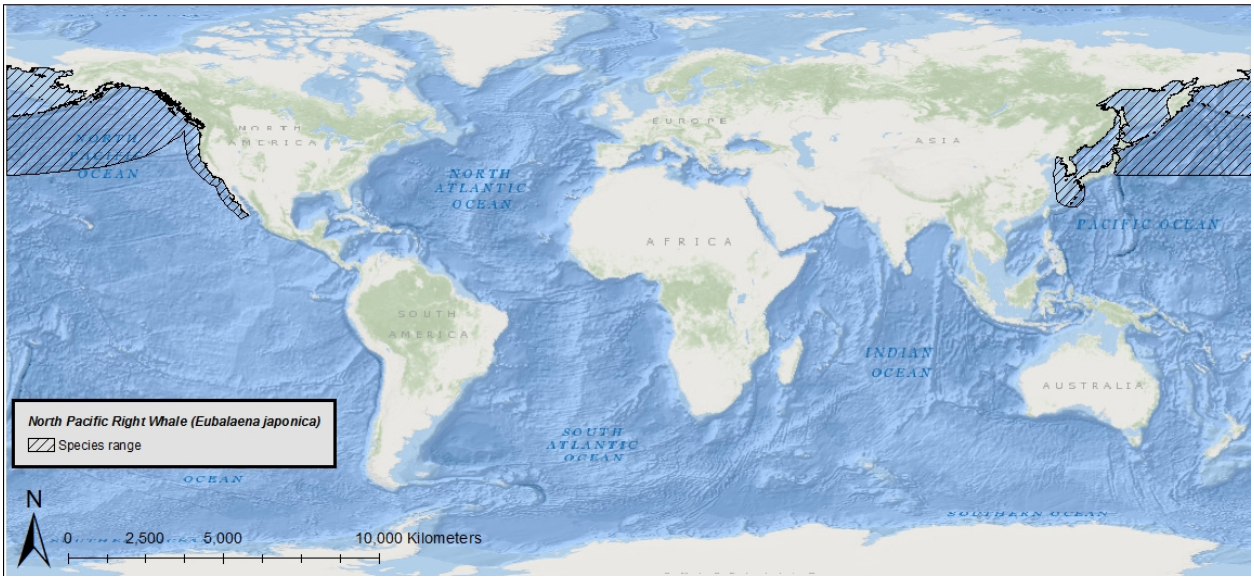

Figure 27: Map identifying the range of the North Pacific right whale.

The North Pacific right whale is a baleen whale found only in the North Pacific Ocean and is distinguishable by a stocky body, lack of dorsal fin, generally black coloration, and callosities on the head region (Figure 28). The species was originally listed with the North Atlantic right whale (i.e., "Northern" right whale) as endangered on December 2, 1970. The North Pacific right whale was listed separately as endangered on March 6, 2008 (Table 16).

Figure 28: North Pacific right whale. Photo: National Oceanic and Atmospheric Administration

Table 16: North Pacific right whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Eubalaena japonica	North Pacific right whale	None	Endangered	2012	73 FR 12024	2013	73 FR 19000

Information available from the recovery plan (NMFS 2013a) recent stock assessment reports (Muto et al. 2017), and status review (NMFS 2012a) were used to summarize the life history, population dynamics and status of the species as follows.

6.2.11.1 Life History

North Pacific right whales can live, on average, 50 or more years. They have a gestation period of approximately one year, and calves nurse for approximately one year. Sexual maturity is reached between nine and 10 years of age. The reproduction rate of North Pacific right whales remains unknown. However, it is likely low due to a male-biased sex ratio that may make it difficult for females to find viable mates. North Pacific right whales mostly inhabit coastal and continental shelf waters. Little is known about their migration patterns, but they have been observed in lower latitudes during winter (Japan, California, and Mexico) where they likely calve and nurse. In the summer, they feed on large concentrations of copepods in Alaskan

waters. North Pacific right whales are unique compared to other baleen whales in that they are skim feeders meaning they continuously filtering through their baleen while moving through a patch of zooplankton.

6.2.11.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the North Pacific right whale.

The North Pacific right whale remains one of the most endangered whale species in the world. Their abundance likely numbers fewer than 1,000 individuals. There are two currently recognized stocks of North Pacific right whales, a Western North Pacific stock that feeds primarily in the Sea of Okhotsk, and an Eastern North Pacific stock that feeds eastern north Pacific waters off Alaska, Canada, and Russia. Several lines of evidence indicate a total population size of less than 100 for the Eastern North Pacific stock. Based on photo-identification from 1998 to 2013 (Wade et al. 2011) estimated 31 individuals, with a minimum population estimate of 25.7 individuals. Genetic data have identified 23 individuals based on samples collected between 1997 and 2011 (Leduc et al. 2012). The Western North Pacific stock is likely more abundant and was estimated to consist of 922 whales (95 percent confidence intervals 404 to 2,108) based on data collected in 1989, 1990, and 1992 (IWC 2001; Thomas et al. 2016). While there have been several sightings of Western North Pacific right whales in recent years, with one sighting identifying at least 77 individuals, these data have yet to be compiled to provide a more recent abundance estimate (Thomas et al. 2016). There is currently no information on population trends for either stock of North Pacific right whales.

As a result of past commercial whaling, the remnant population of North Pacific right whales has been left vulnerable to genetic drift and inbreeding due to low genetic variability. This low diversity potentially affects individuals by depressing fitness, lowering resistance to disease and parasites, and diminishing the whales' ability to adapt to environmental changes. At the population level, low genetic diversity can lead to slower growth rates, lower resilience, and poorer long-term fitness (Lacy 1997). Marine mammals with an effective population size of a few dozen individuals likely can resist most of the deleterious consequences of inbreeding (Lande 1991). It has also been suggested that if the number of reproductive animals is fewer than fifty, the potential for impacts associated with inbreeding increases substantially. Rosenbaum et al. (2000) found that historic genetic diversity of North Pacific right whales was relatively high compared to North Atlantic right whales, but samples from extant individuals showed very low genetic diversity, with only two matrilineal haplotypes among the five samples in their dataset.

The North Pacific right whale inhabits the Pacific Ocean, particularly between 20° and 60° latitude (Figure 27). Prior to exploitation by commercial whalers, concentrations of right whales in the North Pacific where found in the Gulf of Alaska, Aleutian Islands, south central Bering Sea, Sea of Okhotsk, and Sea of Japan. There has been little recent sighting data of right whales occurring in the central North Pacific and Bering Sea. However, since 1996, North Pacific right

whales have been consistently observed in Bristol Bay and the southeastern Bering Sea during summer months. In the Western North Pacific where the population is thought to be somewhat larger, right whales have been sighted in the Sea of Okhotsk and other areas off the coast of Japan, Russia, and South Korea (Thomas et al. 2016). Although North Pacific right whales are typical found in higher latitudes, they are thought to migrate to more temperate waters during winter to reproduce, and have been sighted as far south as Hawaii and Baja California.

6.2.11.3 Status

The North Pacific right whale is endangered as a result of past commercial whaling. Prior to commercial whaling, abundance has been estimated to have been more than 11,000 individuals. Current threats to the survival of this species include hunting, vessel strikes, climate change, and fisheries interactions (including entanglement). The resilience of North Pacific right whales to future perturbations is low due to its small population size and continued threats. Recovery is not anticipated in the foreseeable future (several decades to a century or more) due to small population size and lack of available current information.

6.2.11.4 Critical Habitat

In 2008, NMFS designated critical habitat for the North Pacific right whale, which includes an area in the Southeast Bering Sea and an area south of Kodiak Island in the Gulf of Alaska (Figure 27). These areas are influenced by large eddies, submarine canyons, or frontal zones which enhance nutrient exchange and act to concentrate prey. These areas are adjacent to major ocean currents and are characterized by relatively low circulation and water movement. Both critical habitat areas support feeding by North Pacific right whales because they contain the designated physical and biological features (previously referred to as primary constituent elements), which include: nutrients, physical oceanographic processes, certain species of zooplankton, and a long photoperiod due to the high latitude. Consistent North Pacific right whale sightings are a proxy for locating these elements.

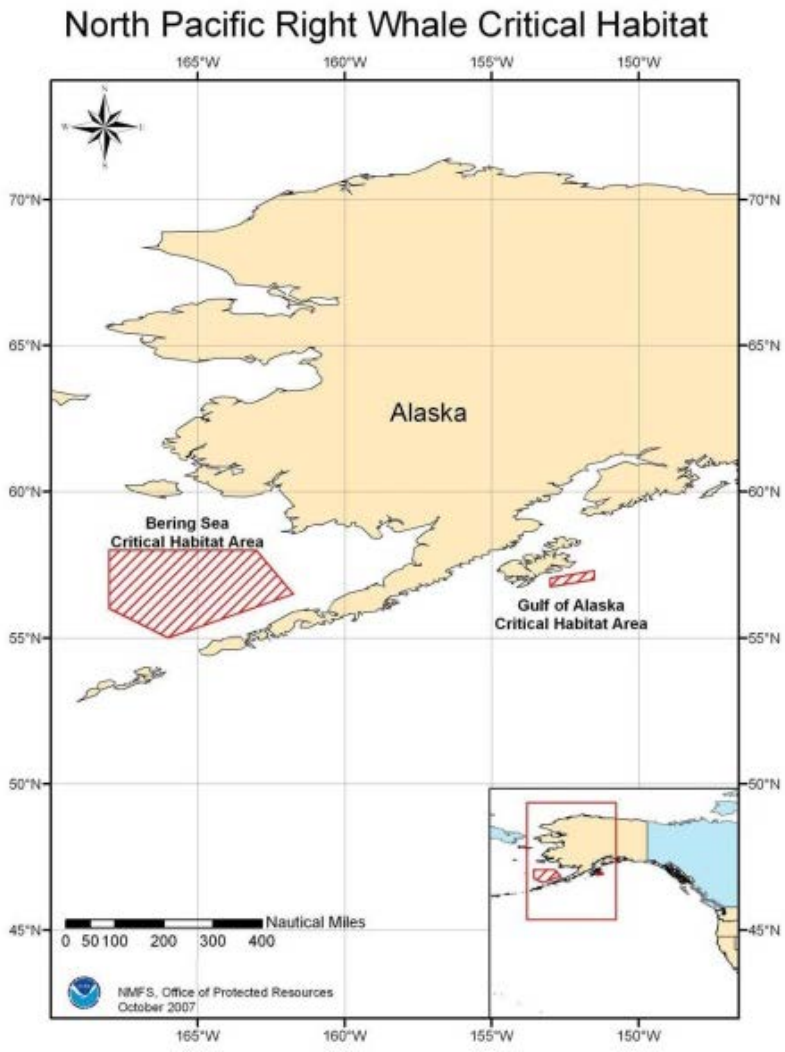

Figure 29: Map identifying designated critical habitat for the North Pacific right whale in the Southeast Bering Sea and south of Kodiak Island in the Gulf of Alaska.

6.2.11.5 Recovery Goals

See the 2013 Final Recovery Plan for the North Pacific right whale for complete down listing/delisting criteria for both of the following recovery goals.

1. Achieve sufficient and viable populations in all ocean basins.
2. Ensure significant threats are addressed.

6.2.12 Sei Whale

The sei whale is a widely distributed baleen whale found in all major oceans (Figure 30).

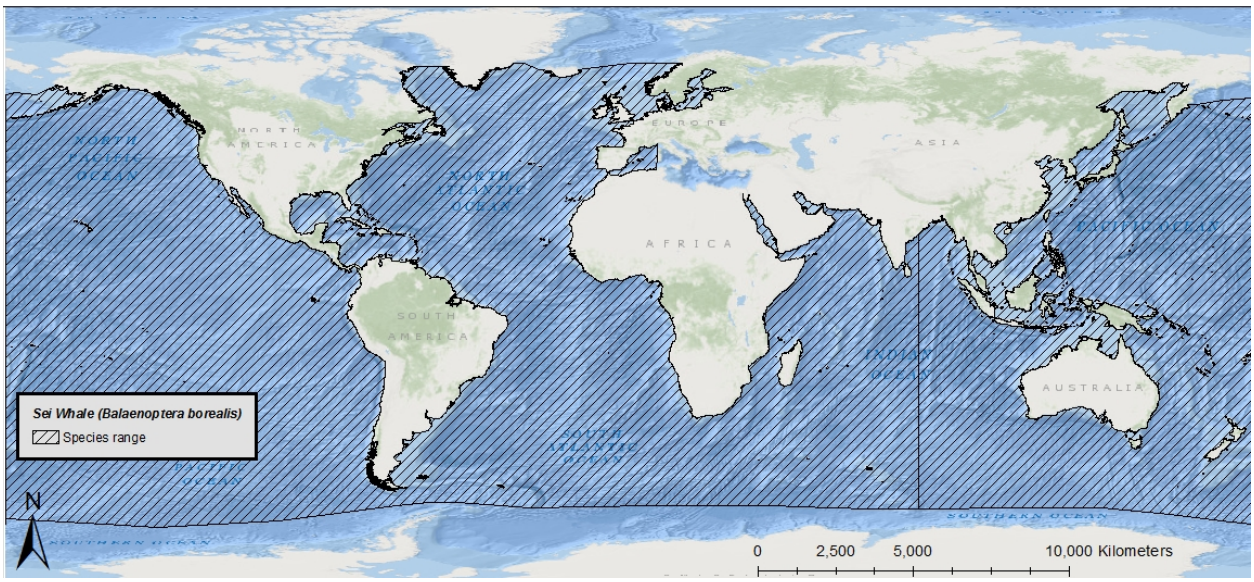

Figure 30: Map showing the range of the sei whale.

Sei whales are distinguishable from other whales by a long, sleek body that is dark bluish-gray to black in color and pale underneath, and a single ridge located on their rostrum (Figure 31). The sei whale was originally listed as endangered on December 2, 1970 (Table 17). Information available from the recovery plan (NMFS 2011d), recent stock assessment reports (Carretta et al. 2017; Hayes et al. 2017; Muto et al. 2017), and status review (NMFS 2012b) were used to summarize the status of the species as follows.

Figure 31: Sei whale. Photo: National Oceanic and Atmospheric Administration

Table 17: Sei whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Balaenoptera borealis	Sei whale	None	Endangered	2012	35 FR 18319	2011	None Designated

6.2.12.1 Life History

Sei whales can live, on average, between 50 to 70 years. They have a gestation period of 10 to 12 months, and calves nurse for six to nine months. Sexual maturity is reached between six and 12 years of age with an average calving interval of two to three years. Sei whales mostly inhabit continental shelf and slope waters far from the coastline. They winter at low latitudes, where they calve and nurse, and summer at high latitudes, where they feed on a range of prey types, including zooplankton (copepods and krill), small schooling fishes, and cephalopods.

6.2.12.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section is broken down into: abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the sei whale.

Two subspecies of sei whale are recognized, *B. b. borealis* in the Northern Hemisphere and *B. b. schlegellii* in the Southern Hemisphere. There are no estimates of pre-exploitation abundance for sei whales in the North Atlantic. Models indicate that total abundance declined from 42,000 to 8,600 between 1963 and 1974 in the North Pacific. More recently, the North Pacific population was estimated to be 29,632 (95 percent confidence intervals 18,576 to 47,267) between 2010 and 2012 (IWC 2016; Thomas et al. 2016). In the Southern Hemisphere, pre-exploitation abundance is estimated at 65,000 whales, with recent abundance estimated ranging from 9,800 to 12,000. Three relatively small stocks occur in U.S. waters: Nova Scotia (N=357, N_{min}=236), Hawaii (N=178, N_{min}=93), and Eastern North Pacific (N=519, N_{min}=374). Population growth rates for sei whales are not available at this time as there are little to no systematic survey efforts to study sei whales.

While some genetic data exist sei whales, current samples sizes are small limiting our confidence in their estimates of genetic diversity (NMFS 2011d). However, genetic diversity information for similar cetacean population sizes can be applied. Stocks that have a total population size of 2,000 to 2,500 individuals or greater provide for maintenance of genetic diversity resulting in long-term persistence and protection from substantial environmental variance and catastrophes. Stocks that have a total population 500 individuals or less may be at a greater risk of extinction due to genetic risks resulting from inbreeding. Stock populations at low densities (less than 100) are more likely to suffer from the 'Allee' effect, where inbreeding and the heightened difficulty of finding mates reduces the population growth rate in proportion with reducing density. All stocks of sei whales within U.S. waters are estimated to be below 500 individuals indicating they may be at risk of extinction due to inbreeding.

Sei whales are distributed worldwide, occurring in the North Atlantic, North Pacific, and Southern Hemisphere (Figure 30).

6.2.12.3 Status

The sei whale is endangered as a result of past commercial whaling. Now, only a few individuals are taken each year by Japan; however, Iceland has expressed an interest in targeting sei whales. Current threats include vessel strikes, fisheries interactions (including entanglement), climate change (habitat loss and reduced prey availability), and anthropogenic sound. Given the species' overall abundance, they may be somewhat resilience to current threats. However, trends are largely unknown, especially for individual stocks, many of which have relatively low abundance estimates.

6.2.12.4 Critical Habitat

No critical habitat has been designated for the sei whale.

6.2.12.5 Recovery Goals

See the 2011 Final Recovery Plan for the sei whale for complete down listing/delisting criteria for both of the following recovery goals:

1. Achieve sufficient and viable populations in all ocean basins.
2. Ensure significant threats are addressed.

6.2.13 Sperm Whale

The sperm whale is a widely distributed toothed whale found in all major oceans (Figure 32).

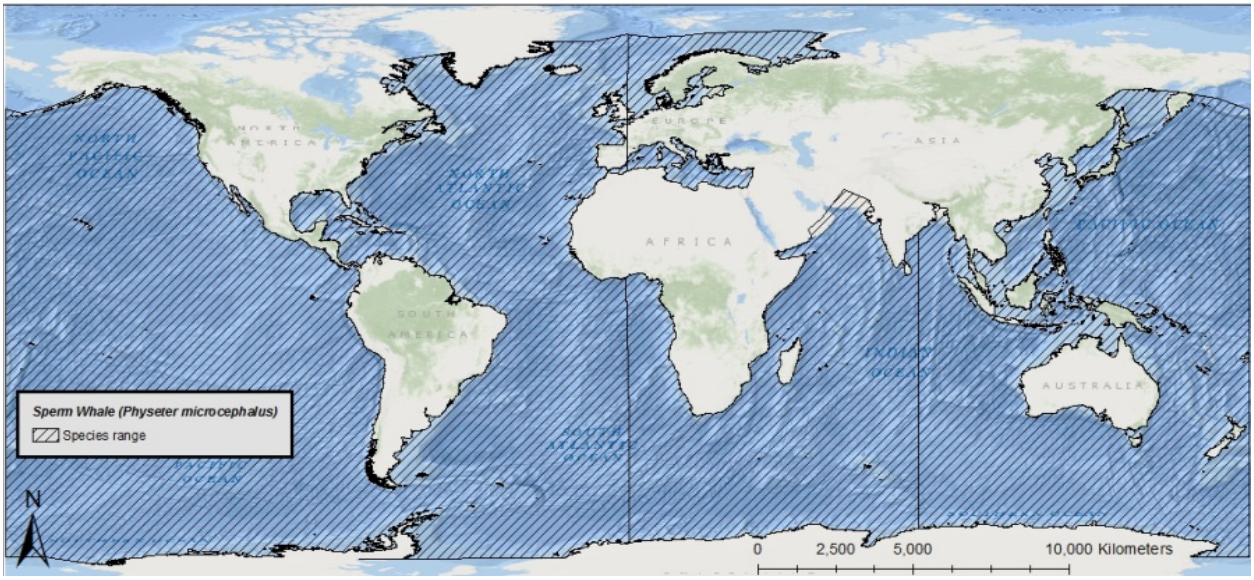

Figure 32: Map showing the range of the sperm whale.

They are the largest toothed whale and distinguishable from other whales by an extremely large head, which takes up to 25 to 35 percent of their total body length, and a single blowhole asymmetrically situated on the left side of the head near the tip (Figure 33). The sperm whale was originally listed as endangered on December 2, 1970 (Table 18). Information available from the recovery plan (NMFS 2010a), recent stock assessment reports (Carretta et al. 2017; Hayes et al. 2017; Muto et al. 2017), and status review (NMFS 2015d) were used to summarize the status of the species as follows.

Figure 33: Sperm whale. Photo: National Oceanic and Atmospheric Administration

Table 18: Sperm whale status summary and information links.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Physeter microcephalus	Sperm whale	None	Endangered	2015	35 FR 18319	2010	None Designated

6.2.13.1 Life History

The average lifespan of sperm whales is estimated to be at least 50 years (Whitehead 2009). They have a gestation period of one to one and a half years, and calves nurse for approximately two years. Sexual maturity is reached between seven to 13 years of age for females with an average calving interval of four to six years. Male sperm whales reach full sexual maturity in their twenties. Sperm whales mostly inhabit areas with a water depth of 600 meters or more, and are uncommon in waters less than 300 meters deep. They winter at low latitudes, where they calve and nurse, and summer at high latitudes, where they feed primarily on squid; other prey include octopus and demersal fish (including teleosts and elasmobranchs).

6.2.13.2 Population Dynamics

The following is a discussion of the species' population and its variance over time. This section is broken down into: abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the sperm whale.

The sperm whale is the most abundant of the large whale species, with total abundance estimates between 200,000 and 1,500,000. The most recent estimate indicated a global population of between 300,000 and 450,000 individuals (Whitehead 2009). The higher estimates may be approaching population sizes prior to commercial whaling, the reason for ESA listing. There are no reliable estimates for sperm whale abundance across the entire Atlantic Ocean. However, estimates are available for two of the three U.S. stocks in the Atlantic, the Northern Gulf of Mexico stock, estimated to consists of 763 individuals (N_{min}=560) and the North Atlantic stock, underestimated to consists of 2,288, individuals (N_{min}=1,815). There are insufficient data to estimate abundance for the Puerto Rico and the U.S. Virgin Islands stock. In the northeast Pacific, the abundance of sperm whales was estimated to be between 26,300 and 32,100 in 1997. In the eastern tropical Pacific, the abundance of sperm whales was estimated to be 22,700 (95 percent confidence intervals 14,800 to 34,600) in 1993. Population estimates are also available for two of the three U.S. stocks that occur in the Pacific, the California/Oregon/Washington stock, estimated to consist of 2,106 individuals (N_{min}=1,332), and the Hawaii stock, estimated to consist of 3,354 individuals (N_{min}=2,539). There are insufficient data to estimate the population abundance of the North Pacific stock. We are aware of no reliable abundance estimates specifically for sperm whales in the South Pacific, and there is insufficient data to evaluate trends in abundance and growth rates of sperm whale populations at this time.

Ocean-wide genetic studies indicate sperm whales have low genetic diversity, suggesting a recent bottleneck, but strong differentiation between matrilineally related groups (Lyrholm and Gyllensten 1998). Consistent with this, two studies of sperm whales in the Pacific indicate low genetic diversity (Mesnick et al. 2011; Rendell et al. 2012). Furthermore, sperm whales from the Gulf of Mexico, the western North Atlantic, the North Sea, and the Mediterranean Sea all have been shown to have low levels of genetic diversity (Engelhaupt et al. 2009). As none of the stocks for which data are available have high levels of genetic diversity, the species may be at some risk to inbreeding and 'Allee' effects, although the extent to which is currently unknown.

Sperm whales have a global distribution and can be found in relatively deep waters in all ocean basins (Figure 32). While both males and females can be found in latitudes less than 40°, only adult males venture into the higher latitudes near the poles.

6.2.13.3 Status

The sperm whale is endangered as a result of past commercial whaling. Although the aggregate abundance worldwide is probably at least several hundred thousand individuals, the extent of depletion and degree of recovery of populations are uncertain. Commercial whaling is no longer allowed, but illegal hunting may occur at biologically unsustainable levels. Continued threats to

sperm whale populations include vessel strikes, entanglement in fishing gear, competition for resources due to overfishing, pollution, loss of prey and habitat due to climate change, and noise. The species' large population size indicates it is somewhat resilient to current threats.

6.2.13.4 Critical Habitat

No critical habitat has been designated for the sperm whale.

6.2.13.5 Recovery Goals

See the 2010 Final Recovery Plan for the sperm whale for complete down listing/delisting criteria for both of the following recovery goals:

1. Achieve sufficient and viable populations in all ocean basins.
2. Ensure significant threats are addressed.

7 ENVIRONMENTAL BASELINE

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action areas that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 C.F.R. §402.02). In this section, we discuss the environmental baseline within the action areas as it applies to species that are likely to be adversely affected by the proposed action.

7.1 Climate Change

There is no question that our climate is changing. The globally-averaged combined land and ocean surface temperature data, as calculated by a linear trend, show a warming of approximately 0.85 degrees Celsius over the period 1880 to 2012 (IPCC 2014). Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850 (IPCC 2014). Burning fossil fuels has increased atmospheric carbon dioxide concentrations by 35 percent with respect to pre-industrial levels, with consequent climatic disruptions that include a higher rate of global warming than occurred at the last global-scale state shift (the last glacial-interglacial transition, approximately 12,000 years ago) (Barnosky et al. 2012). Ocean warming dominates the increase in energy stored in the climate system, accounting for more than 90 percent of the energy accumulated between 1971 and 2010 (IPCC 2014). It is virtually certain that the upper ocean (zero to 700 meters) warmed from 1971 to 2010 and it likely warmed between the 1870s and 1971 (IPCC 2014). On a global scale, ocean warming is largest near the surface, and the upper 75 meters warmed by 0.11 degrees Celsius per decade over the period 1971 to 2010 (IPCC 2014). There is high confidence, based on substantial evidence, that observed changes in marine systems are associated with rising water temperatures, as well as related changes in ice cover, salinity, oxygen levels, and circulation. Higher carbon dioxide concentrations have also caused the ocean rapidly to become more acidic, evident as a decrease in pH by 0.05 in the past two decades (Doney 2010).

This climate change is projected to have substantial direct and indirect effects on individuals, populations, species, and the structure and function of marine ecosystems in the near future. It is most likely to have the most pronounced effects on species whose populations are already in tenuous positions (Isaac 2008). As such, we expect the extinction risk of ESA-listed species to rise with global warming. Primary effects of climate change on individual species include habitat loss or alteration, distribution changes, altered and/or reduced distribution and abundance of prey, changes in the abundance of competitors and/or predators, shifts in the timing of seasonal activities of species, and geographic isolation or extirpation of populations that are unable to adapt. Secondary effects include increased stress, disease susceptibility, and predation. Cetaceans with restricted distributions linked to water temperature may be particularly exposed to range restriction (Issac 2009; Learmonth et al. 2006). MacLeod (2009) estimated that, based on expected shifts in water temperature, the ranges of 88 percent of cetaceans would be affected, 47 percent would be negatively affected, and 21 percent would be put at risk of extinction. Blue, fin, humpback, killer, and sperm whales all have a fairly global, cosmopolitan distribution, and so are not predicted to significantly alter their ranges. However, even if these species ranges are not expected to shift, changes in other aspects of their ecology such as the arrival at and departure from feeding grounds and diet may still occur (Ramp et al. 2015). Having a northern distributions, beluga, bowhead, North Atlantic right, North Pacific right whales are expected to be negatively impacted. No prediction is available for sei whales. False killer whales have an oceanic distribution and favor warmer waters, and as such are expected to experience favorable conditions with climate change. Gray whales tend to be distributed along the continental shelf and are predicted to be relatively unaffected. Bryde's whales are found both along the coastal shelf and in oceanic waters, and are predicted to experience favorable conditions.

