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

Title: Biological and Conference Opinion on the Issuance of Permit No. 20465 to NMFS Alaska Fisheries Science Center Marine Mammal Laboratory 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

Marine Mammal Laboratory, Alaska Fisheries Science Center, National Marine Fisheries Service

Publisher: Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Approved:

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Date: MAY 10 2017

Consultation Tracking number: FPR-2017-9186

Digital Object Identifier (DOI): doi:10.7289/V5Z899GZ

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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 concur 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 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 an 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 agencies for this consultation are NMFS, Office of Protected Resources, Permits and Conservation Division (hereafter the Permits Division), the lead action agency, and NMFS, Alaska Fisheries Science Center, Marine Mammal Laboratory (hereafter MML), the permit applicant. The Permits Division proposes to issue a scientific research permit (Appendix A) pursuant to section 10(a)(1)(A) of the ESA and section 104 of the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 USC 1361 et seq.) to MML, 7600 Sand Point Way NE, Seattle, WA (Responsible Party: John Bengtson, Ph.D.). The purpose of the proposed permit is to allow an exception to the moratoria and prohibition on takes established under the ESA and MMPA in order to allow the applicant to conduct scientific research on cetaceans (both ESA-listed and non-ESA-listed), and in doing so incidentally harass several pinniped species (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.

This consultation, biological and conference opinion, and incidental take statement, were completed in accordance with section 7(a)(2) of the statute (16 U.S.C. 1536 (a)(2)), associated implementing regulations (50 C.F.R. §§401-16), and agency policy and guidance was conducted by NMFS Office of Protected Resources Endangered Species Act Interagency Cooperation Division (hereafter referred to as "we"). This biological and conference opinion (opinion) and incidental take statement were prepared by NMFS Office of Protected Resources Endangered Species Act Interagency Cooperation Division in accordance with section 7(b) of the ESA and implementing regulations at 50 C.F.R. §402.

This document represents NMFS opinion on the effects of the proposed issuance of Permit No. 20465 on beluga whales (*Delphinapterus leucas*, Cook Inlet Distinct Population Segment [DPS]), blue whales (*Balaena musculus*), bowhead whales (*Balaena mysticetus*), fin whales (*Balaena physalus*), gray whales (*Eschrichtius robustus*, Western Pacific Population), humpback whales (*Megaptera novaeangliae*, Mexico, Central America, and Western North Pacific DPSs), killer whales (*Orcinus area*, Southern Resident DPS), North Atlantic right whales (*Eubalaena*

glacialis), North Pacific right whales (*Eubalaena japonica*), sei whales (*Balaena borealis*), sperm whales (*Physeter macrocephalus*), bearded seals (*Erignathus barbatus*, Beringia DPS), ringed seals (*Phoca hispida*, Arctic DPS), and Steller sea lions (*Eumetopias jubatus*, Western DPS), and bearded (Beringia DPS) seals; Steller sea lion (Western US population); North Pacific right whale, Steller sea lion (Western US Population), killer whale (Southern Resident DPS), and beluga whale (Cook Inlet DPS) designated critical habitat; and ringed seal (Arctic DPS) proposed critical habitat. A complete record of this consultation is on file at NMFS Office of Protected Resources in Silver Spring, Maryland.

1.1 Background

MML has been conducting research on cetaceans since at least 1974, and has held numerous scientific research permits for both ESA-listed and non-ESA-listed cetaceans (e.g., held ESA-cetacean Permit Nos. P77163 #791 [1992-1997], P77170 #925 [1994-1999], 0782-1438 [1998-2004], 782-1719 [2004-2011], and 14245 [2011-2017]). In fact, the proposed Permit No. 20465 being considered in this opinion is a renewal of MML's most recent Permit No. 14245. Since MML's research is long-term in nature, most of the activities that would be authorized under the proposed Permit No. 20465 (Section 3) are the same or similar to those MML has been permitted to conduct previously. Such activities include aerial surveys, vessel surveys and close approaches, photography, videography, and observation, biopsy sampling, and tagging. Previous consultations considering permits to authorize MML 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 adversely modify designated critical habitat (NMFS 2010a). The only activity that we have not previously consulted on as part of a research permit for MML is acoustic playbacks, but as detailed further in (Section 3), this activity is not directed at ESA-listed species. In this consultation, we rely on our long-term evaluation of MML's research activities from these previous consultation, but here we consider these previous permits as part of the environmental baseline (Section 6.2.10), and evaluate the effects of authorizing MML to continue to conduct the research under Permit No. 20465.

1.2 Consultation History

This opinion is based on information provided in the applicant's permit application (NMFS 2016b), correspondence and discussions with the Permits Division and the applicant, previous biological opinions for research permits for MML and other similar research activities (NMFS 2010a; NMFS 2015a; NMFS 2016a), annual reports from MML's previous research (NMFS 2011c; NMFS 2016d), and the best scientific and commercial data available from the literature. Our communication with the Permits Division regarding this consultation is summarized as follows:

- On October 31, 2016, the Permits Division provided us a copy of the initial permit application and asked for our review.

- On November 16, 2016, we provided our review of the initial application, requesting addition information from the applicant and the Permits Division.
- On December 6, 2016, we met with the Permits Division to discuss our review of the application
- On December 8, 2016, the Permits Division sent us an updated application and some of the information requested on November 16, 2016.
- On December 16, 2016, the Permits Division sent us a memorandum and initiation package requesting formal consultation on Permit No. 20465. We briefly reviewed the package this day and determined it was missing several attachments.
- On December 21, 2016, we met with the Permits Division to discuss the initiation package and clarify any addition information we required.
- On December 27 2016, we provided the Permits Division with our full review of the initiation package in which we requested additional information.
- On January 10, 2017, we again met with the Permits Division to discuss the initiation package and clarify and addition information we required.
- On January 24, 2017, the Permits Division provided an updated application and the additional information we had requested based on our review of the initiation package.
- On January 30, 2017, we informed the Permits Division that the initiation package was complete and that we would initiate formal consultation as of January 24, 2017.
- On February 17, 2017, the Permits Division provided an updated application reflecting minor changes.
- On February 22, 2017, the Permits Division provided additional information based on external review of the application.
- On March 1, 2017, we sent the Permits Division a memorandum informing them that we initiated formal consultation as of as of January 24, 2017.

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 action area with the spatial extent of those stressors.

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 those *Species and Designated Critical Habitat Not Likely to be Adversely Affected* (Section 6.1), because these resources will either not be affected or are not likely to be adversely affected.

Environmental Baseline (Section 6.2.10): 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, impacts of state or private actions that are contemporaneous with the consultation in process.

Effects of the Action (Section 8): We identify the number, age (or life stage), and gender 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 analyses in the opinion 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 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 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 identified 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 a scientific research permit pursuant to the ESA and MMPA to MML, 7600 Sand Point Way NE, Seattle, WA (Responsible Party: John Bengtson, Ph.D.). The research permit would allow an exception to the moratoria and prohibition on takes established under the

ESA and MMPA in order to allow MML to conduct scientific research on ESA-listed and non-ESA-listed cetaceans, and incidentally harass ESA-listed and non-ESA-listed pinnipeds. The purpose of the research is to provide information on the status, biology, and behavior of federally protected species of cetaceans in United States and international waters. The information gained from these studies and from related collaborations with scientific colleagues would be used to make recommendations to management bodies charged with the protection and recovery of endangered, threatened or other marine mammal species.

The permit would authorize MML to take the following ESA-listed species: beluga whales (Cook Inlet DPS), blue whales, bowhead whales, fin whales, humpback whales (Mexico, Central America, and Western North Pacific DPSs), killer whales (Southern Resident DPS), North Pacific right whales, sei whales, sperm whales, bearded seals (Beringia DPS), ringed seals (Arctic DPS), and Steller sea lions (Western DPS). Table 1 below displays the annual takes of ESA-listed species that would be authorized under Permit No. 20465. For the purposes of 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. 20465.

Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe/ Collect Method	Procedures	Details
Whale, beluga	Cook Inlet Stock (Endangered)	All	6500	20	Harass/ Sampling	Survey, aerial/vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Other; Photo-identification (photo-id); Photogrammetry; Photograph/Video; Remote vehicle, aerial (vertical takeoff and landing [VTOL]); Sample, fecal ; Underwater photo/videography	Other=environmental DNA (eDNA). 20 days could encounter most whales for photo-id, resulting in ~ 6500; Included are approaches for Level A activities that did not result in contact with the animal, and incidental takes during Level A procedures directed towards other whales.
			8000	20	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	Includes 6 + surveys of entire population and additional flights to search for recoverable tags.
		Non-neonate	100	1	Harass/ Sampling	Survey, aerial/vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., very high frequency [VHF], time depth recorder [TDR]); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal ; Sample, skin and blubber biopsy; Underwater photo/videography	Individuals may incidentally be biopsied more than once because of small pop. size. No tagging of animals < 6 mos. Only one suction cup tag on an animal at a time. Other = water sampling for eDNA.
Whale, blue	Range-wide (Endangered)	All	200	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
			500	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
		Non-neonate	75	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. Only one suction cup tag on an animal at a time.
		Adult/ Juvenile	50	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin.

Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe/ Collect Method	Procedures	Details
Whale, bowhead	Range-wide (Endangered)	Non-neonate	75	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. Only one suction cup tag on an animal at a time.
		Adult/ Juvenile	30	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin.
		All	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
			11000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
Whale, fin	California/Oregon/Washington Stock (Endangered)	Non-neonate	250	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. Only one suction cup tag on an animal at a time.
		Adult/ Juvenile	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin.
		All	1000	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
			1000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
	Northeast Pacific Stock (Endangered)	All	500	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
			5000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	

Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe/ Collect Method	Procedures	Details
		Non-neonate	150	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. Only one suction cup tag on an animal at a time.
		Adult/ Juvenile	50	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin.
Whale, humpback	Range-wide (Non-Listed/Endangered/Threatened)	All	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	West coast work. Includes approaches for sampling and tagging activities that do not result in contact with the animal.
		Non-neonate	30	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	West coast work. No tagging of animals < 6 mos. Only one suction cup tag on an animal at a time.
		Adult/ Juvenile	10	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	West coast work. No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin.
		All	400	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Alaska work. Includes approaches for sampling and tagging activities that do not result in contact with the animal.
			5000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	Alaska work.
		Non-neonate	120	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	Alaska work. No tagging of animals < 6 mos. Only one suction cup tag on an animal at a time.

Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe/ Collect Method	Procedures	Details
		Adult/ Juvenile	40	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	Alaska work. No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin.
Whale, killer	Eastern North Pacific Southern Resident Stock (Endangered)	All	550	3	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling activities that did not result in contact with the animal.
			500	3	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
		Non-neonate	10	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. Only one suction cup tag on an animal at a time.
Whale, right, North Pacific	Range-wide (Endangered)	Non-neonate	60	5	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. Possibility of biopsy sampling an individual up to 3 times on separate days and also account for any shots that do not result in a successful biopsy; Only 1 suction cup tag on an whale at a time.
		Adult/ Juvenile	30	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin.
		All	100	3	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
			300	10	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	

Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe/ Collect Method	Procedures	Details
Whale, sei	Range-wide (Endangered)	All	200	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
			200	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
		Non-neonate	75	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. Only one suction cup tag on an animal at a time.
		Adult/ Juvenile	30	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin.
Whale, sperm	Range-wide (Endangered)	Non-neonate	125	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. Only one suction cup tag on an animal at a time.
		Adult/ Juvenile	90	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal ; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin.
		All	1000	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
			1000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
Sea lion, Steller	Western DPS (Endangered)	All	10000	1	Harass	Survey, aerial	Incidental disturbance	Incidental harassment during aerial surveys.
Seal, bearded	Beringia DPS (Threatened)	All	100	1	Harass	Survey, aerial	Incidental disturbance	Incidental harassment during aerial surveys.

Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe/ Collect Method	Procedures	Details
Seal, ringed	Arctic DPS (Threatened)	All	100	1	Harass	Survey, aerial	Incidental disturbance	Incidental harassment during aerial surveys.

3.1 Proposed Activities

The proposed research would encompass a variety of activities directed at ESA-listed species including aerial surveys (manned and unmanned), vessel surveys and close approaches, documentation (photography, videography, and observation), biological sampling (fecal, sloughed skin, environmental DNA, and biopsy sampling), and tagging. These activities would be directed at ESA-listed and non-ESA-listed cetaceans and are described in more detail below. In addition, non-target ESA-listed and non-ESA-listed cetaceans and pinnipeds that are near target cetaceans may be incidentally harassed during these research activities. The permit would also authorize a variety of other activities directed only at non-ESA-listed cetaceans, but during the course of consultation, we determined that these activities would not affect ESA-listed species, and thus, we do not describe them further.

3.1.1 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 systems to provide similar information, as well as collect additional data not possible with during manned aerial surveys. Below we described the proposed manned and unmanned aerial surveys. More detail on both activities can be found in the application (NMFS 2016b).

3.1.1.1 Manned Aerial Surveys

The Permits Division proposed to authorize MML to take all ESA-listed cetaceans in Table 1 (any age and sex classes) by means of harassment during manned aerial surveys. ESA-listed pinnipeds as specified in Table 1 may be incidentally harassed as a result of manned aerial surveys. The proposed manned aerial surveys fall into four general categories, but the applicant would be authorized to conduct aerial surveys that fall outside the scope of these categories as long as the specifications of the surveys are similar. For all manned aerial surveys, aircraft would consist of Turbo Commanders, de Havilland Twin Otters, or similar aircraft flown at altitudes between 1,500 (for larger species) and 300 feet (for photography and close inspection) and speeds between 90 and 120 knots depending on the species and weather conditions. The duration aircraft would circle or pass over animals would vary but would be for no more than 15 minutes, and typically only 10 minutes.

The first type of manned aerial surveys MML would conduct involve comprehensive aerial searches and video-assisted counts. For this type of survey, which has historically be used to study beluga whales, a predetermined line-transect would be flown in order to search for cetaceans. Once an individual or group is located, observers would count the number of individuals in the group at least four times, while concurrently recording video to provide a correction factor. Up to 16 passes (on average four to eight passes) over or near a group could occur on any given day, and four to eight surveys of the group within each field season are possible.

The second type of manned aerial surveys MML would conduct involve photographic studies, which historically have focused on bowhead whales. These aerial surveys would be used to locate whales, take photographs of individuals for capture/recapture abundance estimation, and document feeding behavior, growth rates, and calving intervals. Transects would not be flown during these surveys; rather, researchers would follow leads in the sea ice in an effort to photograph whales. If cow-calf pairs are observed, the aircraft would circle the animals to capture additional photographs in order to document this crucial demographic and collect data related to calving intervals. All efforts would be made to minimize multiple passes over animals, as doing so would inflate the resulting population estimates.

The third type of manned aerial surveys MML would conduct involve line-transect surveys to study distribution, habitat use, density or abundance, and behavior of cetaceans. These surveys would usually be flown along predetermined transects located systematically across the study area in which observers would search for and document the location of cetaceans and environmental conditions with a data logger. The aircraft would occasionally break from the transect to circle over cetaceans to determine species or calf presence, obtain a better group size count, or photograph noteworthy sightings. However, in most cases animals would experience only a single overpass.

The final type of manned aerial surveys involves search flights in an effort to assist with vessel surveys. These surveys would either be flown along predetermined transects or in areas of interest (i.e., shelf breaks, isobaths and historical areas of high-density sightings) in an effort to locate cetaceans that can then be studied through vessel surveys. For these surveys, most animals would experience only a single overpass, but on occasion circling would occur in order to obtain photographs or record group size estimates. While MML would be authorized to conduct these aerial surveys on all species listed in Table 1 (as is the case with all manned aerial survey methods previously mentioned), the proposed study species for this method is North Pacific right whales.

3.1.1.2 Unmanned Aerial Surveys

The Permits Division proposed to authorize MML to take all age and sexes classes of beluga whales (Cook Inlet DPS) and humpback whales (Mexico, Central America, Western North Pacific DPSs) by means of harassment during unmanned aerial surveys. The primary goal for these activities is to collect photographic data to be used in estimating body size and body condition and identifying individuals. All unmanned aerial surveys would be conducted using vertical takeoff and landing systems (VTOL) such as the APH-22 hexacopter (Aerial Imaging Solutions, Old Lyme, CT, described in (Goebel et al. 2015), equipped with photography equipment. VTOL would be launched from a variety of different vessel platforms, which are further described below. The flight operations would be similar to those described in (Durban et al. 2015), with flight duration being approximately 12 to 16 minutes. Survey altitude would varying depending on weather, the target species, sensor capabilities, and Federal Aviation

Administration and other regulations, but would typically be approximately 75 to 125 feet, with a minimum altitude of 30 feet.

3.1.2 Vessel Surveys, Close Approaches, and Documentation

Vessel surveys are the primary means by which cetacean researchers collect data on large whale species as they provide a platform for researchers to collect a wealth of information on whale biology. Here we describe the proposed vessel surveys, close approaches, and documentation of these activities more generally, and then in each section below, detail the individual research activities that would occur during vessel surveys.

The Permits Division proposes to authorize MML to take all age and sex classes of ESA-listed cetaceans in Table 1 by means of harassment as the result of close approaches and documentation during vessel surveys. The proposed vessels surveys would use a line-transect method, and general follow the protocol described below. However, variations of this protocol would be used to meet specific research objectives, but such variations would not change the nature of effects to ESA-listed species.

Typically NOAA Corps or private charter vessels, varying in size from approximately 120 to 210 feet, would traverse predetermined track lines within the action area at a constant speed (usually 10 knots), while observers (typically three) search for cetaceans with binoculars. Once a cetacean or group of cetaceans is spotted, the vessel would either remain on the track line to record data, or depending on the species, turn off the track line and approach to confirm species identification and estimate group size. Large whales such as sperm and humpback whales would often not be approached if they are not near the track line. If the vessel were to approach, the approach would be conducted at the minimum speed (less than 10 knots) needed to close the distance between the ship and the group of animals to within 500 meters. After researchers determine species identification and estimate group size, the vessel would either resume its course along the track line, or switch to other research activities as described below.