In the Pacific, large-scale periodic oceanographic patterns such as the El Niño Southern Oscillation, the Pacific decadal oscillation, and the North Pacific gyre oscillation can fundamentally change oceanographic conditions leading to changes in productivity and ultimately marine species' distribution and ecology. Cetaceans are no exception with baleen whales showing distribution shifts and changes in diet in accordance with large-scale ocean oscillations (Benson et al. 2002; Fleming et al. 2016). Typical changes from these climatic patterns include changes in sea surface temperature, precipitation, sea level, and downwelling conditions (Royer and Weingartner 1999; Whitney et al. 1999). The 1982/1983 El Niño and other downwelling events are generally regarded to have reduced food supplies for marine mammals along the U.S. West Coast (Feldkamp et al. 1991; Hayward 2000; Le Boeuf and Crocker 2005). Marine mammal distribution and group size is also believed to have shifted northward in response to persistent prey occurrence in more northerly waters during El Niño events (Benson et al. 2002; Danil and Chivers 2005; Lusseau et al. 2004; Norman et al. 2004; Shane 1994; Shane 1995). Plankton diversity also shifts with El Niño events, as smaller plankton are better able to cope with reduced nutrient availability (Corwith and Wheeler 2002; Sherr et al. 2005). While these large-scale oceanographic patterns occur naturally and are not the consequence of climate change, climate change is predicted to affect these patterns, which may

have cascading affects to baleen whales. For example, climate models predict that El Niño will remain the dominant mode of interannual variability into the 21st century (IPCC 2014), which based on historic data, may reduce prey availability for marine mammals on the west coast of the U.S. (Feldkamp et al. 1991; Hayward 2000; Le Boeuf and Crocker 2005).

In the western North Atlantic, surface temperatures have been unusually warm in recent years (Blunden and Arndt 2016). A study by (Polyakov et al. 2009), suggests that the North Atlantic overall has been experiencing a general warming trend over the last 80 years of 0.031 ± 0.006 ºCelsius per decade in the upper 2,000 meters of the ocean. These sea surface temperatures are closely related to the North Atlantic Oscillation, which results from variability in pressure differences between a low pressure system that lies over Iceland and a high pressure system that lies over the Azores Islands. The North Atlantic Oscillation Index, which is positive when both systems are strong and negative when both systems are weak, varies from year to year. In years when the North Atlantic Oscillation Index is positive, sea surface temperature generally increases, which is thought to produced favorable conditions for *C. finmarchicus*, the principal prey of North Atlantic right whales (Conversi et al. 2001). As a result, during these years North Atlantic right whale calving rates generally increase, although there may be some lag in timing (Greene et al. 2003). In years when the index is negative, sea surface temperatures are generally lower, and as a result, so is the abundance of *C. finmarchicus* and consequently, North Atlantic right whale calving rates in subsequent years (Drinkwater et al. 2003; Greene et al. 2003; Pershing et al. 2010). In recent years, the oscillation has been mostly positive, leading to increases in copepod abundance and North Atlantic right whale calving rates (Meyer-Gutbrod and Greene 2014). However, climate change models suggest that increases in ocean temperature may produce more severe fluctuations in the North Atlantic Oscillation, which may cause dramatic shifts in the reproductive rate of North Atlantic right whales (Drinkwater et al. 2003; Greene et al. 2003). While the relationship between changes in sea surface temperature, prey, and the reproduction of other ESA-listed whales is unknown, it is likely that these species will be similarly affected by future climatic changes.

7.2 Whaling

It is not known how many whales were taken by aboriginal hunting and early commercial whaling, though some stocks were already reduced by 1864 (the beginning of the era of modern commercial whaling using harpoon guns as opposed to harpoons simply thrown by men). From 1864 to 1985, at least 2.4 million baleen whales (excluding minke whales) and sperm whales were killed (Gambell 1999). In 1982, the IWC issued a moratorium on commercial whaling beginning in 1985. There is currently no legal commercial whaling by IWC Member Nations party to the moratorium; however, whales are still killed commercially by countries that filed objections to the moratorium (Iceland and Norway). Additionally, the Japanese whaling fleet carries out whale hunts under the guise of “scientific research,” though very few peer-reviewed papers have been published as a result of the program, and meat from the whales killed under the program is processed and sold at fish markets. Finally, whales in a few areas of the world are

also still killed for subsistence purposes. ESA-listed whale mortalities since 1985 resulting from these activities can be seen below in Table 19 (IWC 2017a; IWC 2017b; IWC 2017c).

Table 19: Endangered Species Act-listed whale mortalities as the result of whaling since 1985.

Species	Commercial Whaling	Scientific Research	Subsistence
Beluga whales			
Blue whales			
Bowhead whales			1531
False killer whales			
Fin whales	706	310	368
Gray whales			3,667
Gulf of Mexico Bryde's whales			
Humpback whales			114
Killer whales			
North Atlantic right whales			
North Pacific right whales			
Sei whales		1,339	3
Sperm whales	388	56	

7.3 Vessel Strikes

Vessel strikes are considered a serious and widespread threat to ESA-listed whales. This threat is increasing as commercial shipping lanes cross important breeding and feeding habitats and as whale populations recover and populate new areas or areas where they were previously extirpated (Swingle et al. 1993; Wiley et al. 1995). As vessels continue to become faster and more widespread, an increase in vessel interactions with cetaceans is to be expected. The vast majority of commercial vessel strike mortalities of cetaceans are likely undocumented, as most are likely never reported and most whales killed by vessel strike likely end up sinking rather than washing up on shore. Kraus et al. (2005) estimated that 17 percent of vessel strikes are actually detected. Of 11 cetacean species known to be threatened by vessel strikes, fin whales are the mostly commonly struck species (Laist et al. 2001; Vanderlaan and Taggart 2007). While any vessel has the potential to hit whales, in most cases, lethal or severe injuries are caused by vessel 80 meters or greater, travelling 14 knots or faster (Laist et al. 2001).

Vessel traffic within the action areas can come from both private (e.g., commercial, recreational) and federal vessel (e.g., military, research), but traffic that is most likely to result in vessel strikes comes from commercial shipping. A map of the action area, with commercial shipping density data overlaid can be seen in Figure 34 (Halpern et al. 2015).

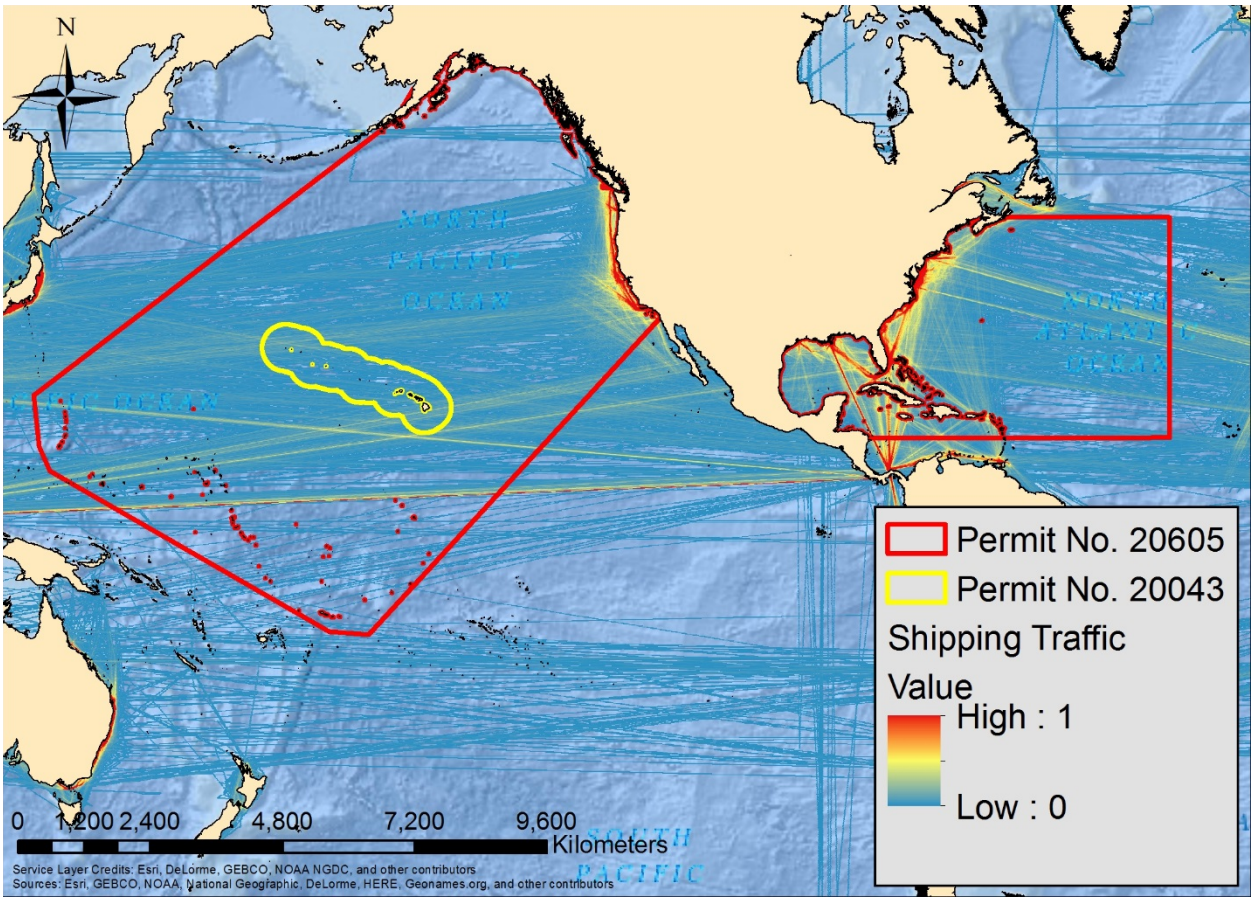

Figure 34: Relative shipping traffic within the action areas. Data from (Halpern et al. 2015).

The potential lethal effects of vessel strikes are particularly profound on species with low abundance. However, all whale species have the potential to be affected by vessel strikes. The latest five-year average mortalities and serious injuries related to vessel strikes for the ESA-listed cetacean stocks within U.S. waters likely to be found in the action areas are given in Table 20 below (Carretta et al. 2017; Carretta et al. 2016a; Helker et al. 2017; Henry et al. 2016). Data are broken down by ocean basin/NMFS stock areas and represent only known mortalities and serious injuries; more, undocumented mortalities and serious injuries for these and other stocks found within the action areas have likely occurred.

Table 20: Five-year mortalities and serious injuries related to vessel strikes for Endangered Species Act-listed whale stocks within the action areas. NA indicates not applicable as the species does not occur in this area.

Species	Stocks		
	Atlantic	Pacific	Alaska
Beluga whales (Cook Inlet DPS)	NA	NA	0
Blue whales	0	0.6	0
Bowhead whales	0	NA	0
False killer whales (Main Hawaiian Islands Insular DPS)	NA	0	NA
Fin whales	3.2	1.8	0.2

Species	Stocks		
	Atlantic	Pacific	Alaska
Gray whales (Unknown Population)	NA	1.4	0
Gulf of Mexico Bryde's whales	0	NA	NA
Humpback whales (Multiple ESA-listed DPSs)	NA	1	2
Killer whales (Southern Resident DPS)	NA	0	NA
North Atlantic right whales	1.2	NA	NA
North Pacific right whales	NA	0	0
Sei whales	0.8	0	0
Sperm whales	0.2	0.2	0

7.4 Whale Watching

There are numerous whale watching operations within the action areas (O'Connor et al. 2009). Whale watching is a rapidly-growing business with more than 3,300 operators worldwide, serving 13 million participants in 119 countries and territories (O'Connor et al. 2009). Although considered by many to be a non-consumptive use of cetaceans with economic, recreational, educational and scientific benefits, whale watching has the potential impact whales in a variety of whales (reviewed in Parsons 2012). In some cases, whale watching vessels have a high frequency of collision with whales (Parsons 2012). Whale watching vessels can also contribute to underwater noise that may affect whales (Parsons 2012). Harassment from whale watching vessels has been known to cause whales to alter surfacing, acoustic, and swimming behavior and can lead to changes in direction, group size, and coordination (Parsons 2012). In addition, preferred habitats may be abandoned if disturbance levels are too high (Parsons 2012). The particular response observed appears to be dependent on factors such as vessel proximity, speed, and direction, as well as the number of vessels in the vicinity. While numerous short-term behavioral responses to whale watching vessels are well documented, much less is known about long-term negative effects. However, in a recent study of humpback whales off the coast of New England, Weinrich and Corbelli (2009) found no detectable impacts on calf production or survival. Nonetheless, as longitudinal research on these species continues, we will soon have a better understanding of the population-level, long-term impacts of whale watching (New et al. 2015).

7.5 Sound

Cetaceans generate and rely on sound to navigate, hunt, and communicate with other individuals and anthropogenic sound can interfere with these important activities (Nowacek et al. 2007). Anthropogenic sound in the action areas may be generated by commercial and recreational vessels, sonar, aircraft, military activity (discussed in Section 7.6), seismic exploration, in-water construction activities, wind farms, and other human activities. These activities occur to varying degrees throughout the year and may lead to behavioral disturbance or even physical damage, both of which have the potential to negatively impact fitness. Behavioral disturbances may include changes in surfacing, diving, orientation, and vocalizations (Gomez et al. 2016; Nowacek

et al. 2007). Physiological responses can include stress related changes such as increases in heart rate, respiratory rates, stress hormones, and temporary or permanent hearing threshold shifts (Kunc et al. 2016; Nowacek et al. 2007).

Commercial shipping traffic is a major source of low frequency anthropogenic sound in the action areas, particularly some parts of the action area for Permit No. 20605 (Figure 34, Section 7.3) (NRC 2003). Large vessels emit predominantly low frequency sound which overlaps with many mysticetes predicted hearing ranges [7 hertz (Hz) to 35 kHz, (NOAA 2016)] and may mask their vocalizations and cause stress (Rolland et al. 2012). Studies also report broadband sound from large cargo ships above two kHz that may interfere with important biological functions of odontocetes, including foraging (Blair et al. 2016; Holt 2008). Other commercial vessels (e.g., whale watching, fisheries, etc.) and recreational vessels also operate within the action areas and may produce similar sounds, although to a lesser extent given their much smaller size. Nonetheless, even sound from small whale watching vessels can cause auditory masking, behavioral responses, and temporary threshold shifts in cetaceans (Nowacek et al. 2007). Anthropogenic sound from vessel traffic may be particularly prevalent in shallower waters (13 to 19 meters). At greater foraging depths of 100 to 200 meters (Croll et al. 2001; Goldbogen et al. 2011), less but still substantial vessel traffic sound can be heard. Anthropogenic noise from commercial vessel traffic within the action areas can be seen in Figure 35 below.

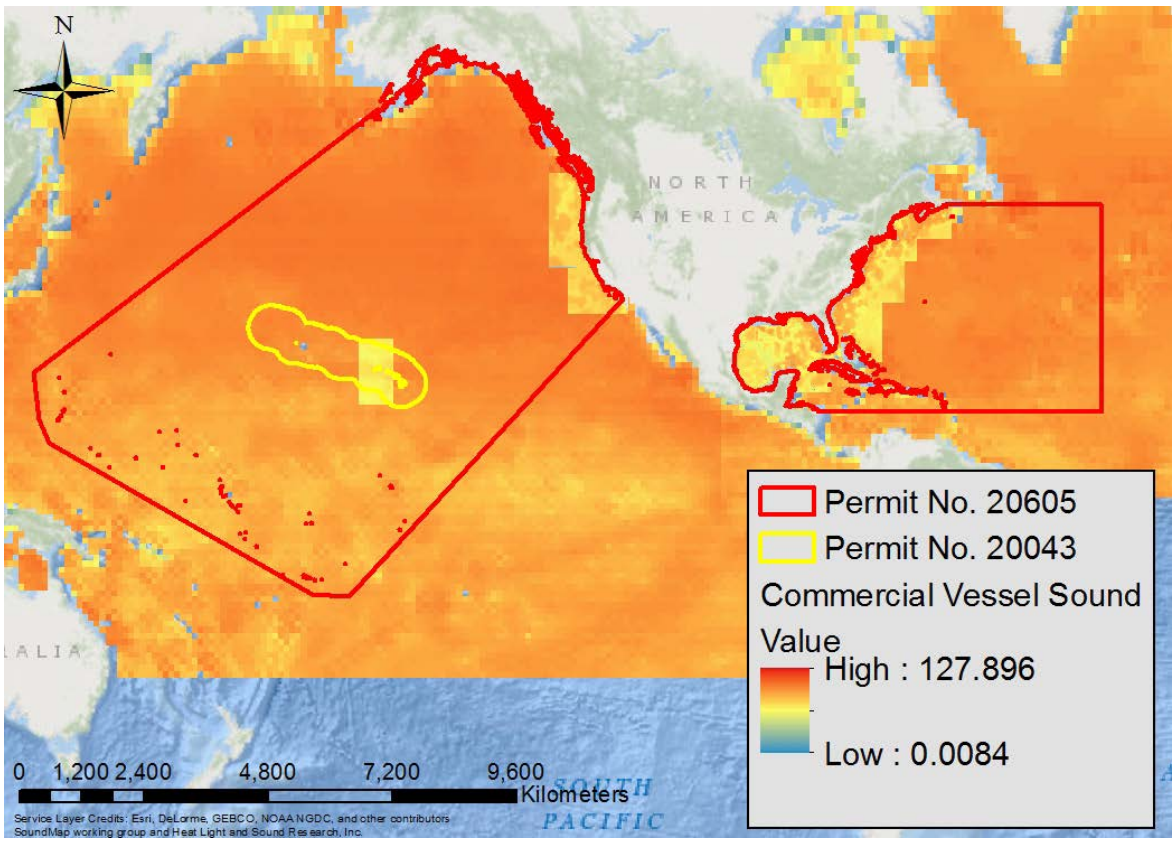

Figure 35: Commercial vessel traffic sound in decibels, 1/3-octave centered at 100 hertz at 30 meters, within action areas. Data from http://cetsound.noaa.gov/

Sonar systems are used on recreational, commercial, and military vessels and may also affect cetaceans (NRC 2003). Although little information is available on potential effects of multiple commercial and recreational sonars to cetaceans, the distribution of these sounds would be small because of their short durations and the fact that the high frequencies of the signals attenuate quickly in seawater (Nowacek et al. 2007). However, military sonar, particularly low frequency active sonar, often produces intense sounds at high source levels, and these may impact cetacean behavior (Southall et al. 2016). For further discussion of military sound on the ESA-listed species considered in this opinion see Section 7.6.

Aircraft within the action areas may consist of small commercial or recreation airplanes or helicopters, to large commercial airliners. These aircraft produce a variety of sounds that could potentially enter the water and impact cetaceans. While it is difficult to assess these impacts, several studies have documented what appear to be minor behavioral disturbances in response to aircraft presence (Nowacek et al. 2007).

There are also oil and gas activities within the action area of Permit No. 20605, especially in the Gulf of Mexico. These activities may produce noise that could impact ESA-listed cetaceans within the action areas. In addition, scientific research and/or geological and geophysical seismic surveys involving airguns may occur within the action area. These airguns generate intense low-frequency sound pressure waves capable of penetrating the seafloor and are fired repetitively at intervals of 10 to 20 seconds for extended periods (NRC 2003). Most of the energy from the guns is directed vertically downward, but significant sound emission also extends horizontally. Peak sound pressure levels from airguns usually reach 235 to 240 decibels at dominant frequencies of five to 300 Hz (NRC 2003). Most of the sound energy is at frequencies below 500 Hz, which is within the hearing range of baleen whales (Nowacek et al. 2007). In the United States, all seismic surveys involving the use of airguns with the potential to take marine mammals are covered by incidental harassment authorizations under the MMPA, and if they involve ESA-listed species, undergo formal ESA section 7 consultation. In addition, the Bureau of Ocean Energy Management authorizes oil and gas activities in U.S. waters, and in doing so, consults with NMFS to ensure their actions do not jeopardize the continued existence of ESA-listed species or adversely modify or destroy designated critical habitat. More information on the effects of oil and gas activities on ESA-listed species, including authorized takes, can be found in the recent biological opinions on the Bureau of Ocean Energy Management activities (NMFS 2002; NMFs 2013b; NMFS 2016d)

Marine construction in the action areas that produces sound includes drilling, dredging, pile driving, cable laying, and explosions. These activities are known to cause behavioral disturbance and physical damage (NRC 2003). While most of these activities are coastal, offshore construction does occur.

7.6 Military Activities

The U.S. Navy conducts military readiness activities within the action areas. All four of the Navy's range complexes overlap with the action area for Permit No. 20605, whereas only one

range complex overlaps with the action area for Permit No. 20043. Military readiness activities can be categorized as either training or testing exercises. During training, existing and established weapon systems and tactics are used in realistic situations to simulate and prepare for combat. Activities include: routine gunnery, missile, surface fire support, amphibious assault and landing, bombing, sinking, torpedo, tracking, and mine exercises. Testing activities are conducted for different purposes and include at-sea research, development, evaluation, and experimentation. The U.S. Navy performs testing activities to ensure that its military forces have the latest technologies and techniques available to them. In addition to these testing and training activities, the Navy operates Surveillance Towed Array Sensor System Low Frequency Active sonar (SURTASS LFA) within the action areas of both permits. SURTASS LFA utilizes low frequency sounds to detect and monitor submarines.

U.S. Navy activities are likely to produce sound and visual disturbance to cetaceans and may result in vessel strikes and/or other physical injury. Take of ESA-listed cetaceans within the action areas for these Navy activities has been authorized and previously consulted (NMFS 2015a; NMFS 2015b; NMFS 2015c; NMFS 2016b; NMFS 2017d). Even though our previous biological opinions considering the effects of Navy activities within the action areas resulted in incidental take statements, we concluded that the Navy's actions were not likely to jeopardize the continued existence of ESA-listed species, nor adversely modify designated critical habitat. Effects of Navy's activities on ESA-listed cetaceans include behavioral disturbance, temporary or permanent hearing threshold shifts, injury, and mortality. More details regarding the effects of Navy activities on ESA-listed cetaceans can be found in recent biological opinions considering the U.S. Navy's actions (NMFS 2015a; NMFS 2015b; NMFS 2015c; NMFS 2016b; NMFS 2017d).

7.7 Fisheries

Entrapment and entanglement in fishing gear is a frequently documented source of human-caused mortality in cetaceans (see Dietrich et al. 2007). Materials entangled tightly around a body part may cut into tissues, enable infection, and severely compromise an individual's health (Derraik 2002). Entanglements also make animals more vulnerable to additional threats (e.g., predation and vessel strikes) by restricting agility and swimming speed. The majority of cetaceans that die from entanglement in fishing gear likely sink at sea rather than strand ashore, making it difficult to accurately determine the extent of such mortalities. Cetaceans are also known to ingest fishing gear, likely mistaking it for prey, which can lead to fitness consequences and mortality. Necropsies of stranded whales have found that ingestion of net pieces, ropes, and other fishing debris has resulted in gastric impaction and ultimately death (Jacobsen et al. 2010).

As with vessel strikes, entanglement or entrapment in fishing gear likely has the greatest impact on populations of ESA-listed species with the lowest abundance (e.g., Kraus et al. 2016). Nevertheless, all species of cetacean may face threats from derelict fishing gear.

The latest five-year average mortalities and serious injuries related to fisheries interactions for the ESA-listed cetacean stocks within U.S. waters likely to be found in the action areas are given

in Table 21 below (Carretta et al. 2017; Carretta et al. 2016a; Helker et al. 2017; Henry et al. 2016). Data are broken down by ocean basin/NMFS stock areas and represent only known mortalities and serious injuries; more, undocumented mortalities and serious injuries for these and other stocks found within the action areas have likely occurred.

Table 21: Five-year mortalities and serious injuries related to fisheries interactions for Endangered Species Act-listed whale stocks within the action areas. NA indicates not applicable as the species does not occur in this area.

Species	Stocks		
	Atlantic	Pacific	Alaska
Beluga whales (Cook Inlet DPS)	NA	NA	0
Blue whales	0	0	0
Bowhead whales	0	NA	0.2
False killer whales (Main Hawaiian Islands Insular DPS)	NA	NA	0.1
Fin whales	3.2	0.2	0.2
Gray whales (Undetermined Population	NA	9	0
Gulf of Mexico Bryde's whales	0	NA	NA
Humpback whales (Multiple DPSs)	NA	7	3.4
Killer whales (Southern Resident DPS)	NA	0	NA
North Atlantic right whales	1.2	NA	NA
North Pacific right whales	NA	NA	0
Sei whales	0.8	0	0
Sperm whales	0.4	0.4	0.2

In addition to these direct impacts, cetaceans may also be subject to indirect impacts from fisheries. Many cetacean species (particularly fin and humpback whales) are known to feed on species of fish that are harvested by humans (Carretta et al. 2016b). Thus, competition with humans for prey is a potential concern. Reductions in fish populations, whether natural or human-caused, may affect the survival and recovery of ESA-listed populations. Even species that do not directly compete with human fisheries could be indirectly affected by fishing activities through changes in ecosystem dynamics. However, in general the effects of fisheries on whales through changes in prey abundance remain unknown.

7.8 Pollution

Contaminants cause adverse health effects in cetaceans. Contaminants may be introduced by rivers, coastal runoff, wind, ocean dumping, dumping of raw sewage by boats and various industrial activities, including offshore oil and gas or mineral exploitation (Garrett 2004; Grant and Ross 2002; Hartwell 2004). The accumulation of persistent organic pollutants, including polychlorinated-biphenyls, dibenzo-p-dioxins, dibenzofurans and related compounds, through trophic transfer may cause mortality and sub-lethal effects in long-lived higher trophic level animals such as cetaceans (Waring et al. 2016), including immune system abnormalities, endocrine disruption, and reproductive effects (Krahn et al. 2007). Persistent organic pollutants

may also facilitate disease emergence and lead to the creation of susceptible "reservoirs" for new pathogens in contaminated marine mammal populations (Ross 2002). Recent efforts have led to improvements in regional water quality and monitored pesticide levels have declined, although the more persistent chemicals are still detected and are expected to endure for years (Law 2014).

Exposure to hydrocarbons released into the environment via oil spills and other discharges pose risks to marine species. Cetaceans are generally able to metabolize and excrete limited amounts of hydrocarbons, but exposure to large amounts of hydrocarbons and chronic exposure over time pose greater risks (Grant and Ross 2002). Cetaceans have a thickened epidermis that greatly reduces the likelihood of petroleum toxicity from skin contact with oils (Geraci 1990), but they may inhale these compounds at the water's surface and ingest them while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect ESA-listed species indirectly by reducing food availability.

Cetaceans are also impacted by marine debris, which includes: plastics, glass, metal, polystyrene foam, rubber, and derelict fishing gear (Baulch and Perry 2014; Li et al. 2016). Marine debris is introduced into the marine environment through ocean dumping, littering, or hydrologic transport of these materials from land-based sources. Even natural phenomena, such as tsunamis and continental flooding, can cause large amounts of debris to enter the ocean environment. Small cetaceans often become entangled in marine debris, including fishing gear (Baird et al. 2015). The ingestion of marine debris has been documented to result in blockage or obstruction of the digestive tract, mouth, and stomach lining of various species and can lead to serious internal injury or mortality (Derraik 2002). In addition to interference with alimentary processes, plastics lodged in the alimentary tract could facilitate the transfer of pollutants into the bodies of whales and dolphins (Derraik 2002).

Aquatic nuisance species are aquatic and terrestrial organisms, introduced into new habitats throughout the United States and other areas of the world, that produce harmful impacts on aquatic ecosystems and native species (http://www.anstaskforce.gov). They are also referred to as invasive, alien, or nonindigenous species. Introduction of these species is cited as a major threat to biodiversity, second only to habitat loss (Wilcove et al. 1998). They have been implicated in the endangerment of 48 percent of ESA-listed species (Czech and Krausman 1997).

7.9 Scientific Research

Scientific research similar to that which would be conducted under Permit Nos. 20605 and 20043 has and will continue to impact ESA-listed cetaceans within the action areas. Currently, there are 34 active research permits that may affect the ESA-listed cetaceans considered in this opinion (Permit Nos. 13927, 14450, 14809, 14856, 15240, 15569, 15844, 16160, 16163, 16239, 16325, 16388, 17312, 17344, 17355, 17845, 18016, 18059, 18529, 18636, 18786, 18824, 18890, 19091, 19116, 19225, 19257, 19315, 19674, 20294, 20311, 20430, 20465, 20527). The primary objective of these studies is generally to monitor populations or gather data for behavioral and ecological studies. These activities may directly or incidentally result in harassment, stress, and injury. No mortalities are authorized for any animal of any age and no mortalities have been

reported from the permits currently active in the action area (although see Section 8.4.4 for a possible research related mortality). It is important to note that the research activities that would be conducted under Permit Nos. 20605 and 20043 would be in addition to those conducted under these other research permits. Many individuals would be subject to more than one activity within in a given year, and in some cases could be subject to the same activity multiple times within a single year. All of these permits have undergone ESA section 7 consultation and for each permit, we concluded that the permits and research was not likely to jeopardize the continued existence of ESA-listed species, nor adversely modify designated critical habitat.

Thirty-four research permits represents substantial research, but this research occurs over an expansive area given the size of the action area for Permit No. 20605. Much less research occurs specifically within the action area of Permit No. 20043. Nonetheless, in both action areas research is typically concentrated around easily accessible areas. As such, repeated disturbances of individuals may within a year. However, all permits contain conditions requiring the permit holders to coordinate their activities with the NMFS' regional offices and other permit holders and, to the extent possible, share data to avoid unnecessary duplication of research. In addition, many values represent permitted research activities occurring over the entire range of the species or in areas outside the limits of the action area for Permit No. 20043, and possible 20605. Nevertheless, these numbers represent a worst-case scenario in the action areas.

As detailed further below in our response analysis, cetaceans may respond to these research activities in a variety of ways including no obvious response, minor behavioral disturbances, avoidance and stress related response, temporarily abandoning important behaviors such as feeding and breeding, and in rare cases whales may become injured, infected, and possibly even die when biological samples are taken or implantable tags are used (NMFS 2017a; NMFS 2017b). The fact that multiple permitted "takes" of ESA-listed cetaceans is already permitted in the action areas and is expected to continue to be permitted in the future means that research has the ability to contribute to or even exacerbate the stress response to cetaceans generated from other threats occurring in the action area.

8 EFFECTS OF THE ACTION

Section 7 regulations define "effects of the action" as the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 C.F.R. §402.02). Indirect effects are those that are caused by the proposed action and are later in time, but are reasonably certain to occur. This effects analyses section is organized following the stressor, exposure, response, risk assessment framework.

The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of a listed species," which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50

C.F.R. §402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

In this section, we describe the potential stressors associated with the proposed action, the probability of individuals of ESA-listed species being exposed to these stressors based on the best scientific and commercial evidence available, and the probable responses of those individuals (given probable exposures) based on the available evidence. As described in Section 2, for any responses that would be expected to reduce an individual's fitness (i.e., growth, survival, annual reproductive success, or lifetime reproductive success), the assessment would consider the risk posed to the viability of the population(s) those individuals comprise and to the ESA-listed species those populations represent. For this consultation, we are particularly concerned about behavioral and stress-based physiological disruptions and potential unintentional mortality that may result in animals that fail to feed, reproduce, or survive because these responses are likely to have population-level consequences. The purpose of this assessment and, ultimately, of this consultation is to determine if it is reasonable to expect the proposed action to have effects on ESA-listed species that could appreciably reduce their likelihood of surviving and recovering in the wild.

8.1 Stressors Associated with the Proposed Action

Stressors are any physical, chemical, or biological entity that may induce an adverse response either in an ESA-listed species or their designated critical habitat. The issuance of Permit Nos. 20605 and 20043 would authorize several research activities that may expose ESA-listed cetaceans within the action areas to a variety of stressors. Each research activity presents a unique set of stressors, as further detailed below. Given the directed nature of the proposed research, all research activities directed only at non-ESA listed cetaceans (except active acoustic tags) are not expected to present any stressors to the ESA-listed cetaceans found in the action areas, and so these activities are not considered further.

Manned aerial surveys would expose cetaceans to aircraft noise and visual disturbance depending on the aircraft altitude. Unmanned aerial surveys present similar stressors, although given their much smaller size and quieter engines, the magnitude of these stressors is expected to be much smaller. Vessel surveys and close approaches would present a range of stressors including vessel traffic, discharge, and visual and auditory disturbances. Given their non-invasive nature, fecal sampling, sloughed skin sampling, prey part sampling, exhaled breath sampling, and most documentation (except underwater documentation with divers) are not expected to produce any stressors aside from those associated with vessel surveys and close approaches. Underwater documentation with snorkelers has the potential to cause disturbance as snorkelers attempt to approach and photography/video whales. Biopsy sampling carries the stressor of a closer vessel approach than is typical for other vessel survey activities (except tagging), a minor puncture wound, and tissue collection. Tagging presents the additional stressors of a very close approach to apply tags, direct physical contact in the case of suction-cup tags or puncture wounds in the case of dart/barb tags. Finally, the use of active acoustic tags,

although they would only be used on non-ESA-listed species, may present an acoustic disturbance to ESA-listed cetaceans.

8.2 Mitigation to Minimize or Avoid Exposure

Several aspects of the proposed action are designed to minimize ESA-listed species' exposure to the potential stressors associated with the research activities. These include the experience and measures taken by the researchers and conditions specified in the permit, as proposed by the Permits Division.

Dr. Baird and Dr. Au both all have extensive experience conducting research on cetaceans within the action areas using the methods described here (NMFS 2016a; NMFS 2016m). As noted in Section 1.1, all previous permits for Dr. Baird and Dr. Au underwent section 7 consultation and resulted in biological opinions concluding that the research was not likely to jeopardize the continued existence of ESA-listed species, nor destroy or adversely modify designated critical habitat. In addition, in their permits applications Dr. Baird and Dr. Au outline mitigation measures designed to minimize exposure to cetaceans. Note that some of these measures only apply to non-ESA listed species as specified.

In the application for Permit No. 20605, Dr. Baird notes the following mitigation measures:

> "We coordinate with researchers working in the same study areas with similar species and similar methods to avoid unnecessary duplication of activities and to facilitate sharing of information. For example, in Hawaii we collaborate with the Pacific Islands Fisheries Science Center; in the Pacific Northwest we collaborate with the Northwest Fisheries Science Center; and in the Atlantic all our field work is current done in collaboration with Duke.
>
> *Aerial surveys (manned and unmanned)*
>
> Manned aerial surveys will be flown at a minimum of 150 meters to minimize harassment (and at higher altitudes for ESA-listed species). A maximum of one successful close drone approach to collect blow samples will be conducted per individual per day, and the UAS will only hover over an individual long enough to obtain the needed photographs or video sequence. Overflights will be discontinued if individuals react strongly to approaches or if there is any evidence that activities are interfering with mother/calf pair bonding.
>
> *Vessel approach, photo-ID, behavioral observations, sloughed skin and fecal sample collection*
>
> During surveys the vessel travels at a constant speed averaging 18 kilometers per hour (approximately 10 knots). When animals are sighted, the vessel speed/direction is slowly changed to match the speed/direction of the animals. When close to animals, efforts are made to minimize sudden changes in speed or direction, to minimize disturbance. The vessel driver either has substantial experience working with cetaceans or is under the

direction of the Principal Investigator or a Co-Investigator. For photo-identification or behavioral observations the vessel is typically steered to remain parallel to individuals in the group when dorsal fin photos are used to identify individuals, or approached from behind when tail fluke photos are used for identification (e.g., sperm whales, humpback whales). Approaches from behind are also undertaken for fecal sample or prey sample collection, or, if an animal breaches, we may approach the location of where the individual breached to collect sloughed skin in the water (using a long-handled net). For the purposes of photo-identification groups will not be approached longer than is necessary to obtain identification photographs of the individuals present, and if there is evidence of repeated avoidance encounters will be terminated. Encounters where there is repeated avoidance are typically terminated after less than 10 minutes. For groups that are actively avoiding the vessel (e.g., striped dolphins often avoid vessels in the Pacific), encounter duration will only be long enough to obtain photos to confirm species identification, and then encounters will be terminated.

Tagging and biopsy approaches

Tags will be deployed without capturing individuals, thus eliminating risks associated with capture and handling. Approaches for the purposes of tagging or biopsying will be made in such a way as to minimize disturbance to individuals, with the research vessel gradually reducing speed as the group is approached to match the group/individual speed and direction. To minimize harassment of non-target individuals, when there is an appropriate individual that is somewhat separated from the main body of a group, these individuals will be targeted for tagging or biopsy sampling. It should be noted however that for some species (e.g., beaked whales) opportunities for tagging or biopsying are rare and there may be no option for tagging or biopsying individuals away from the main body of a group. Approaches will be discontinued if there is evidence that activities are interfering with mother/calf pair bonding, or is there is sustained evasion behavior during multiple close approaches. In general, individuals targeted for tagging or biopsying need to be surfacing in a predictable fashion, thus individuals that are engaged in high intensity activities (e.g., breaching, tail lobbing) are typically not approached for tagging or biopsying. No more than three tagging attempts per individual per day, or six tagging attempts per individual per year, will be made. No tagging attempts will be made on calves estimated to be less than one year of age (based on relative size) or females accompanied by calves less than six months of age with the exception of dwarf sperm whales, as noted above.

Biopsy and Type 2 Tagging

With the exception of individuals biopsied for the stress hormone study noted above, an individual will be not be intentionally biopsied more than once per year (based on photo-ID). Individuals will not be intentionally tagged with a Type II tag more than once per year (based on photo-ID). However as the biopsy or tag sites heal quickly it is possible

that an individual may be unintentionally biopsied or tagged twice in one year if encountered after a sufficient period that the site had healed and was no longer visible. Extra care will be taken when biopsying or tagging females which have calves less than one year of age present to avoid any unnecessary risks. For example, biopsy and/or tagging of the female would be undertaken when the calf was more than five meters from the female or after the calf had already dove and was not going to surface again immediately in close proximity to the female.

To minimize hydrodynamic drag, the smallest, lightest possible tag package available is used. Current versions of the Type II tags weigh 44 to 59 grams, in comparison to typical Type III tags being deployed which weigh from approximately 250 to 800 grams.

To minimize risk of infection, the parts of the tag that are implanted into the whale and are in contact with whale tissue will be constructed of medical grade stainless steel, titanium, or other materials (such as medical-grade synthetic polymers) proven to be biocompatible, after approval by our IACUC and the permits office. The implanted parts of the tags will be sterilized prior to first use under a veterinary approved protocol. The primary method of sterilization is with ethylene oxide gas. If a biopsy tip was used in a failed attempt, made contact with salt water, or was contaminated in the field, we would disinfect prior to use by our IACUC approved methodology, which involves soaking in a 10 percent bleach solution for at least 20 minutes, rinsing with water, soaking in isopropyl or ethyl alcohol and being allowed to air dry. If a tag misses and makes contact with salt water the darts will not be reused without gas sterilization or another sterilization method that has been approved by our IACUC.

Sex and age classes to be biopsy and tagged include adult and juvenile (greater than one year old) males and females. Biopsy may also be performed on male and female calves at least six months old and at least one month old for North Pacific right whale calves. Age of calves will be determined as described above in the methods.

Monitoring effects of activities

During field projects when tagging is undertaken, and during subsequent field projects, attempts will be made to obtain photographs of tagged individuals to examine wound healing and modes of tag failures. All groups of odontocetes encountered during field activities are approached for the purposes of photo-identification and thus obtaining photographs to monitor wound healing can be undertaken simultaneously. In addition, photographs taken by other researchers working in the area (e.g., Pacific Islands Fisheries Science Center, University of Hawaii) will be utilized."

In the application for Permit No. 20043, Dr. Au notes the following mitigation measures:

Coordination

We have and hope to continue working with the Hawaiian Islands Humpback Whale National Marine Sanctuary, Pacific Islands Fisheries Science Center, the NOAA Marine Mammal Health and Stranding Response Program, Cascadia Research Collective, and State of Hawaii Department of Land and Natural Resources.

Genetic Sampling

Methods for genetic sampling will be determined by two factors: the amount of stress, pain, or suffering caused to the animal, and the effectiveness of the sampling technique in providing sufficient amounts of DNA for genetic analysis. Of the available techniques for sampling small cetaceans, skin swabbing causes the least amount of physical damage to the animal and also results in low behavioral responses (Harlin et al. 1999). Therefore, this technique will be used unless it results in insufficient amounts of DNA for genetic analysis. If skin swabbing does not provide sufficient amounts of DNA, biopsy sampling with a hand-held pole will be used. This technique has resulted in very mild behavioral responses in common dolphins, striped dolphins, bottlenose dolphins, and Risso's dolphins (IWC 1991). Although this technique does result in more physical damage to the animal, this damage likely has no significant short-term or long-term effect on the animal. For dolphins and other small odontocetes, if the animals do not bowride frequently enough obtain a sufficient number of samples for genetic analysis, biopsy darting with a crossbow or rifle will be used. Crossbows will be the standard method for biopsy sampling with humpback whales. This general technique has been widely used and also results in only mild behavioral responses (see background discussion). The distance from which animals will be sampled by biopsy darting with a crossbow or rifle will be as large as possible to minimize pain to the animal without compromising accuracy of shot or adequacy of tissue sample (generally about five to twenty meters). No animal will be intentionally sampled more than once; however, for animals that travel in large groups and that are difficult to individually distinguish, it is possible that an animal will be sampled more than once. However, due to the high level of mobility of which these animals are capable and the close distance a vessel must approach for sampling, a disturbed animal will easily be able to avoid the vessel. If a group of animals demonstrates a strong negative response to sampling, sampling from that group of animals will be discontinued for that day. If a species consistently demonstrates strong negative responses to sampling, sampling of that species will be halted and re-evaluated. Strong negative responses may include breaches when not observed prior to sampling, strong avoidance behavior and a failure to return to previous behavior that lasts more than five minutes. As in all proposed research activities, disturbance to animals will be minimized by approaching at minimal speeds from behind or beside the group. During sampling, a steady course and speed will be held.

Suction Cup Tagging

Unlike other methods of recording diving behavior, suction cup tagging provides a method of continuous recording of the behavior, even at great depths. Other methods of recording diving behavior, such as underwater observations and sonar recordings, do not provide such detailed and continuous observations. Disadvantages of underwater observation and sonar recordings include inability to record behaviors at certain depths, inability to record fast-moving animals, and inability to record long-term diving behaviors. Using a Time Depth Recorder attached to an animal provides a more accurate record of diving behavior; however, most methods of attachment involve the capture of an animal and bolting or pinning the tag to its body. The proposed technique of tag attachment, by suction cup tags, does not involve the capture of any animals or the bolting or pinning of tags to their bodies. Therefore, the proposed method will cause much less pain, stress, or suffering to animals than alternate methods of tag attachment.

Previous studies have shown that suction cup tagged animals are able to remove the tags if they are disturbed by them (Schneider et al. 1998). To minimize disturbance to animals, attempts to tag an individual will be discontinued for the day if an animal demonstrates a strong negative response (as described above) to tagging. In addition, tagging for any individual species will be halted and re-evaluated if 10 individuals of that species demonstrate strong negative responses to tagging. As in all proposed research activities, disturbance to animals will be minimized by approaching at minimal speeds from behind or beside the group.

Behavioral and Photo-identification Studies

For photo-identification, behavioral studies, and acoustic recording, disturbance to animals will be minimized by approaching at minimal speeds from behind or beside the group. Care will be taken to remain parallel to the animals, to match speeds with the group, and to minimize changes in speed. Activities will be halted if a calf is observed to be separated from the mother.

Playbacks

Impact mitigation measures will be similar to those for the other projects, including reducing individual attempts to three, and minimizing close approaches to non-focal individuals during visual observations and behavioral monitoring, and pinger source levels will not exceed 180 dB re 1 µPa."

In addition to these mitigation measures taken by Dr. Baird and Dr. Au, the Permits Division proposed to include the following terms and conditions with each permit, which include several mitigation measures that are similar across the permits:

Permit No. 20605

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 attachments and appendices. 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 August 1, 2022. This permit expires on the date indicated and is non-renewable. This permit may be extended by the Director, NMFS Office of Protected Resources, pursuant to applicable regulations and the requirements of the MMPA and ESA.

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

   a. If serious injury or mortality[4] of protected species occurs.

   b. If authorized take[5] is exceeded in any of the following ways:

      i. More animals are taken than allowed in Tables 1 and 2 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.

[4] 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 of dependent young by starvation following research-related death of a lactating female; or deaths resulting from infections related to sampling procedures or invasive tagging. Note that for marine mammals, a serious injury is defined by regulation as any injury that will likely result in mortality.

[5] By regulation, a take under the 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.

3. The Permit Holder may continue to possess biological samples[6] acquired[7] under this permit after permit expiration without additional written authorization, provided the samples are maintained as specified in this permit.

B. Number and Kind(s) of Protected Species, Location(s) and Manner of Taking

1. The tables in Appendix 1 outline the number of protected species, by species and stock, authorized to be taken, and the locations, manner, and time period in which they may be taken.

2. Researchers working under this permit may collect visual images (e.g., photographs, video) in addition to the photo-identification or behavioral photo-documentation authorized in Appendix 1 as needed to document the permitted activities, provided the collection of such images does not result in takes.

3. The Permit Holder may use visual images and audio recordings collected under this permit, including those authorized in Tables 1 and 2 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/MMPA Permit No. 20605. 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:

[6] 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.
[7] Authorized methods of sample acquisition are specified in Appendix 1.

Counting and Reporting Takes

a. Count and report a take of a cetacean regardless of whether you observe a behavioral response to the permitted activity.

b. Count and report 1 take per cetacean per day including all approaches[8] in water and attempts to remotely biopsy, breath sample, and tag.

   i. If any of your Level A attempts on a single day are unsuccessful but make contact with the animal, count the take for the day against your applicable sampling or tagging take row.

   ii. If all of your Level A attempts on a single day are unsuccessful but do not make contact with the animal, count the take against your applicable Level B (harassment) take row.

c. During manned aerial surveys flown at an altitude lower than 1,000 ft, count and report 1 take per cetacean observed per day, regardless of the number of passes.

d. During Unmanned Aircraft System (UAS) surveys, count 1 take per cetacean approached per day, regardless of the number of passes.

e. Counting Harassment Takes for Pinnipeds: Count and report 1 take per pinniped per day for those that show movement[9] or flushing[10] (excluding alert[11]) to an approach or other permitted activity, regardless of the number of approaches and behavioral responses of the same individual in a day.

General

f. Researchers must approach animals cautiously and retreat if behaviors indicate the approach may be interfering with reproduction, feeding, or other vital functions.

g. Where females with calves are authorized to be taken, Researchers:

   i. Must immediately terminate efforts if there is any evidence that the activity may be interfering with pair-bonding or other vital

[8] An "approach" is defined as a continuous sequence of maneuvers involving a vessel, including drifting, directed toward a cetacean or group of cetaceans closer than 100 yards for sperm and baleen whales (excluding minke whales) and 50 yards for all other cetaceans.

[9] Movements in response to the source of disturbance, ranging from short withdrawals at least twice the animal's body length to longer retreats over the beach, or if already moving a change of direction of greater than 90 degrees.

[10] All retreats (flushes) to the water.

[11] Seal head orientation or brief movement in response to disturbance, which may include turning head towards the disturbance, craning head and neck while holding the body rigid in a u-shaped position, changing from a lying to a sitting position, or brief movement of less than twice the animal's body length.

functions;

ii. Must not position the research vessel between the mother and calf;

iii. Must approach mothers and calves gradually to minimize or avoid any startle response;

iv. Must discontinue an approach if a calf is actively nursing; and

v. Must, if possible, sample the calf first to minimize the mother's reaction when sampling mother/calf pairs.

h. For underwater filming/photography:

i. No more than 3 divers may be in the water at one time during research. An underwater approach/activity must be terminated if a cetacean exhibits adverse/evasive changes in behavior. Use of an additional diver is subject to review and approval by the NMFS Permits Division.

ii. Research Assistants may conduct underwater activities only if they are trained photographers, videographers, or safety divers.

i. For research in the inland waters of Washington state and research on humpbacks in Hawaii:

Vessels engaged in research activities must fly a clearly visible triangular pennant at all times. The pennant must be yellow with minimum dimensions of 18"H x 26"L and with the permit number displayed in 6" high black numerals.

j. For research in CA/OR/WA:

For activities occurring in near-shore kelp beds in California, Oregon or Washington waters between mid-July and December 31, if marbled murrelets are present, researchers must reduce boat speed to 10 miles per hour, maintain a consistent heading, and make only 1 pass through per day.

Aerial Surveys

k. Aerial flights must not be conducted over pinnipeds on land.

Manned Aerial Surveys

l. Manned aerial surveys must be flown no lower than 820 feet (250 m) for ESA-listed species and 600 feet (182 m) for non-listed species.

Unmanned Aircraft Systems (UAS)

m. Researchers are authorized to use a vertical take-off and landing (VTOL)

UAS.

n. UAS must be flown no lower than 98 feet (30 m), expect for brief descents to 50 feet (15 m) for detailed images, or 6 feet (2 m) for breath sampling.

Remote Biopsy, Breath Collection, Tagging (Suction-cup and Dart/Barb)

o. Researchers may attempt (deploy or discharge/fire) each procedure (biopsy, breath sample, and tag) on an animal 3 times a day.

p. A biopsy, breath sample, or tag attachment attempt must be discontinued if an animal exhibits repetitive, strong, adverse reactions to the activity or vessel.

q. Before attempting to biopsy, breath sample, or tag an individual, researchers must take reasonable measures (e.g., compare photo-identifications) to avoid unintentional repeated sampling of any individual.

r. Researchers must not attempt to biopsy or tag a cetacean anywhere forward of the pectoral fin.

s. Researchers must use sterile[12] biopsy tips and dart/barb tag anchors. Sterilization procedures must follow the Institutional Animal Care and Use Committee (IACUC) approved protocol described in the application.

i. If the biopsy tip, tag anchor becomes contaminated and is no longer sterile (e.g., missed attempt, contacts seawater, physical contact) prior to use, a new sterile biopsy tip and dart/barb tag anchors must be used.

ii. If a new, sterile biopsy tip is not available, the contaminated tip must be completely cleaned and disinfected[13] following the IACUC approved protocol described in the application.

iii. However, if new sterile tag anchors are not available, the researcher should cease tagging efforts until sterile alternatives are available.

[12] Sterilization = destroys or eliminates all forms of microbial life and is carried out by physical or chemical methods (CDC 2008). These methods should follow the IACUC-approved protocol for sterilization (e.g., gas).

[13] Disinfection= eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects usually by liquid chemicals (CDC 2008).

Biopsy sampling

t. Only adults, juveniles, and calves 6 months or older may be biopsy sampled, with the exception that North Pacific right whale calves 1 month or older may be biopsy sampled.

   i. Females with calves 6 months or older may be biopsy sampled.

   ii. Repeat biopsy sampling may only be performed on juveniles and adults.

Tagging

u. Only adults, juveniles, and calves 1 year or older may be tagged.

   i. Females with calves less than 6 months old may not be tagged.

   ii. For dwarf sperm whales, females with non-neonate[14] calves less than 6 months of age may be tagged.

v. A subset of animals may receive a combination of two tags per year, as follows:

   i. two suction-cup tags,

   ii. two dart/barb tags, or

   iii. one dart/barb and one suction-cup tag.

Non-target Species

w. This permit does not authorize takes of any protected species not identified in Appendix 1, including those species under the jurisdiction of the United States Fish and Wildlife Service (USFWS). Should other protected species be encountered during the research activities authorized under this permit, researchers must exercise caution and remain a safe distance from the animal(s) to avoid take, including harassment.

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

y. To avoid taking Steller sea lions:

   i. Do not approach within 92 meters (100 yards) of a Steller sea lion in the water or hauled out on land.

   ii. Remain at an altitude of 3,000 feet while flying over any major Steller sea lion haulouts and rookeries listed in 50 CFR 223.202.

[14] Neonates are generally defined based on the presence of fetal folds and uncoordinated surfacing behavior.

iii. Maintain an altitude of at least 1,000 feet (304.8 meters) when flying over all other known Steller sea lion terrestrial habitat (rookeries and haulouts) and associated aquatic zones during periods when Steller sea lions are likely to be present.

iv. Maintain a vessel distance of at least 3 nautical miles (5.5 kilometers) of a Steller sea lion rookery site listed in 50 CFR 223.202.

v. Do not discharge a firearm at or within 100 yards (91.4 meters) of a Steller sea lion.

z. For sea turtles: If sea turtles are opportunistically encountered during permitted marine mammal activities, researchers may approach no closer than 10 m for a maximum of 5 minutes to photograph and determine species and life stage.

6. The Permit Holder must comply with the following conditions and the regulations at 50 CFR 216.37, for biological samples acquired or possessed under authority of this permit.

a. The Permit Holder is ultimately responsible for compliance with this permit and applicable regulations related to the samples unless the samples are permanently transferred according to NMFS regulations governing the taking and importing of marine mammals (50 CFR 216.37) and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR 222.308).

b. Samples must be maintained according to accepted curatorial standards and must be labeled with a unique identifier (e.g., alphanumeric code) that is connected to on-site records with information identifying the

i. species and, where known, age and sex;

ii. date of collection, acquisition, or import;

iii. type of sample (e.g., blood, skin, bone);

iv. origin (i.e., where collected or imported from); and

v. legal authorization for original sample collection or import.

c. Biological samples belong to the Permit Holder and may be temporarily transferred to Authorized Recipients identified in Appendix 2 without additional written authorization, for analysis or curation related to the objectives of this permit. The Permit Holder remains responsible for the samples, including any reporting requirements.

d. The Permit Holder may request approval of additional Authorized Recipients for analysis and curation of samples related to the permit objectives by submitting a written request to the Permits Division specifying the:

i. name and affiliation of the recipient;

ii. address of the recipient;

iii. types of samples to be sent (species, tissue type); and

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

e. Sample recipients must have authorization pursuant to 50 CFR 216.37 prior to permanent transfer of samples and transfers for purposes not related to the objectives of this permit.

f. Samples cannot be bought or sold, including parts transferred pursuant to 50 CFR 216.37.

g. After meeting the permitted objectives, the Permit Holder may continue to possess and use samples acquired under this permit, without additional written authorization, provided the samples are maintained as specified in the permit and findings are discussed in the annual reports (See Condition E.3).

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 (See Appendix 2) specified herein:

a. Principal Investigator – Robin Baird, Ph.D.

b. Co-Investigators –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.

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 may add CIs 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. If a CI will only be responsible for a subset of permitted activities, the request must also specify the activities for which they would provide oversight.

8. Submit requests to add CIs 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 or imported 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.

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. Any time a serious injury or mortality of a protected species occurs, a written report must be submitted within two weeks.

c. 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 August 1 to July 31) must:

a. be submitted by November 1 each year for which the permit is valid, and

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

4. A final report summarizing activities over the life of the permit must be submitted by February 1, 2023 or, if the research concludes prior to permit expiration, within 180 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 the Permits Division.

6. The Permit Holder must submit with the annual report data on disturbance rates of marine mammals specific to UAS operations. Details should include, but not be limited to: species, altitude and angle of approach, context of exposure (e.g., behavioral states), and observed behavioral responses to the UAS.

F. Notification and Coordination

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 Offices listed below at least two weeks prior to initiation of each field trip/season.

a. Notification must include the:

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, boat driver, safety diver, Research Assistant "in training").

b. Notification must be sent to the following Assistant Regional Administrators for Protected Resources as applicable to the location of your activity:

For activities in AK; Arctic Ocean; and Bering, Beaufort, and Chukchi Seas: Alaska Region, NMFS, P.O. Box 21668, Juneau, AK 99802-1668; phone (907)586-7235; fax (907)586-7012;

For activities in WA, OR, CA, and Antarctic:

West Coast Region, NMFS, 501 West Ocean Blvd., Suite 4200, Long Beach, CA 90802-4213; phone (562)980-4005; fax (562)980-4027

Email (*preferred*): WCR.research.notification@noaa.gov;

For activities in HI, American Samoa, Guam, and Northern Mariana Islands:

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;

For activities in NC, SC, GA, FL, AL, MS, LA, TX, PR, and USVI:

Southeast Region, NMFS, 263 13th Ave South, St. Petersburg, FL 33701; phone (727)824-5312; fax (727)824-5309

Email (*preferred*): nmfs.ser.research.notification@noaa.gov; and

For activities in ME, VT, NH, MA, NY, CT, NJ, DE, RI, MD, and VA: Greater Atlantic Region, NMFS, 55 Great Republic Drive, Gloucester, MA 01930; phone (978)281-9328; fax (978)281-9394

Email (*preferred*): NMFS.GAR.permit.notification@noaa.gov.