Throughout vessel surveys and close approaches, researchers would be authorized to document cetaceans through photography, videography, and observation. These methods are commonly used by cetacean researchers to collect data on animal behavioral and physical characteristics and to identify and track individuals. For some species, photography would be conducted from the large track line vessel if there is not sufficient time or a need to launch a smaller research, if documentation must begin before a smaller vessel is launched in an effort to maximize data collection in the event the animals are lost before the small vessel is launched, or if weather conditions are not suitable for launching as a smaller vessel. In these cases, the track line vessel typically maneuvers to within 20 to 50 meters of the cetaceans at a slow speed (two to six knots) in order to observe the animals and take photographs and video.

When possible, documentation would occur from smaller research vessels such as 4.3 meter Achilles Inflatables with 25 horsepower outboard engines, 7.5 meter rigid-hulled inflatable with 175 horsepower outboard engines, five meter open skiff Boston Whaler type boats, seven meter

Almar aluminum cabin boats, seven to 10 cabin cruisers, or small fishing boats such as 9.8 meter Bristol Bay gillnetter. These vessels would be launched either from a larger track line vessel or from shore and slowly approach cetaceans, typically at three to six knots, with a maximum of 10 knots. The final approach distance and location would vary by species. For some large whales such as sperm and humpback whales, fluke photo are desired and so the boat would typically be maneuvered to within 25 to 50 meters behind the whale. For other large whales such as blue, North Pacific right, and gray whales, body photographs are desired and so the boat would typically be maneuvered to within 20 to 40 meters to the side of the whales on a parallel course. Photographs for killer whales would also be collected alongside animals, but from a closer position, typically 10 to 20 meters. If water quality allows, researchers would also attempt to record underwater video of cetaceans from these small vessels using a waterproof camera mounted to a hand-held pole that would be lowered into the water to a depth of no more than 10 feet. All small vessel approaches would be conducted in a manner that minimizes boat noise and sudden changes in speed or course in order to avoid disturbing the animals.

During both small vessel and large vessel encounters, the total time spent in the vicinity of target animals, as well as the number of attempts made to collect photographs, would vary by species and group size but limited in duration in order to minimize incidental harassment and disturbance. For killer whales, the average encounter time would be approximately two hours (maximum three hours), due to their large groups. For large baleen whales, the average encounter time would be approximately 45 minutes (maximum one hour). For sperm whales, encounter times would vary and mostly be a function of how long researchers need to wait for the whales to return to the surface in between long, deep dives.

3.1.3 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 proposed to authorize MML to collect a variety of different biological samples including feces, sloughed skin, environmental DNA, exhaled breath, and skin and blubber through biopsy sampling. Methods for obtaining each of these types of samples are described below.

3.1.3.1 Fecal, Sloughed Skin, and Environmental DNA 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). The collection of sloughed skin and feces does not usually require approaching animals directly. However, fecal and sloughed skin sampling could take place in the vicinity of whales, and due to this potential for close proximity, the Permits Division proposes to authorize the applicant to collect fecal and sloughed skin samples in the vicinity of all age and sex classes of ESA-listed cetaceans in Table 1 during vessel surveys. When feces or sloughed skin is observed in the water, researchers would approach the sample (not the whale) and collect it with fine mesh, long-

handled pool skim nets. As no particular whale is expected to be "taken" during fecal and sloughed skin 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 ESA-listed cetaceans in Table 1 as a result of the close approaches that may occur during fecal and sloughed skin sampling.

Environmental DNA (eDNA) sampling is a relatively new, non-invasive method for monitoring genetics of marine mammals (Foote et al. 2012). The Permits Division proposes to authorize the applicant to collect eDNA samples in the vicinity of all age and sex classes of ESA-listed cetaceans in Table 1 during vessel surveys. During close vessel approaches for photography, videography, and observation as described above, researchers would collect eDNA by scooping water near cetaceans with sterile, plastic water canteens. While such activities may occur behind or alongside cetaceans within 10 to 50 meters, in most cases animals are expect to have already left the immediate area when water samples are collected.

3.1.3.2 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 MML to biopsy sample ESA-listed cetaceans as identified in Table 1 during vessel surveys. Biopsy sampling would be authorized for both sexes and all non-neonates, where neonates is defined as less than a year old for small cetaceans (e.g., beluga and killer whales) and less than six months old for large cetaceans (baleen and sperm whales). In practice, non-neonates would be determined in the field by size and physical features. For small cetaceans, neonates would be defined as those individuals that are less than half the length of an adult and exhibit sustained close proximity to a female in an echelon position. For large cetaceans, neonates would be determined by the presence of skin folds and/or a non-rigid dorsal fin, which is common in recently born animals. Researchers would be authorized to attempt to biopsy sample an individual up to three times in a day. While most cetaceans would only be biopsied once a year, under some circumstances animals may be biopsied multiple times per year (Table 1). Repeat sampling within a year could be unintentional or intentional for the purposes of studying movement of individuals or longitudinal changes in contaminant profiles, stable isotopes or other markers. 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 so that previously biopsied individuals can be identified prior to repeat biopsying.

Biopsy sampling would be authorized to take place from both large vessels and small vessels, using a variety of different methods (reviewed in Noren and Mocklin 2012) depending on the vessel platform, species, and behavior. Close vessel approaches for biopsy sampling would be the same as those described above except that vessels may get slightly closer, to within three to 30 meters of the target animal(s) (Palsbøll et al. 1991). Biopsy sampling from small research vessels would use lower powered delivery devices such as recurve crossbows or adjustable-power guns (Chivers et al. 2000). Higher-powered delivery devices such as compound crossbows or black-powder Larsen guns would be used to sample large cetaceans at a distance from large research vessels. In addition, if small cetaceans are riding the bow of a large research vessel, lower powered delivery devices (e.g., recurve crossbows or adjustable-power guns) with tethered biopsy darts would be used. For this method, one end of a length of line would be tied to the biopsy dart and the other to handrail on the ship. With just enough line to reach the water, the dart would be projected at the target animal and then easily retrieved by an onboard researcher using the tethered line. Tethered biopsy sampling of large cetaceans may also occur if conditions make retrieving biopsy darts by small vessel unfeasible. For this method, a spool of line with one end attached to the biopsy dart and the other attached to the biopsy dart launcher (e.g., crossbow or gun) would be used. In both cases of tethered biopsy sampling, the lines that would be used would be light, easily breakable by cetaceans, and would not be expected to cause any entanglement or injury (NMFS 2016b). Nonetheless, MML would primarily use non-tethered biopsy sampling methods since tethering alters dart trajectory in windy conditions, decreasing the likelihood of successfully obtaining a biopsy sample. When targeting and individual for biopsy sampling, researchers would aim for the lateral area just below the dorsal fin in order to avoid hitting the head of the animal and simultaneously collect individual identification photographs of the sampled animal. Once the biopsy dart hits the animal, it is design to recoil, fall into the water, and float for retrieval.

Biopsy dart tip specifications would vary by species in order to ensure that dart tips do not penetrate deeper than the target species' and age's average blubber thickness. For small cetaceans such as killer and beluga whales, biopsy tips would be approximately 25 millimeters in length (10 millimeters in diameter). For large cetaceans (e.g., baleen and sperm whales), biopsy tips would be between 40 and 60 millimeters in length (10 millimeters in diameter). Prior to field work, biopsy tips would be heat sterilized by autoclave or gas sterilized using ethylene oxide or hydrogen peroxide or equivalent following methods described Rutala and Weber (2008) and kept in air and watertight containers, or in the sterilization pouches prior to use. Manipulation of the biopsy tips during and after sterilization and before deployment would be performed with sterile surgical gloves or other sterilized equipment. In the event a biopsy tip becomes contaminated while at sea (e.g., missed attempt) and a new, previously lab sterilized tip is unavailable, researchers would field sterilize the biopsy tip by first cleaning it with soap and water to remove any visible contaminants, and then submerging the tip in a 10 percent sodium hypochlorite (bleach) bath for 20 minutes, followed by dip rinsing in alcohol, a spray rinsing with sterile

water, and air drying. Nonetheless, researchers would minimize the need to conduct such field sterilization by having a surplus of biopsy darts available during all vessel surveys.

3.1.4 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 MML to tag ESA-listed cetaceans as specified in Table 1 with suction-cup, dart/barb, and implantable type tags. For suction-cup tags, only those animals greater than six months of age would be tagged. For invasive tags such as dart/barb or implantable tags, only juveniles and adults animals would be tagged. Regardless of tag type, researchers would not attempt to tag an individual that appears to be compromised (e.g., appears to be in poor health, exhibiting unusual behavior). Researchers would only be authorized to tag any given individual once per year. However, within any given day, researchers could attempt to tag an individual up to three times, and for projects that focus on known individuals, researchers could attempt to tag and individual on up to two days. In addition, researchers would be authorized to simultaneously tag and individual with up to two invasive tags and one suction-cup tag. 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 whales following tag attachment, which are similar across tag types.

3.1.4.1 Tag Types

Tagging technologies for large whales are rapidly advancing (Nowacek et al. 2016). As such, the suite of tags that MML would use over the five-year duration of the permit are not known at this time. However, below we describe the general types of tags that would be used under Permit No. 20465, which currently include location-only satellite tags, satellite-linked time depth recorders, time depth recorders, digital 3-D motion and acoustic tags, dermally-attached short-term tags, Global Positioning System (GPS) tags, multi-sensor tags, acoustic tags, physiological recording tags, and radio tags. Any new tags or modifications to existing tags would only be authorized under Permit No. 20465 if they have the same or lesser impacts to animals (i.e., smaller, lighter, reduced risk of injury, etc.). Currently, MML proposes to use three different types of tag, as distinguished by their attachment mechanism. These include fully implantable tags (Type I, referred to as implantable in Table 1), partially penetrating tag (Type II, referred to as dart/barb in Table 1), and non-penetrating tags (Type III, referred to as suction-cup in Table 1) (ONR 2009). The exact tag used would vary by species and research objective, but MML would ensure that the smallest, lightest, most hydrodynamic and least invasive tag package that can achieve the research goal is used in order to reduce drag, increase retention time, and have the least impact on the tagged cetacean.

Type I

Type I tags consist of those tags in which the attachment system and electronic package of the tag are fully embedded in the body of the animal. These tags are designed for long deployments, typically lasting from weeks to over a year, and for large whales (e.g., baleen whales and sperm whales). Historically, implantable tags were made of two components (a transmitter and an attachment system), but this designed appeared to cause tag breakage and possible adverse health impacts leading to the currently proposed fully integrated tags (Figure 1) that appear to have resolved these issues (NMFS 2016b; Robbins et al. 2016).

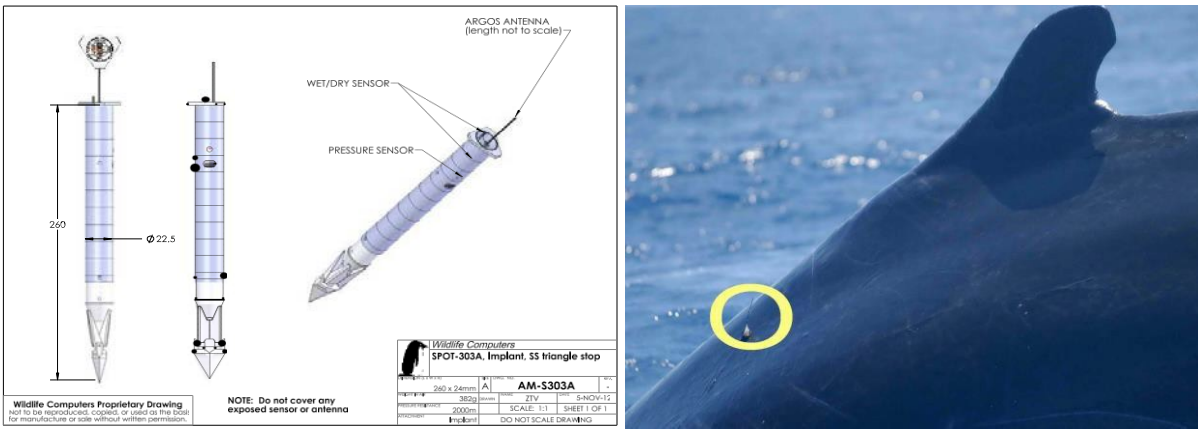

Figure 1: Example of an integrated-implantable tag (left) and deployment (right, yellow circle) in a large whale.

These fully integrated implantable tags are made from surgical-quality stainless steel or high-grade titanium and vary in their dimensions. The minimum size and weight of existing models is 78 millimeters (length) by 20 millimeters (width) by 10 millimeters (depth) and 77 grams (e.g. mold AM-194 by Wildlife Computers). The maximum size and weight of existing models can measure 160 to 300 millimeters in length, 20 to 25 millimeters in diameter and weigh between 300 and 450 grams. Tag diameters vary, but would not exceed 28 millimeters.

Implantable tags anchor in the blubber or blubber-muscle interface (the fascia) of cetaceans. Only small portion of the tag (an antenna and environmental sensors) remains external, as ensured by a "stopper" that limits the depth of penetration (Mate et al. 2007). To penetrate the animal's tissue, implantable tags have in a sharp needle, triangular, or arrow-shaped tip. Once implanted in an animal, they anchor via multiple sets of retention barbs, petals or toggle, which are held flush to the body of the tag for deployment, but expand outward after tag penetration. The number and dimensions of barb/petal/toggle sets would range from one (shorter attachment systems) to three (longer systems) and the length of the barbs would range from 35 to 70 millimeters. When selecting an appropriate penetration depth, researchers would consider the thickness of the blubber layer of the species of interest, with the intent of limiting anchoring to the fascia. The maximum depth of penetration would be 300 millimeters, but penetration depth would vary by species and always be less than the full size of the tag due the stoppers and the fact that tags would almost always penetrate at a non-perpendicular angle.

While attached to cetaceans, implantable tags would collect a variety of data depending on the configuration. Tags would typically collect location data only (e.g. SPOT5 and SPOT6 electronics of Wildlife Computers) or be archival (i.e., need to be retrieved by researchers) and collect data on light level, temperature, and diving information in addition to location (e.g. the SPLASH10/Mk10A tags from Wildlife Computers). Current implantable tags use the ARGOS system to retrieve transmissions from the tags and determine location, but future tags would likely use GPS technologies. Implantable tags are designed to detach from whales via natural outward foreign body migration. This results in varying longevity, with maximum longevity being between 100-300 days in minke, fin, right and humpback whales to over 500 days in blue, sperm, bowhead, and southern right whales (Best and Mate 2007; Heide-Jorgensen et al. 2006; Mate and Best 2008; Mate et al. 2007; Mate et al. 1999; Zerbini et al. 2006a).

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. As with Type I tags, 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 2) (NMFS 2016b).

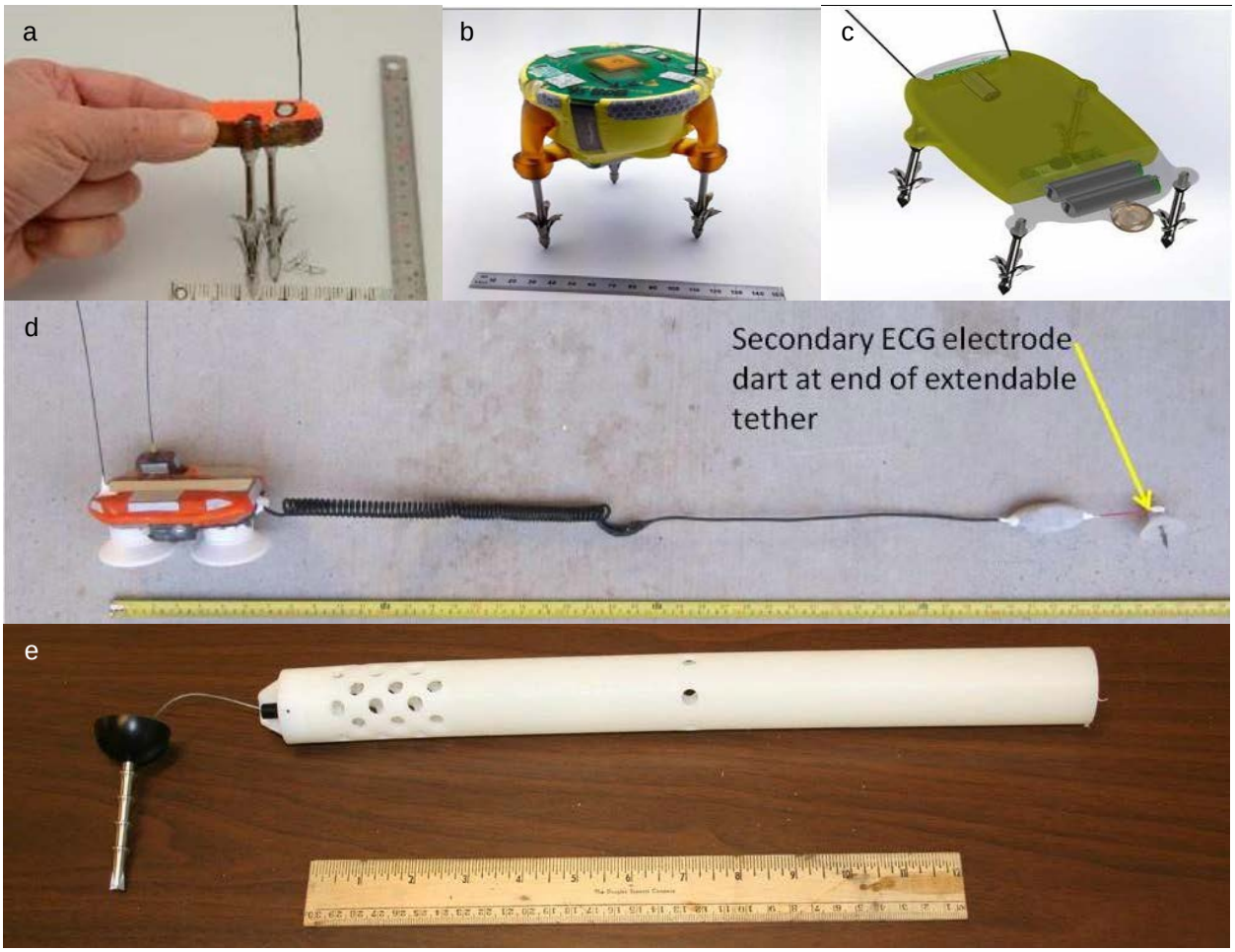

Figure 2: Example Type II tags. a) Low Impact Minimally Percutaneous External-electronics Transmitter tag, b) Whale Lander tag, c) alternate design of a Multi-sensor, Multi-dart tag with four darts, d) Multi-sensor behavioral and physiological recording tag with primary electrodes in darts of main tag body (under suction cups) and secondary electrode in dart at end of tether, e) Dermally Attached Short-term tag (NMFS 2016b).