3. To minimize disturbance of Hawaiian monk seals, researchers must 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 to avoid harassment of monk seals.

4. Researchers must coordinate their activities with other permitted researchers to avoid unnecessary disturbance of animals or duplication of efforts. Contact the

applicable Regional Offices 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 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 103 of the MMPA and 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[15] 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.

[15] 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.

3. Issuance of this permit does not guarantee or imply that NMFS will issue or approve subsequent permits or amendments 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 216 and 50 CFR 222-226 is subject to civil and criminal penalties, permit sanctions, and forfeiture as authorized under the MMPA, ESA, and 15 CFR Part 904.

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 MMPA, the ESA, and applicable regulations in any enforcement actions.

Permit No. 20043

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 attachments and appendices. 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 April 20, 2022. This permit expires on the date indicated and is non-renewable. This permit may be extended by the Director, NMFS Office of Protected Resources, pursuant to applicable regulations and the requirements of the MMPA and ESA.

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

a. If serious injury or mortality[16] of protected species.

b. If authorized take[17] 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[18] acquired[19] under this permit after permit expiration without additional written authorization, provided the samples are maintained as specified in this permit.

B. Number and Kind(s) of Protected Species, Location(s) and Manner of Taking

1. The table in Appendix 1 outlines the number of protected species, by species and stock, authorized to be taken, and the locations, manner, and time period in which they may be taken.

2. Researchers working under this permit may collect visual images (e.g., photographs, video) in addition to the photo-identification or behavioral photo-documentation authorized in Appendix 1 as needed to document the permitted activities, provided the collection of such images 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/MMPA Permit No.

[16] 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 or while attempting to avoid researchers or escape capture. Note that for marine mammals, a serious injury is defined by regulation as any injury that will likely result in mortality.

[17] By regulation, a take under the 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.

[18] 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.

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

20043. 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:

Counting and Reporting Take

a. Count and report a take of a cetacean regardless of whether you observe a behavioral response to the permitted activity.

b. Count and report 1 take per cetacean per day including all approaches[20] in water and attempts to remotely biopsy and tag.

c. Count and report 1 take per cetacean per day for animals observed during sound playback trials.

General

d. Researchers must approach animals cautiously and retreat if behaviors indicate the approach may be interfering with reproduction, feeding, or other vital functions.

e. Where females with calves are authorized to be taken, Researchers:

[20] An "approach" is defined as a continuous sequence of maneuvers involving a vessel, equipment, or researcher's body, including drifting, directed toward a cetacean or group of cetaceans closer than 100 yards for baleen and sperm whales and 50 yards for all other cetaceans.

i. Must immediately terminate efforts if there is any evidence that the activity may be interfering with pair-bonding or other vital functions;

ii. Must not position the research vessel between the mother and calf;

iii. Must approach mothers and calves gradually to minimize or avoid any startle response;

iv. Must discontinue an approach if a calf is actively nursing; and

v. Must, if possible, sample the calf first to minimize the mother's reaction when sampling mother/calf pairs.

f. For underwater filming/photography:

i. No more than 3 divers may be in the water at one time during research. An underwater approach/activity must be terminated if a cetacean exhibits adverse/evasive changes in behavior. Use of an additional diver requires approval by the NMFS Permits Division.

ii. Research Assistants may conduct underwater activities only if they are trained photographers, videographers, or safety divers.

g. For research on humpbacks in Hawaii:

Vessels engaged in research activities must fly a clearly visible triangular pennant at all times. The pennant must be yellow with minimum dimensions of 18"H x 26"L and with the permit number displayed in 6" high black numerals.

Remote Biopsy and Tagging,

h. Researchers may attempt (deploy or discharge/fire) each procedure (biopsy, breath sample, tag) on an animal 3 times a day.

i. A biopsy, breath sample, or tag attachment attempt must be discontinued if an animal exhibits repetitive, strong, adverse reactions to the activity or vessel.

j. Researchers must use sterile[21] biopsy tips and darts. If the biopsy tip or tag anchors become contaminated and are no longer sterile (e.g., missed attempt, contacts seawater, physical contact) prior to use, new sterile biopsy tips and tag anchors must be used. If a new, sterile biopsy tip is not available, the contaminated tip must be completely cleaned and disinfected[22] following the IACUC -approved protocol described in the application.

[21] Sterilization = destroys or eliminates all forms of microbial life and is carried out by physical or chemical methods (CDC 2008). These methods should follow the IACUC-approved protocol for sterilization (e.g., gas).

[22] Disinfection= eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects usually by liquid chemicals (CDC 2008).

k. Only adults, juveniles and calves 1 year of age or older may be biopsy sampled or tagged, including females with calves;

l. Before attempting to biopsy/tag/sample an individual, Researchers must take reasonable measures (e.g., compare photo-identifications) to avoid unintentional repeated sampling of any individual.

m. Researchers must not attempt to biopsy or tag a cetacean anywhere forward of the pectoral fin.

Active Acoustics

n. Playback studies must be limited to 30 minutes in duration, not exceed 180 dB re 1 µPa at 1 meter, and must not be broadcast to animals closer than 100 meters.

o. A playback episode must be discontinued if an animal exhibits repetitive strong adverse reactions to the playback activity or the vessel.

For research occurring in the Hawaiian Islands

p. To minimize disturbance of Hawaiian monk seals:

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 to avoid harassment of monk seals;

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

r. 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

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

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

6. The Permit Holder must comply with the following conditions and the regulations at 50 CFR 216.37, for biological samples acquired or possessed under authority of this permit.

a. The Permit Holder is ultimately responsible for compliance with this permit and applicable regulations related to the samples unless the samples are permanently transferred according to NMFS regulations governing the taking and importing of marine mammals (50 CFR 216.37) and the

regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR 222.308).

b. Samples must be maintained according to accepted curatorial standards and must be labeled with a unique identifier (e.g., alphanumeric code) that is connected to on-site records with information identifying the

   i. species and, where known, age and sex;

   ii. date of collection, acquisition, or import;

   iii. type of sample (e.g., blood, skin, bone);

   iv. origin (i.e., where collected or imported from); and

   v. legal authorization for original sample collection or import.

c. Biological samples belong to the Permit Holder and may be temporarily transferred to Authorized Recipients identified in Appendix 2 without additional written authorization, for analysis or curation related to the objectives of this permit. The Permit Holder remains responsible for the samples, including any reporting requirements.

d. The Permit Holder may request approval of additional Authorized Recipients for analysis and curation of samples related to the permit objectives by submitting a written request to the Permits Division specifying the

   i. name and affiliation of the recipient;

   ii. address of the recipient;

   iii. types of samples to be sent (species, tissue type); and

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

e. Sample recipients must have authorization pursuant to 50 CFR 216.37 prior to permanent transfer of samples and transfers for purposes not related to the objectives of this permit.

f. Samples cannot be bought or sold, including parts transferred pursuant to 50 CFR 216.37.

g. After meeting the permitted objectives, the Permit Holder may continue to possess and use samples acquired under this permit, without additional written authorization, provided the samples are maintained as specified in the permit and findings are discussed in the annual reports (See Condition E. 3).

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 – Whitlow Au, Ph.D.

   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. Where the Permit Holder is an institution/facility, 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 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 may add CIs 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. If a CI will only be responsible for a subset of permitted activities, the request must also specify the activities for which they would provide oversight.

8. Where the Permit Holder is an institution/facility, 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.

9. Submit requests to add CIs or change the PI 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

Engaged in a permitted activity.

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

b. 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

4. 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.

5. Incident Reporting

a. If the total number of mortalities is reached, or authorized takes have been exceeded as specified in Conditions 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. Any time a serious injury or mortality of a protected species occurs, a written report must be submitted within two weeks.

c. 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.

6. Annual reports describing activities conducted during the previous permit year (from Jan 01 to Dec 31) must

   a. be submitted by March 30 each year for which the permit is valid, and

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

7. A final report summarizing activities over the life of the permit must be submitted by September 30, 2022, or, if the research concludes prior to permit expiration, within 180 days of completion of the research.

8. 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 the Permits Division.

F. Notification and Coordination

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 the

      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, safety diver, Research Assistant "in training").

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

      For activities in HI, American Samoa, Guam, and Northern Mariana Islands:

      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 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 103 of the MMPA and 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[23] 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.

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

[23] 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.

I. Penalties and Permit Sanctions

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

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 MMPA, the ESA, and applicable regulations in any enforcement actions.

As detailed above, the Permits Division would require individuals conducting the research activities to possess qualifications commensurate with their roles and responsibilities. In accordance, the only personnel authorized to conduct the research would be Dr. Baird, Dr. Au, listed Co-Investigators, and research assistants. We anticipate that requiring that the research be conducted by experienced personnel would further minimize impacts to the ESA-listed cetaceans that may be exposed to the stressors, as these individuals should be able to recognize adverse responses and cease or modify their research activities accordingly.

8.3 Exposure Analysis

In this section, we quantify the likely exposure of ESA-listed species to the activities and associated stressors that may result from the proposed action (Section 3). Table 1 and Table 2 specify the applicants' and the Permits Division's proposed exposure to ESA-listed species associated with aerial surveys, vessel surveys, close approaches, and documentation, biological sampling, tagging, and active acoustics. In accordance with our regulations (50 C.F.R. §402), here we evaluate whether or not this proposed level of exposure is reasonably certain to occur.

In his application, Dr. Baird states the follow as justification for the proposed takes in Table 1:

> "The number of takes requested reflects the maximum number of individuals that may be approached for each species each year, although actual takes for most species will be far lower than those listed. These numbers are derived based on past field efforts by the applicant in the study areas, taking into account a potential increase in research effort if additional funds become available (including work in authorized areas where the abundance of a particular species may be much higher than in areas where we are

primarily working), as well as a consideration of unusual group sizes that may be encountered.

Encounters (within 50 meters for small cetaceans and 100 meters for sperm and baleen whales) will typically last from 10 to 30 minutes, but could range from one minute (for species that dive upon approach and are not seen again, for low priority species that are approached before species identity is known, or in rough conditions when transiting back to the harbor) up to 12 hours, depending on the sea conditions, time of day, species encountered, behavior, and research goals. Long encounters (e.g., greater than one hour) will typically only be for rarely-encountered high-priority species (e.g., false killer whales, beaked whales). Up to 20 approaches (within 50 or 100 meters) may occur on a single day one day. In our research, there are a number of scenarios where we may move across that 50 or 100 yard boundary on multiple occasions for any particular individual within a day. Several examples follow.

With follows of individuals to collect prey or fecal samples (e.g., (Hanson et al. 2010)), we typically follow 10 to 30 meters behind individuals to collect samples that appear in the "fluke print" (an area of upwelling water pushed up by the movement of the tail flukes). When samples are seen, we slow down to collect them, usually dropping greater than 50 meters from the whale (or dolphin), and then once the sample is collected we slowly approach back to within the 10 to 30 meter distance.

Another scenario where we may move inside and outside the 50 (or 100) yard distance more than three times in a day is when species are diving out of sight for more than a minute or two and not remaining motionless. This regularly occurs for long-diving species (e.g., beaked whales, sperm whales, baleen whales), but also occurs with most (if not all species), including small dolphins such as rough-toothed dolphins, whose long dives range from four to seven minutes (Baird 2016). In such cases, depending on group size and goals of an encounter (e.g., primarily photo-identification or with other types of sampling in addition), we may approach within the 50 (or 100) yard distance on multiple occasions, reflecting that individuals may surface a small number (e.g., two to 10) times during any particular surfacing bout, and then disappear out of sight on a long dive. While we try to maintain the groups speed and direction on longer dives, they are often greater than the approach boundary when they re-surface.

A third scenario is groups of individuals that are spread apart by more than 50 (or 100 yards), which is common for most species. For example, with our Hawaii sightings of Blainville's beaked whales, which are typically found in very small groups (less than 10 individuals), only eight of 38 encounters with two or more individuals had individuals spread less than 50 meters apart. Thus moving from one individual to another, within the same group, and back again (for example to try to get both left and right side photos of each individual), can result in multiple approaches. With large groups (e.g., of pilot whales, which can range over 50 individuals spread out over hundreds of meters, or

melon-headed whales, which can range up to 800 individuals spread over a kilometer or more), we may slowly move back and forth through the group on multiple occasions to try to obtain good quality left and right hand side photos of as many individuals as possible. In such cases, the number of approaches within the distance limits for any one individual are impossible to tally accurately, but could easily exceed 10 occasions within an encounter.

In addition, the take limits provide a buffer, given that research efforts may often be undertaken at multiple sites (e.g., Hawaii and California, or California and North Carolina) simultaneously, so that research will not have to cease if approach limits for one species are unexpectedly reached. It should be noted that while average group sizes of most species are relatively small, most species do occasionally aggregate in extremely large groups, and if one of these large groups was encountered, take limits based on average group sizes and encounter rates could easily result in the permitted limits being exceeded. For example, although Risso's dolphins are typically encountered in groups of five to 10, there is one documented record of a group of approximately 2,000 individuals off the coast of Washington (Braham 1983). Similarly, researchers working off southern California have seen a group of common dolphins estimated at 2,000 to 3,000 individuals (G. Schorr, pers. comm.). Thus while we typically may encounter only tens or hundreds of Risso’s dolphins in a year, one encounter with one of these extremely large groups could result in 2000 animals being “taken”. As such, take limits are given larger than those expected to be approached under typical (i.e., average) scenarios.

Takes for unusual species such as North Pacific right whales or bowheads are included to account for potential observations in the survey area. Sightings of a North Pacific right whale have been documented for Hawaiian waters and along the U.S. west coast (Kennedy et al. 2012). A bowhead whale has been sighted in recent years in Cape Cod bay. For all of these reasons the number of takes by approach or incidental harassment requested are much larger than the actual number of individuals that are likely to be approached. The number of takes for tagging and biopsy includes an anticipation of both successful and unsuccessful attempts (e.g., when the biopsy dart hits but does not collect a sample, or in the case of suction-cup attached tags that do not stick).

The number of tags of each type (e.g., suction cup tagging, dart tagging, other (i.e., a combined dart/suction-cup tag)) requested for each species each year reflect the maximum number of potential takes that might occur within a one-year period. However, actual sample size of tags deployed will typically be much lower for all or virtually all species for a variety of reasons. For our field studies on cetaceans, the total number of satellite tags to be deployed will be limited by low encounter rates (there is low density for most species in the study areas), the difficulty in tracking and approaching some species (e.g., beaked whales, dwarf sperm whales), the duration of our field effort (typically 10 to 20 weeks per year for research in both the Atlantic and Pacific), and the

> costs of dart/satellite tags (approximately $4400 per tag for a depth-transmitting tag for a one-time use). We expect the number of dart tags to be deployed on any one species during a two-three week field project to be limited to less than five, unless we have unusually high encounter rates and unusually cooperative individuals to approach for tagging, or species that are relatively easy to find and approach (e.g., short-finned pilot whales in Hawaii or off North Carolina). In any one year, based on expected budgets, no more than approximately 80 to 150 satellite tags on all species in the study areas (e.g., Atlantic and Pacific) are likely to be deployed. Obtaining a sufficient sample size to statistically assess factors influencing movement and residency patterns from satellite tag data is likely to require multiple years of field effort, particularly as movements may vary with age or sex, as well as based on population identity, and even on social group (e.g., Baird et al. 2012). However, since nothing is known of the movement patterns of most species, deployment of only a single tag (or two) will dramatically increase our knowledge of these species (Schorr et al. 2009; Schorr et al. 2014). In addition, we intend to address movements and residency through a combination of satellite tagging and photo-identification, thus providing two independent methods to assess movements/residency."

In his application, Dr. Au provides a justification for his requested takes but mostly focuses on non-ESA-listed marine mammals as they constitute the majority of the takes that would be authorized under Permit No. 20043. As such, we do not detail his full justification here. However, in his application he notes that his take requests, including those for Main Hawaiian Island Insular DPS false killer whales, are based on past research efforts, power analyses to determine adequate sample size needed for statistical significance testing, and species population abundance estimates within the action area.

With these explanations for take number estimates, our own evaluation of these take numbers in comparison to Dr. Baird's, Dr. Au's, and other researchers' annual reports for similar species and activities (NMFS 2016f; NMFS 2016g; NMFS 2016h; NMFS 2017b; NMFS 2017c), and the conservative assumption that all take that the Permits Division authorized *could* occur, we adopt the exposure of ESA-listed species specified in Table 1 and Table 2. This exposure could occur year-round, with the duration of each exposure ranging from a few minutes to 12 hours as described in Section 3. However, for some species listed in Table 1 and Table 2, the applicants and the Permits Division did not estimated take (and thus exposure) according to the ESA listing unit (e.g., DPS), and instead, estimated range-wide exposure of the species. This is true for false killer whales under Permit No. 20403 and for gray and humpback whales in Permit No. 20605. For gray whales, rang-wide exposure was estimated for vessel and or aerial surveys (and associated close approaches, documentation, and non-invasive sampling), whereas exposure for biopsy sampling and tagging were estimated consistent with the ESA-listing. Given this, we do not rely solely on the proposed takes as listed in Table 1 and Table 2 for these species, and below estimate the likely exposure of only the ESA-listed DPSs that may result from these takes authorized range-wide.

Under Permit No. 20403 false killer whale takes for all activities would be issued range-wide to include individuals from both the ESA-listed and non-ESA listed populations. For this permit, we assume that all of the takes of false killer whales listed in Table 2 could be of Main Hawaiian Islands Insular DPS false killer whales for two reasons. First, the action area for Permit No. 20043 heavily overlaps with the range of Main Hawaiian Islands Insular DPS false killer whales (see Figure 5 and Figure 12). Second, while researchers would be required to take reasonable measures to avoid unintentional repeat takes, they would not be in violation of the permit if all takes listed in Table 2 were of Main Hawaiian Islands Insular DPS false killer whales. Thus, we conservatively assume that all false killer whale takes in Table 2 could and would be authorized to be of the Main Hawaiian Islands Insular DPS. Given that the current population of Main Hawaiian Islands Insular DPS false killer whales is estimated to be a minimum of 92 individuals, which is less than the total takes that would be authorized for vessel surveys (and associated close approaches, documentation, and non-invasive sampling) and incidental harassment from active acoustic tags (rows two and three in Table 2), we assume that the entire population of Main Hawaiian Islands Insular DPS false killer whales may be exposed to these activities within a given year, and in some cases multiple times per year. For biopsy sampling and tagging (row one in Table 2), only 50 takes would be authorized, which is less than the minimum abundance estimate for Main Hawaiian Islands Insular DPS false killer whales. Thus, we assume all 50 of these takes may be of Main Hawaiian Islands Insular DPS false killer whales.

Under Permit No. 20605, 4,000 takes of gray whales for vessel and or aerial surveys (and associated close approaches, documentation, and non-invasive sampling) would be authorized range-wide to include individuals from both the ESA-listed and non-ESA listed populations. As with Main Hawaiian Islands Insular DPS false killer whales under Permit No. 20043, we conservatively assume that all of these takes may be from the ESA-listed Western North Pacific population of gray whale because (1) there is considerable uncertainty about the range of Western North Pacific gray whales and recent data suggest their range may show greater overlap with the action area for Permit No. 20605 than previously thought (Weller et al. 2012), and (2) Dr. Baird is unlikely to be able to identify gray whales in the field as belonging to one population or another and would not be in violation of his permit if all takes listed for vessel and or aerial surveys (and associated close approaches, documentation, and non-invasive sampling) in Table 1 were of Western North Pacific gray whales. Also like with Main Hawaiian Islands Insular DPS false killer whales under Permit No. 20043, more takes of gray whales (range-wide) would be authorized than there are estimated to be individuals in the population of Western North Pacific gray whales (4,000 takes vs. 135 minimum population estimate). Thus, we assume that all individuals in the Western North Pacific population of gray whales may be exposed to vessel and or aerial surveys (and associated close approaches, documentation, and non-invasive sampling) within a given year, and in some cases multiple times per year, although repeat exposure is less likely here than for Main Hawaiian Islands Insular DPS false killer whales under Permit No. 20043 given the vast range of gray whales and the large action area for Permit No. 20605.

For Humpback whale takes that would be authorized under Permit No. 20605, take estimates were based on the location in which research would occur, either off the coast of Alaska, Washington, or Oregon/California, but within these locations multiple DPSs of ESA-listed humpbacks can be found. To calculate the exposure of individual humpback whale DPSs, we relied on NMFS internal guidance as derived from Wade et al. (2016) (NMFS 2016e; NMFS 2016n). For Dr. Baird's take requests off Washington and Oregon/California, we directly applied percentages of the probability of encountering whales from each DPS as estimated and further described in Wade et al. (2016). However, for Alaska, which in Wade et al. (2016) is composed of several smaller sub-locations, we combined the percentage estimates from Wade et al. (2016) into the greater Alaska area that Dr. Baird requested takes in. To do this, we calculated the proportional area each location specified in Wade et al. (2016) (Gulf of Alaska and Southeast Alaska/Norther British Columbia) made up of the combined area of the two based on a recent biological opinion with a similar action area (NMFS 2017b). We then multiplied these proportions by the DPS breakdown percentage estimates for each area as specified in Wade et al. (2016), and summed these percentages across Dr. Baird's larger Alaska area. The final estimated DPS percentage breakdown for Washington and Oregon/California from Wade et al. (2016) and for Alaska from our calculations can be seen below in Table 22. We recognize that that these percentages sum to greater than 100 percent in some cases, but this overestimation is necessary in order to conservatively address uncertainty in the percentage estimates likely to be taken for each DPS and to protect the small, endangered Central America and Western North Pacific DPSs. Furthermore, percentages were rounded up as partial takes of an animal are not possible. These percentages were directly multiplied by the takes specified in Table 1 to estimate the number of individual humpback whales from each DPS that would be exposed to research under Permit No. 20605. During consultation, we shared these DPS percentages with the Permits Division during, and as a result, they are noted in Table 1. At this time, this method of estimating humpback whale DPS exposure represent the best available data and method given the granularity Dr. Baird is able to project in his research.

Table 22: Relative humpback whale Distinct Population Segment exposure estimates for Permit No. 20605.

Permit No. 20605 Humpback Whale DPS Breakdown	
Alaska	
Western North Pacific	1%
Hawaii	90%
Mexico	10%
Central America	0%
Washington	
Western North Pacific	0%
Hawaii	53%
Mexico	42%
Central America	15%
Oregon/California	
Western North Pacific	0%

Permit No. 20605 Humpback Whale DPS Breakdown	
Hawaii	0%
Mexico	90%
Central America	20%

Having estimated or adopted the applicants' and Permit Divisions' exposure of ESA-listed cetaceans to research activities that would be authorized under Permit Nos. 20605 and 20043, we now further consider the meaning of the numbers specified in Table 1 and Table 2. Despite their names, the columns titled *No. Takes* and *Takes Per Animal* in Table 1 and Table 2 do not necessarily reflect the number of animals that would be exposed or their repeat exposure, respectively (as further detailed below). Instead, *No. Takes* represent the maximum number of *takes* that would be authorized and *Takes Per Animal* represents the maximum number of intentional repeat *takes* of the same individual, as further detailed below.

Given the Permits Division's issuance and counting of takes[24] and the fact that researchers may often not be able to identify individual animals in the field, the number specified in *No. Takes* in Table 1 and Table 2 does not necessarily reflect the number of animals that would be exposed to the research activities under Permit Nos. 20605 and 20043 respectively. For example, if researchers take an animal on one day it would count as one individual taken. If the same individual were taken on another day that same year without realizing it, it would be counted as a different individual taken. This would result in the total annual number of individuals taken being less than in Table 1 and Table 2. This scenario also illustrates that researchers may unintentionally take the same individual more than once in a single year, and thus may not be able to adhere to the number specified in the *Takes Per Animal* column. However, given the nature of fieldwork (unpredictability, reliance on equipment and personnel availability, and good weather for operations, etc.) and the vast action area of Permit No. 20605 and range of most ESA-listed cetaceans, it is likely that many, if not all animals, would only be taken once or at most two to three times. For fairly small, residential populations such as Main Hawaiian Island Insular DPS false killer whales, and for the relatively small action area of Permit No. 20043, there is an increased possibility that the same animal may be unintentionally taken more than once in a given year. However, in these circumstances, researchers typically have well established photo-identification catalogs and are able to readily identify animals in the field and avoid repeat takes (NMFS 2016a; NMFS 2016m).

Given researchers inability to identify each individual animal in the field, the *No. Takes* presented in Table 1 and Table 2 represents the maximum number of individuals that could be exposed annually, and it is possible that individuals could be exposed more than the number of times specified in *Takes Per Animal* in a given year. This exposure from directed research

[24] The Permits Division directs researchers to count and report one take per cetacean per day including all approaches and procedure attempts, regardless of whether a behavioral response to the permitted activity is observed.

represents a relatively small percentage (i.e., less than 25 percent based on Table 1 and population abundance estimates given in Section 6.2) of the individuals from the populations of bowhead, fin, humpback (Central America, Mexico, Western North Pacific DPS), North Atlantic right, and sei whales found in each ocean basin for Permit No. 20605. However, it is a relatively large proportion (i.e., greater than 25 percent) of the individuals from the populations of beluga (Cook Inlet DPS), blue, false killer (Main Hawaiian Islands Insular DPS), gray (Western North Pacific), Gulf of Mexico Bryde's, killer (Southern Resident DPS), North Pacific right, and sperm whales found in each ocean basin for Permit No. 20605. In fact, in some cases more takes are authorized than there are thought to be animals in the entire ocean basin for these species, indicating that some individuals will likely be taken more than once, although as noted in Section 6.2, many population estimates for ESA-listed cetaceans are likely underestimates. Nevertheless, most of this exposure would be to aerial and vessel surveys (and associated close approaches, documentation, and non-invasive sampling) or incidental harassment from active acoustic tags, with a much smaller percentage of each species/population being exposed to biopsy sampling and tagging. As noted previously, Permit No. 20403 is expected to expose the entire population of Main Hawaiian Islands Insular DPS false killer whales to vessel surveys (and associated close approaches, documentation, and non-invasive sampling) and incidental harassment from active acoustic tags, and about half of the population to suction-cup tagging and or biopsy sampling.

8.4 Response Analysis

Given the exposure detailed above, in this section we describe the range of responses among ESA-listed cetaceans that may result from the stressors associated with the research activities that would be authorized under Permit Nos. 20605 and 20043. These include stressors associated with the following activities: manned and unmanned aerial surveys, vessel surveys, close approaches, underwater documentation, biopsy sampling, tagging, and active acoustics. As discussed in Section 8.1, fecal, sloughed skin, prey part, and exhaled breath sampling, as well as non-underwater documentation, are not expected to produce any stressors themselves. Thus, no response to these activities is expected beyond the response to the vessel surveys and close approaches needed to perform these activities. We assess potential lethal, sub-lethal (or physiological), or behavioral responses that might reduce the fitness of individuals. Our response analysis considers and weighs evidence of adverse consequences, as well as evidence suggesting the absence of such consequences.

In general, all the research activities described in Section 3 have the potential to cause some sort of disturbance. Responses by animals to human disturbance are similar to their responses to potential predators (Beale and Monaghan 2004; Frid 2003; Frid and Dill 2002; Gill et al. 2001; Harrington and Veitch 1992; Lima 1998; Romero 2004). These responses manifest themselves as stress responses in which an animal perceives human activity as a potential threat and undergoes physiological changes to prepare for a flight or fight response or more serious physiological changes with chronic exposure to stressors. They can also lead to interruptions of essential behavioral or physiological events, alteration of an animal's time budget, or some combinations

of these responses (Frid and Dill 2002; Romero 2004; Sapolsky et al. 2000; Walker et al. 2005). Further, these responses have been associated with abandonment of sites (Sutherland and Crockford 1993), reduced reproductive success (Giese 1996; Mullner et al. 2004), and the death of individual animals (Bearzi 2000; Daan 1996; Feare 1976).

The mammalian stress response involves the hypothalamic-pituitary-adrenal axis being stimulated by a stressor, causing a cascade of physiological responses, such as the release of the stress hormones adrenaline (epinephrine), glucocorticosteroids, and others (Busch and Hayward 2009; Gulland et al. 1999; St. Aubin and Geraci 1988; St. Aubin et al. 1996; Thomson and Geraci 1986). These hormones can subsequently cause short-term weight loss, the liberation of glucose into the blood stream, impairment of the immune and nervous systems, elevated heart rate, body temperature, blood pressure, and alertness, and other responses (Busch and Hayward 2009; Cattet et al. 2003; Dickens et al. 2010; Dierauf and Gulland 2001a; Dierauf and Gulland 2001b; Elftman et al. 2007; Fonfara et al. 2007; Kaufman and Kaufman 1994; Mancia et al. 2008; Noda et al. 2007; Thomson and Geraci 1986). In some species, stress can also increase an individual's susceptibility to gastrointestinal parasitism (Greer 2008). In highly stressful circumstances, or in species prone to strong "fight-or-flight" responses, more extreme consequences can result, including muscle damage and death (Cowan and Curry 1998; Cowan and Curry 2002; Cowan and Curry 2008; Herraez et al. 2007). The most widely recognized hormonal indicator of vertebrate stress, cortisol, normally takes hours to days to return to baseline levels following a significantly stressful event, but other hormones of the hypothalamic-pituitary-adrenal axis may persist for weeks (Dierauf and Gulland 2001b). Mammalian stress levels can vary by age, sex, season, and health status (Hunt et al. 2006; Keay et al. 2006; Peters 1983). In addition, smaller mammals tend to react more strongly to stress than larger mammals (Hunt et al. 2006; Keay et al. 2006; Peters 1983).

In sum, the common underlying stressor of a human disturbance caused by the research activities that would occur under Permit Nos. 20605 and 20043 may lead to a variety of different stress related responses. In addition to possibly causing a stress related response, each research activity is likely to produce unique responses as detailed further below. For incidental harassment that may result when animals are associated with individuals targeted for directed research, we expect responses to be similar to, or in most cases less than, those described below for each research activity, and above for general human disturbances.

8.4.1 Aerial Surveys

Responses to aerial surveys consist only of behavioral responses, which vary by species and aircraft type. As outlined below, behavioral responses to manned aerial surveys are likely more pronounced than to unmanned aerial surveys.

8.4.1.1 Manned Aerial Surveys

Manned aerial surveys that would be authorized under Permit No. 20605 may cause visual disturbance or noise that may affect ESA-listed cetaceans within the action area. Cetacean

responses to aircraft depend on the animals' behavioral state at the time of exposure (e.g., resting, socializing, foraging or traveling) as well as the altitude and lateral distance of the aircraft to the animals (Luksenburg and Parsons 2009). The underwater sound intensity from aircraft is less than produced by boats; and visually, aircraft are more difficult for whales to locate since they aren't in the water and move rapidly (Richter et al. 2006). However, when aircraft fly below certain altitudes (about 500 meters), they have caused cetaceans to exhibit behavioral responses that might constitute a significant disruption of their normal behavioral patterns (Patenaude et al. 2002). Thus, aircraft flying at low altitude, at close lateral distances and above shallow water elicit stronger responses than aircraft flying higher, at greater lateral distances and over deep water (Patenaude et al. 2002; Smultea et al. 2008). The sensitivity to disturbance by aircraft may also differ among species (Wursig et al. 1998). Sperm whales have been observed to respond to a fixed-wing aircraft circling at altitudes of 245 to 335 meters by ceasing forward movement and moving closer together in a parallel flank-to-flank formation, a behavioral response interpreted as an agitation, distress, and/or defense reaction to the circling aircraft (Smultea et al. 2008). About 14 percent of bowhead (*Balaena mysticetus*) whales approached during aerial surveys exhibited short-term behavioral reactions (Patenaude et al. 2002). While all ESA-listed whale species exposed to aerial surveys may exhibit short-term behavioral reactions, data from Dr. Baird from past permits indicated only mild behavioral responses, if any (NMFS 2016g; NMFS 2016h; NMFS 2016m). Therefore, it is expected the aerial surveys conducted during the proposed research activities would result in no reaction or only mild short-term behavioral reactions and not any long-term behavioral changes or reduction in fitness.

8.4.1.2 Unmanned Aerial Surveys

Unmanned aerial surveys that would be authorized under Permit No. 20605 may also cause visual or auditory disturbances to ESA-list cetaceans. Despite being conducted at much lower altitudes than manned aerial surveys, the aircraft used to conduct unmanned aerial surveys would be much smaller and quieter, indicating less of a behavioral response might be expect. While the use of UAS to study cetaceans is in its infancy, current data support this notion and indicate that cetaceans exhibit no behavioral response to UAS. For example Acevedo-Whitehouse et al. (2010) used a UAS at 13 meters over blue, gray (*Eschrichtius robustus*), humpback, and sperm whales, and observed no avoidance behaviors. Koski et al. (2015) used UAS over bowhead whales at 120 meters with no behavioral responses noted. NMFS' Southwest Fisheries Science Center used UAS over killer whales (*Orcinus orca*) and found that at 35 meters, there were no behavioral reactions (Durban et al. 2015). Three recent reviews covering the potential impacts of UAS on marine mammals found no data to indicate that ESA-listed cetaceans behaviorally respond to UAS (Christie et al. 2016; Marine Mammal Commission 2016; Smith et al. 2016). However, in a recent report submitted to NMFS for Permit No. 18636, researchers documented behavioral responses by large whales when UAS were flown at a height of approximately 12 feet (NMFS 2017f). These responses consisted of mild, short-term change in behavior such as whales rolling over to view the UAS, or "bucking" before returning to pre-exposure behavior. Given the

available information, we anticipate that in most cases, there would be no response to unmanned aerial surveys, but in some cases, mild short-term behavioral responses could occur.

8.4.2 Vessel Surveys and Close Approaches, and Documentation

Vessel surveys and close approaches conducted under both permits would expose ESA-listed whales within the action areas to vessel traffic, discharge, and visual and auditory disturbances. As noted previously, most documentation does not present any stressors outside of those associated with vessel surveys and close approaches. However, underwater documentation by snorkelers presents an addition stressor of snorkelers being in the water and possibly approaching whales. The purpose of vessel surveys and close approaches is to allow researchers to conduct other activities, responses to which are described below in individual sections.

Vessel surveys necessarily involve transit within the marine environment, and the transit of any vessel in waters inhabited by whales carries the risk of striking a whale. Responses to a vessel strike can involve death, serious injury, or minor, non-lethal injuries. The probability of a vessel collision and the associated response depends, in part, on the size and speed of the vessel. The majority of vessel strikes of large whales occur when vessels are traveling at speeds greater than approximately 10 knots, with vessels traveling faster, especially large vessels (80 meters or greater), being more likely to cause serious injury or death (Conn and Silber 2013; Jensen and Silber 2004; Laist et al. 2001; Vanderlaan and Taggart 2007). While vessel strikes are possible during all research vessel transits, we are aware of only two instances of any research vessel ever striking a whale in thousands of hours at sea, and both are thought to have been non-lethal (Wiley et al. 2016). These vessel strike incidents are an important reminder that even with well-trained marine mammal observers and vessel operators, all vessels, even research vessels, have the potential to strike whales. Given the rarity of ships strikes of large whales during research activities, the extensive experience Dr. Baird and Dr. Au have in spotting cetaceans at sea, and the slow speeds (generally 18 kilometers per hour, which is about 10 knots) at which they would operate when near whales, we believe the likelihood of a vessel strike from research vessel transits is extremely unlikely. As such, we do not expect vessel strikes to occur, and in turn, we find effects from this stressor to be discountable, and we will not discuss it further.

Discharge from research vessels in the form of leakages of fuel or oil is possible, though effects of any spills would have minimal, if any, effects on ESA-listed cetaceans. Given the experience of the researchers and boat operators in conducting research activities in the action areas, it is unlikely that spills or discharges would occur. If discharge does occur, the amounts of leakage would be small, disperse into the water, and not affect whales directly, or pose measurable hazards to their food sources. Therefore, we conclude that effects from this stressor are discountable, and we will not discuss it further.

Close approaches by research vessels may cause visual or auditory disturbances to cetaceans and more generally disrupt their behavior, which may negatively influence essential functions such as breeding, feeding, and sheltering. Cetaceans react in a variety of ways to close vessel approaches. Responses range from little to no observable change in behavior to momentary

changes in swimming speed and orientation, diving, surface and foraging behavior, and respiratory patterns, (Au and Green. 2000; Baker et al. 1983; Baumgartner and Mate 2003; Hall 1982; Isojunno and Miller 2015; Jahoda et al. 2003; Koehler 2006; Malme et al. 1983; Richardson et al. 1985; Scheidat et al. 2006; Watkins et al. 1981). Changes in cetacean behavior can correspond to vessel speed, size, and distance from the whale, as well as the number and frequency of vessels approaches (Baker et al. 1988; Beale and Monaghan 2004). Characteristics of the individual and/or the context of the approach, including age, sex, the presence of offspring, whether or not habituation to vessels has occurred, individual differences in reactions to stressors, and the behavioral state of the whales can also influence the responses to close vessel approaches (Baker et al. 1988; Gauthier and Sears 1999; Hooker et al. 2001; Koehler 2006; Lusseau 2004; Richter et al. 2006; Weilgart 2007; Wursig et al. 1998). Observations of large whales indicate that cow-calf pairs, smaller groups, and groups with calves appear to be more responsive to close vessel approaches (Bauer 1986; Bauer and Herman 1986; Clapham and Mattila 1993; Hall 1982; Williamson et al. 2016). Cetaceans may become sensitized or habituated to vessels as the result of multiple approaches (Constantine 2001), which could increase or decrease stress levels associated with additional approaches and or research activities following an approach. Reactions to vessel noise by bowhead and gray whales have been observed when engines are started at distances of 3,000 feet (Malme et al. 1983; Richardson et al. 1985), suggesting that some level of disturbance may result even if the vessel does not closely approach. It should be noted that human observations of a whale's behavioral response may not reflect a whale's actual experience; thus our use of behavioral observations as indicators of a whale's response to research may or may not be correct (Clapham and Mattila 1993).

Despite the varied observed responses to vessel approaches documented in the literature, and the multitude of factors that may affect an individual whale's response, we expect affects from close vessel approaches that would be authorized under Permit Nos. 20605 and 20403 to be minimal for several reasons. First, Dr. Baird and Dr. Au have years of experience approaching cetaceans in a way that is designed to minimize disturbance and associated responses. Second, the source levels of sounds that would be generated by research vessels are below that which could cause physical injury or temporary hearing threshold shifts, and they are unlikely to mask cetaceans ability to hear mates and other conspecifics for any significant amount of time (Hildebrand 2009; NOAA 2016). Finally, no long-term effects on behavior or fitness from disturbances caused by close vessel approaches for research have been documented, both by Dr. Baird and Dr. Au and more generally in the literature. In his application, Dr. Baird notes that previously observed response to close vessel approaches have "varied from no reaction to swimming away or diving". From his work around Hawaii between 2000 and 2007, Dr. Baird notes 3.5 and 45.2 percent of false killer whales and sperm whales have avoided his research vessel, respectively. Furthermore, Dr. Baird states that "if there is evidence of repeated avoidance encounters will be terminated." Dr. Au's past annual reports from his most recent permit indicate he did not approach false killer whales, but we assume their responses would be similar to those noted by Dr. Baird given the similarity in their research methods. In his application, Dr. Au states that

"Behavioral cues from subject animals will be closely monitored and conservatively interpreted so as to cease any research activities that may cause an animal to deviate from its normal behavioral pattern." Thus, based on accounts from Dr. Baird's past research, responses documented in the literature, and the proposed method for closely approaching whales by vessel, we expect the proposed close approaches may produce short- to mid-term behavioral and stress responses, but would not significantly disrupt the normal behavioral patterns of whales to an extent that they would create the likelihood of injury or impact fitness. As a result, we do not expect close approaches to have fitness consequences for individual whales. This conclusion is based on close vessel approaches made during most research activities. The anticipated response from the close approaches that would be required for tagging, which occur at much close distances (within a few meters) are further discussed below.

As noted above, documentation (written observation, photography and videography, etc.) that occurs from the vessel would not present any additional stressors to whales outside of those associated with a close vessel approach. However, underwater documentation by snorkelers does present the additional stressor of snorkelers being in the water, possibly approaching whales. Data on cetacean response to snorkelers mostly comes from the tourism industry. While the manner in which researchers would observe and document cetaceans differs greatly from that of tourists, these data can be seen as a worst case scenario. For small cetaceans such as Main Hawaiian Islands Insular DPS false killer whales, swim-with dolphin programs indicate that small cetaceans may show short- to mid-term behavioral responses such as tail-slaps, breaches, and changes in activity, and may either avoid or approach snorkelers (Samuels et al. 2003). While data on the response of large whales to snorkelers, which constitute the majority of ESA-listed species considered in this opinion are lacking as compared to data for small cetaceans, the available literature indicates large whales exhibit similar attraction to or avoidance of snorkelers, and similar behavioral responses (Lundquist et al. 2013; Mangott et al. 2011). These responses are consistent with the observations of the applicants as noted in previous annual reports and their applications (NMFS 2016a; NMFS 2016f; NMFS 2016g; NMFS 2016h; NMFS 2016m). If an individual exhibited an unexpected adverse response or evasive change in behavior to snorkelers, researchers would be required to terminate underwater documentation. Given this, and based on the available responses documented in the literature, we expect cetaceans may on occasion be attracted to snorkelers, and at other times exhibit short- to mid-term behavioral and stress responses, but we do not expect underwater documentation would significantly disrupt the normal behavioral patterns of whales to an extent that it would create a likelihood of injury or impact fitness.

8.4.3 Biological Sampling

Under Permit Nos. 20605 and 20043, Dr. Baird and Dr. Au would be authorized to collect a variety of biological samples. The only stressors associated with fecal, sloughed skin, and prey part sampling would be those associated with a potential close vessel approach as described above. Similar, exhaled breath sampling under Permit No. 20605 is not expected to produce any

additional stressors aside from the close approach, but if done from a research vessel, it would involve approaching animals closer (one to six meters) than would typically done for other activities except for tagging and biopsy sampling. As a result, we anticipate the very close approaches associated with vessel-based exhaled breath sampling may elicit a greater proportion of the more extreme responses noted above, such as momentary changes in swimming speed and orientation, diving, surface and foraging behavior, and respiratory patterns.

Biopsy sampling presents the stressors of a minor puncture wound and tissue collection, and also requires a very close approach. In general, it is difficult to distinguish between animals' reactions to these different stressors without explicit studies designed to isolate the response to individual stressors, which to our knowledge have not be conducted. As such, below we describe the range of responses, both physiological and behavioral, to the overall procedure of biopsy sampling, and where data are available, indicate possible responses to specific stressors.

Physiological responses of cetaceans to biopsy sampling may include the biopsy site wound and associated healing, a stress response, serious injury, or even death (reviewed in Noren and Mocklin 2012). Responses vary by species, biopsy tip dimensions, the draw weight of the sampling method, and the distance from which animals are sampled (Noren and Mocklin 2012). However, generally speaking wounds from biopsy sampling heal quickly, often within a month or less, and show no signs of infection (Noren and Mocklin 2012). In fact, for at least some large whale species (e.g., southern right whales) immediately after sampling takes place, biopsy sites are hardly noticeable (Reeb and Best 2006). This is perhaps not surprising given that cetaceans have high rates of cell proliferation that enable them to heal from large shark inflicted wounds within months (Corkeron et al. 1987; Dwyer and Visser 2011; Lockyer and Morris 1990).

Beyond the wound itself, biopsy sampling could cause a physiological stress response similar to that described above in the beginning of this section, even if the biopsy dart does not successfully penetrate the animal's tissue. Such a response may involve the release of stress hormones, short-term weight loss, susceptibility to gastrointestinal parasitism, the liberation of glucose into the blood stream, impairment of the immune and nervous systems, an elevated heart rate, body temperature, blood pressure, and alertness, muscle damage, and death. However, given the small size of wounds created by biopsy sampling and the short duration in which the sampling occurs, stress responses to remote biopsy sampling are likely minimal.

Finally, biopsy sampling could result in serious injury or death. However, in over 40 years of researchers collecting biopsy samples from cetaceans, we are aware of only one example of such an event: a common dolphin death following biopsy sampling in 2000 (Bearzi 2000). Several possibly explanations exist for why this particular animal died including a dart stopper malfunction, the location of the biopsy wound, the thinness of the animal's blubber, the handling of the animal, and possibly this animal having a predisposition to catatonia and death during stressful events (Bearzi 2000). It is important to note that due to this animal's unusually thin blubber layer, the biopsy tip penetrated the animal's muscle, which is not the intent of most researchers' biopsy sampling efforts.

While the above discussion indicates a range of physiological responses to biopsy sampling, only minor wounds and low-level stress responses are anticipate as the result of biopsy sampling that would be conducted under Permit Nos. 20605 and 20043. This is because all biopsy dart tips that Dr. Baird and Dr. Au would use would be 1) thoroughly sterilized before sampling, thus minimizing any chances of infection, and 2) only penetrate the animal's blubber layer, not muscle, and thus result in no serious injury or death.

Cetaceans also exhibit a wide range of behavioral responses to biopsy sampling (reviewed in Noren and Mocklin 2012), and in some cases these are indistinguishable from those described below for penetrating tags (Reisinger et al. 2014). Most researchers report either no behavioral response or minor behavioral responses including changes in dive behavior, heading, or speed, and startle responses and tail flicks (Noren and Mocklin 2012). On occasion, researchers report similar low-level responses from animals nearby those being biopsied and to darts entering the water, suggesting that some observed responses are a general startle response and not necessarily due to being contacted by the biopsy dart (Gorgone et al. 2008; Noren and Mocklin 2012). From his past research, Dr. Baird has observed responses to biopsy sampling "ranging from no visible response to a 'startled' reaction sometimes followed by an animal swimming away or diving." While Dr. Au's most recent annual reports indicate no recent biopsy sampling of false killer whales, we expect response to biopsy sampling under Permit No. 20043 would be similar to those noted by Dr. Baird given the similarity in their research methods. On rare occasions (zero to six percent of animals biopsied), researchers have reported more severe behavioral responses such as a flight response, breaching, multiple tail slaps, and/or numerous trumpet blows (Noren and Mocklin 2012). These more severe responses appear to coincide with instances where biopsy tips struck an unintended body part (e.g., dorsal fin) or when tips remain lodged in the animal (Berrow et al. 2002; Gauthier and Sears 1999; Weinrich et al. 1991; Weinrich et al. 1992). This being said, when darts remain in animals it does not appear to result in mortality, infection, or lasting behavioral changes (Barrett-Lennard et al. 1996; Clapham and Mattila 1993; Parsons et al. 2003). For all of these responses, it is important to keep in mind that in many cases it is hard to distinguish the behavioral response to biopsy sampling from the response to the close vessel approach (Pitman 2003). Regardless, in most instances animals return to pre-biopsying/close approach behavior quickly, usually within 30 seconds to three minutes (Noren and Mocklin 2012). In fact, biopsied individuals do not appear to avoid vessels during subsequent biopsy attempts (within one week to five months), and in many cases show the same or a lesser response to the second biopsying event (Noren and Mocklin 2012, although see Best et al. 2005).

A variety of factors influence how cetaceans behavioral respond to biopsy sampling including the species, age and sex, behavioral context, location, methods and or equipment used, type and size of the boat, size of the biopsy dart, season, water depth, and sea state (Noren and Mocklin 2012). For example, a higher proportion of odontocetes respond the biopsy sampling compared to mysticetes (Noren and Mocklin 2012). In some cases (Best et al. 2005), but not others (Weinrich et al. 1991), mothers and calves appear to be more sensitive to biopsy sampling than other age groups. Migrating humpback whales appear to be less responsive than those on the

feeding grounds (Clapham and Mattila 1993; Weinrich et al. 1991), but on the feeding grounds, foraging whales are less likely to respond than resting whales (Weinrich et al. 1992).

Given the above overview of possible behavioral responses of cetaceans to biopsy sampling, and the mitigation measures proposed by the Permits Division and the applicants (Section 8.2), we expect ESA-listed cetaceans to behaviorally respond to biopsy sampling by exhibiting short-term, minor to moderate changes in behavior, which we do not expect to impact any individual's fitness.

In summary, of the large number of cetaceans that have been biopsy sampled in recent decades (probably in the tens of thousands), there has been only one documented case of an immediate fitness consequence associated with biopsy sampling (Bearzi 2000). While studies on the delayed, long-term impacts of biopsy sampling are lacking, the available data suggests no effects to fitness (Best et al. 2005; Noren and Mocklin 2012). As such, we expect biopsy sampling to result in minor wounds, low-level stress responses, and temporary behavior changes, but we do not expect any individuals to experience reductions in fitness.

8.4.4 Tagging

Dr. Baird would be authorized to tag several ESA-listed cetacean species with either dart/barb (Type II) or suction-cup (Type III) tags. Dr. Au would be authorized to tag Main Hawaiian Islands Insular DPS false killer whales with only suction-cup (Type III) tags. Tagging presents a variety of stressors including a very close approach (to within a few meters) and physical contact if a suction-cup tag is used or puncture wounds if dart/barb tags are used. Responses to these stressors may be physiological and/or behavioral in nature and likely differ depending on the tag attachment type. Below we detail the range of physiological and behavioral responses to tags based the timing of the response, from the initial tag deployment until the tag detaches.

8.4.4.1 Tag Deployment

Cetaceans are likely to respond behaviorally to very close approaches for tag attachment in a similar way as previously described above for other close approaches. However, given the closer proximity of these approaches (one to 30 meters) we anticipate these responses would consist of the greater responses noted above such as momentary changes in swimming speed and orientation, diving, surface and foraging behavior, and respiratory patterns.

Concurrent with this response would be a response to the physical application of the suction-cup tag, or in the case of dart/barb tags, tag penetration and puncture wounds. However, current research examining how cetaceans respond to tag attachments, regardless of type, does not usually distinguish between a whale's response to a very close approach and the tag attachment. Possible reasons for this include: (1) such responses are indistinguishable to researchers, (2) no proper controls exist to make such a distinction given that researcher generally do not approach very close unless they are also tagging, and (3) such a distinction is not warranted as cetaceans themselves may not differentiate between the two stressors. As such, below we describe what is

known about how cetaceans respond behaviorally to the initial tag deployment, which includes the response to both the very close approach and the attachment of tags.

Previous studies have found that cetaceans respond to suction-cup tag deployment (and missed attempts) in a variety of ways. In humpback whales, Goodyear (1989a; 1989b) observed quickened dives, high back arches, tail swishes (31 percent) or no reaction (69 percent) to suction-cup deployments. One breach was observed in roughly 100 taggings and no damage to skin was found (Goodyear 1989a; 1989b). Baird et al. (2000) observed only low (e.g., tail arch or rapid dive) to medium (e.g., tail flick) level reactions by humpbacks in response to suction-cup tag deployments. Baumgartner and Mate (2003) reported that strong reactions of North Atlantic right whales to suction-cup tag deployments were uncommon, and that 71 percent of the 42 whales closely approached for suction-cup tagging showed no observable reaction (22 of 28 that were successfully tagged and 8 of 14 that were unsuccessfully tagged). The remaining whales reacted by lifting their heads or flukes, rolling, back arching, beating their flukes, or performing head lunges. In a review on the effects of marking and tagging on marine mammals, Walker et al. (2012) found that cetaceans exhibited short-term behavioral responses to suction-cup tag deployments including changes in frequency of leaps and group speed, flinching, tail slapping, rapid swimming, and rapid surfacing attempts, but no long term fitness consequences. To our knowledge, there are no studies indicating a physiological response to the attachment of suction-cup tags, but we believe a short-term, minor stress response as described at the beginning of Section 8.4 is possible.

The behavioral responses cetaceans exhibit to the application of invasive tags, such as dart/barb, are similar to those described for suction-cup tags and very close vessel approaches (Walker et al. 2012). Furthermore, behavioral responses to dart/barb tags, as proposed here, to not appear to drastically differ from those noted for deeper penetrating implantable tags, which are not proposed as part of Permit No. 20605 (Mate et al. 2007; Mate et al. 2016; Robbins et al. 2016; Szesciorka et al. 2016; Walker et al. 2012). These responses include head lifts, fluke lifts, exaggerated fluke beats on diving, quick dives, or increased swimming speeds. Less frequent behavioral responses include fluke slaps, head lunges, fluke swishes, defecation, decreased surfacing rates, disaffiliation with a group of whales, evasive swimming behavior, cessation of singing, breaching, bubble blowing, or rapid acceleration (Mate et al. 2007; Mate et al. 2016; Szesciorka et al. 2016; Walker et al. 2012).

Given that dart/barb tags penetrate the animal's tissue, a physiological response is expected. Anticipated reactions to these puncture wounds include minor pain, cell damage, and possibly local inflammation, swelling, bleeding, blood clotting, hemorrhage, and bruising (Mate et al. 2016; NMFS 2017a; Robbins et al. 2016; Szesciorka et al. 2016; Walker et al. 2012; Weller 2008). However, since barb/darts would be designed to not penetrate beyond the blubber layer or entirely through the dorsal, and the size of the puncture wounds would be small, very little bleeding, and no hemorrhage, blood clotting, or bruising is expected to occur from these types of tags. Furthermore, current evidence suggest such responses are rare, even for deeper penetrating

implantable tags (Mate et al. 2016; NMFS 2017a; NMFS 2017b; Robbins et al. 2016; Szesciorka et al. 2016; Walker et al. 2012; Weller 2008). In addition, a stress response to the deployment of invasive tags is possible, but the available data indicates such a response would be short-term and minimal (Eskesen et al. 2009). If the penetrating tips of tags were contaminated, a viral, fungal, or bacterial infection is possible (Haulena 2016; NMFS 2016k; Weller 2008). However, given that Dr. Baird would thoroughly sterilize all tags prior to deployment, infection is unlikely. That said, tag sterilization does not preclude the possibility that a pathogen on the whales skin enters the body upon tag insertion (Weller 2008).

There is also a possibility that some dart/barb tags may break upon impact or soon after, leaving parts of these tags (e.g., petals) in the animal with no tag attached. In Dr. Baird's application he states that out of approximately 500 dart/barb tag deployments, there have been approximately 8 instances of dart/barb tag breakage (NMFS 2016m). Furthermore, future tag breakage is even less unlikely given that recent tag modifications made by researchers have greatly reduced or eliminated tag breakage (Robbins et al. 2016; Szesciorka et al. 2016). In fact, in his past research Dr. Baird has noted such tag breakage, and has always consulted with tag manufactures to modify future tags in an effort to reduce and hopefully eliminate such tag breakage(NMFS 2016g; NMFS 2016h). Furthermore, even if such an event were to occur, we do not anticipate the response to this initial tag breakage to be any different from that described above. However, as discussed below, such tag breakage may have adverse impacts beyond the initial tagging event.

In his permit application, Dr. Baird notes similar behavioral responses to the initial tag deployment to those described above (NMFS 2016m). In fact, in his application Dr. Baird provides an extensive, species specific, quantitative datasets detailing cetacean reactions to dart/barb tag deployments (Table 23).

Table 23: Responses to dart/barb tag deployments by species from Dr. Baird's research from 2006 to early 2016. Response levels follow (Weinrich et al. 1992) and (Berrow et al. 2002).