The penetrating portions of Type II tags are typically made of surgical grade stainless steel or high-grade titanium, which are then attached to the electronic portion of the tag encased in an epoxy and urethane housing. Type II tags are generally less invasive than Type I tags, being smaller and lighter, creating smaller (although usually more) puncture wounds, and penetrating much shallower (between 30 to 100 millimeters). Type II tags are designed to remain solely within the blubber layer when deployed on large cetaceans, and not fully penetrate the dorsal fin when deployed on medium sized cetaceans.

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. 20465 is not known, but current models represent examples of tag specifications that would likely be used. Current location-only LIMPET tags (SPOT6, Figure 2a) 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 5 and 30 millimeters long, making for a maximum tag weight of 90 grams. Current Whale Lander tags (Figure 2b), 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 2016b). An alternate design Multi-sensor, Multi-dart tag currently under development (Figure 2c) 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 (detailed further below) also exist in which LIMPET style darts (e.g., Figure 2d) are added to suction-cups to increase attachment, and or add additional physiological sensors. DASH tags (Figure 2e) 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 (Argos, GPS), 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 GPS unit and or 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 much like Type I tags. However, given their shallower penetration depths, the penetrating portions of 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; NMFS 2016b; Szesciorka et al. 2016).

Type III

Type III tags consist of tags that utilize 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 3), Acousonde tags, Customized Animal Tracking Solutions tags, among others.

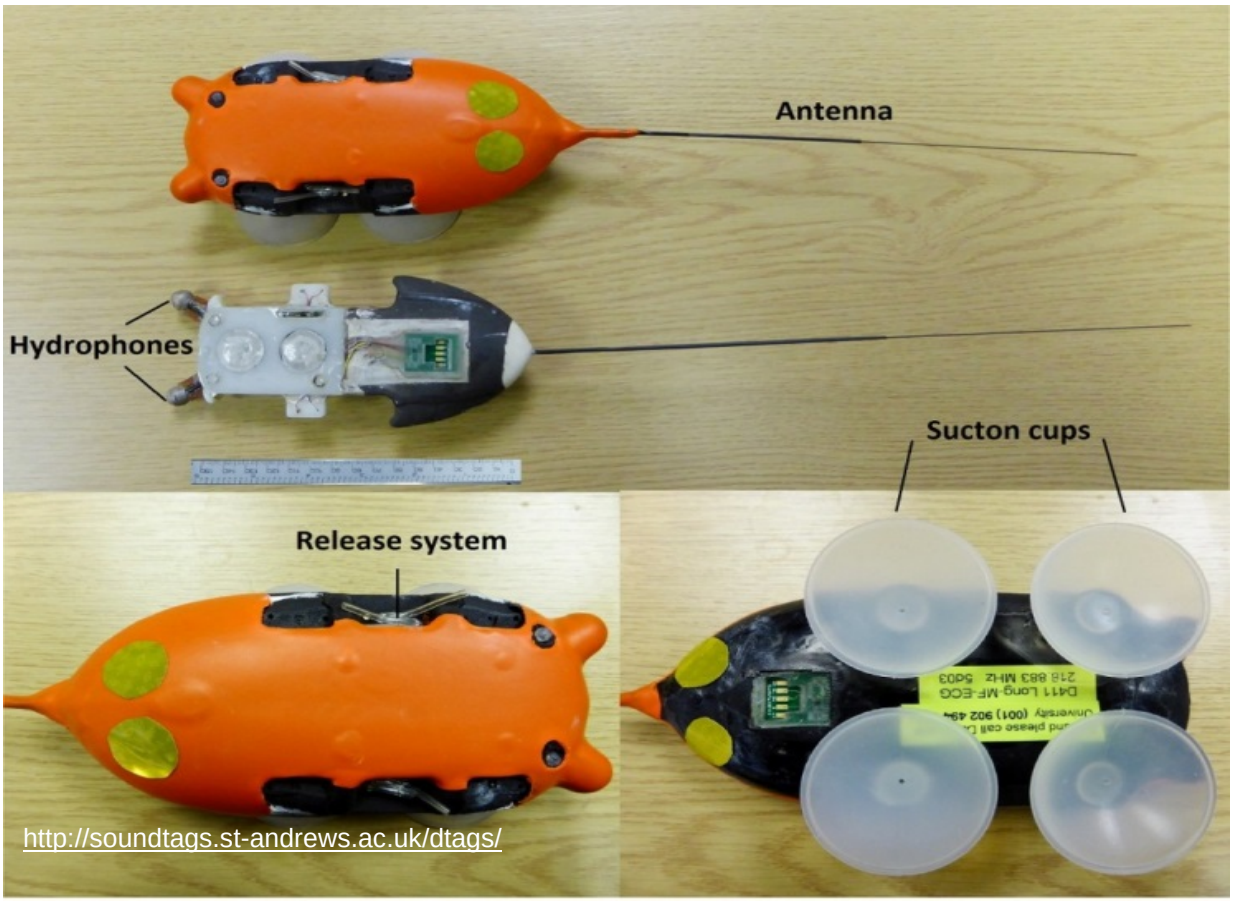

Figure 3: Example Digital Acoustic Recording Tag, Version 3.

Type III tags are typically small measuring approximately 10 centimeters by 3 centimeters by 3 centimeters and weighing 100 grams, but larger video camera tags such as Crittercam tags measuring 30 centimeters by 8 centimeters by 8 centimeters and weighing approximately 1000 grams exist. Type III 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, GPS 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 tags models are equipped with release mechanism.

Regardless, suction-cup tags only remain attached to animals from minutes up to several days before falling off (Szesciorka et al. 2016).

3.1.4.2 Tag Deployment

Prior to tag deployment, all tags that penetrate the animal's tissue would be sterilized and sealed in transport packages before used in the field. Sterilization would follow similar procedures as previously outlined for biopsy darts. All penetrating tags would be washed in water and detergent to ensure removal of residuals from manufacturing and then rinsed. Following this, they would be placed in an individual sterilization pouch or bags and then sterilized using ethylene oxide or hydrogen peroxide in a commercial gas sterilization unit. Prior to sterilization, some tags (e.g., Type I tags), may be coated with topical or integrated slow-release antibiotics (e.g., gentamycin sulphate mixed in acetone with a long-dispersant methacrylate powder) following the methods of (Mate et al. 2007). In the field, all tags would be kept in their sterilization pouches until they are being deployed, upon which they would be handled with surgical gloves or other sterilized equipment. If tags become contaminated in the field, the same procedures as described for biopsy tips would be used to re-sterilize. This includes a 10 percent bleach (sodium hypochlorite) bath for 20 minutes, a dip rinse in alcohol, a spray rinse of sterile water, and air-drying. However, researchers will attempt to avoid the need for field sterilization by having additional, lab-sterilized tags available when possible.

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 3.1.2, but in some cases with closer proximity to whales. The exact method would depend on the tag type, the target species, and the vessel from which the tag is being deployed (NMFS 2016b). Such methods include pneumatic rifles, archery bows, crossbows, black-powder guns, spear guns, or hand-held poles or jab sticks. Depending on the method, researchers would approach whales to distances between two and 30 meters.

Type I tags would typically be deployed with crossbows, a modified pneumatic rifle (Heide-Jorgensen et al. 2001) or hand-held poles (Mate et al. 2007) (Figure X). When crossbows or rifles are used, the tag itself would be placed at the front of a plastic or aluminum carrier (often referred to as the delivery rocket), which launched by the crossbow or rifle at pressures ranging from either to 20 bar (Figure 4). Once the tag penetrates the whale, the carrier would detach from the tag and be retrieved for re-use. Using these projectile methods, researchers would approach whales to within 10 to 30 meters (NMFS 2016b). When hand-held poles are used, tags attached to poles, approximately eight meters in length and typically made from carbon fiber, would be manually attached to cetaceans during close small vessel approaches, typically within two to five meters of whales. In most cases, projectile methods (crossbows, line throwers, etc.) are preferred due to the close approach and calm sea state needed for pole tag deployments.

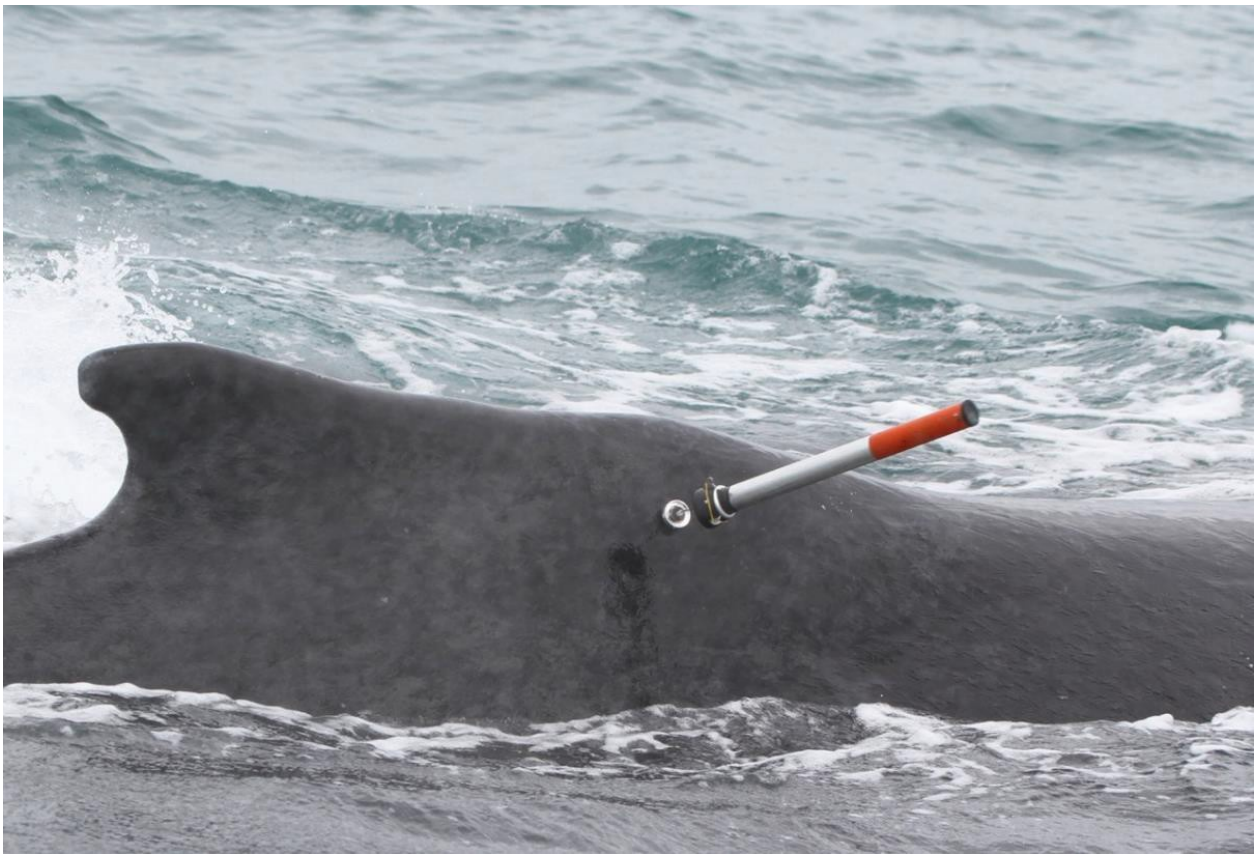

Figure 4: Photo of an implantable tag carrier immediately after an implantable satellite tag is deployed on a humpback whale.

For Type II tags, crossbows, poles, pneumatic rifles and black-powder guns would be used for deployment. LIMPET tags would typically attached to whales using high-power crossbows, precision and power-adjustable compressed carbon dioxide rifles (e.g. the Dan Inject) or a black-powder rifle (e.g. the Larsen gun). DASH tags would be deployed with pneumatic rifles as described for Type I tags above. With all these methods, the tag would be placed in a tag holder at the tip of a bolt, which slides into the flight groove of the crossbow or the barrel of the rifles prior to firing (e.g. Figure 5). On contact with a whale, the bolt would fall away and be retrieved, leaving only the tag attached to the whale. When Type II tags are deployed with these projectile methods, researchers would approach cetaceans to within five and 25 meters. Pole deployment methods use for Type II tags would be similar to those described for Type I tags, and would be primarily used for larger, archival tags.

Figure 5: Example of crossbow equipped with Low Impact Minimally Percutaneous External-electronics Transmitter tag.

Type III tags would typically deployed with hand-held poles, ranging in length from three to seven meters. As with other pole-based methods, researchers would extend the pole over the side of the small vessel close approaches and manually place the tag on the whale (either passively or actively as previously described). However, Type III tags have recently been deployed with similar projective methods as described above for Type I tags, and MML would be authorized to utilize these new methods for deploying Type III tags.

Figure 6: Example of suction-cup tag deployment with hand-held pole.

The location tags would be placed on cetaceans would vary according to species and tag type. 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 2016b; 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 the whale as long as the location of the tag would not be expected to impair the whale to carry out species typical behaviors. In particular, the area near the blowhole, eyes, mouth, genitals, flippers, and flukes would be avoided, and invasive tags would not be attached anterior to the first cervical vertebrae.

MML 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, MML would only be authorized to use a maximum of two invasive tags (e.g., one Type I and one Type II tag) and one non-invasive (Type III) tag. However, MML would attempt to combine instruments into two or fewer tag packages in an effort to reduce the number of tags that would be deployed on any single animal.

3.1.4.3 Tag Monitoring

For many Type III tags, researchers would attempt to stay near whales (at a distance) to monitor the tag and whale behavior until the tag detaches. In contrast, Type I and II tags are expected to have longer durations and so whales are not typically followed up success tag deployment. Instead, MML would attempt to conduct follow-up monitoring whenever feasible by attempting to re-locate previously tagged individuals, both before and after the tag has detached. In the event a previously tagged whale is located, MML would make every effort to obtain photographs to assess the tag (if still attached) and tagging site. Beyond these direct efforts by MML to monitor tagged whales, photographs and other details of tagged animals would be disseminated to other researchers requesting that make efforts to photograph these tagged animals if sighted. Finally, photographs of tagging sites would be shared with appropriate veterinary experts for assistance with assessing the condition of the tagged animal.

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-list 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. 20465 can be seen below in Figure 7. This includes Alaskan waters, waters off the Western U.S., New England waters off the Northeastern U.S., and international waters near these areas. However, within New England waters no takes of ESA-listed species would be authorized. Within the action area there are several National Marine Sanctuaries in which a variety of human activities are regulated (15 C.F.R. Part 922). Research would occur anytime throughout the year, but primarily during the late spring and summer, when weather is optimal and data can be compared to previous efforts.

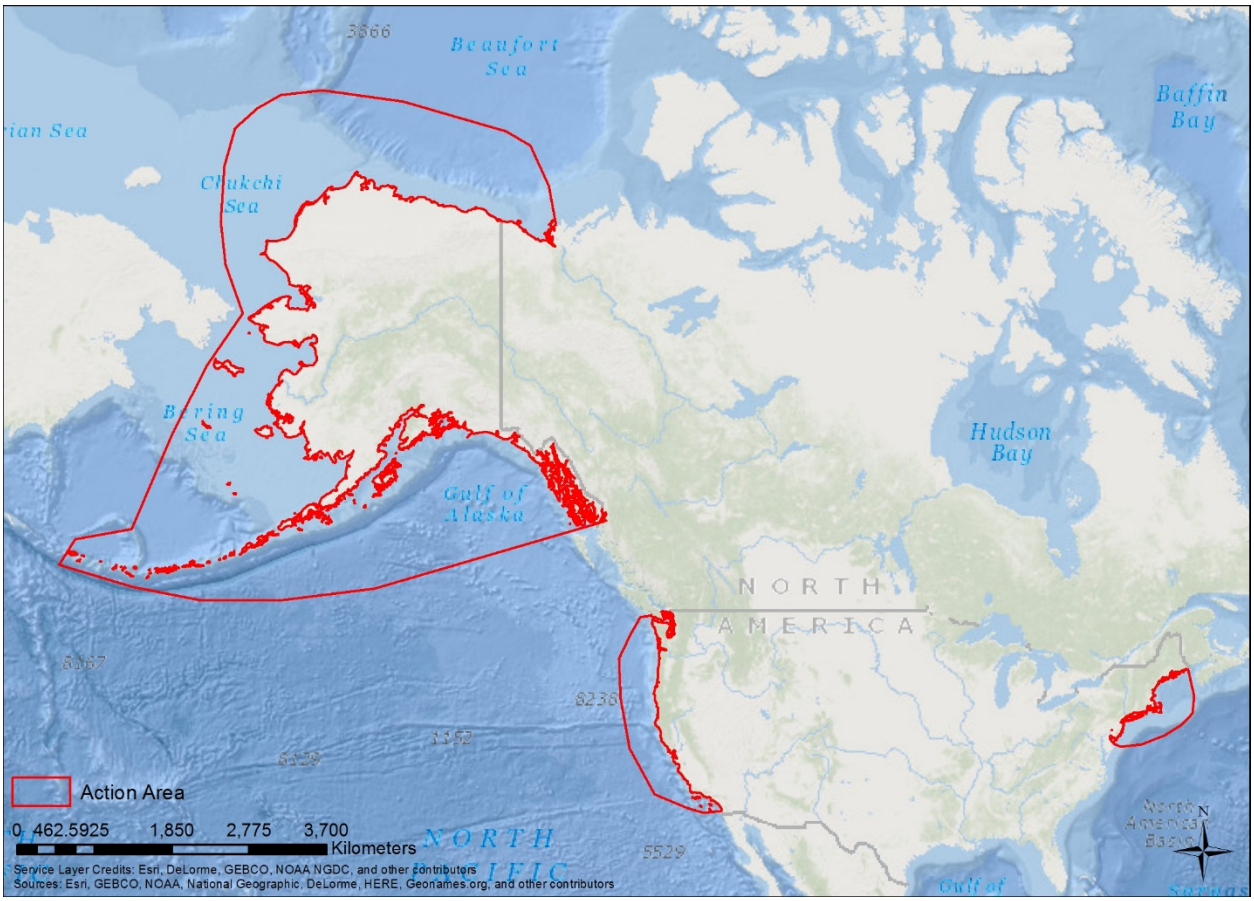

Figure 7: Action Area for Permit No. 20465 off the coast of Alaska and the western and northeastern United States.