Species	Total Tag Deployments	No Response [# (%)]	Low Level Response (e.g., slight acceleration) [# (%)]	Moderate Response (e.g., fast dive, tail flick, acceleration) [# (%)]	Strong Response (e.g., several tail flicks, breaches) [# (%)]
Blue Whale	4	2 (50)	1 (25)	1 (25)	0 (0)
False Killer Whale	45	2 (4)	11 (24)	32 (71)	0 (0)
Fin Whale	71	15 (21)	43 (61)	12 (17)	1 (1)
Gray Whale	3	1 (33)	2 (67)	0 (0)	0 (0)
Humpback Whale	6	0 (0)	4 (67)	2 (33)	0 (0)
Killer Whale	50	9 (18)	19 (38)	22 (44)	0 (0)

Species	Total Tag Deployments	No Response [# (%)]	Low Level Response (e.g., slight acceleration) [# (%)]	Moderate Response (e.g., fast dive, tail flick, acceleration) [# (%)]	Strong Response (e.g., several tail flicks, breaches) [# (%)]
Sperm Whale	25	0 (0)	10 (40)	15 (60)	0 (0)

Based on this and the information presented above, we expect behavioral responses to initial tag deployments (including unsuccessful attempts) to consist of brief, low-level to moderate behavioral responses. We do not anticipate any physiological responses to the initial attachment of suction-cup tags other than those associated with a minor stress response. For dart/barb tags, a range of physiological responses is possible, but the initial deployment of tags is not expected to result in serious injury. Based on all of these responses, we do not anticipate that the initial tag deployment would affect the fitness of individual whales.

8.4.4.2 Continued Tag Attachment

Once tagged, whales may respond both behavioral and physiologically to the continued attachment of tags. For all types of tags, current studies suggest little to no measurable impact on whale behavior. In suction-cup tagging humpback whales, Baird et al. (2000) observed pre-tagging behavior within minutes and no long term or strong reactions. Baumgartner and Mate (2003) reported that suction-cup tagged North Atlantic right whales resumed normal foraging dives within two dives post tag attachment, indicating that the continued attachment of the tag had little effect on their behavior. For implantable tags, which penetrate deep and stay on longer than the dart/barb tags being proposed here, researchers also note that whales appear to return to baseline behavior within minutes of the initial tagging event. For example, blue and humpback whales tagged with implantable tags appear to resume feeding soon after being tagged (Mate et al. 2007; Robbins et al. 2016). Robbins et al. (2016) reported that the median time it took humpback whales in the Gulf of Maine to recover behaviorally from being tagged with implantable tags was nine minutes. However, recovery times for some individuals were longer, lasting at least 4.5 hours for one individual, which appeared to be related to tag design flaws and the placement of the tag lower on the animal's body than is desired (Robbins et al. 2016). This suggests that under some circumstances, at least some individuals (and/or species) exhibit more extended behavioral responses to tagging. However, all but one whale in this study observed on subsequent days appeared to resume species typical behavioral (Robbins et al. 2016). Thus, for most species and circumstances, behavioral response to continued attachment of tags is expected to be mild and short-term. These behavioral responses are in line with those described by Dr. Baird and Dr. Au in their applications and annual reports from previous research (NMFS 2016a; NMFS 2016f; NMFS 2016g; NMFS 2016h; NMFS 2016m).

While similar long-term behavioral responses are expected for the different tag types, they differ in the long-term physiological responses they are likely to elicit. For suction-cup tags, almost no

physiological response is expected. While the continued attachment of suction-cup tags could cause inflammation and hyperemia at the attachment site, such responses would be short term and minimal (NMFS 2017a). In contrast, dart/barb tags maintain long-term (months) penetration within the animal, which may lead to a variety of short-term or chronic responses including pain, tissue damage, inflammation, swelling, and/or depression, change in skin pigmentation and/or skin loss, tissue extrusion, exudate, serious injury, infection, changes in reproduction, or even death.

The available data on the physiological responses of cetaceans to the continued attachment of invasive tags are primarily limited to short-term effects, as few studies have attempted to follow up on tagged individuals weeks, months, or years after tagging. In general, wounds from invasive tags heal with only minor scaring and indentation (Best et al. 2015; Calambokidis 2015; Hanson et al. 2008; NMFS 2016c; Norman et al. in review; Robbins et al. 2016; Szesciorka et al. 2016). Long-term impacts, however, remain difficult to gauge (Mate et al. 2007). Several studies have examined long-term impacts of invasive tags and have not found any. In a study on false killer and pilot whales, researchers found no significant difference in survival (Baird et al. 2013). One recent study investigating long-term impacts from dart/barb tags on cetaceans in Hawaii found little evidence of any impacts on survival or reproduction (Andrews et al. 2015), although the power to detect significant differences was very low. In studying the effects of implantable tags, which are more invasive than the dart/barb tags proposed here, on southern right whales, Best et al. (2015) found similar calving rates between tagged and un-tagged females. Thus, in most instances where researchers have attempted to document long-term impacts of invasive tagging on fitness, they have failed to detect any negative effects. However, we are aware of three recent studies that suggests at least older tag designs may result in negative long-term fitness consequences.

Gendron et al. (2014) monitored the wound site of a broken subdermal attachment from an invasive satellite tag somewhat similar to the dart/barb tags being proposed here, on an adult female blue whale over a period of 16 years (1995-2011). In 2005, ten years after tag deployment, the tag attachment remained embedded in the whale, with swelling less than 60 centimeters in diameter observed at the site of the attachment. In 2006, 11 years after tag deployment, the sub-dermal attachment had been expelled, leaving an open wound with blubber tissue apparently visible at the center of the swelling, which appeared to have decreased in size compared to two years before. The whale was last seen in 2011 with a scar (closed wound) present at the tag site. The whale's calving history showed three calves; two were observed prior to, and one after, the swelling period (1999-2007). Though there was not definitive evidence of the tag attachment's effect on reproduction, the authors suggested that it may have affected the female's reproductive success during this period (Gendron et al. 2014).

In a study on the effects of implantable tags on humpback whales in the Gulf of Maine, Robbins et al. (2016) examined the effects of implantable tags on vital rates of both males and females. For both sexes, there did not appear to be any effect on survival and many tagged females

continued to successfully reproduce. However, tagging did appear to increase females' inter-birth intervals, with non-tagged females being nearly twice as likely to produce a calf compared to tagged females in the year following the initial tagging (or relevant year for non-tagged females). This suggest that implantable tagging may have an effect on pregnancy. Following this first year after tagging, tagged and non-tagged females appeared to be similarly likely to reproduce. Additional analyses investigating the effects of different tag models indicated that this impact on reproduction may have been due to a tag design flaw that lead to tag breakage and parts of the tag being left inside the whale after the tag detached. This flaw was recently addressed with a fully integrated implantable, and more recent data using these tags does not currently show the same negative effect on reproduction (NMFS 2017b; Robbins et al. 2016).

In examining the health effects and long-term impacts of implantable tags on large whales in the Pacific, Calambokidis (2015) used photographs and sightings records to evaluate tag-site wound healing and tagging effects on survival. Data came from a variety of long-term studies on blue and gray whales, which were tagged with implantable tags between 1993 and 2008 for blue whales, and in 2011 and 2013 for gray whales. While no effect on re-sighting rate was found for blue whales, tagged gray whales appeared to be less likely to be seen in subsequent years as compared to a control group. When sighting data were used in Cormack-Jolly-Seber capture recapture models to examine the effects of tagging on survival, there was no unequivocal evidence to support a tagging effect on survival, but several of the top models included a negative effect of tagging. Given this and the small sample size, caution should be used when interpreting these results, and effects of tagging on gray whale survival appear to be possible.

Importantly, two of these studies involved implantable tags, which are not being proposed here, and all involved much older tag technologies than would be used by Dr. Baird under Permit No. 20605. In recent years, many advances in tag technology have been made both to improve data collection and to minimize and avoid adverse impacts to tagged animals, and Dr. Baird has been directly involved in these efforts (NMFS 2016m). These include smaller tag designs, stronger materials, fully-integrated designs, improved sterilization techniques, and better tag application methods, all of which are incorporated in tags that would be used under Permit No. 20605. With these improvements, the chances of long-term adverse effects are greatly reduced (Mate et al. 2007; NMFS 2016c; Robbins et al. 2016; Szesciorka et al. 2016). However, even with these advances impacts to fitness can still occur, as exemplified by the recent death of a Southern Resident DPS killer whale.

In 2016, the death of a Southern resident killer whale, L95, was reported following attachment of a dart/barb tag under Permit No. 16163. An expert veterinary panel concluded that a fungal infection developed at the tag site, as determined by gross dissection, radiographs, magnetic resonance imaging and histopathology, though the killer whale presented in moderate to advanced decomposition at the time of necropsy (Haulena 2016; NMFS 2016k). This fungal infection contributed to illness in the whale and most likely contributed to its death. There were several factors in this case that may have predisposed this whale to a fungal infection at the

tagging site including: incomplete disinfection of the tag after seawater contamination, retention of the tag petals which may have allowed for formation of a biofilm or direct pathogen implantation, placement of the tag lower on the body and near large bore vessels which increased the chance of fungal dissemination through the blood system, poor body condition, and possible immunosuppression.

The case of L95 is an important reminder that all invasive tags carry some risk of death, even if minimal. However, the circumstances that lead to L95's death are extremely unlikely to occur under Permit No. 20605 for several reasons. First, Dr. Baird would not attempt to tag any individual that appears to be in poor health. Second, Dr. Baird would follow stringent sterilization methods as described in his application and the permit terms and conditions. Third, Dr. Baird would use the latest tag technologies to minimize chances of tag breakage. Given these measures, we find it highly unlikely that the use of invasive tags would result in the death of any individual cetacean.

In summary, we expect whales to show minor to no behavioral response to the continued attachment of tags. For suction-cup tags, we also anticipate little to no physiological response to the continued attachment of the tag. For dart/barb tags, we anticipate most wounds would heal with little to no complication and minimal scaring, with only a few animals exhibiting prolonged healing and scaring. Given recent advances in tagging technologies and the mitigation measures proposed by the Permits Division and Dr. Baird, we find it unlikely that mortality or a reduction in fitness would result from invasive tagging. However, as indicated by the above review, mortality and fitness impacts have been documented in the literature for older tag designs or under extenuating circumstances (e.g., L95). Thus, while we find that effects to fitness from the invasive tags proposed here are not likely to occur, invasive tagging is not without risk.

8.4.5 Active Acoustics

Dr. Au would be authorized to incidentally harass Main Hawaiian Islands Insular DPS false killer whales as the result of active acoustic tags that would be deployed on non-ESA-listed humpback whales. The only stressor associated with the use of these tags on humpbacks is a possible acoustic disturbance.

As noted previously in Section 3.5, the proposed active acoustic tags would produce sounds between 60 to 80 kHz with source levels between 147 to 180 dB re: 1 µPa at 1 m (rms). False killer whales are considered mid-frequency cetaceans, and conservatively have an estimated functional hearing range between 150 Hz and 160 kHz (NOAA 2016). Thus, they would likely able to hear the sounds produced by the proposed active acoustic tags. However, the source levels that would be used are below those that would be expected to cause temporary or permanent threshold hold shifts (NMFS 2016a; NOAA 2016) and are within the range of natural odontocete and mysticete vocalizations (Au et al. 2006; Southall et al. 2007). Furthermore, Main Hawaiian Islands Insular DPS false killer whales would need to be within one kilometer of a tagged whale to hear the tag sounds above ambient noise levels, and while close association between false killer whales and humpbacks is possible, it is rare (NMFS 2016a). Nevertheless, if

Main Hawaiian Islands Insular DPS false killer whales were to come close enough to a humpback whale tagged with an active acoustic tag, they may exhibit a behavioral response to the sound produce by the tag. Data from the literature indicates that such behavioral responses may include changes in surfacing, diving, orientation, and vocalizations (Gomez et al. 2016; Nowacek et al. 2007). However, if sounds from an active acoustic tag disturbed a Main Hawaiian Islands Insular DPS false killer whale, we would expect the individual to avoid the tagged whale, and as a consequence, any exposure and associated response is expected to be short-term.

In summary, we do not expect incidental exposure to sound from active acoustic tags attached to humpback whales to affect Main Hawaiian Islands Insular DPS false killer whales hearing. It would also not cause injury to any individual. While a behavioral response is possible, we anticipate any such response would be mild, short-term, and that in most cases, Main Hawaiian Islands Insular DPS false killer whales would avoid humpback whales tagged with active acoustic tags if the sound causes a disturbance. As a result, we do not expect incidental exposure to active acoustic tags would significantly disrupt the normal behavioral patterns of Main Hawaiian Islands Insular DPS false killer whales to an extent that it would create a likelihood of injury or impact fitness.

8.5 Risk Analysis

In this section we assess the consequences of the responses to the individuals that have been exposed, the populations those individuals represent, and the species those populations comprise. Whereas the *Response Analysis* (Section 8.4) identified the potential responses of ESA-listed species to the proposed action, this section summarizes our analysis of the expected risk to individuals, populations, and species given the expected exposure to those stressors (as described in Section 8.3) and the expected responses to those stressors (as described in Section 8.4).

We measure risks to individuals of endangered or threatened species using changes in the individuals' "fitness," which may be indicated by changes the individual's growth, survival, annual reproductive success, and lifetime reproductive success. When we do not expect ESA-listed animals exposed to an action's effects to experience reductions in fitness, we would not expect the action to have adverse consequences on the viability of the populations those individuals represent or the species those populations comprise. As a result, if we conclude that ESA-listed animals are *not* likely to experience reductions in their fitness, we would conclude our assessment. If, however, we conclude that individual animals are likely to experience reductions in fitness, we would assess the consequences of those fitness reductions on the population(s) those individuals belong to.

As noted in the *Response Analysis*, none of the research activities as proposed with the mitigation measures to minimize exposure and associated responses, are expected reduce the long-term fitness of any individual ESA-listed cetacean. As such, the issuance of Permit Nos. 20605 and 20043 is not expected to present any risk to populations, DPSs, or species listed under the ESA.

9 CUMULATIVE EFFECTS

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 C.F.R. §402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

This section attempts to identify the likely future changes and their impact on ESA-listed and their critical habitats in the action areas. This section is not meant to be a comprehensive socio-economic evaluation, but a brief outlook on future changes on the environment. Projections are based upon recognized organizations producing best-available information and reasonable rough-trend estimates of change stemming from these data. However, all changes are based upon projections that are subject to error and alteration by complex economic and social interactions. During this consultation, we searched for information on future state, tribal, local, or private (non-Federal) actions reasonably certain to occur in the action areas. We did not find any information about non-Federal actions other than what has already been described in the *Environmental Baseline* (Section 7), which we expect will continue in the future. Anthropogenic effects include climate change, whaling, vessel strikes, whale watching, sound, military activities, fisheries, pollution, and scientific research, although some of these activities would involve a federal nexus and thus be subject to future ESA section 7 consultation. An increase in these activities could result in an increased effect on ESA-listed species; however, the magnitude and significance of any anticipated effects remain unknown at this time. The best scientific and commercial data available provide little specific information on any long-term effects of these potential sources of disturbance on cetacean populations.

10 INTEGRATION AND SYNTHESIS

The *Integration and Synthesis* section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the *Effects of the Action* (Section 8) to the *Environmental Baseline* (Section 7) and the *Cumulative Effects* (Section 9) to formulate the agency's opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a ESA-listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species. These assessments are made in full consideration of the *Status of Endangered Species Act Protected Resources* (Section 6).

The following discussions summarize the probable risks the proposed action poses to threatened and endangered species. This summary integrates the exposure profile presented previously with the results of our response analysis for the proposed action considered in this opinion.

As discussed in Section 6.1, several ESA-listed species occur within the action areas and may be affected by the issuance of Permit Nos. 20605 and 20043, but are not likely to be adversely affected because the effects of the proposed action are insignificant, or discountable. These include Hawaiian monk seals, Steller sea lions (Western DPS), Guadalupe fur seals, green turtles (Central North Pacific, Central South Pacific, Central West Pacific, East Pacific, and North Atlantic DPSs), hawksbill turtles, Kemp's ridley turtles, leatherback turtles, loggerhead turtles (North Pacific, Northwest Atlantic, and South Pacific DPSs), and olive ridley turtles (Mexico's Pacific Coast Breeding Colonies and all other areas).

The remaining ESA-listed species considered in this opinion may be affected, and are likely to be adversely affected, by the proposed action. On an annual basis over the five-year life of Permit No. 20605, a relatively small percentage of the individuals from the populations of bowhead, fin, humpback (Central America, Mexico, Western North Pacific DPS), North Atlantic right, and sei whales found in the Atlantic and/or Pacific Ocean would be exposed to non-invasive research activities (i.e., not biopsy sampling or tagging). In contrast, a relatively large proportion of the individuals from the populations of beluga (Cook Inlet DPS), blue, false killer (Main Hawaiian Islands Insular DPS), gray (Western North Pacific), Gulf of Mexico Bryde's, killer (Southern Resident DPS), North Pacific right, and sperm whales found in the Atlantic and/or Pacific Ocean would be exposed to non-invasive research activities under Permit No. 20605. Under Permit No. 20043, the entire population of Main Hawaiian Islands Insular DPS false killer whales would be exposed to non-invasive research activities. Under both permits, in some cases individuals would be exposed to non-invasive research activities more than once within a year. In addition, under both permits a smaller percentage of these populations would be exposed to more invasive research activities such as biopsy sampling and tagging, and under Permit No. 20605, a limited number of individuals would be exposed to these activities more than once in a year. Based on the best available data, responses to non-invasive research activities range from no response, to mild behavioral and stress responses. Biopsy sampling and tagging responses include similar behavioral and stress responses. However, given the relatively short duration of the research activities that are expected to elicit such behavioral and stress responses (a few minutes up to 12 hours) relative to cetacean life histories (e.g., life expectancies of 60 to over 100 years), we do not anticipate these responses to result in negative fitness consequences. Biopsy sampling and tagging may also result in puncture wounds, but these activities are not expected to result in infection, long-term adverse health impacts, or effects on fitness.

The status of each species, as described in Section 6, varies greatly. Despite regulations on hunting after being listed under the ESA, Cook Inlet beluga whales have yet to recover making their future unknown. While some populations of blue whales are still relatively small, others number over 1,000 and are currently experiencing population growth. Similarly, bowhead and fin whale populations vary in size, but some are quite large and experienced or are experiencing increases in abundance. In contrast, false killer whales (Main Hawaiian Islands Insular DPS) were only recently listed under the ESA and have a small population which may be in decline.

Little is known about the Western North Pacific population of gray whales but the latest abundance estimates indicate a very small population at high risk of extinction. Similarly, the proposed Gulf of Mexico Bryde's whale numbers fewer than a hundred, and as such is proposed to be listed as endangered under the ESA. Of the three humpback whale DPSs considered in this opinion, the Mexico DPS appears to be doing the best with a relatively large population. The Central America DPS's population estimate is small while the Western North Pacific DPS's population is intermediate in size. However, population abundance trends for all three humpback DPSs are unavailable at this time making it difficult to assess their recovery trajectory. Southern Resident killer whales experience a recent decline, and with continued threats, especially to their primary prey, their future is uncertain. In recent years North Atlantic right whales have experienced some population growth, although their population size is still very small and they may currently be in decline. Very little information exists on North Pacific right whales, but the population is likely quite small putting them at great risk of extinction. Similarly, little is known about sei whales. Existing estimates indicate most populations are small, and population trends are unknown. Sperm whales are likely one of the most abundant large whale species and globally are showing strong signs of recovery.

A variety of current and past anthropogenic threats impact these ESA-listed cetaceans within the action areas including climate change, whaling, vessel strikes, whale watching, sound, military activities, fisheries, pollution, and scientific research. Perhaps the most significant direct anthropogenic threats these cetaceans currently face are vessel strikes and entanglement in fishing gear. Although other factors remain significant threats, the direct impact on ESA-listed cetaceans is more difficult to assess. All of these activities are expected to continue into the future, but the magnitude at which, and their future impacts on the survival and recovery of ESA-listed species is not reliably predictable.

Considering the activities to which ESA-listed cetaceans within the action areas are likely to be exposed, their potential responses to these activities, the status of each species, and the baseline anthropogenic threats they face, we determined that the issuance of research Permit Nos. 20605 and 20043 would result in minor behavioral and physiological responses, which are not likely to result in negative consequences to the fitness of any individual cetacean.

11 CONCLUSION

After reviewing the current status of the ESA-listed species, the environmental baseline within the action areas, the effects of the proposed action, any effects of interrelated and interdependent actions, and cumulative effects, it is the NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence or recovery of beluga whales (Cook Inlet DPS), blue whales, bowhead whales, false killer whales (Main Hawaiian Islands Insular DPS), fin whales, gray whales (Western North Pacific population), humpback whales (Central America, Mexico, and Western North Pacific DPSs), killer whales (Southern Resident DPS), North Atlantic right whales, North Pacific right whales, sei whales, sperm whales, Hawaiian monk seals, Guadalupe

fur seals, Steller sea lions (Western DPS), green turtles (Central North Pacific, Central South Pacific, Central West Pacific, East Pacific, and North Atlantic DPSs), hawksbill turtles, Kemp's ridley turtles, leatherback turtles, loggerhead turtles (North Pacific, Northwest Atlantic, and South Pacific DPSs), and olive ridley turtles (Mexico's Pacific Coast Breeding Colonies and all other areas).

After reviewing the current status of the ESA-listed species, the environmental baseline within the action areas, the effects of the proposed action, any effects of interrelated and interdependent actions, and cumulative effects, it is the NMFS' conference opinion that the proposed action is not likely to jeopardize the continued existence or recovery of Gulf of Mexico Bryde's whales.

12 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury to ESA-listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is further defined as an act that "creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (NMFSPD 02-110-19). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement.

All activities associated with the issuance of Permit Nos. 20605 20043 involve directed take for the purposes of scientific research. Therefore, NMFS does not expect the proposed action would incidentally take threatened or endangered species. However, we request that the Permits Division report to us the take as specified in Table 1 and Table 2 that actually occurs at the expiration of the permit, as well as any information on the response animals exhibited to those takes. Such information will be used to inform the *Environmental Baseline* and *Effects of the Action* sections for future consultations for Dr. Baird and Dr. Au, and other similar research activities.

13 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on ESA-listed species or critical habitat, to help implement recovery plans or develop information (50 C.F.R. §402.02).

We make the following conservation recommendations, which would provide information for future consultations involving the issuance of permits that may affect ESA-listed whales as well as reduce harassment related to the authorized activities:

1. **Effects of invasive tagging**

   We recommend the Permits Division require from all researchers conducting invasive of cetaceans tagging detailed information on the responses they have observe from their past research, as was provided by Dr. Baird in his application (e.g., Table 23). Understandably, researchers tend not to focus on evaluating the impacts of their own research on ESA-listed species, as the objective of most researchers is to provide information on the biology of the species that ultimately can be used to better manage and protect ESA-listed species. As result, the published literature often lacks detailed studies on the effects of research on the target species. The information Dr. Baird supplied with his application regarding the effects of dart/barb tags across his and his collaborators research projects, along with several published studies he has contributed, is invaluable to both us and the Permits Division in assessing the impacts of these tags. The level of detail he provided in his application should be seen as an ideal example that other applicants should attempt to provide when possible.

2. **Aggregate Take Tracking**

   We recommend that the Permits Division develop a system for tracking and evaluating the amount of take issued and that which is realized for any given population of ESA-listed species. While the Permits Division's current permit tracking system allows tracking of individual permit takes, and for understanding the extent of research at broad scales (e.g., number of research permits in a particular region), it remains difficult to quantify the extent of take each individual population of ESA-listed species may be subject to across permits for any given period of time. Such aggregate take tracking would better enable the Permits Division and us to evaluate the impacts of multiple, simultaneous research efforts on ESA-listed species.

3. **Reporting**

   We recommend the Permits Division tailor the required reporting for research permits to go beyond that needed to demonstrate compliance, in order to aid managers in collecting the information needed to better protect and conserve ESA-listed species. In requiring researchers to provide annual reports, the Permit's Division is positioned to collect unprecedented, nation-wide data on ESA-listed species, which in some cases may take years to surface in the peer-reviewed public literature. For large baleen whale species, the Permits Division may consider discussing what data gaps exist with designated recovery coordinators and work on specific reporting requirements that aid those managers in obtaining the necessary data, and then make an annual report of these data available to managers and the public. In addition, as noted in our first conservation recommendation,

we recommend the Permits Division continue to request information on the effects of research activities on ESA-listed cetaceans, and where possible, require applicants to provide quantitative data regarding the impacts of their research like Dr. Baird did here.

4. **Data Sharing**

   We recommend the Permits Division work to establish protocols for data sharing among all permit holders. While many researchers in the community collaborate, having a national standard for data sharing among all researchers permitted by NMFS will reduce impacts to trusted resources by minimizing duplicated research efforts. We recommend basic information be required from each researcher including the species, location, number of individuals, and age, sex, and identity if known be reported at the expiration of each permit. This information could be further refined based on our second conservation recommendation above and then be made available to all other permit holders and/or applicants, and preferably the public. To help meet this need, data could be uploaded to one of several already established online repositories. For example OBIS-SEAMAP allows researchers to upload spatial data regarding marine mega-vertebrate sighting (http://seamap.env.duke.edu/). Similarly, the IWC has a portal system (https://portal.iwc.int/) where researchers can contribute basic information on species sightings. In our experience, direct submission by researchers to the IWC portal is required by other countries (e.g., Australia) as a condition of research permits.

5. **Coordination Meetings**

   The Permits Division should continue to work with the NMFS' Regional Offices to conduct meetings among regional species coordinators, permit holders conducting research within a region, and future applicants to ensure that the results of all research programs or other studies on specific threatened or endangered species are coordinated among the different investigators. Such meetings may be a venue to discuss the details outlined in our second conservation recommendation.

In order for NMFS' Office of Protected Resources Endangered Species Act Interagency Cooperation Division to be kept informed of actions minimizing or avoiding adverse effects on, or benefiting, ESA-listed species or their critical habitat, the Permits Division should notify the Endangered Species Act Interagency Cooperation Division of any conservation recommendations they implement in their final action.

14 REINITIATION NOTICE

This concludes formal consultation for the Permits Division's proposal to issuance Permit No. 20605. As 50 C.F.R. §402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

(1) The amount or extent of taking specified in the incidental take statement is exceeded.

(2) New information reveals effects of the agency action that may affect ESA-listed species or critical habitat in a manner or to an extent not previously considered.
(3) The identified action is subsequently modified in a manner that causes an effect to ESA-listed species or designated critical habitat that was not considered in this opinion.
(4) A new species is listed or critical habitat designated under the ESA that may be affected by the action.

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16 APPENDICES

Appendix A: Draft Permit No. 20605 (July, 13, 2017)

*Final permit may have minor changes that would not affect this opinion. Permit No. 20605

Permit No. 20605

Expiration Date: August 1, 2022

Reports Due: November 1, annually

PERMIT TO TAKE PROTECTED SPECIES[25] FOR SCIENTIFIC PURPOSES

I. Authorization

This permit is issued to Robin Baird, Ph.D., Cascadia Research Collective, 218 ½ West Fourth Ave., Olympia, WA 98501 (hereinafter "Permit Holder"), pursuant to the provisions of the Marine Mammal Protection Act of 1972 as amended (MMPA; 16 U.S.C. 1361 *et seq.*); the regulations governing the taking and importing of marine mammals (50 CFR Part 216); 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 a long-term assessment of the biology and ecology of multiple species of cetaceans to obtain information relevant to the management and conservation of populations and species and assess responses to anthropogenic activities. Questions being addressed include the size of populations, habitat use, population structure, social organization, range, movement patterns, movement rates, diving behavior, diet, ecology, disease monitoring, and behavior.

III. Terms and Conditions

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

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 attachments and appendices. 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 August 1, 2022. This permit expires on the date indicated and is non-renewable. This permit may be extended by the Director, NMFS Office of Protected Resources, pursuant to applicable regulations and the requirements of the MMPA and ESA.

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

c. If serious injury or mortality[26] of protected species occurs.

c. If authorized take[27] is exceeded in any of the following ways:

iv. More animals are taken than allowed in Tables 1 and 2 of Appendix 1.

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

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

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

[26] 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 of dependent young by starvation following research-related death of a lactating female; or deaths resulting from infections related to sampling procedures or invasive tagging. Note that for marine mammals, a serious injury is defined by regulation as any injury that will likely result in mortality.

[27] By regulation, a take under the 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.

3. The Permit Holder may continue to possess biological samples[28] acquired[29] under this permit after permit expiration without additional written authorization, provided the samples are maintained as specified in this permit.

B. Number and Kind(s) of Protected Species, Location(s) and Manner of Taking

1. The tables in Appendix 1 outline the number of protected species, by species and stock, authorized to be taken, and the locations, manner, and time period in which they may be taken.

2. Researchers working under this permit may collect visual images (e.g., photographs, video) in addition to the photo-identification or behavioral photo-documentation authorized in Appendix 1 as needed to document the permitted activities, provided the collection of such images does not result in takes.

3. The Permit Holder may use visual images and audio recordings collected under this permit, including those authorized in Tables 1 and 2 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/MMPA Permit No. 20605. 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

d. 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.

[28] 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.
[29] Authorized methods of sample acquisition are specified in Appendix 1.

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

f. 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:

Counting and Reporting Takes

e. Count and report a take of a cetacean regardless of whether you observe a behavioral response to the permitted activity.

b. Count and report 1 take per cetacean per day including all approaches[30] in water and attempts to remotely biopsy, breath sample, and tag.

i. If any of your Level A attempts on a single day are unsuccessful but make contact with the animal, count the take for the day against your applicable sampling or tagging take row.

ii. If all of your Level A attempts on a single day are unsuccessful but do not make contact with the animal, count the take against your applicable Level B (harassment) take row.

[30] An "approach" is defined as a continuous sequence of maneuvers involving a vessel, including drifting, directed toward a cetacean or group of cetaceans closer than 100 yards for sperm and baleen whales (excluding minke whales) and 50 yards for all other cetaceans.

c. During manned aerial surveys flown at an altitude lower than 1,000 ft, count and report 1 take per cetacean observed per day, regardless of the number of passes.

d. During Unmanned Aircraft System (UAS) surveys, count 1 take per cetacean approached per day, regardless of the number of passes.

e. Counting Harassment Takes for Pinnipeds: Count and report 1 take per pinniped per day for those that show movement[31] or flushing[32] (excluding alert[33]) to an approach or other permitted activity, regardless of the number of approaches and behavioral responses of the same individual in a day.

General

f. Researchers must approach animals cautiously and retreat if behaviors indicate the approach may be interfering with reproduction, feeding, or other vital functions.

g. Where females with calves are authorized to be taken, Researchers:

i. Must immediately terminate efforts if there is any evidence that the activity may be interfering with pair-bonding or other vital functions;

ii. Must not position the research vessel between the mother and calf;

iii. Must approach mothers and calves gradually to minimize or avoid any startle response;

iv. Must discontinue an approach if a calf is actively nursing; and

[31] Movements in response to the source of disturbance, ranging from short withdrawals at least twice the animal's body length to longer retreats over the beach, or if already moving a change of direction of greater than 90 degrees.
[32] All retreats (flushes) to the water.
[33] Seal head orientation or brief movement in response to disturbance, which may include turning head towards the disturbance, craning head and neck while holding the body rigid in a u-shaped position, changing from a lying to a sitting position, or brief movement of less than twice the animal's body length.

v. Must, if possible, sample the calf first to minimize the mother's reaction when sampling mother/calf pairs.

h. For underwater filming/photography:

i. No more than 3 divers may be in the water at one time during research. An underwater approach/activity must be terminated if a cetacean exhibits adverse/evasive changes in behavior. Use of an additional diver is subject to review and approval by the NMFS Permits Division.

ii. Research Assistants may conduct underwater activities only if they are trained photographers, videographers, or safety divers.

i. For research in the inland waters of Washington state and research on humpbacks in Hawaii:

Vessels engaged in research activities must fly a clearly visible triangular pennant at all times. The pennant must be yellow with minimum dimensions of 18"H x 26"L and with the permit number displayed in 6" high black numerals.

j. For research in CA/OR/WA:
For activities occurring in near-shore kelp beds in California, Oregon or Washington waters between mid-July and December 31, if marbled murrelets are present, researchers must reduce boat speed to 10 miles per hour, maintain a consistent heading, and make only 1 pass through per day.

Aerial Surveys

k. Aerial flights must not be conducted over pinnipeds on land.

Manned Aerial Surveys

l. Manned aerial surveys must be flown no lower than 820 feet (250 m) for ESA-listed species and 600 feet (182 m) for non-listed species.

Unmanned Aircraft Systems (UAS)

m. Researchers are authorized to use a vertical take-off and landing (VTOL) UAS.

n. UAS must be flown no lower than 98 feet (30 m), expect for brief descents to 50 feet (15 m) for detailed images, or 6 feet (2 m) for breath sampling.

Remote Biopsy, Breath Collection, Tagging (Suction-cup and Dart/Barb)

s. Researchers may attempt (deploy or discharge/fire) each procedure (biopsy, breath sample, and tag) on an animal 3 times a day.

t. A biopsy, breath sample, or tag attachment attempt must be discontinued if an animal exhibits repetitive, strong, adverse reactions to the activity or vessel.

u. Before attempting to biopsy, breath sample, or tag an individual, researchers must take reasonable measures (e.g., compare photo-identifications) to avoid unintentional repeated sampling of any individual.

v. Researchers must not attempt to biopsy or tag a cetacean anywhere forward of the pectoral fin.

s. Researchers must use sterile[34] biopsy tips and dart/barb tag anchors. Sterilization procedures must follow the Institutional Animal Care and Use Committee (IACUC) approved protocol described in the application.

i. If the biopsy tip, tag anchor becomes contaminated and is no longer sterile (e.g., missed attempt, contacts seawater, physical contact) prior to use, a new sterile biopsy tip and dart/barb tag anchors must be used.

ii. If a new, sterile biopsy tip is not available, the contaminated tip must be completely cleaned and disinfected[35] following the

[34] Sterilization = destroys or eliminates all forms of microbial life and is carried out by physical or chemical methods (CDC 2008). These methods should follow the IACUC-approved protocol for sterilization (e.g., gas).

[35] Disinfection= eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects usually by liquid chemicals (CDC 2008).

IACUC approved protocol described in the application.

iii. However, if new sterile tag anchors are not available, the researcher should cease tagging efforts until sterile alternatives are available.

Biopsy sampling

t. Only adults, juveniles, and calves 6 months or older may be biopsy sampled, with the exception that North Pacific right whale calves 1 month or older may be biopsy sampled.

i. Females with calves 6 months or older may be biopsy sampled.

ii. Repeat biopsy sampling may only be performed on juveniles and adults.

Tagging

u. Only adults, juveniles, and calves 1 year or older may be tagged.

i. Females with calves less than 6 months old may not be tagged.

ii. For dwarf sperm whales, females with non-neonate[36] calves less than 6 months of age may be tagged.

v. A subset of animals may receive a combination of two tags per year, as follows:

i. two suction-cup tags,

ii. two dart/barb tags, or

iii. one dart/barb and one suction-cup tag.

Non-target Species

[36] Neonates are generally defined based on the presence of fetal folds and uncoordinated surfacing behavior.

w. This permit does not authorize takes of any protected species not identified in Appendix 1, including those species under the jurisdiction of the United States Fish and Wildlife Service (USFWS). Should other protected species be encountered during the research activities authorized under this permit, researchers must exercise caution and remain a safe distance from the animal(s) to avoid take, including harassment.

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

y. To avoid taking Steller sea lions:

vi. Do not approach within 92 meters (100 yards) of a Steller sea lion in the water or hauled out on land.

vii. Remain at an altitude of 3,000 feet while flying over any major Steller sea lion haulouts and rookeries listed in 50 CFR 223.202.

viii. Maintain an altitude of at least 1,000 feet (304.8 meters) when flying over all other known Steller sea lion terrestrial habitat (rookeries and haulouts) and associated aquatic zones during periods when Steller sea lions are likely to be present.

ix. Maintain a vessel distance of at least 3 nautical miles (5.5 kilometers) of a Steller sea lion rookery site listed in 50 CFR 223.202.

x. Do not discharge a firearm at or within 100 yards (91.4 meters) of a Steller sea lion.

z. For sea turtles: If sea turtles are opportunistically encountered during permitted marine mammal activities, researchers may

approach no closer than 10 m for a maximum of 5 minutes to photograph and determine species and life stage.

6. The Permit Holder must comply with the following conditions and the regulations at 50 CFR 216.37, for biological samples acquired or possessed under authority of this permit.

h. The Permit Holder is ultimately responsible for compliance with this permit and applicable regulations related to the samples unless the samples are permanently transferred according to NMFS regulations governing the taking and importing of marine mammals (50 CFR 216.37) and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR 222.308).

i. Samples must be maintained according to accepted curatorial standards and must be labeled with a unique identifier (e.g., alphanumeric code) that is connected to on-site records with information identifying the

vi. species and, where known, age and sex;

vii. date of collection, acquisition, or import;

viii. type of sample (e.g., blood, skin, bone);

ix. origin (i.e., where collected or imported from); and

x. legal authorization for original sample collection or import.

j. Biological samples belong to the Permit Holder and may be temporarily transferred to Authorized Recipients identified in Appendix 2 without additional written authorization, for analysis or curation related to the objectives of this permit. The Permit Holder remains responsible for the samples, including any reporting requirements.

k. The Permit Holder may request approval of additional Authorized Recipients for analysis and curation of samples related to the permit objectives by submitting a written request to the Permits Division specifying the:

v. name and affiliation of the recipient;

vi. address of the recipient;

vii. types of samples to be sent (species, tissue type); and

viii. type of analysis or whether samples will be curated.

l. Sample recipients must have authorization pursuant to 50 CFR 216.37 prior to permanent transfer of samples and transfers for purposes not related to the objectives of this permit.

m. Samples cannot be bought or sold, including parts transferred pursuant to 50 CFR 216.37.

n. After meeting the permitted objectives, the Permit Holder may continue to possess and use samples acquired under this permit, without additional written authorization, provided the samples are maintained as specified in the permit and findings are discussed in the annual reports (See Condition E.3).

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 (See Appendix 2) specified herein:

a. Principal Investigator – Robin Baird, Ph.D.

b. Co-Investigators –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.

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.

10. 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.

11. The Permit Holder may add CIs 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. If a CI will only be responsible for a subset of permitted activities, the request must also specify the activities for which they would provide oversight.

12. Submit requests to add CIs by one of the following:

d. the online system at https://apps.nmfs.noaa.gov;

e. an email attachment to the permit analyst for this permit; or

f. 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 or imported 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

7. 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:

iv. the online system at https://apps.nmfs.noaa.gov;

v. an email attachment to the permit analyst for this permit; or

vi. a hard copy mailed or faxed to the Chief, Permits Division.

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

8. Incident Reporting

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

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

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

vi. 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.

e. Any time a serious injury or mortality of a protected species occurs, a written report must be submitted within two weeks.

f. 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.

9. Annual reports describing activities conducted during the previous permit year (from August 1 to July 31) must:

a. be submitted by November 1 each year for which the permit is valid, and

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

4. A final report summarizing activities over the life of the permit must be submitted by February 1, 2023 or, if the research concludes prior to permit expiration, within 180 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 the Permits Division.

6. The Permit Holder must submit with the annual report data on disturbance rates of marine mammals specific to UAS operations. Details should include, but not be limited to: species, altitude and angle of approach, context of exposure (e.g., behavioral states), and observed behavioral responses to the UAS.

F. Notification and Coordination

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.

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

   c. Notification must include the:

      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, boat driver, safety diver, Research Assistant “in training”).

   d. Notification must be sent to the following Assistant Regional Administrators for Protected Resources as applicable to the location of your activity:

For activities in AK; Arctic Ocean; and Bering, Beaufort, and Chukchi Seas: Alaska Region, NMFS, P.O. Box 21668, Juneau, AK 99802-1668; phone (907)586-7235; fax (907)586-7012;

For activities in WA, OR, CA, and Antarctic:

West Coast Region, NMFS, 501 West Ocean Blvd., Suite 4200, Long Beach, CA 90802-4213; phone (562)980-4005; fax (562)980-4027

Email (*preferred*): WCR.research.notification@noaa.gov;

For activities in HI, American Samoa, Guam, and Northern Mariana Islands:

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;

For activities in NC, SC, GA, FL, AL, MS, LA, TX, PR, and USVI:

Southeast Region, NMFS, 263 13th Ave South, St. Petersburg, FL 33701; phone (727)824-5312; fax (727)824-5309

Email (*preferred*): nmfs.ser.research.notification@noaa.gov; and

For activities in ME, VT, NH, MA, NY, CT, NJ, DE, RI, MD, and VA: Greater Atlantic Region, NMFS, 55 Great Republic Drive, Gloucester, MA 01930; phone (978)281-9328; fax (978)281-9394

Email (*preferred*): NMFS.GAR.permit.notification@noaa.gov.

3. To minimize disturbance of Hawaiian monk seals, researchers must 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 to avoid harassment of monk seals.

4. Researchers must coordinate their activities with other permitted researchers to avoid unnecessary disturbance of animals or duplication of efforts. Contact the

applicable Regional Offices 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 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 103 of the MMPA and 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[37] 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 amendments 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 216 and 50 CFR 222-226 is subject to civil and criminal penalties, permit sanctions, and forfeiture as authorized under the MMPA, ESA, and 15 CFR Part 904.

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.

c. 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.

d. 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 MMPA, the ESA, and applicable regulations in any enforcement actions.

J. Acceptance of Permit

[37] 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.

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 216, and 222-226, and all restrictions and requirements under the MMPA, and 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 — Date Issued

Director, Office of Protected Resources

National Marine Fisheries Service

Robin Baird, Ph.D. — Date Effective

Cascadia Research Collective

Permit Holder

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

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
1	Dolphin, Atlantic spotted; Range-wide	All	3,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
2		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
3		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

[38] Takes = the **maximum** number of animals, not necessarily individuals, that may be targeted for research annually for the suite of procedures in each row of the table.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
4			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).
5	Dolphin, bottlenose; Range-wide	All	3,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
6		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
7		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
8			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (one dart/barb and one suction-cup tag).
9	Dolphin, clymene; Western North Atlantic Stock	All	2,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
10		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
11		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 animals may receive 2 suction-cup tags.
12			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
13	Dolphin, common, short-beaked; Range-wide	All	6,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
14		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
15		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
16			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).
17	Dolphin, Fraser's; Range-wide	All	2,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
18		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
19		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
20			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).
21	Dolphin, pantropical spotted; Range-wide	All	3,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
22		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
23		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
24			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
25	Dolphin, Risso's; Range-wide	All	3,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
26		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
27		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
28			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
29	Dolphin, rough-toothed; Range-wide	All	2,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
30		Non-neonate	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
31		Adult/ Juvenile	10	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
32		Adult/ Juvenile	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).
33	Dolphin, spinner; Range-wide	All	2,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
34		Non-neonate	30	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
35		Adult/ Juvenile	10	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
36	Dolphin, striped; Range-wide	All	3,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
37		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
38		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
39		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).
40	Seal, gray	All	1,000	1	Harass	Incidental disturbance	During all cetacean research.
41	Seal, harbor	All	1,000	1			
42	Whale, beluga; Range-wide	All	500	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
43		Non-neonate	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
44		Adult/ Juvenile	10	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 5 of 10 animals may receive 2 suction-cup tags.
45		Adult/ Juvenile	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 5 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
46	Whale, Blainville's beaked; Range-wide	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
47		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
48		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, skin and blubber biopsy; Sample, exhaled air; Sample, fecal; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
49			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, skin and blubber biopsy; Sample, exhaled air; Sample, fecal; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
50	Whale, blue; Range-wide (NMFS Endangered)	All	500	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
51		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
52		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 2 of 10 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
53			10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 2 of 10 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
54	Whale, bowhead; Range-wide	Adult/ Juvenile	12	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Up to 3 of 12 animals may receive 2 suction-cup tags.
55	Whale, Bryde's; Range-wide	All	80	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging. Excludes Northern Gulf of Mexico stock.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
56		Non-neonate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Excludes Northern Gulf of Mexico stock. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
57		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 2 of 10 animals may receive 2 suction-cup tags. Excludes Northern Gulf of Mexico stock.
58			10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 2 of 10 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag). Excludes Northern Gulf of Mexico stock.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
59	Whale, Bryde's; Northern Gulf of Mexico stock (NMFS proposed Endangered)	All	60	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
60		Non-neonate	5	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled.
61		Adult/ Juvenile	5	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup tagging. Only 1 tag per animal.
62			5	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb tagging. Only 1 tag per animal.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
63	Whale, Cuvier's beaked; Range-wide	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
64		Non-neonate	25	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
65		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
66			25	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 25 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
67	Whale, dwarf sperm; Range-wide	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
68		Non-neonate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
		Adult/ Juvenile	5	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. All 5 animals may receive 2 suction-cup tags. Females with non-neonate calves less than six months of age may be tagged.
69			15	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 5 of 15 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag). Females with non-neonate calves less than six months of age may be tagged.
71	Whale, false killer; Range-wide	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
72		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
73		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. All 10 animals may receive 2 suction-cup tags.
74			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 10 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
75	Whale, fin; Range-wide (NMFS Endangered)	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
76		Non-neonate	15	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
77		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 2 of 10 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
78			15	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 2 of 15 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
79	Whale, Gervais' beaked; Range-wide	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
80		Non-neonate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
81		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
82			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
83	Whale, gray; Eastern North Pacific	Adult/ Juvenile	12	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Up to 3 of 12 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
84	Whale, humpback; West Indies DPS	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
85		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
86		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
87			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
88	Whale, killer; Range-wide	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
89		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
90		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
91			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
92	Whale, melon-headed; Range-wide	All	6,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
93		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
94		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. All 10 animals may receive 2 suction-cup tags.
95			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 10 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
96	Whale, minke; Range-wide	All	800	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
97		Non-neonate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
98		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
99			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
100	Whale, northern bottlenose; Range-wide	All	800	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
101		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
102		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
103			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
104	Whale, pilot, long-finned; Range-wide	All	6,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
105		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
106		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 10 of 20 animals may receive 2 suction-cup tags.
107			50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 10 of 50 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
108	Whale, pilot, short-finned; Range-wide	All	6,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
109		Non-neonate	70	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
110		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 10 of 20 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
111			50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 10 of 50 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
112	Whale, pygmy killer; Range-wide	All	800	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
113		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
114		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
115			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).
116	Whale, pygmy sperm; Range-wide	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
117		Non-neonate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
118		Adult/ Juvenile	5	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. All 5 animals may receive 2 suction-cup tags.
119			15	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 5 of 15 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
120	Whale, right, North Atlantic; Range-wide (NMFS Endangered)	All	12	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal	No biopsy or tagging.
121	Whale, sei; Range-wide (NMFS Endangered)	All	800	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
122		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
123		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
124			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
125	Whale, Sowerby's beaked; Range-wide	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
126		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
127		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
128			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
129	Whale, sperm; Range-wide (NMFS Endangered)	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
130		Non-neonate	25	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
131		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
132			25	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 25 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
133	Whale, True's beaked; Range-wide	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
134		Non-neonate	15	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
135		Adult/ Juvenile	10	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
136	Whale, unidentified baleen	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	Species most likely to be involved are Bryde's and sei whales, or hybrids (e.g., fin x blue whales), which render species identification problematic.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
137		Non-neoate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
138		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
139			10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 10 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [38]	Takes Per Animal	Take Action	Procedures	Details
140	Whale, unidentified Mesoplodon	All	800	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
141		Non-neonate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
142		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

Table 1. Authorized annual takes in the Atlantic Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [38]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
143			10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 10 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
1	Dolphin, bottlenose; Range-wide	All	3,000	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
2		Non-neonate	50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
3		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.

[39] Takes = the **maximum** number of animals, not necessarily individuals, that may be targeted for research annually for the suite of procedures in each row of the table.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
4			60	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 60 animals may receive 2 tags (one dart/barb and one suction-cup tag).
5	Dolphin, common, long-beaked; Range-wide	All	6,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
6		Non-neonate	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
7		Adult/ Juvenile	20	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Only 1 tag per animal.
8			10	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb tagging. Only 1 tag per animal.
9	Dolphin, common, short-beaked; Range-wide	All	6,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
10		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
11		Adult/ Juvenile	20	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Suction-cup only tagging. Only 1 tag per animal.
12			10	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb tagging. Only 1 tag per animal.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
13	Dolphin, Fraser's; Range-wide	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
14		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
15		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
16			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).
17	Dolphin, Indian Ocean bottlenose; Range-wide	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
18		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
19		Adult/ Juvenile	20	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Only 1 tag per animal.
20			10	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb tagging. Only 1 tag per animal.
21	Dolphin, northern right whale; Range-wide	All	6,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
22		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
23		Adult/ Juvenile	20	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Only 1 tag per animal.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
24	Dolphin, Pacific white-sided; Range-wide	All	6,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
25		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
26		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
27			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).
28	Dolphin, pantropical spotted; Range-wide	All	8,000	5	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
29		Non-neonate	100	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
30		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.
31			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (one dart/barb and one suction-cup tag).
32	Dolphin, Risso's; Range-wide	All	6,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
33		Non-neonate	50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
34		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.
35			40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 40 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
36	Dolphin, rough-toothed; Range-wide	All	5,000	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
37		Non-neonate	50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
38		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
39			50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 50 animals may receive 2 tags (one dart/barb and one suction-cup tag).
40	Dolphin, spinner; Range-wide	All	6,000	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
41		Non-neonate	50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
42		Adult/ Juvenile	30	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Only 1 tag per animal.
43	Dolphin, striped; Range-wide	All	6,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
44		Non-neonate	40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
45		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.
46			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (one dart/barb and one suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
47	Porpoise, Dall's; Range-wide	All	4,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
48		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
49		Adult/ Juvenile	30	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Only 1 tag per animal.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
50	Porpoise, harbor; Range-wide	All	6,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video; Remote vehicle, aerial (VTOL)	No biopsy or tagging.
51	Sea lion, California; Range-wide	All	4,000	1	Harass	Incidental disturbance	Incidental disturbance during vessel or aerial surveys
52	Sea lion, Steller; (Eastern US)		3,000				
53	Sea lion, Steller; (Western US) (NMFS Endangered)		3,000				
54	Seal, Guadalupe fur; Range-wide		100				
55	Seal, harbor; Range-wide		6,000				

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
56	Seal, Hawaiian monk; Hawaiian Islands (NMFS Endangered)		30				
57	Seal, northern elephant; Range-wide		6,000				
58	Seal, Northern fur; Range-wide		6,000				
59	Whale, Baird's beaked; Range-wide	All	2,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Tracking; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
60		Non-neonate	60	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
61		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.
62			60	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 60 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
63	Whale, beluga; Cook Inlet Stock (NMFS Endangered)	All	100	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging for Cook Inlet DPS.
64	Whale, beluga; Range-wide	All	400	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging. Excludes Cook Inlet DPS.
65		Non-neonate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Excludes Cook Inlet DPS. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
66	Whale, Blainville's beaked; Range-wide	All	2,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
67		Non-neonate	40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
68		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
69		Adult/ Juvenile	50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 50 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
70	Whale, blue; Range-wide (NMFS Endangered)	All	800	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
71		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
72		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 2 of 10 animals may receive 2 suction-cup tags.
73			10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 2 of 10 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
74	Whale, Bryde's; Range-wide	All	800	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
75		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
76		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 2 of 10 animals may receive 2 suction-cup tags.
77			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 2 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
78	Whale, Cuvier's beaked; Range-wide	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
79		Non-neonate	40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
80		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
81			50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 50 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
82	Whale, Deraniyagala's beaked; Range-wide	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
83		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
84		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.
85			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
86	Whale, dwarf sperm; Range-wide	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
87		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
88		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags. Mothers with non-neonate calves may be tagged.
89			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (one dart/barb and one suction-cup tag). Mothers with non-neonate calves may be tagged.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
90	Whale, false killer; Hawaii Insular (NMFS Endangered)	All	3,000	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
91		Non-neonate	40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
92		Adult/ Juvenile	15	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 15 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
93			40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 40 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
94	Whale, false killer; Range-wide	All	2,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	Excludes Main Hawaiian Islands Insular DPS.
95		Non-neonate	50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Excludes Main Hawaiian Islands Insular DPS. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
96		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. All 10 animals may receive 2 suction-cup tags. Excludes Main Hawaiian Islands Insular DPS.
97			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 10 of 30 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag). Excludes Main Hawaiian Islands Insular DPS.
98	Whale, fin; Range-wide (NMFS Endangered)	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
99		Non-neonate	60	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
100		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 2 of 10 animals may receive 2 suction-cup tags.
101			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 2 of 30 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
102	Whale, ginkgo-toothed beaked; Range-wide	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
103		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
104		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
105			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
106	Whale, gray; Range-wide	All	4,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
107	Whale, gray; Eastern North Pacific	Non-neonate	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling for Eastern North Pacific stock. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
108		Adult/ Juvenile	20	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup tagging for Eastern North Pacific stock. Only 1 tag per animal.
109		Adult/ Juvenile	20	1		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb tagging for Eastern North Pacific stock. Only 1 tag per animal.
110	Whale, gray; Western North Pacific (Korean) (NMFS Endangered)	Non-neonate	5	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; ; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling and tagging for Western North Pacific stock. Animals over 6 months old may be biopsy sampled, and repeat biopsy sampling for adults and juveniles only. Animals over 1 year old may be tagged, only 1 tag per animal.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
111	Whale, Hubbs' beaked; Range-wide	All	800	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
112		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
113		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
114			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
115	Whale, humpback; Hawaii DPS	All	800	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	Humpback research in Hawaii. No biopsy or tagging.
116		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Humpback research in Hawaii. Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
117		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in Hawaii. Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.
118			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in Hawaii. Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
119	Whale, humpback; Mexico DPS (NMFS Threatened)	All	200	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	Humpback research in California and Oregon. No biopsy or tagging. Estimated to be 90% Mexico DPS and 20% Central America DPS.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
120	Central America DPS (NMFS Endangered)	Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Humpback research in California and Oregon. Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
121		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in California and Oregon. Suction-cup only tagging. Up to 4 of 10 animals may receive 2 suction-cup tags.
122			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in California and Oregon. Dart/barb and combination tagging. Up to 4 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
123	Whale, humpback; Mexico DPS (NMFS Threatened)	All	200	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	Humpback research in Washington. No biopsy or tagging. Estimated to be 53% Hawaii DPS, 42% Mexico DPS, and 15% Central America DPS.
124	Central America DPS (NMFS Endangered) Hawaii DPS	Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Humpback research in Washington. Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
125		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in Washington. Suction-cup only tagging. Up to 4 of 10 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
126			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in Washington. Dart/barb and combination tagging. Up to 4 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
127	Whale, humpback; Mexico DPS (NMFS Threatened)	All	200	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	Humpback research in Alaska. No biopsy or tagging. Estimated to be 90% Hawaii DPS, 10% Mexico DPS, and 1% Western North Pacific DPS.
128	Western North Pacific DPS (NMFS Endangered) Hawaii DPS	Non-neonate	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Humpback research in Alaska. Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
129		Adult/ Juvenile	10	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in Alaska. Suction-cup only tagging. Up to 4 of 10 animals may receive 2 suction-cup tags.
130		Adult/ Juvenile	20	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Humpback research in Alaska. Dart/barb and combination tagging. Up to 4 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
131	Whale, killer; Range-wide	All	5,000	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging. Excludes Southern Resident DPS.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
132		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Excludes Southern Resident DPS. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
133		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Excludes Southern Resident DPS. Up to 6 of 30 animals may receive 2 suction-cup tags.
134		Adult/ Juvenile	40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Excludes Southern Resident DPS. Up to 6 of 40 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
135	Whale, killer; Southern Resident DPS (NMFS Endangered)	All	1,000	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging for Southern Resident DPS.
136	Whale, killer; Southern Resident DPS (NMFS Endangered	Adult/ Juvenile	30	1	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup tagging and biopsy for Southern Resident DPS. Only 1 tag per animal.
137	Whale, Longman's beaked; Range-wide	All	3,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
138		Non-neonate	40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
139		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
140			50	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 50 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
141	Whale, melon-headed; Range-wide	All	8,000	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
142		Non-neonate	70	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
143		Adult/ Juvenile	30	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 10 of 30 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
144		Adult/ Juvenile	60	2	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 10 of 60 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
145	Whale, minke; Range-wide	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
146		Non-neonate	40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
147		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.
148			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
149	Whale, Perrin's beaked; Range-wide	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
150		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
151		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.
152			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
153	Whale, pilot, short-finned; Range-wide	All	8,000	40	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
154		Non-neonate	80	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
155		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 10 of 30 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
156			70	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 10 of 70 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
157	Whale, pygmy beaked; Range-wide	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
158		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
159		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.
160			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
161	Whale, pygmy killer; Range-wide	All	1,000	20	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
162		Non-neonate	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
163		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.
164			40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 40 animals may receive 2 tags (one dart/barb and one suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
165	Whale, pygmy sperm; Range-wide	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
166		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
167		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 10 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
168			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (one dart/barb and one suction-cup tag).
169	Whale, right, North Pacific; Range-wide (NMFS Endangered)	All	20	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
170		Non-neonate	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 1 month old (based on relative size) may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
171		Adult/ Juvenile	10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 5 of 10 animals may receive 2 suction-cup tags.
172			10	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 5 of 10 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
173	Whale, sei; Range-wide (NMFS Endangered)	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
174		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
175		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.
176			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
177	Whale, Shepherd's beaked; Range-wide	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
178		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
179		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
180			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
181	Whale, sperm; Range-wide (NMFS Endangered)	All	1,000	10	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
182		Non-neonate	40	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
183		Adult/ Juvenile	30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 30 animals may receive 2 suction-cup tags.
184			30	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 30 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
185	Whale, Stejneger's beaked; Range-wide	All	500	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
186		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
187		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.
188			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
189	Whale, unidentified baleen	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging. Species most likely to be involved are Bryde's and sei whales, or hybrids (e.g., fin x blue whales) which render species identification problematic.
190		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
191		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.