6 STATUS OF ENDANGERED SPECIES ACT PROTECTED RESOURCES

This section identifies the ESA-listed species that potentially occur within the action area (Figure 7) that may be affected by the issuance of Permit No. 20465 (Figure 7). It then summarizes the biology and ecology of those species and what is known about their life histories in the action area. The species potentially occurring within the action area are ESA-listed in Table 2, along with their regulatory status.

Table 2: Threatened and endangered species that may be affected by the Permit and Conservation Division's proposed action of the issuance of research Permit No. 20465.

Species	ESA Status	Critical Habitat	Recovery Plan
	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 mysticetes*)	E – 35 FR 18319	-- --	-- --

Species	ESA Status	Critical Habitat	Recovery Plan
Fin Whale (*Balaenoptera physalus)*	E – 35 FR 18319	-- --	75 FR 47538
Gray Whale (*Eschrichtius robustus*) Western North Pacific	E – 35 FR 18319	-- --	-- --
Humpback Whale (*Megaptera novaeangliae*) – Central America DPS	E – 81 FR 62259		55 FR 29646
Humpback Whale (*Megaptera novaeangliae*) – Mexico DPS	T – 81 FR 62259		55 FR 29646
Humpback Whale (*Megaptera novaeangliae*) – Western North Pacific DPS	E – 81 FR 62259		55 FR 29646
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	70 FR 32293
Sei Whale (*Balaenoptera borealis*)	E – 35 FR 18319	-- --	76 FR 43985
Sperm Whale (*Physeter macrocephalus*)	E – 35 FR 18319	-- --	75 FR 81584
Pinnipeds			
Bearded Seal, (*Erignathus barbatus*) – Beringia DPS	T – 77 FR 76739	-- --	-- --
Ringed Seal, (*Phoca hispida hispida*) – Arctic DPS	T – 77 FR 76706 Listing vacated; pending appeal	79 FR 73010 (Proposed)	-- --
Steller Sea Lion, (*Eumetopias jubatus*) – Western DPS	E – 62 FR 24345	58 FR 45269	3/2008

6.1 Species and Designated Critical Habitat 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 2 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 Cetaceans in New England Waters

The proposed action would authorize research on non-ESA-listed humpback whales in New England waters. While no take of ESA-listed cetaceans within this region would be authorized, it is possible that during this humpback whale research, researchers may affect ESA-listed cetacean species in this area including blue, fin, North Atlantic right, sei, and sperm whales. Interactions with these species could potentially involve disturbance and vessel strikes.

There is a possibility that researchers could disturb a non-target, ESA-listed whale species through a close vessel approach. While researchers would not purposefully approach these species, a close approach could occur if researchers are unable to identify whale species from a distance. However, approaching one of these species alone (i.e., when not in association with a target species) is unlikely since these species are easily distinguished from humpback whales size, color, and morphology (e.g., North Pacific right whales lack a dorsal fin and sperm whales have unique body morphology). Thus, researchers should be able to identify these species from afar and avoid them if in the area. At the distances at which researchers should be able to identify non-target species, 100 meters or more, vessels operations are extremely unlikely to disturb large whales (Nowacek et al. 2004), and are thus discountable.

Any vessel transiting waters inhabited by whales has a 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 MML has in spotting cetaceans at sea, and the slow speeds at which they would operate when near whales, we believe the likelihood of a vessel strike from research vessel transits is extremely unlikely, and thus discountable.

In summary, we have determined that humpback whale research in New England waters is not likely to adversely affect blue, fin, North Atlantic right, sei, or sperm whales found within these waters. However, for all of these species other than North Atlantic right whales, take would be authorized in Pacific waters. As such, only North Atlantic right whales will not be considered further in this opinion.

6.1.2 Gray Whales (Western North Pacific Population)

The proposed action would not permit take of ESA-listed Western North Pacific gray whales. However, it would permit take of non-ESA-listed Eastern North Pacific gray whales and it is possible that researchers could unintentionally take Western North Pacific gray whales in the process.

Western North Pacific gray whales exhibit extensive plasticity in their occurrence, shifting use areas within and between years, as well as over longer time frames, such as in response to oceanic climate cycles (e.g., El Nino-Southern Oscillation, Pacific Decadal Oscillation, and Arctic Oscillation) (Gardner and Chavez-Rosales 2000; Meier et al. 2007; Tyurneva et al. 2009; Vladimirov et al. 2006a; Vladimirov et al. 2006b; Vladimirov et al. 2005; Vladimirov et al. 2008; Vladimirov et al. 2009; Vladimirov et al. 2010; Weller et al. 2012; Yablokov and Bogoslovskaya 1984; Yakovlev and Tyurneva 2005). The species typical distribution extends south along Japan, the Koreas, and China from the Kamchatka Peninsula (IWC 2003; Kato and Kasuya. 2002; Omura 1988; Reeves et al. 2008; Weller et al. 2003). Other possible range areas include Vietnam, the Philippines, and Taiwan, although only historical whaling records support occurrence in these areas (Henderson 1990; Ilyashenko 2009). The range has likely contracted from the Koreas and other southern portions of the range versus pre-whaling periods. Prey availability and, to a lesser extent, sea ice extent, are probably strong influences on the habitats used by western North Pacific gray whales (Clarke and Moore 2002; Moore 2000).

Eastern and Western North Pacific gray whales were once considered geographically separated along either side of the ocean basin, but recent photo-identification, genetic, and satellite tracking data refute this. Two Western North Pacific gray whales have been satellite tracked from Russian

foraging areas east along the Aleutian Islands, through the Gulf of Alaska, and south to the Washington State and Oregon coasts in one case (Mate et al. 2011) and to the southern tip of Baja California and back to Sakhalin Island in another (IWC 2012). Comparisons of Eastern and Western North Pacific gray whale catalogues have thus far identified 24 Western North Pacific gray whales occurring on the eastern side of the basin during winter and spring (Burdin et al. 2011; Weller et al. 2013). During one field season off Vancouver Island, western North Pacific gray whales were found to constitute 6 of 74 (8.1 percent) of photo-identifications (Weller et al. 2012). In addition, two genetic matches of Western gray whales off Santa Barbara, California have been made (Lang et al. 2011). Individuals have also been observed migrating as far as Central Baja Mexico (Weller et al. 2012).

The most recent abundance estimate of the Western North Pacific gray whale population is 140 individuals (Carretta et al. 2016b). The population was believed to be extinct in the 1970s (Bradford et al. 2003). At least 1,700 to 2,000 individuals were commercially harvested from the late 1800s to the mid-20th century (Commission 2004; IWC 2003). Findings that Eastern North Pacific gray whales may be found within the range of Western North Pacific gray whales may mean that even fewer individuals compose the western population, as individuals formerly believed to be western individuals may actually be part of the eastern population (Lang et al. 2010).

From this overview, it is apparent that Western North Pacific gray whales could be found within the action area. Furthermore, since researchers would not always be able to identify individual animals in the field as belonging to either the Western or Eastern North Pacific population of gray whales, it is possible that a Western North Pacific gray whale could be unintentionally taken by means of aerial survey, vessel survey, close approach, documentation, biological sampling, and tagging since these procedures would be authorized for Eastern North Pacific gray whales. However, given their low occurrence in the action area (approximately 20 to 30 individuals) and relative population size compared to Eastern North Pacific gray whales (approximately 0.7 percent with 140 for Western North Pacific vs. 20,125 for the Eastern North Pacific) we find it highly unlikely that any Western North Pacific gray whales would be taken. As a result, we have determined that Western North Pacific gray whales are not likely to be adversely affected because the effects of the action are discountable, and we will not discuss this species further.

6.1.3 Critical Habitat

The action area overlaps with several designed or proposed critical habitats for ESA-listed species including designated critical habitat for beluga whales (Cook Inlet DPS), killer whales (Southern Resident DPS), North Pacific right whales, North Atlantic right whales, and leatherback turtles and proposed critical habitat for ringed seals (Arctic DPS). Due to this spatial overlap, there is a possibility that the proposed action may affect these critical habitats. The Permits Division has determined that the issuance of Permit No. 20465 is not likely to adversely

affect these critical habitats. Here we conduct our own analysis regarding the effects to designated and proposed critical habitat.

NMFS designated critical habitat for the Cook Inlet beluga whale on April 11, 2011 (76 FR 20180). Two areas specific areas were designated comprising 7,809 square kilometers of marine habitat. Area 1 encompasses 1,918 square kilometers of Cook Inlet northeast of a line from the mouth of Threemile Creek to Point Possession. Area 2 includes near and offshore areas of the mid and upper Inlet, and nearshore areas of the lower Inlet, including Tuxedni, Chinitna, and Kamishak Bays on the west coast and a portion of Kachemak Bay of the east coast. 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 (76 FR 20180).

On November 29, 2006, NMFS designated critical habitat for killer whales (Southern Resident DPS) (71 FR 69054). 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. This area contains the following physical and biological features essential to the conservation of killer whales (Southern Resident DPS): 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.

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. These areas are influenced by large eddies, submarine canyons, or frontal zones which enhance nutrient exchange and act to concentrate prey. They 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 physical and biological features essential to the conservation of North Pacific right whales (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 (73 FR 19000).

In 1994, NMFS designated critical habitat for North Atlantic right whales, which was expanded in 2016. The designated areas include important foraging waters in the Gulf of Maine and Georges Bank Region and calving waters off the coast of North Carolina, South Carolina, Georgia, and Florida. The physical and biological features essential to the conservation of North Atlantic right whales found in these waters include the physical oceanographic conditions and

structures that distribute and aggregate zooplankton species *Calanus finmarchicus*, late stage *C. finmarchicus* in dense aggregations, diapausing *C. finmarchicus* in aggregations, and sea surface conditions associated with force four or less on the Beaufort Scale, sea surface temperatures of seven to 17 degrees Celsius, and water depths of six to 28 meters over contiguous areas of at least 231 nautical square-miles of ocean waters during the months of November through April.

In 2012, NMFS designated critical habitat for the leatherback sea turtle along the west coast of the U.S. (50 CFR 226). This designation includes approximately 43,798 square kilometers stretching along the California coast from Point Arena to Point Arguello east of the 3000 m depth contour; and 64,760 square kilometers stretching from Cape Flattery, Washington to Cape Blanco, Oregon east of the 2,000 meters depth contour. The designated areas comprise approximately 108,558 square kilometers of marine habitat and include waters from the ocean surface down to a maximum depth of 80 meters. They were designated specifically because of the occurrence of prey species, primarily *scyphomedusae* of the order Semaeostomeae (i.e., jellyfish), of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks.

In 2014, NMFS issued a proposed rule to designate critical habitat for the Arctic DPS of ringed seals. The proposed area includes all the contiguous marine waters from the coastline of Alaska, to an offshore limit within the U.S. Exclusive Economic Zone. The boundary extends offshore from the northern limit of the United States-Canada land border, to around the west coast of Alaska just southeast of Cape Avinof. The physical and biological features essential to the conservation of the Arctic DPS of ringed seals found in this area include: (1) sea ice habitat suitable for the formation and maintenance of subnivean birth lairs used for sheltering pups during whelping and nursing; (2) sea ice habitat suitable as a platform for basking and molting; and (3) primary prey resources to support Arctic ringed seals, including Arctic cod, saffron cod, shrimps, and amphipods.

For all of these critical habitats, interactions that may result from the proposed research would be limited to aerial and vessel surveys, as all other activities would be directed at individual cetaceans. Given the nature of these surveys, none of the physical and biological features essential to the conservation of Beluga whales (Cook Inlet DPS), Killer whales (Southern Resident DPS), North Pacific right whales, North Atlantic right whales, Leatherback turtles, and Ringed seals (Arctic DPS) found in these critical habitats would be significantly altered. Vessel and aerial operations would not significantly alter large scale physical or oceanographic conditions or processes, nutrients, bathymetry, photoperiod, or prey availability. While vessel operations could result in minor changes in water flow, turbidity, and movement, these would be extremely local and temporary and thus not meaningful on a scale that would be expected to adversely affect critical habitat. Vessels could come into close proximity with, or even in contact with, prey of ESA-listed species found within these critical habitats. We expect that any such interactions would only result in a slight displacement of prey. If larger prey were to come into contact with the research vessels' propellers, it is possible that individual prey could be killed.

However, even if this unlikely event were to occur, the removal of several individual prey would have an immeasurable impact on the overall abundance of prey in these designated or proposed critical habitat areas. Given the short-term nature of aerial and vessel surveys, they would not restrict inter-area passage or significantly alter ambient noise levels. Only aerial surveys would take place over sea-ice, but this activity is in no way expected to alter sea-ice habitat. While some aircraft and vessel pollution and noise would occur, it be short-term, minimal, diluted, and not have any measurable impact on the aforementioned physical and biological features. In summary, while some minor effects to the physical and biological features found within these critical habitat areas are possible, the magnitude of these effects are insignificant. Thus, we conclude that the issuance of Permit No. 20465 is not likely to adversely affect any designated or proposed critical habitat.

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 8) 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).

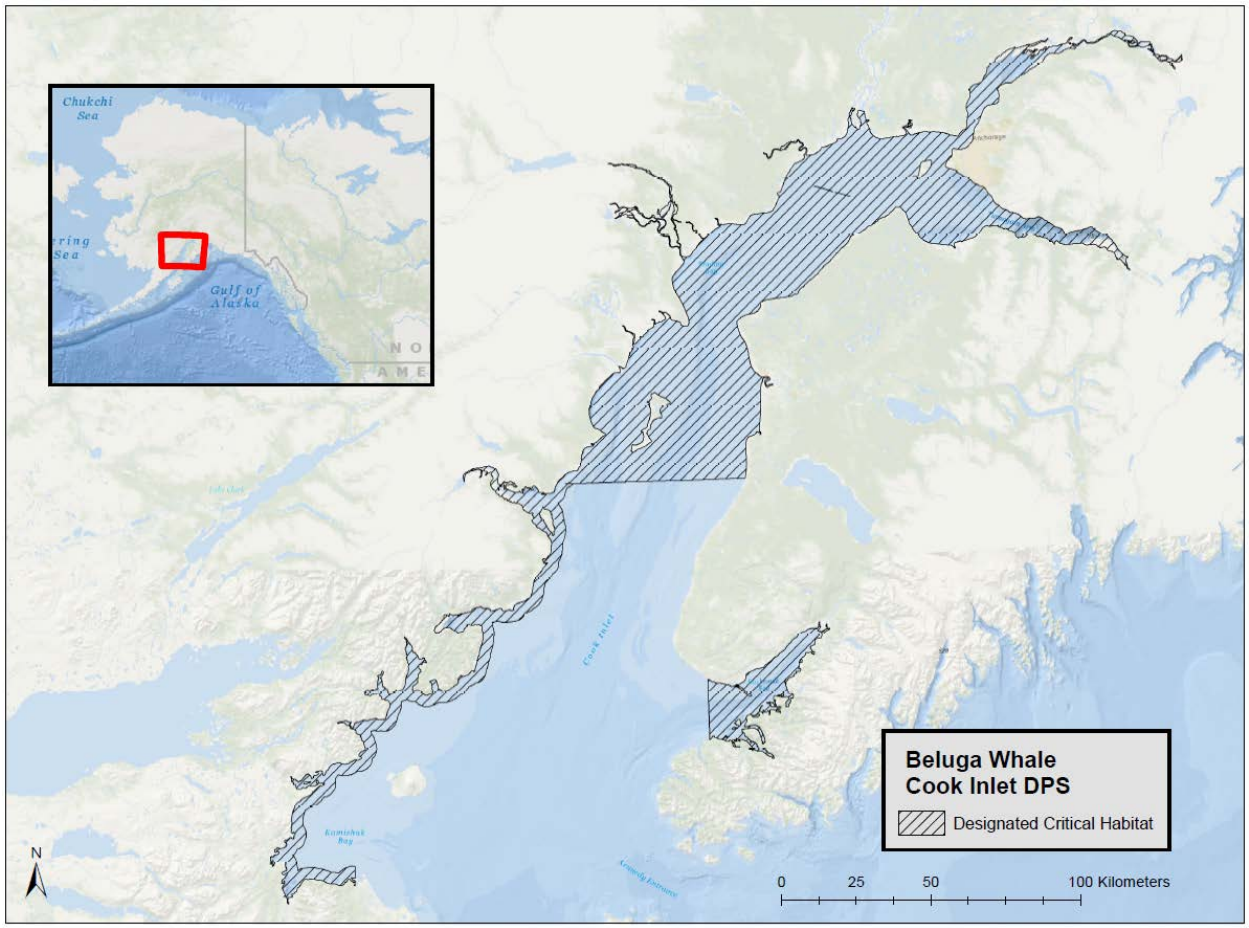

Figure 8. Beluga Whale Cook Inlet distinct population segment general range and designated critical habitat.

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 9). 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 2016e). The Cook Inlet DPS of beluga whales was listed as endangered under the ESA effective October 22, 2008 (73 FR 62919).

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

Table 3: Cook Inlet beluga whale information bar provides species Latin name, common name and current Federal Register notice of listing status, designated critical habitat, Distinct Population Segment/Evolutionary Significant Unit, recent status review, and recovery plan.

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	2016	76 FR 20180

Information available from the recovery plan (NMFS 2016e), recent stock assessment reports (Carretta et al. 2016b), and the status review (NMFS 2017b) 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 2016e).

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 2016e). 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 2016e).

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 2016e).

6.2.1.4 Critical Habitat

NMFS designated critical habitat for the Cook Inlet beluga whale on April 11, 2011 (76 FR 20180). Two specific areas were designated comprising 7,809 square kilometers of marine habitat (Figure 8). 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 (76 FR 20180).

6.2.1.5 Recovery Goals

The 2016 Cook Inlet Beluga recovery plan (NMFS 2016e) contains complete demographic and threat-based downlisting and delisting criteria. A general summary of the criteria is provided in Table 2 below.

Table 4: 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 10).

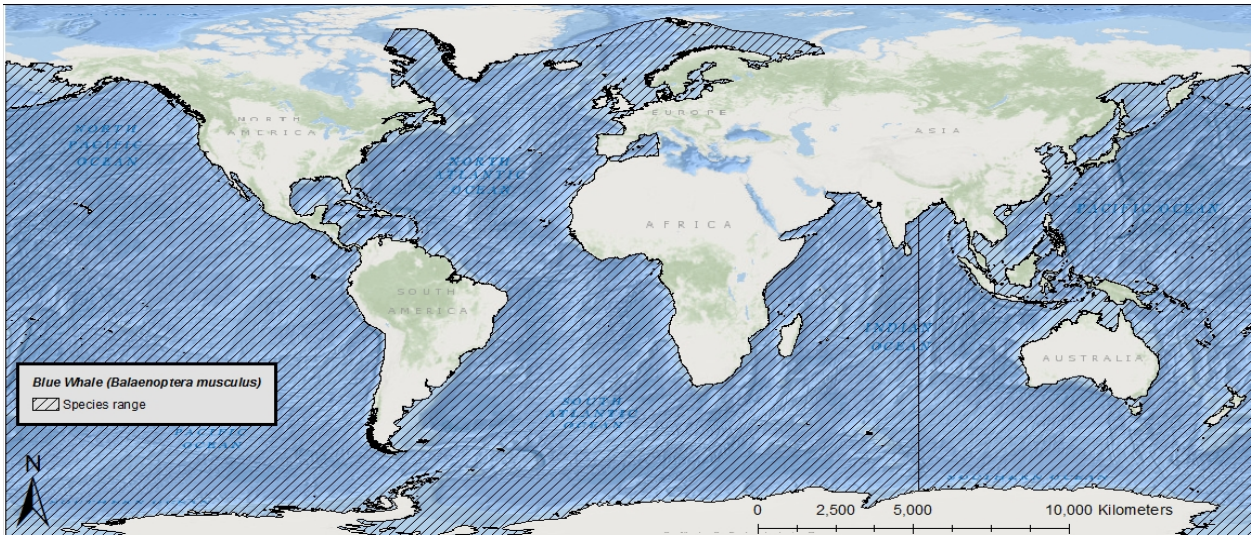

Figure 10: Map identifying the range of the blue whale.

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 11). Most experts recognize at least three subspecies of blue whale, *B. m. musculus*, which occurs in the Northern Hemisphere, *B. m. intermedia*, 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 (35 FR 18319) (Table 5).

Figure 11: Blue whale. Photo: National Oceanic and Atmospheric Administration

Table 5: Blue whale information bar provides species Latin name, common name and current Federal Register notice of listing status, designated critical habitat, Distinct Population Segment/Evolutionary Significant Unit, recent status review, and recovery plan.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Balaenoptera musculus	Blue whale	None	Endangered: range wide	None	35 FR 18316	1998 Intent to update (77 FR 22760)	None Designated

Information available from the recovery plan (NMFS 1998), recent stock assessment reports (Carretta et al. 2016b; Muto et al. 2016; Waring et al. 2016), 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). The Southern Hemisphere ocean basins have approximately 2,000 individual blue whales.

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.

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 10). 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 degrees south and 61 degrees 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.

Status within the Action Area

Within the action area, two recognized populations of blue whales can be found, the Eastern and Central North Pacific stocks. The Eastern North Pacific stock can be found feeding along the California coast in summer and fall, as they migrate down through southern California to spend winter and spring in the warmer, lower latitude waters off Baja California, in the Gulf of California, and on the Costa Rica Dome. The Central North Pacific stock's distribution remains largely unknown but individuals appear to feed in summer southwest of Kamchatka, south of the Aleutians, and in the Gulf of Alaska, and in winter migrate to lower latitudes in the western and central Pacific, including Hawaii. Given that the action area is primarily a foraging area for blue whales, adults, juveniles, and non-neonate calves are likely to occur here as breeding likely takes place further south.

The current best estimate for the population size of the Eastern North Pacific stock is 1,647, with a minimum population size estimate of 1,551 (Mann 1999). The current best estimate for the population size of the Central North Pacific stock is 81 individuals, with a minimum population size estimate of 38 (Carretta et al. 2016b). In 2009 the growth rate of the Eastern North Pacific stock was estimated to be just under three percent per year (Calambokidis et al. 2009), but more recent support a stable population size with no increase or decrease (Carretta et al. 2016b). In fact, in 2013 the Eastern North Pacific stock of blue whales was estimated to be at 97% of its carrying capacity, indicating that perhaps density dependent factors may be limiting population growth now rather than anthropogenic threats such as vessel strikes (Monnahan et al. 2015). There is currently no information available to estimate the population trend for the Central North Pacific stock.

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 12).

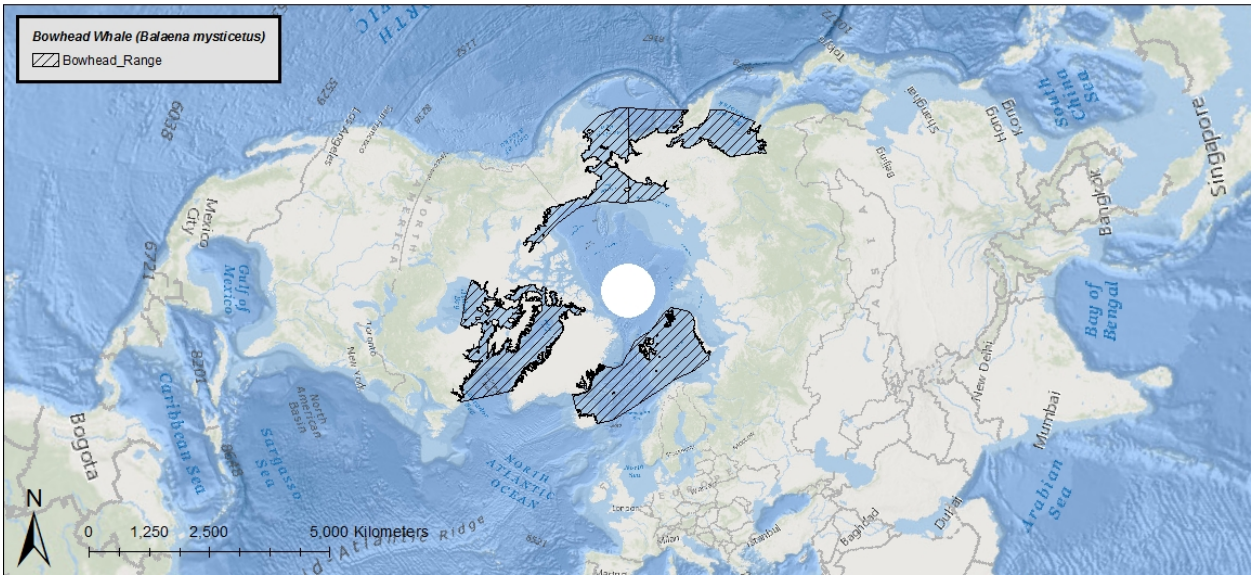

Figure 12: Map identifying the range of bowhead whales.

Figure 13: Bowhead whales. Photo: National Oceanic and Atmospheric Administration

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 13). The bowhead whale was originally listed as endangered on December 2, 1970 (35 FR 18319) (Table 6).

Table 6. Bowhead whale information bar provides species Latin name, common name and current Federal Register notice of listing status, designated critical habitat, Distinct Population Segment/Evolutionary Significant Unit, recent status review, and recovery plan.

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

Information available from the recent stock assessment report (Muto et al. 2016) 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 12).

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 International Whaling Commission. 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.

Status of Species within the Action Area

Within the action area, only the Western Arctic stock is likely to be found. The current best estimate of the population size of this stock is 16,892 whales (N_{min}= 16,091), and the population is estimated to be growing at a rate of 3.7 percent per year (Givens et al. 2013). Individuals from this population spend the majority of their lives within or near the action area, and as such, all age-sex classes are could be encountered. Western Arctic bowheads spend winter months near the southern limit of pack ice in and migrate north as the ice breaks up to feed higher latitudes waters.

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 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).

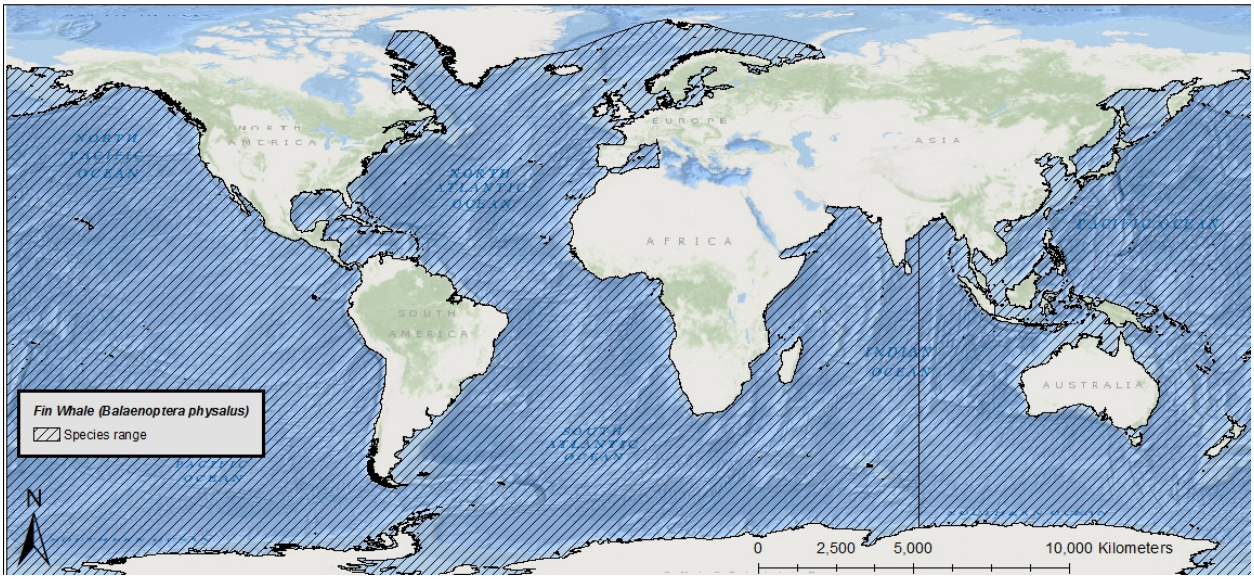

Figure 14: Map identifying the range of the fin whale.

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 (35 FR 18319) (Table 7).

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

Table 7: Fin whale information bar provides species Latin name, common name and current Federal Register notice of listing status, designated critical habitat, Distinct Population Segment/Evolutionary Significant Unit, recent status review, and recovery plan.

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

Information available from the recovery plan (NMFS 2010c), recent stock assessment reports (Carretta et al. 2016b; Muto et al. 2016; Waring et al. 2016), and the status review (NMFS 2011a) were used to summarize the life history, population dynamics and status of the species as follows.

6.2.4.1 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. Fin whales eat pelagic crustaceans (mainly euphausiids or krill) and schooling fish such as capelin, herring, and sand lice.

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 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)]. Abundance data for the Southern Hemisphere stock are limited; however, there were an estimated 85,200 fin whales in 1970.

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 and western north Atlantic stock 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 14), 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.

6.2.4.3 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 International Whaling Commission's (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.

Status within the Action Area

Within the action area, the California/Oregon/Washington and Northeast Pacific stocks of fin whales occur. Whales from the California/Oregon/Washington stock can be found in waters off the coast of California year round, especially in southern California, though fewer fin whales are found here in winter and spring likely due to migration elsewhere by some individuals. Fin whales form the Northeastern Pacific stock occur seasonally off the northwestern coast of north America and in the Bering Sea, with peak sightings and acoustic detections occurring primarily between late summer and late fall. However, some data indicate that at least some individuals use these waters as foraging grounds during the winter. Given this diversity of habitat use patterns within the action area, it is likely that all age classes may be found within the action area. However, the presence of neonates is expected to be rare since that like other baleen whales, fin whales typically breed in warm, lower latitude waters.

The best abundance estimate for the California/Oregon/Washington stock of fin whales is approximately 9,029 individuals, with a minimum of 8,127 individuals, although these are both likely underestimates (Nadeem et al. 2016). There is strong evidence that this stock is recovering, with an average increase in population abundance of 7.5 percent per year from 1991 to 2014. In recent years (2005 to 2014), this growth has slowed and fin whale abundance appears to have stabilized (Nadeem et al. 2016). The best abundance estimate for the Eastern North Pacific stock is a minimum of approximately 1,368 individuals. The annual growth rate for this stock is estimated to be 4.8 percent, with confidence intervals between 4.1 and 5.4 percent (Zerbini et al. 2006b).

6.2.4.4 Critical Habitat

No critical habitat has been designated for the fin whale.

6.2.4.5 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.

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

The humpback whale is a widely distributed baleen whale found in all major oceans (Figure 16).

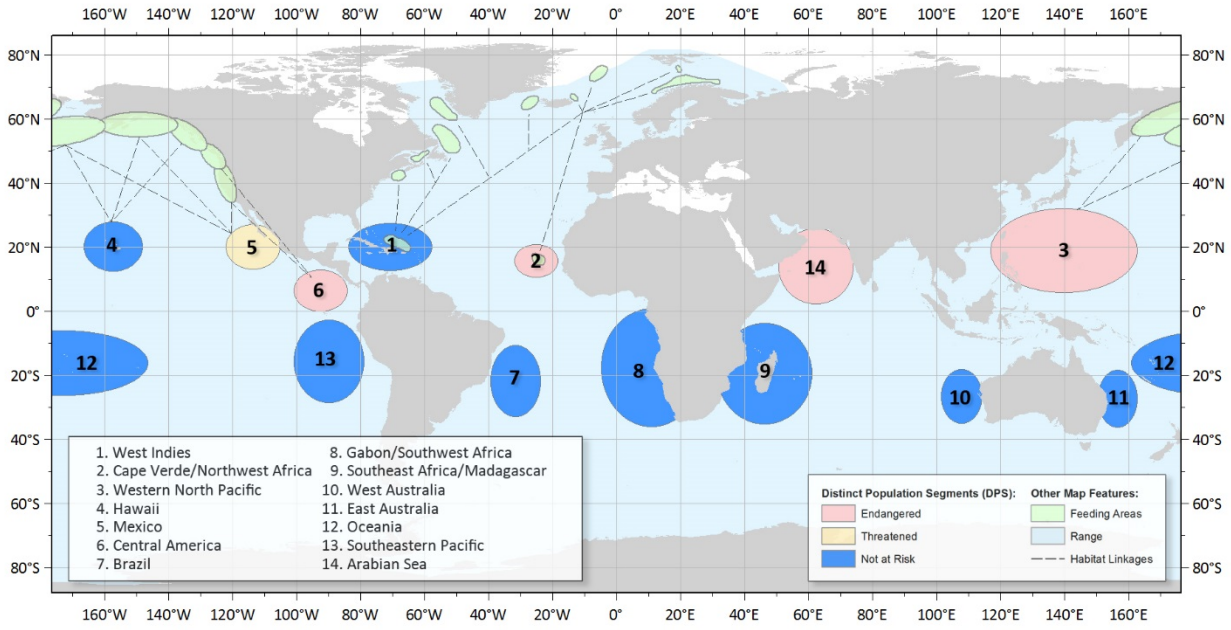

Figure 16: Map identifying 14 distinct population segments with 1 threatened and 4 endangered, based on primary breeding location of the humpback whale, their range, and feeding areas (81 FR 62259, Bettridge et al. 2015).

Humpbacks are distinguishable from other whales by long pectoral fins and are typically dark grey with some areas of white (Figure 17). The humpback whale was originally listed as endangered on December 2, 1970 (35 FR 18319). Since then, NMFS has designated 14 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 8; 81 FR 62259). Only the Mexico, Central America, and Western North Pacific DPSs are further discussed below, as these are the only three DPSs found within the action area.

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

Table 8. Humpback whale information bar provides species Latin name, common name, current and proposed Federal Register notice of listing status, designated critical habitat, Distinct Population Segment, recent status review, and recovery plan.

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), the status review (Bettridge et al. 2015), and the final listing (81 FR 62259) were used to summarize the life history, population dynamics and status of the species as follows.