Line	Species; Stock	Life Stage	No. Takes [39]	Takes Per Animal	Take Action	Procedures	Details
192			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
193	Whale, unidentified beaked	All	1000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.
194		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
195		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.
196			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).
197	Whale, unidentified Mesoplodon	All	1,000	4	Harass/ Sampling	Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Underwater photo/videography	No biopsy or tagging.

Table 2. Authorized takes for the Pacific Ocean year-round during vessel and aerial surveys. Animals over 1 year old may be tagged with dart and/or suction cup tags. Up to 20 individuals of each species may receive a maximum of 2 biopsy samples, per year. Includes direct takes and incidental harassment to non-target animals during directed research.							
Line	**Species; Stock**	**Life Stage**	**No. Takes** [39]	**Takes Per Animal**	**Take Action**	**Procedures**	**Details**
198		Non-neonate	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Biopsy sampling. Animals over 6 months old may be biopsy sampled. Repeat biopsy sampling for adults and juveniles only.
199		Adult/ Juvenile	20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Suction-cup only tagging. Up to 6 of 20 animals may receive 2 suction-cup tags.
200			20	2		Acoustic, passive recording; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Imaging, thermal; Import/export/receive, parts; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, exhaled air; Sample, fecal; Sample, skin and blubber biopsy; Tracking; Underwater photo/videography	Dart/barb and combination tagging. Up to 6 of 20 animals may receive 2 tags (either 2 dart/barb tags OR one of each dart/barb and suction-cup tag).

Appendix 2: NMFS-Approved Personnel and Authorized Recipients for Permit No. 20605

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

		PI	Co-Investigators (CI)												
Activity		R. Baird	R. Andrews	C. Babbitt	J.	A. Douglas	E. Falcone	C. Gabriel	B. Hanson	D.	S. Rickards	G. Schorr	D. Verbeck	D. Webster	S. Yin
Photograph, photo-id, video, or photogrammetry		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Underwater photograph or video		X		X		X		X	X		X	X	X	X	X
Count/survey, behavioral observations, or tracking		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Passive acoustics recording		X	X		X		X	X	X		X	X		X	X
Oversee UAS		X		X	X				X						
UAS pilot				X					X						
Collect fecal sample, sloughed skin, or prey remains		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sample, exhaled air via pole		X			X		X	X	X			X		X	
Biopsy Sampling		X	X		X	X	X	X	X		X	X		X	X
Suction-cup tagging		X	X		X		X		X			X		X	
Dart tagging		X	X		X		X		X			X		X	

Biological samples authorized for collection or acquisition in Tables 1 and 2 of Appendix 1 may be transferred to the following Authorized Recipients for the specified disposition, consistent with Condition B.6 of the permit:

Name	Sample	Disposition
Southwest Fisheries Science Center- Karen Martien 8901 La Jolla Shores Drive, La Jolla, CA 92037	Skin, blubber, fecal, prey, breath	Analysis and storage
Northwest Fisheries Science Center- Brad Hanson or Gina Ylitalo 2725 Montlake Blvd E., Seattle, WA 98112	Skin, blubber, fecal, prey, breath	Analysis and storage
Pacific Island Fisheries Science Center- Erin Oleson 1845 Wasp Blvd, Honolulu, HI 96818	Skin, blubber, fecal, prey, breath	Analysis and storage
Marine Mammal Laboratory- Jim Thomason, Kim Parsons 7600 Sand Point Way NE, Seattle, WA 98115	Skin, blubber, fecal, prey, breath	Analysis and storage
Southeast Fisheries Science Center- Patricia Rosel 8901 La Jolla Shores Drive, La Jolla, CA 92037	Skin, blubber, fecal, prey, breath	Analysis and storage
National Institute of Standards and Technology- Rebecca Pugh 331 Fort Johnson Rd, Charleston, SC 29412	Skin, blubber, fecal, prey, breath	Analysis and storage
Woods Hole Oceanographic Institution- Amy Apprill 266 Woods Hole Road, Woods Hole, MA 02543	Skin, blubber	Analysis and storage
Oregon State University – Scott Baker or Renee Albertson 2030 NE Marine Science Dr., Newport, OR 97365	Skin, blubber, fecal, prey, breath	Analysis and storage
Portland State University- Debbie Duffield or Sarah Courbis PO Box 751, Portland, OR 97207	Skin, blubber, fecal, prey, breath	Analysis and storage
Hawaii Pacific University- Kristi West or Brenda Jensen 45-045 Kamehameha Highway, Kaneohe, HI 96744	Skin, blubber, fecal, prey, breath	Analysis and storage
University of Hawaii, Hawaii Institute of Marine Biology Kristi West 46-007 Lilipuna Road, Kaneohe, HI 96744	Skin, blubber, fecal, prey, breath	Analysis and storage
Ross University- Don Bergfelt School of Veterinary Medicine PO Box 334, Basseterre, St. Kitts	Skin, blubber, fecal, prey, breath	Analysis and storage
National Chiaya University- Wei-Cheng Yang Department of Veterinary Medicine No. 580 Ximmin Rd., Chiayi City, Taiwan	Skin, blubber, fecal, prey, breath	Analysis and storage
University of Washington- Sam Wasser	Skin, blubber, fecal, prey, breath	Analysis and storage

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

Site	Mailing Address	Contact Numbers	Permit Contacts
ONMS Headquarters Office Silver Spring, Maryland	NOAA Office of National Marine Sanctuaries 1305 East-West Highway (N/NMS2) SSMC4 Silver Spring, MD 20910	wk 240-533-0605 fax 301-713-0404 wk 240-533-0679 fax 301-713-0404	Vicki Wedell Vicki.Wedell@noaa.gov Kate Spidalieri Kate.Spidalieri@noaa.gov
Channel Islands National Marine Sanctuary	Channel Islands Nat'l Marine Sanctuary University of California Santa Barbara Ocean Science Education Building 514, MC 6155 Santa Barbara, CA 93106	wk 805-893-6424 cell 805-705-1790 wk 805-893-6435	Sean Hastings Sean.Hastings@noaa.gov Jackie Buhl
Cordell Bank National Marine Sanctuary	Cordell Bank National Marine Sanctuary P.O. Box 159 Olema, CA 94950	wk 415-464-5265 fax 415-663-0315	Lilli Ferguson Lilli.Ferguson@noaa.gov
Florida Keys National Marine Sanctuary	Florida Keys National Marine Sanctuary 33 East Quay Road Key West, FL 33040	wk 305-809-4714 fax 305-293-5011	Joanne Delaney Joanne.Delaney@noaa.gov
Gray's Reef National Marine Sanctuary	Gray's Reef National Marine Sanctuary 10 Ocean Science Circle	wk 912-598-238 fax 912-598-2367	Kimberly Roberson Kimberly.Roberson@noaa.gov

Site	Mailing Address	Contact Numbers	Permit Contacts
Greater Farallones National Marine Sanctuary *(Including Monterey Bay National Marine Sanctuary Northern Management Area)*	Greater Farallones National Marine Sanctuary 991 Marine Drive The Presidio San Francisco, CA 94129	wk 415-970-5255 fax 415-561-6616 wk 415-970-5247 fax 415-561-6616	Max Delaney Max.Delaney@noaa.gov Karen Reyna (Alternate contact) Karen.Reyna@noaa.gov
Hawai‘ian Islands Humpback Whale National Marine Sanctuary	Hawai‘ian 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
Monitor National Marine Sanctuary	*Monitor* National Marine Sanctuary c/o The Mariners’ Museum 100 Museum Drive Newport News, VA 23606	wk 757-591-7333	Tane Casserley Tane.Casserley@noaa.gov
Monterey Bay National Marine Sanctuary	Monterey Bay National Marine Sanctuary 99 Pacific Street, Building 455A Monterey, CA 93940	wk 831-647-1286 fax 831-647-4250	Sophie DeBeukelaer Sophie.DeBeukelaer@noaa.gov
Olympic Coast National Marine Sanctuary	Olympic Coast National Marine Sanctuary 115 East Railroad Avenue, Suite 301 Port Angeles, WA 98362	wk 360-406-2076 fax 360-457-8496	George Galasso George.Galasso@noaa.gov

Site	Mailing Address	Contact Numbers	Permit Contacts
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
Stellwagen Bank National Marine Sanctuary	Stellwagen Bank National Marine Sanctuary 175 Edward Foster Road Scituate, MA 02066	wk 203-882-6515 fax 203-882-6572 wk 781-545-8026 x 207 fax 781-545-8036	Alice Stratton Alice.Stratton@noaa.gov Ben Cowie-Haskell (Alternate contact) Ben.Haskell@noaa.gov

Appendix B: Draft Permit No. 20043 (June 6, 2017)

*Final permit may have minor changes that would not affect this opinion. Permit No. 20043

Permit No. 20043

Expiration Date: April 30, 2022

Reports Due: December 31, annually

PERMIT TO TAKE PROTECTED SPECIES[40] FOR SCIENTIFIC PURPOSES

I. Authorization

This permit is issued to Whitlow Au, Ph.D., University of Hawaii, P.O. Box 1346, Kaneohe, HI 96744, (hereinafter "Permit Holder"), pursuant to the provisions of the Marine Mammal Protection Act of 1972 as amended (MMPA; 16 U.S.C. 1361 *et seq.*); the regulations governing the taking and importing of marine mammals (50 CFR Part 216); 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 objectives of the permitted activity, as described in the application, are to to investigate the population dynamics and behavior of cetaceans around Hawaii and the Pacific, to study: (1) the behavior and use of the acoustic environment by large whales, and (2) the effects of noise on behavior of cetaceans around Hawaii.

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 attachments and appendices. Permit noncompliance constitutes a violation and is grounds for permit modification, suspension, or revocation, and for enforcement action.

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

A. Duration of Permit

1. Personnel listed in Condition C.1 of this permit (hereinafter "Researchers") may conduct activities authorized by this permit through April 20, 2022. This permit expires on the date indicated and is non-renewable. This permit may be extended by the Director, NMFS Office of Protected Resources, pursuant to applicable regulations and the requirements of the MMPA and ESA.

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

d. If serious injury or mortality[41] of protected species.

c. If authorized take[42] is exceeded in any of the following ways:

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

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

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

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

[41] 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 or while attempting to avoid researchers or escape capture. Note that for marine mammals, a serious injury is defined by regulation as any injury that will likely result in mortality.

[42] By regulation, a take under the 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.

3. The Permit Holder may continue to possess biological samples[43] acquired[44] under this permit after permit expiration without additional written authorization, provided the samples are maintained as specified in this permit.

B. Number and Kind(s) of Protected Species, Location(s) and Manner of Taking

1. The table in Appendix 1 outlines the number of protected species, by species and stock, authorized to be taken, and the locations, manner, and time period in which they may be taken.

2. Researchers working under this permit may collect visual images (e.g., photographs, video) in addition to the photo-identification or behavioral photo-documentation authorized in Appendix 1 as needed to document the permitted activities, provided the collection of such images 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/MMPA Permit No. 20043. 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

g. 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.

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

[43] 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.
[44] Authorized methods of sample acquisition are specified in Appendix 1.

i. 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:

Counting and Reporting Take

f. Count and report a take of a cetacean regardless of whether you observe a behavioral response to the permitted activity.

g. Count and report 1 take per cetacean per day including all approaches[45] in water and attempts to remotely biopsy and tag.

h. Count and report 1 take per cetacean per day for animals observed during sound playback trials.

General

i. Researchers must approach animals cautiously and retreat if behaviors indicate the approach may be interfering with reproduction, feeding, or other vital functions.

h. Where females with calves are authorized to be taken, Researchers:

i. Must immediately terminate efforts if there is any evidence that the activity may be interfering with pair-bonding or other vital functions;

[45] An "approach" is defined as a continuous sequence of maneuvers involving a vessel, equipment, or researcher's body, including drifting, directed toward a cetacean or group of cetaceans closer than 100 yards for baleen and sperm whales and 50 yards for all other cetaceans.

ii. Must not position the research vessel between the mother and calf;

iii. Must approach mothers and calves gradually to minimize or avoid any startle response;

iv. Must discontinue an approach if a calf is actively nursing; and

v. Must, if possible, sample the calf first to minimize the mother's reaction when sampling mother/calf pairs.

i. For underwater filming/photography:

i. No more than 3 divers may be in the water at one time during research. An underwater approach/activity must be terminated if a cetacean exhibits adverse/evasive changes in behavior. Use of an additional diver requires approval by the NMFS Permits Division.

ii. Research Assistants may conduct underwater activities only if they are trained photographers, videographers, or safety divers.

j. For research on humpbacks in Hawaii:

Vessels engaged in research activities must fly a clearly visible triangular pennant at all times. The pennant must be yellow with minimum dimensions of 18"H x 26"L and with the permit number displayed in 6" high black numerals.

Remote Biopsy and Tagging,

s. Researchers may attempt (deploy or discharge/fire) each procedure (biopsy, breath sample, tag) on an animal 3 times a day.

t. A biopsy, breath sample, or tag attachment attempt must be discontinued if an animal exhibits repetitive, strong, adverse reactions to the activity or vessel.

u. Researchers must use sterile[46] biopsy tips and darts. If the biopsy tip or tag anchors become contaminated and are no longer sterile (e.g., missed attempt, contacts seawater, physical contact) prior to use, new sterile biopsy tips and tag anchors must be used. If a new, sterile biopsy tip is not available, the contaminated tip must be completely cleaned and disinfected[47] following the IACUC -approved protocol described in the application.

v. Only adults, juveniles and calves 1 year of age or older may be biopsy sampled or tagged, including females with calves;

w. Before attempting to biopsy/tag/sample an individual, Researchers must take reasonable measures (e.g., compare photo-identifications) to avoid unintentional repeated sampling of any individual.

x. Researchers must not attempt to biopsy or tag a cetacean anywhere forward of the pectoral fin.

Active Acoustics

y. Playback studies must be limited to 30 minutes in duration, not exceed 180 dB re 1 µPa at 1 meter, and must not be broadcast to animals closer than 100 meters.

z. A playback episode must be discontinued if an animal exhibits repetitive strong adverse reactions to the playback activity or the vessel.

For research occurring in the Hawaiian Islands

aa. To minimize disturbance of Hawaiian monk seals:
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 to avoid harassment of monk seals;

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

[46] Sterilization = destroys or eliminates all forms of microbial life and is carried out by physical or chemical methods (CDC 2008). These methods should follow the IACUC-approved protocol for sterilization (e.g., gas).
[47] Disinfection= eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects usually by liquid chemicals (CDC 2008).

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

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

6. The Permit Holder must comply with the following conditions and the regulations at 50 CFR 216.37, for biological samples acquired or possessed under authority of this permit.

o. The Permit Holder is ultimately responsible for compliance with this permit and applicable regulations related to the samples unless the samples are permanently transferred according to NMFS regulations governing the taking and importing of marine mammals (50 CFR 216.37) and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR 222.308).

p. Samples must be maintained according to accepted curatorial standards and must be labeled with a unique identifier (e.g., alphanumeric code) that is connected to on-site records with information identifying the

xi. species and, where known, age and sex;

xii. date of collection, acquisition, or import;

xiii. type of sample (e.g., blood, skin, bone);

xiv. origin (i.e., where collected or imported from); and

xv. legal authorization for original sample collection or import.

q. Biological samples belong to the Permit Holder and may be temporarily transferred to Authorized Recipients identified in Appendix 2 without additional written authorization, for analysis or curation related to the objectives of this permit. The Permit Holder remains responsible for the samples, including any reporting requirements.

r. The Permit Holder may request approval of additional Authorized Recipients for analysis and curation of samples related to the permit objectives by submitting a written request to the Permits Division specifying the

ix. name and affiliation of the recipient;

x. address of the recipient;

xi. types of samples to be sent (species, tissue type); and

xii. type of analysis or whether samples will be curated.

s. Sample recipients must have authorization pursuant to 50 CFR 216.37 prior to permanent transfer of samples and transfers for purposes not related to the objectives of this permit.

t. Samples cannot be bought or sold, including parts transferred pursuant to 50 CFR 216.37.

u. After meeting the permitted objectives, the Permit Holder may continue to possess and use samples acquired under this permit, without additional written authorization, provided the samples are maintained as specified in the permit and findings are discussed in the annual reports (See Condition E. 3).

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 – Whitlow Au, Ph.D.

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. Where the Permit Holder is an institution/facility, 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 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.

13. 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.

14. The Permit Holder may add CIs 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. If a CI will only be responsible for a subset of permitted activities, the request must also specify the activities for which they would provide oversight.

15. Where the Permit Holder is an institution/facility, 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.

16. Submit requests to add CIs or change the PI by one of the following:

g. the online system at https://apps.nmfs.noaa.gov;

h. an email attachment to the permit analyst for this permit; or

i. 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

10. 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:

      vii. the online system at https://apps.nmfs.noaa.gov;

      viii. an email attachment to the permit analyst for this permit; or

      ix. a hard copy mailed or faxed to the Chief, Permits Division.

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

11. Incident Reporting

   g. If the total number of mortalities is reached, or authorized takes have been exceeded as specified in Conditions A.2, the Permit Holder must

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

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

ix. 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.

h. Any time a serious injury or mortality of a protected species occurs, a written report must be submitted within two weeks.

i. 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.

12. Annual reports describing activities conducted during the previous permit year (from Jan 01 to Dec 31) must

a. be submitted by March 30 each year for which the permit is valid, and

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

4. A final report summarizing activities over the life of the permit must be submitted by September 30, 2022, or, if the research concludes prior to permit expiration, within 180 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 the Permits Division.

F. Notification and Coordination

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.

5. 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.

e. Notification must include the

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, safety diver, Research Assistant "in training").

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

For activities in HI, American Samoa, Guam, and Northern Mariana Islands:

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;

6. 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 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 103 of the MMPA and 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[48] 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.

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

[48] 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.

I. Penalties and Permit Sanctions

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

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.

e. 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.

f. 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 MMPA, the ESA, and applicable regulations in any enforcement actions.

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 216, and 222-226, and all restrictions and requirements under the MMPA, and 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

Director, Office of Protected Resources

National Marine Fisheries Service

Date Issued

Whitlow Au, Ph.D.

University of Hawaii

Permit Holder

Date Effective

Appendix 1: Tables Specifying the Kind(s) of Protected Species, Location(s), and Manner of Taking

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
1		Dolphin, bottlenose	Hawaiian Islands Stock Complex	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR); Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
2		Dolphin, bottlenose	Hawaiian Islands Stock Complex	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
3		Dolphin, common, short-beaked	Range-wide	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
4		Dolphin, common, short-beaked	Range-wide	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
5		Dolphin, Pacific white-sided	Range-wide	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
6		Dolphin, Pacific white-sided	Range-wide	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
7		Dolphin, pantropical spotted	Hawaiian Stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater	N/A	2/1/2017	10/31/2021

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
		Details: P1												
8		Dolphin, pantropical spotted	Hawaiian Stock	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
9		Dolphin, Risso's	Hawaiian Stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
10		Dolphin, Risso's	Hawaiian Stock	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
11		Dolphin, rough-toothed	Hawaiian Stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
12		Dolphin, rough-toothed	Hawaiian Stock	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
13		Dolphin, spinner	Eastern Tropical Pacific Stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
14		Dolphin, spinner	Eastern Tropical Pacific Stock	Wild	All	Male and Female	200	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
		Details: P1												
15		Dolphin, spinner	Hawaiian Islands Stock Complex	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
16		Dolphin, spinner	Hawaiian Islands Stock Complex	Wild	All	Male and Female	5000	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
17		Dolphin, striped	Hawaiian Stock	Wild	Adult	Male and Female	150	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
18		Dolphin, striped	Hawaiian Stock	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
19		Whale, Blainville's beaked	Hawaiian Stock	Wild	Adult/ Juvenile	Male and Female	10	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Incidental harassment; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1, P2												
20		Whale, Blainville's beaked	Hawaiian Stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1, P2												
		Whale, Blainville's beaked	Hawaiian Stock	Wild	All	Male and Female	300	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
Details: P1, P2														

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
22		Whale, Cuvier's beaked	Hawaiian Stock	Wild	Adult/ Juvenile	Male and Female	10	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Incidental harassment; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P2												
23		Whale, Cuvier's beaked	Hawaiian Stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1, P2												
24		Whale, Cuvier's beaked	Hawaiian Stock	Wild	All	Male and Female	300	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1, P2												
25		Whale, dwarf sperm	Hawaiian Stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
		Details: P1												
26		Whale, dwarf sperm	Hawaiian Stock	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
27		Whale, false killer	Range-wide	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
28		Whale, false killer	Range-wide	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
29		Whale, humpback	Range-wide (NMFS Endangered/Threatened)	Wild	Non-neonate	Male and Female	30	2	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Incidental harassment; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
		Details: P2, calves >2 weeks of age												
30		Whale, humpback	Range-wide (NMFS Endangered/Threatened)	Wild	Non-neonate	Male and Female	170	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy; Sample, skin biopsy; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1, P2, calves > 2 weeks of age												
31		Whale, humpback	Range-wide (NMFS Endangered/Threatened)	Wild	All	Male and Female	540	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1, P2												
32		Whale, killer	Range-wide	Wild	Adult	Male and Female	25	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
33		Whale, killer	Range-wide	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
		Details: P1												
34		Whale, melon-headed	Hawaiian Stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
35		Whale, melon-headed	Hawaiian Stock	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
36		Whale, pilot, short-finned	Hawaiian stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
37		Whale, pilot, short-finned	Hawaiian stock	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
38		Whale, pygmy killer	Hawaiian Stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
39		Whale, pygmy killer	Hawaiian Stock	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
40		Whale, pygmy sperm	Hawaiian stock	Wild	Adult	Male and Female	50	1	Harass/Sampling	Survey, vessel	Acoustic, passive recording; Collect, sloughed skin; Import/export/receive, parts; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, skin and blubber biopsy; Sample, skin biopsy; Tracking; Instrument, suction-cup (e.g., VHF, TDR) ; Underwater photo/videography	N/A	2/1/2017	10/31/2021

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
		Details: P1												
41		Whale, pygmy sperm	Hawaiian stock	Wild	All	Male and Female	500	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Tracking; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: P1												
42		Whale, humpback	Range-wide (NMFS Endangered/Threatened)	Wild	All	Male and Female	352	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: Project 3 only												
43		Whale, humpback	Range-wide (NMFS Endangered/Threatened)	Wild	Adult/ Juvenile	Male and Female	30	1	Harass	Survey, vessel	Acoustic, passive recording; Incidental harassment; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: Maximum of 30 animals tagged per year, up to two tags per animal (one suction cup and one dart) (Project 3 only)												
44		Whale, humpback	Range-wide (NMFS Endangered/Threatened)	Wild	All	Male and Female	225	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Acoustic, passive recording; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video; Underwater photo/videography	N/A	2/1/2017	10/31/2021
		Details: Maximum of 20 animals per year for playbacks (Project 3 only)												
45		Dolphin, bottlenose	Hawaiian Islands Stock Complex	Wild	All	Male and Female	300	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
46		Dolphin, common, short-beaked	Range-wide	Wild	All	Male and Female	200	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
47		Dolphin, pantropical spotted	Hawaiian Stock	Wild	All	Male and Female	520	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
48		Dolphin, Risso's	Hawaiian Stock	Wild	All	Male and Female	80	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
49		Dolphin, rough-toothed	Hawaiian Stock	Wild	All	Male and Female	350	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
50		Dolphin, spinner	Hawaiian Islands Stock Complex	Wild	All	Male and Female	2000	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
51		Dolphin, striped	Hawaiian Stock	Wild	All	Male and Female	240	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
52		Whale, Blainville's beaked	Hawaiian Stock	Wild	All	Male and Female	100	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
53		Whale, Cuvier's beaked	Hawaiian Stock	Wild	All	Male and Female	40	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
54		Whale, dwarf sperm	Hawaiian Stock	Wild	All	Male and Female	40	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
55		Whale, false killer	Range-wide	Wild	All	Male and Female	120	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
56		Whale, killer	Range-wide	Wild	All	Male and Female	40	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
57		Whale, melon-headed	Hawaiian Stock	Wild	All	Male and Female	2000	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												
58		Whale, pilot, short-finned	Hawaiian stock	Wild	All	Male and Female	480	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021

Line	Ver	Species	Listing Unit/Stock	Production/ Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
		Details: P3												
59		Whale, pygmy killer	Hawaiian Stock	Wild	All	Male and Female	80	1	Harass	Survey, vessel	Acoustic, active playback/broadcast; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	N/A	2/1/2017	10/31/2021
		Details: P3												

Appendix 2: NMFS-Approved Personnel and Authorized Recipients for Permit No. 20043.

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
Whitlow Au	All activities except biopsy, tagging, and underwater videogrammetry
Jessica Chen	All activities except acoustic playback and dart tagging
Adrienne Copeland	All except acoustic playback, biopsy and tagging
Giacomo Giorli	All except acoustic playback, biopsy and tagging
Elizabeth Henderson	All activities except biopsy, dart tagging, and underwater photo/video/videogrammetry
Marc Lammers	All activities except acoustic playback and dart tagging
Edward Gerard Lyman	All activities
Julie Oswald	All activities except biopsy, tagging, and underwater photo/video/videogrammetry
Michael Richlen	All activities except dart tagging
Lee Shannon	All except biopsy, tagging, and acoustic playback
Alison Stimpert	All activities except dart tagging

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
NOAA Pacific Islands Fisheries Science Center (PIFSC), Honolulu, HI	Biopsy, sloughed skin, fecal samples	Analysis and curation of remaining samples
NOAA Marine Mammal Health and Stranding Response Program (MMHSRP), Honolulu, HI	Biopsy, sloughed skin, fecal samples	Analysis and curation of remaining samples
State of Hawaii, Department of Land and Natural Resources, Honolulu, HI	Biopsy, sloughed skin, fecal samples	Analysis and curation of remaining samples
Adam Pack, University of Hawaii Hilo, Hilo, HI	Biopsy, sloughed skin, fecal samples	Analysis and curation of remaining samples