6.2.5.1 Life History

Humpbacks can live, on average, 50 years. They have a gestation period of 11 to 12 months, and calves nurse for one year. Sexual maturity is reached between five to 11 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.

6.2.5.2 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 humpback whale.

The global, pre-exploitation estimate for humpback whales is 1,000,000 (Roman and Palumbi 2003). The most recent population abundance estimate for the Mexico DPS is 3,264 individuals, for the Central America DPS, 411 individuals, and for the Western North Pacific DPS, 1,059 (81 FR 62259, Bettridge et al. 2015). Currently, there is no information on population trends for these DPSs. With an abundance estimate between 2,000 and 2,500 individuals or greater, the Mexico DPS is expected to be able to maintain high genetic diversity, resulting in long-term persistence and protection from substantial environmental variance and catastrophes (81 FR 62259, Bettridge et al. 2015). With a population estimate below 500, the Central America DPS may be at a greater risk of extinction due to genetic risks resulting from inbreeding. With its low population, the Central America DPSs is 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 (81 FR 62259, Bettridge et al. 2015). 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 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 16) (81 FR 62259). 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 16) (81 FR 62259). 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 16) (81 FR 62259).

6.2.5.3 Status

Humpback whales were originally listed as endangered as a result of past commercial whaling, and the five DPSs that remain listed (Cape Verde Islands/Northwest Africa, Western North Pacific, Central American, and Arabian Sea and Mexico) 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 International Whaling Commission (IWC). Additional threats include vessel 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.

6.2.5.4 Critical Habitat

No critical habitat has been designated for the humpback whale.

6.2.5.5 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.

6.2.6 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 18).

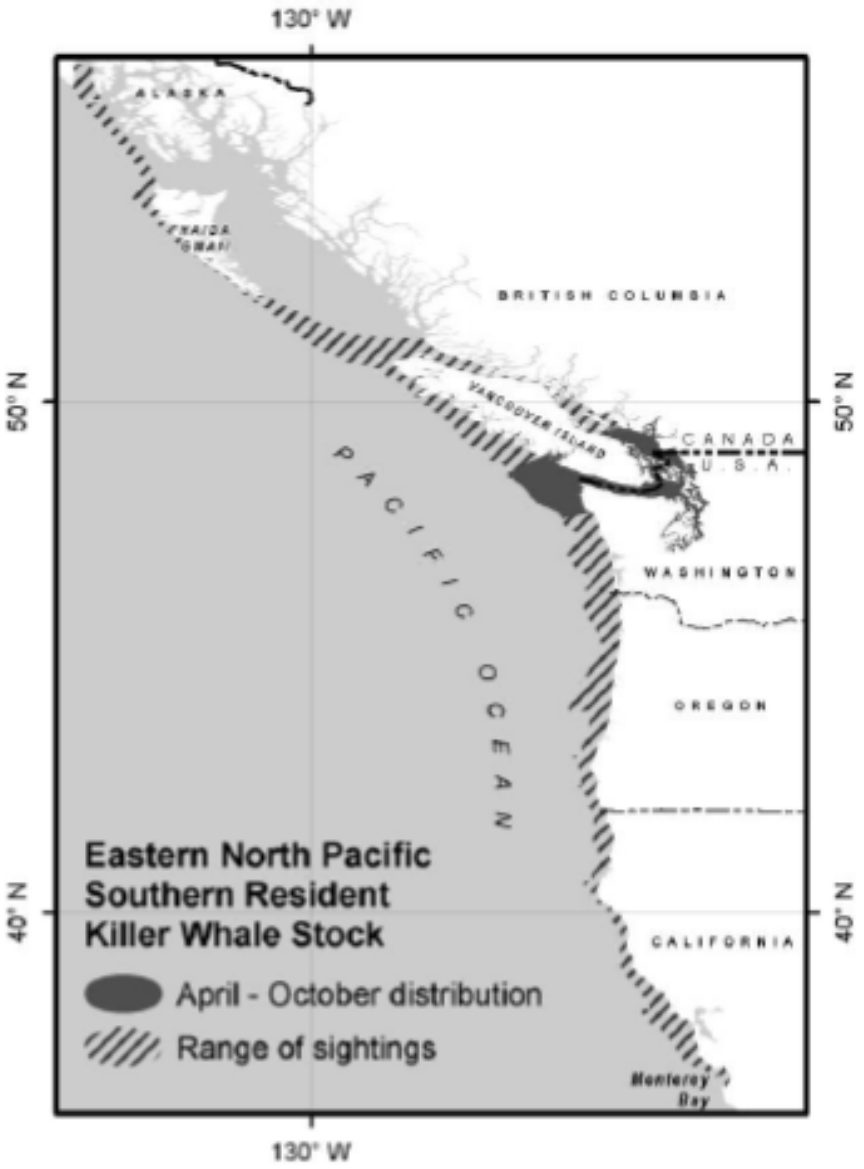

Figure 18. Map identifying the range of the Southern resident killer whale. Approximate April to October distribution of the Southern Resident killer whale (shaded area) and range of sightings (diagonal lines) (Carretta et al. 2016b).

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 19). The Southern Resident DPS of killer whales was listed as endangered under the ESA on November 18, 2005 (70 FR 69903) (Table 9).

Figure 19: Southern Resident killer whales. Photo: National Oceanic and Atmospheric Administration

Table 9. Southern Resident killer whale information bar provides species Latin name, common name and current Federal Register notice of listing status, designated critical habitat, Distinct Population Segment/Evolutionary Significant Unit, recent status review, and recovery plan.

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 2008a), the 2016 Status Review (NMFS 2016g) and the 2015 Stock Assessment Report (Carretta et al. 2016b) to summarize the life history, population dynamics and status of this species, as follows.

6.2.6.1 Life History

Southern Resident killer whales are geographically, matrilineally, and behaviorally distinct from other killer whale populations (70 FR 69903). 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).

6.2.6.2 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 Southern Resident killer whale.

The most recent abundance estimate for the Southern Resident DPS is eighty whales in 2016[2]. 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. 2016b), 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 2016g).

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. 2016b).

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 18).

6.2.6.3 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

[2] http://www.orcanetwork.org/Main/index.php?categories_file=Births%20and%20Deaths; accessed 11/15/2016

may lead to immune suppression or reproductive impairment (70 FR 69903). 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.

6.2.6.4 Critical Habitat

On November 29, 2006, NMFS designated critical habitat for the Southern Resident killer whale (71 FR 69054). 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 20). 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.

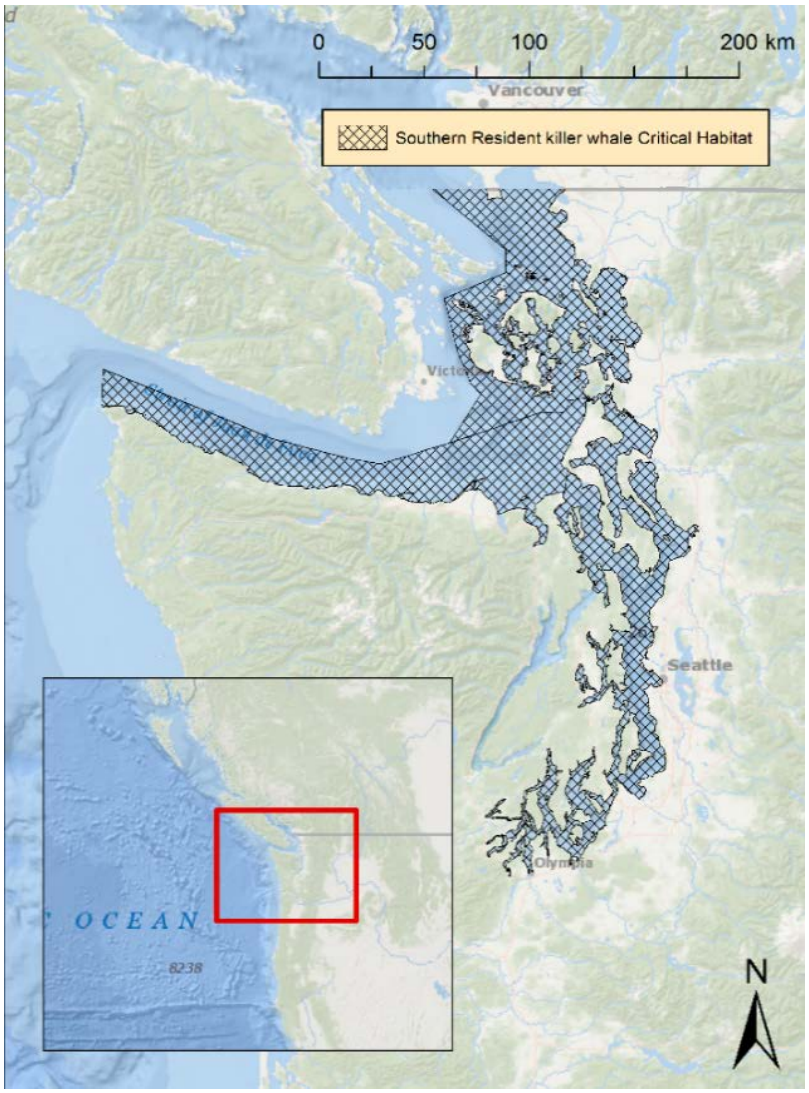

Figure 20: Map depicting designated critical habitat for the Southern Resident killer whale.

6.2.6.5 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.

6.2.7 North Pacific Right Whale

North Pacific right whales are found in temperate and sub-polar waters of the North Pacific Ocean (Figure 21).

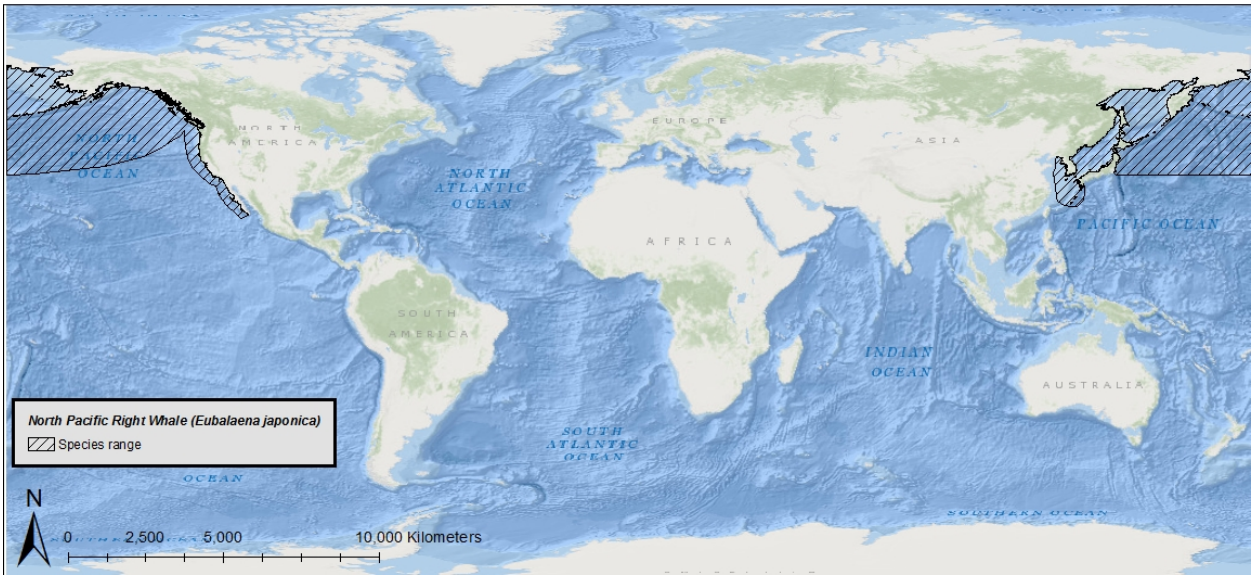

Figure 21: Map identifying the range of the North Pacific right whale.

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 22). The species was originally listed with the North Atlantic right whale (i.e., “Northern” right whale) as endangered on December 2, 1970 (35 FR 18319). The North Pacific right whale was listed separately as endangered on March 6, 2008 (73 FR 12024).

Figure 22: North Pacific right whale. Photo: National Oceanic and Atmospheric Administration

Table 10: North Pacific right whale information bar provides species Latin name, common name and current Federal Register notice of listing status, designated critical habitat, Distinct Population Segment/Evolutionary Significant Unit, recent status review, and recovery plan.

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 2013) recent stock assessment reports (Carretta et al. 2016b; Muto et al. 2016; Waring et al. 2016), and status review (NMFS 2012a) were used to summarize the life history, population dynamics and status of the species as follows.

6.2.7.1 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.

6.2.7.2 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 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. Several lines of evidence indicate a total population size of less than 100. 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). There is currently no information on the population trend 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 degrees latitude (Figure 21). 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.

6.2.7.3 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.

6.2.7.4 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 23). 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 (73 FR 19000). Consistent North Pacific right whale sightings are a proxy for locating these elements.

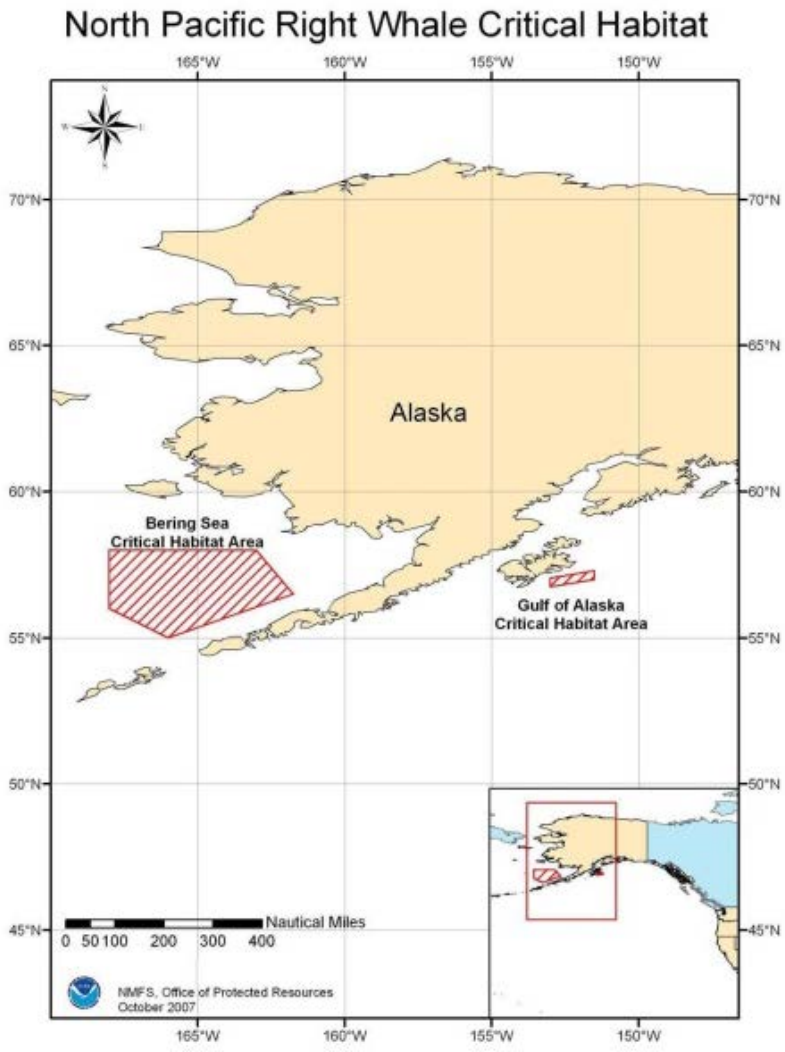

Figure 23: Map identifying designated critical habitat for the North Pacific right whale in the Southeast Bering Sea and south of Kodiak Island in the Gulf of Alaska.

6.2.7.5 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.

6.2.8 Sei Whale

The sei whale is a widely distributed baleen whale found in all major oceans (Figure 24).

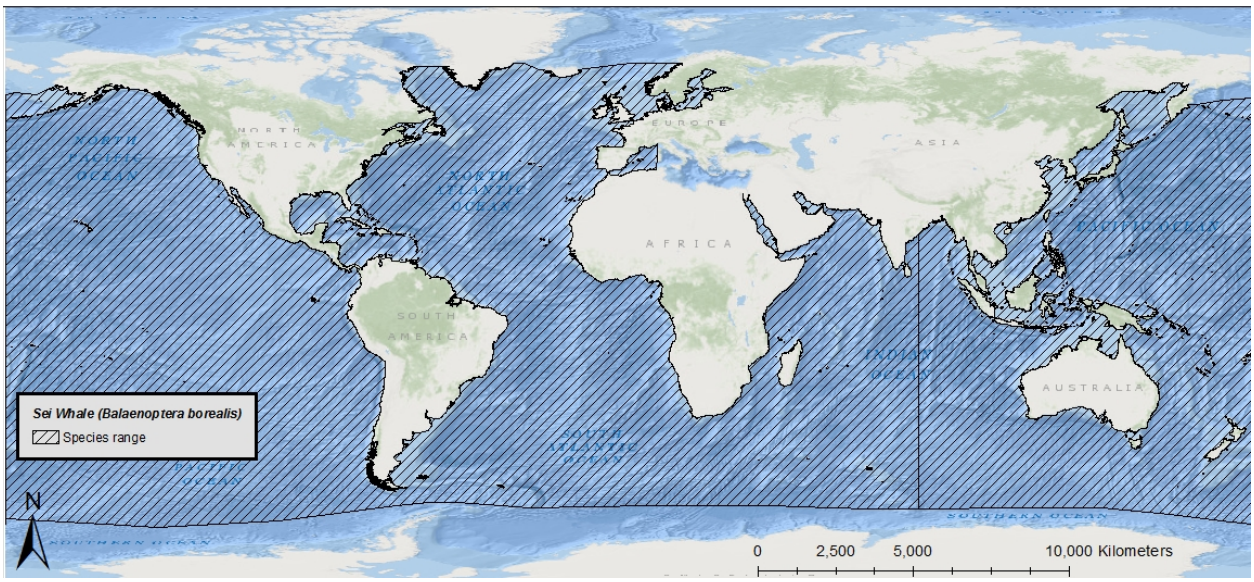

Figure 24: Map showing the range of the sei whale.

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 25). The sei whale was originally listed as endangered on December 2, 1970 (35 FR 18319). Information available from the recovery plan (NMFS 2011b), recent stock assessment reports (Carretta et al. 2016b; Muto et al. 2016; Waring et al. 2016), and status review (NMFS 2012b) were used to summarize the status of the species as follows.

Figure 25: Sei whale. Photo: National Oceanic and Atmospheric Administration

Table 11: Sei whale information bar provides species Latin name, common name, Federal Register notice of listing status, designated critical habitat, Distinct Population Segment/Evolutionary Significant Unit, recent status review, and recovery plan for sei whale.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Balaenoptera borealis	Sei whale	None	Endangered: range-wide	2012	35 FR 18316	2011	None Designated

6.2.8.1 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.

6.2.8.2 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. In the Southern Hemisphere, pre-exploitation abundance is estimated at 65,000 whales, with recent abundance estimated at 9,700. 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=126, N_{min}=83). Population growth rates for sei whales are not available at this time.

While some genetic data exist sei whales, current samples sizes are small limiting our confidence in their estimates of genetic diversity (NMFS 2011b). 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 (<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 24).

6.2.8.3 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.

6.2.8.4 Critical Habitat

No critical habitat has been designated for the sei whale.

6.2.8.5 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.

6.2.9 Sperm Whale

The sperm whale is a widely distributed toothed whale found in all major oceans (Figure 26).

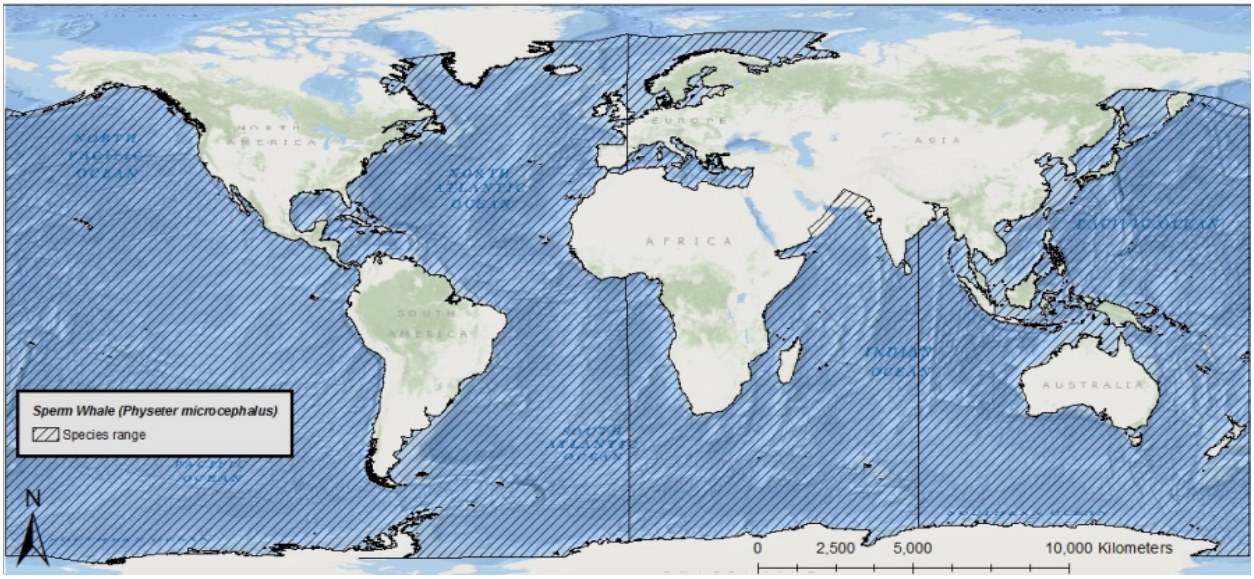

Figure 26: Map showing the range of the sperm whale.

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 27). The sperm whale was originally listed as endangered on December 2, 1970 (35 FR 18319). Information available from the recovery plan (NMFS 2010b), recent stock assessment reports (Carretta et al. 2016b; Muto et al. 2016; Waring et al. 2016), and status review (NMFS 2015d) were used to summarize the status of the species as follows.

Figure 27: Sperm whale. Photo: National Oceanic and Atmospheric Administration

Table 12: Sperm whale information bar provides species Latin name, common name, current and proposed Federal Register notice of listing status, designated critical habitat, Distinct Population Segment/Evolutionary Significant Unit, recent status review, and recovery plan.

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

6.2.9.1 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 20s. 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).

6.2.9.2 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 six recognized stocks of sperm whales that exist in U.S. waters: California/Oregon/Washington (N=2,106, N_{min}=1,332), Hawaii (N=3,354; N_{min}=2,539), Northern Gulf of Mexico (N=763, N_{min}=560), North Pacific (no reliable estimate at this time), North Atlantic (N=2,288 [underestimate]; N_{min}=1,815), and Puerto Rico and the U.S. Virgin Islands (insufficient data). There is insufficient data to evaluate trends in abundance and growth rates of sperm whales 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 26). While both males and females can be found in latitudes less than 40 degrees, only adult males venture into the higher latitudes near the poles.

6.2.9.3 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.

Status of Species within the Action Area

There are two currently recognized stocks of sperm whale that occur within the action area, the North Pacific stock and the California/Oregon/Washington stock. Across the action area, sperm whales are generally found foraging at higher latitudes in the summer, and breeding at lower

latitudes during the winter. This is true for both the North Pacific and California/Oregon/Washington stock, which recent evidence indicates may not actually be separate populations (Mizroch and Rice 2013). Given this habitat use, it is likely that all non-neonate age-sex classes occur within the action area.

The current best estimate for the population abundance of the California/Oregon/Washington stock is 2,106 with a minimum estimate of 1,332. At this time, there is not enough information to estimate the population abundance of the North Pacific stock, or population trends for either stock.

6.2.9.4 Critical Habitat

No critical habitat has been designated for the sperm whale.

6.2.9.5 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.

6.2.10 Bearded Seal (Beringia Distinct Population Segment)

Two subspecies of bearded seals are recognized by NMFS: *Erignathus barbatus nauticus* in the Pacific and *Erignathus barbatus* in the Atlantic (Figure 28). Bearded seals in the Pacific are distributed from 85 degrees north, south to Sakhalin Island (45 degrees north), including the Chukchi, Bering and Okhotsk Seas.

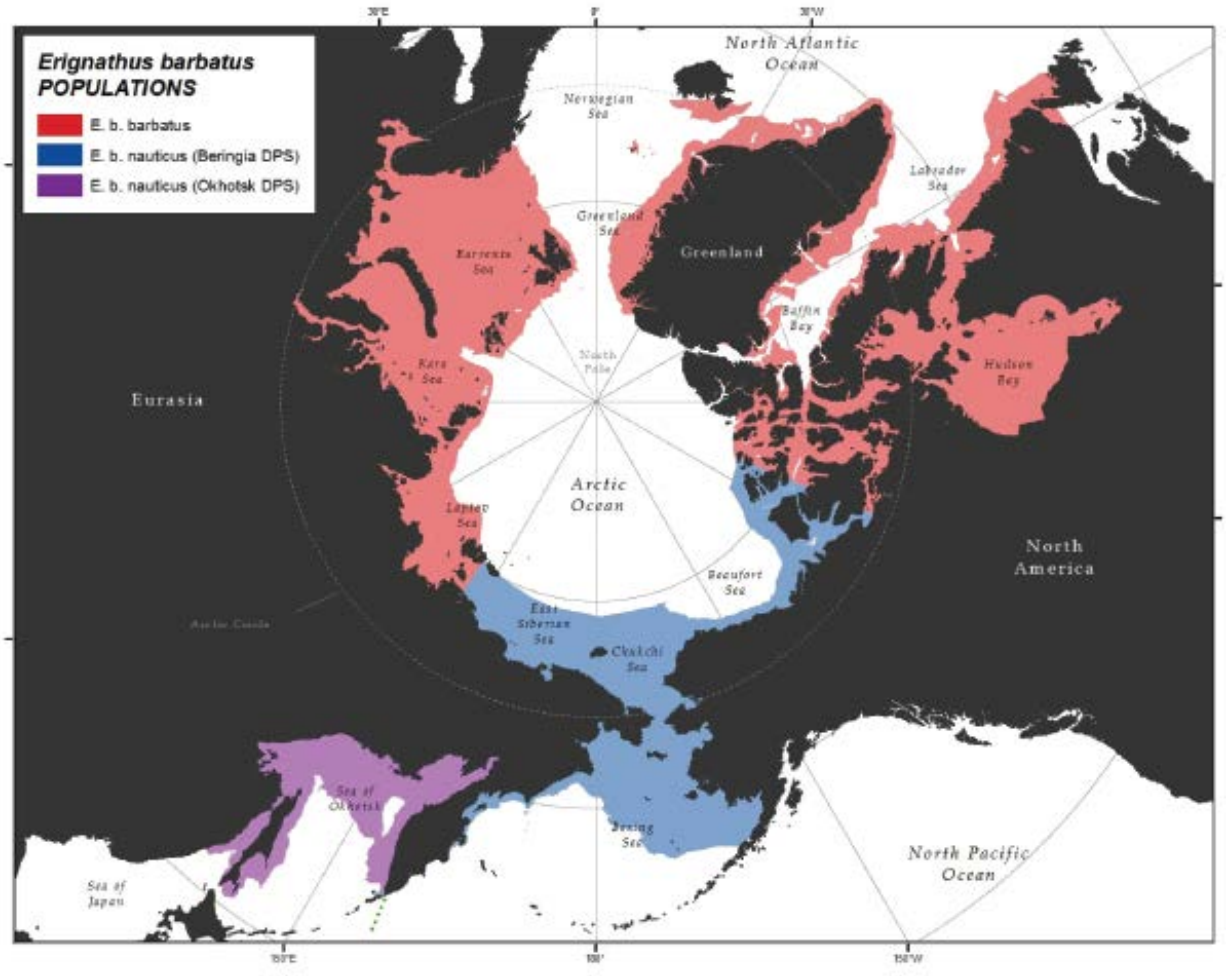

Figure 28. Map identifying the range of the two sub-species of bearded seal, *Erignathus barbatus barbatus* and *E. b. nauticus*, and the Beringia and Okhotsk distinct population segments (Cameron et al. 2010).

Bearded seals are distinguished by their small head, small square foreflippers, and thick, long, white whiskers that have resulted in the name "bearded." Pups have lighter markings on the face, resembling a "T" (Figure 29). The bearded seal is divided into two subspecies, with the Pacific subspecies (*E. b. nauticus*) further divided into two geographically and ecologically discrete DPSs; the Beringia DPS and the Okhotsk DPS. On December 20, 2012, the NMFS issued a final determination to list the Beringia DPS and Okhotsk DPS as threatened under the ESA (77 FR 76739) (Table 13). The U.S. District Court for the District of Alaska issued a decision that vacated the ESA listing of the Beringia DPS of bearded seals on July 25, 2014 (Alaska Oil and Gas Association v. Pritzker, Case No. 4:13-cv-00018-RPB). NMFS appealed that decision and on October 24, 2016, the Ninth Circuit Court ruled that the listing decision is reasonable and the threatened status of the Beringia DPS bearded seal was upheld.

Figure 29: Bearded seal. Photo: National Oceanic and Atmospheric Administration

Table 13. Bearded seal information bar provides species Latin name, common name and current Federal Register notice of listing status, designated critical habitat, Distinct Population Segment, recent status review, and recovery plan.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Erignathus barbatus nauticus	Bearded seal	Beringia	Threatened	2010	77 FR 76739	N/A	None Designated

We used information available in the final listing (77 FR 76740), the status review (Cameron et al. 2010), the 2015 stock assessment report (Muto et al. 2016) and available literature to summarize the status of the bearded seal, as follows.

6.2.10.1 Life History

Generally, bearded seals move north in late spring and summer, staying along the edge of the pack ice in summer, and then move south in the fall. Bearded seals can live up to twenty to twenty-five years old. Female bearded seals become sexually mature at five or six years of age, males at six or seven. Breeding occurs from March to July. Male bearded seals vocalize during the breeding season, with a peak in calling during and after pup rearing. These calls are likely

used to attract females and defend their territories to other males (Cameron et al. 2010). Pups are born between mid-March and May, and are usually weaned in 15 days. Dependent pups spend about 50 percent of their time in the water. Nursing females spend more than 90 percent of their time in water, more than other large phocid seals. Bearded seals forage on a wide variety of benthic invertebrates, demersal fishes and sometimes, schooling fishes.

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 Beringia DPS of the bearded seal.

The estimated population size of the Beringia bearded seal DPS is 155,000 individuals (75 FR 77496). There is substantial uncertainty around this estimate, however, and population trends for the DPS are unknown. An estimate of bearded seals in the western Bering Sea (63,200; 95 percent confidence interval of 38,400 to 138,600) from 2003 to 2008 appears to be similar in magnitude to an estimate from 1974 through 1987 (57,000 to 87,000) (Cameron et al. 2010).

To our knowledge, there has been only one study on the genetic and population structure of bearded seals. In exploring population differentiation among multiple species of ice seals (Davis et al. 2008), analyzed genetic samples from 119 bearded seals sampled at locations in the Bering Sea, the Beaufort Sea, Qaanaaq, Greenland, the Labrador Sea, and Svalbard, Norway. Their results supported the recognition of two subspecies of bearded seals, but did not allow for examining differences between DPSs within a subspecies. However, their data did indicate that the Beringia DPS of bearded seals tended to have high genetic diversity (Davis et al. 2008), suggestion it may be somewhat robust to natural and anthropogenic disturbances.

Bearded seals are boreoarctic with a circumpolar distribution and are closely associated with sea ice. Most seals move seasonally, following the extent of the sea ice; however some remain near the coasts during the summer and early fall. Bearded seals in the Beringia DPS are found in the continental shelf waters throughout the eastern Siberian, Chukchi and Beaufort Seas (Figure 28).

6.2.10.3 Status

The Beringia bearded seal DPS has a large, apparently stable population size, which makes it resilient to immediate perturbations. It is, however, threatened by future climate change, specifically the loss of essential sea ice and change in prey availability, and as a result, is likely to become endangered in the future. Bearded seals are an important species for Alaska subsistence hunters; the most recent estimate of annual statewide harvest is from 2000 and was 6,788 bearded seals. The current level of subsistence harvest is not known and there are no efforts to quantify statewide harvest numbers. Additional threats to the species include disturbance from vessels, sound from seismic exploration, and oil spills.

6.2.10.4 Critical Habitat

Critical habitat has not been designated for the Beringia DPS bearded seal.

6.2.10.5 Recovery Goals

A Recovery Plan has not been prepared for the Beringia DPS bearded seals.

6.2.11 Ringed Seal (Arctic Distinct Population Segment)

Ringed seals are small ice seals that can be found throughout the Arctic Ocean (Figure 30).

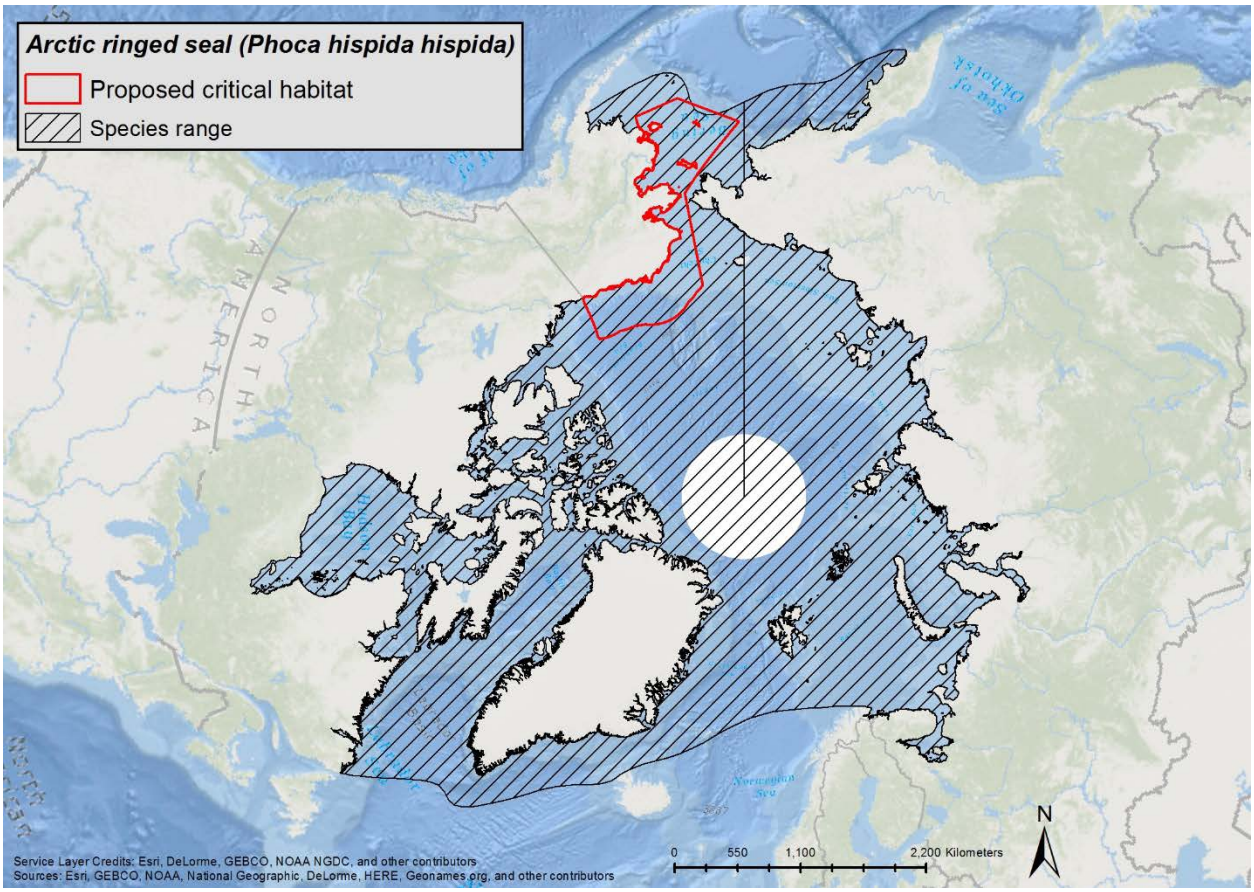

Figure 30: Map showing the range of Arctic ringed seals.

Ringed seals are the smallest of the Arctic seals, reaching lengths of 1.5 meters and weights of 50 to 70 kilograms. Their coat is variable, but is normally dark with light to silver rings that encircle spots along the back and sides and silver along the underside. They are distinguished by their small head; short, cat-like snout, and plump body (Figure 31).

Figure 31: Ringed seal. Photo: National Oceanic and Atmospheric Administration

Table 14: Ringed seal information bar provides species Latin name, common name and current Federal Register notice of listing status, designated critical habitat, Distinct Population Segment, recent status review, and recovery plan.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Phoca hispida hispida	Ringed seal	Arctic	Threatened Listing vacated; pending appeal	2012	77 FR 76706	N/A	79 FR 73010

We used information available in the recent stock assessment report (Allen and Angliss 2014), the status review (Kelly et al. 2010), listing documents (75 FR 77476, 77 FR 76705), and a recent biological opinion (NMFS 2014) to summarize the status of the species, as follows.

6.2.11.1 Life History

The lifespan of ringed seals is 25 to 30 years. Males reach sexual maturity at five to seven years of age; females mature at four to eight years of age and give birth to a single pup annually.

Mating generally occurs in May, though implantation of the fertilized egg is delayed for three to three and a half months. Once implanted, the gestation period lasts about eight months and pups are weaned between five to nine weeks of age. Birthing and nursing occur in snow caves excavated by the female on sea ice. Arctic ringed seals forage throughout the water column for a wide variety of prey items, from crustaceans to schooling fishes, though members of the cod family usually dominate their diet.

6.2.11.2 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 Arctic ringed seal.

No reliable population estimates are available for Arctic ringed seals due to the species' widespread distribution across political boundaries. In the status review, the population of the Arctic ringed seals was estimated to have approximately two million individuals; however, NMFS considers this to be a crude estimate, as it relies on outdated data collected in a variety of ways and does not include all areas of the species' range. Similarly, a reliable population estimate for the Alaska stock of ringed seals is not available due to inconsistencies in survey methods and assumptions, lack of survey effort in some areas, and because surveys efforts are now more than a decade old. In the status review, the population of ringed seals in Alaskan waters of the Chukchi and Beaufort Seas was estimated to be at least 300,000 individuals, though it is most likely an underestimate of the true because surveys in the Beaufort Sea were limited to within 40 kilometers of the shore.

Due to insufficient data, population trends for the Arctic subspecies and Alaska stock cannot be calculated. It is unknown if the population is stable or fluctuating.

There has yet to be thorough genetic analysis of the Arctic subspecies of ringed seals. In fact, it may prove to be comprised of multiple distinct populations. However, current evidence suggestions high genetic diversity, with both microsatellite and mtDNA markers showing high levels of diversity among Arctic ringed seals (Palo 2003). Such high genetic diversity may make the subspecies more resilient to natural and anthropogenic disturbances

The Arctic subspecies of ringed seal has a circumpolar distribution and are found in all seasonally ice-covered waters throughout the Arctic and adjacent waters. The Arctic ringed seal is the most wide-ranging of the five ringed seal subspecies and the only subspecies in the action area.

6.2.11.3 Status

The Arctic ringed seal was listed as threatened under the ESA on December 28, 2012 (77 FR 76705). The species is threatened due to climate change, especially from the expected loss of sea ice and snow cover in the foreseeable future. A final determination to list the Arctic subspecies of the ringed seal as threatened under the ESA went into effect on February 26, 2013 (77 FR

67705). On March 11, 2016, the U.S. District Court for the District of Alaska issued a memorandum decision in a lawsuit challenging the listing of ringed seals under the ESA (Alaska Oil and Gas Association et al. v. National Marine Fisheries Service et al., Case No. 4: 14-cv-00029-RRB). The decision vacated NMFS's listing of the Arctic subspecies of ringed seals as a threatened species under the ESA. A notice of appeal of the U.S. District Court decision was filed on May 3, 2016. While the appeal is pending, our biological opinions will continue to address effects to ringed seals so that action agencies have the benefit of NMFS's analysis of the consequences of the proposed action on the species, even though the listing is not in effect.

Ringed seals are an important species for Alaska subsistence hunters. The most recent estimate of annual statewide harvest is from 2000 and was 9,567 ringed seals. The current level of subsistence harvest is not known and there are no efforts to quantify statewide harvest numbers. Additional threats to the species include fisheries interactions (including entanglement), disturbance from vessel, sound from seismic exploration, and oil spills.

Because of their apparently large population size and the long-term nature of the threat of climate change to the species, ESA section 4(d) protective regulations and section 9 prohibitions were deemed unnecessary for the conservation of the species at the time of listing.

In summary, the Arctic ringed seal has an apparently large population, making it resilient to immediate perturbations. However, threatened by climate change in the long-term, the species is likely to become endangered in the future.

6.2.11.4 Critical Habitat

In 2014, NMFS issued a proposed rule to designate critical habitat for the Arctic DPS of ringed seals. The proposed area includes all the contiguous marine waters from the coastline of Alaska, to an offshore limit within the U.S. Exclusive Economic Zone Figure 30. The boundary extends offshore from the northern limit of the United States-Canada land border, to around the west coast of Alaska just southeast of Cape Avinof. The physical and biological features essential to the conservation of the Arctic DPS of ringed seals found in this area include: (1) sea ice habitat suitable for the formation and maintenance of subnivean birth lairs used for sheltering pups during whelping and nursing; (2) sea ice habitat suitable as a platform for basking and molting; and (3) primary prey resources to support Arctic ringed seals, including Arctic cod, saffron cod, shrimps, and amphipods.

6.2.11.5 Recovery Goals

A Recovery Plan has not been prepared for the Arctic DPS ringed seals.

6.2.12 Steller Sea Lion (Western Distinct Population Segment)

The Steller sea lion ranges from Japan, through the Okhotsk and Bering Seas, to central California. It consists of two morphologically, ecologically, and behaviorally separate DPSs: the Eastern, which includes sea lions in Southeast Alaska, British Columbia, Washington, Oregon

and California; and the Western, which includes sea lions in all other regions of Alaska, as well as Russia and Japan (Figure 32).

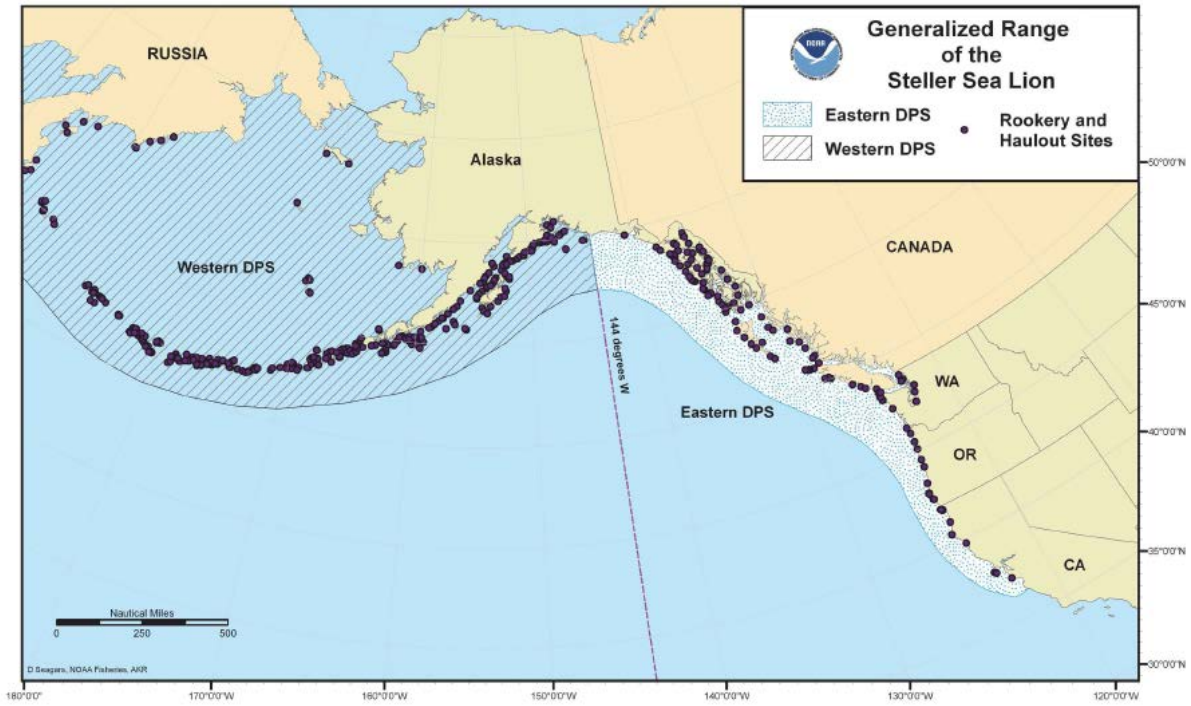

Figure 32: Map identifying the range of the western distinct population segment Steller sea lions.

Steller sea lions adults are light blonde to reddish brown and slightly darker on the chest and abdomen (Figure 33). At the time of their initial listing, Steller sea lions were considered a single population listed as threatened (55 FR 29793). On May 5, 1997, following a status review, NMFS established two DPSs of Steller sea lions, and issued a final determination to list the Western DPS as endangered under the ESA (62 FR 24345). The Eastern DPS was delisted on November 4, 2013, and the Western DPS retained its endangered status (78 FR 66139) (Table 15).

Figure 33: Steller sea lion. Photo: National Oceanic and Atmospheric Administration

Table 15. Steller sea lion Western distinct population segment information bar provides species Latin name, common name and current Federal Register notice of listing status, designated critical habitat, Distinct Population Segment/Evolutionary Significant Unit, recent status review, and recovery plan.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Eumetopias jubatus	Steller sea lion	Western	Endangered	N/A	62 FR 24345	3/2008	58 FR 45269

We used information available in the final listing (62 FR 24345), the revised Recovery Plan (NMFS 2008b) and the 2015 stock assessment report (Muto et al. 2016) to summarize the status of the Western DPS, as follows.

6.2.12.1 Life History

Within the Western DPS, pupping and breeding occurs at numerous major rookeries from late May to early July. Male Steller sea lions become sexually mature at three to seven years of age. They are polygynous, competing for territories and females by age 10 or 11. Female Steller sea lions become sexually mature at three to six years of age and reproduce into their early 20s. Most females breed annually, giving birth to a single pup. Pups are usually weaned in one to two years. Females and their pups disperse from rookeries by August to October. Juveniles and adults disperse widely, especially males. Their large aquatic ranges are used for foraging, resting, and traveling. Steller sea lions forage on a wide variety of demersal, semi-demersal, and pelagic prey, including fish and cephalopods. Some prey species form large seasonal aggregations, including endangered salmon and eulachon species. Others are available year round.

6.2.12.2 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 Western DPS of the Steller sea lion.

As of 2015, the best estimate of abundance of the western Steller sea lion DPS in Alaska was 12,189 for pups and 37,308 for non-pups (total N_{min} = 49, 497) (Muto et al. 2016). This represents a large decline since counts in the 1950s (N = 140,000) and 1970s (N = 110,000).

Steller sea lion Western DPS site counts decreased 40 percent from 1991 to 2000, an average annual decline of 5.4 percent; however, counts increased three percent between 2004 and 2008, the first recorded population increase since the 1970s (NMFS 2008b). However, there are regional differences in population growth rate, with positive trends in the eastern portion of the range, and negative trends west of Samalga Pass (approximately 170 degrees West) (Muto et al. 2016). These trends indicate that overall, the Western DPS may be stable or exhibiting a slight negative trend as a whole.

Based on the results of genetic studies, the Steller sea lion population was reclassified into two DPSs: western and eastern. These data indicate that the two populations have been separate since the last ice age (Bickham et al. 1998). Further examination of the Steller sea lions from the Gulf of Alaska (i.e., the Western DPS) revealed a high level of haplotype diversity, indicating that genetic diversity has been retained despite the decline in abundance (Bickham et al. 1998).

Steller sea lions are distributed mainly around the coasts to the outer continental shelf along the North Pacific Ocean rim from northern Hokkaiddo, Japan through the Kuril Islands and Okhotsk Sea, Aleutian Islands and central Bering Sea, and southern coast of Alaska including the central and western Gulf of Alaska (Figure 32).

6.2.12.3 Status

The species was listed as threatened in 1990 because of significant declines in population sizes (55 FR 49204). At the time, the major threat to the species was thought to be reduction in prey availability. To protect and recovery the species, NMFS established the following measures: prohibition of shooting at or near sea lions; prohibition of vessel approach to within three nautical miles of specific rookeries, within 0.5 miles on land, and within sight of other listed rookeries; and restriction of incidental fisheries take to 675 sea lions annually in Alaskan waters. In 1997, the Western DPS was reclassified as endangered because it had continued to decline since its initial listing in 1990 (62 FR 24345). Despite the added protection (and an annual incidental fisheries take of twenty-six individuals), the DPS is likely still in decline (though the decline has slowed or stopped in some portions of the range). The reasons for the continued decline are unknown but may be associated with nutritional stress as a result of environmental change and competition with commercial fisheries. The DPS appears to have little resilience to future perturbations.

6.2.12.4 Critical Habitat

In 1997, NMFS designated critical habitat for the Steller sea lion (58 FR 45269). The critical habitat includes specific rookeries, haulouts, and associated areas, as well as three foraging areas that are considered to be essential for the health, continued survival, and recovery of the species.

Figure 34: Map depicting Alaskan designated critical habitat for the Western distinct population segment Steller sea lion.

In Alaska, areas include major Steller sea lion rookeries, haulouts and associated terrestrial, air, and aquatic zones (Figure 34). Designated critical habitat includes a terrestrial zone extending 3,000 feet (0.9 kilometers) landward from each major rookery and haulout; it also includes air zones extending 3,000 feet (0.9 kilometers) above these terrestrial zones and aquatic zones. Aquatic zones extend 3,000 feet (0.9 kilometers) seaward from the major rookeries and haulouts east of 144 degrees west. In addition, NMFS designated special aquatic foraging areas as critical habitat for the Steller sea lion. These areas include the Shelikof Strait (in the Gulf of Alaska),

Bogoslof Island, and Seguam Pass (the latter two are in the Aleutians). These sites are located near Steller sea lion abundance centers and include important foraging areas, large concentrations of prey, and host large commercial fisheries that often interact with the species.

Although within the range of the now delisted Eastern DPS, the designated critical habitat in California and Oregon remains in effect (78 FR 66139). In California and Oregon, major Steller sea lion rookeries and associated air and aquatic zones are designated as critical habitat. Critical habitat includes an air zone extending 3,000 feet (0.9 kilometers) above rookery areas historically occupied by sea lions. Critical habitat also includes an aquatic zone extending 3,000 feet (0.9 kilometers) seaward.

6.2.12.5 Recovery Goals

See the 2008 Revised Recovery Plan for the Steller sea lion for complete down listing/delisting criteria for each of the following recovery goals.

1. Baseline population monitoring
2. Insure adequate habitat and range for recovery
3. Protect from over-utilization for commercial, recreational, scientific or educational purposes
4. Protect from diseases, contaminants and predation
5. Protect from other natural or anthropogenic actions and administer the recovery program

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 area 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 area as it applies to species that are likely to be adversely affected by the proposed action. We focus mainly on ESA-listed cetaceans, given that the only action that may affect ESA-listed pinnipeds is incidental harassment.

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 Arctic distributions, beluga and bowhead whales are expected to be negatively impacted as are North Pacific right whales. No prediction is available for sei whales. As indicated in their status sections, bearded and ringed seals depend on sea-ice and so are highly sensitive the effects of climate change. Climate changes is also likely to impact stellar sea lions, with the effects depending on how large-scale ocean climatic changes impact their prey base (Trites et al. 2007).

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. Marine mammals 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).

7.2 Whaling and Subsistence Harvesting

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). Since the moratorium on commercial whaling in 1985, 706 fin and 388 sperm whales have been documented as killed for commercial purposes (IWC 2017b). 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. Since 1985, 310 fin, 56 sperm, and 1,339 sei whales have been documented as killed for "scientific research" under these IWC special permits (IWC 2017c). Whales are also killed for subsistence purposes; since 1985, an estimated 368 fin, 114 humpback, three sei, and 1,531 bowhead whales have been killed for subsistence purposes (IWC 2017a). While most of these whaling activities occur outside of the action area, subsistence whaling for bowhead whales does occur in the Beaufort, Bering, and Chukchi Seas. Alaskan subsistence whaling accounts for the majority of the 1,531 bowheads noted above, and is regulated by the IWC and allocated and enforced by the Alaska Eskimo Whaling Commission.

Seals and sea lions have also been hunted by humans for centuries for their fur, meat, and oil. Two species (Caribbean monk seal and Japanese sea lion) were hunted to extinction in the twentieth century, while other species were hunted to near extinction, and many species were severely depleted. While hunting was previously the primary cause of population decline among ESA-listed pinnipeds, it no longer represents a major threat. Only limited subsistence hunting of Steller sea lions, bearded seals, and ringed seals is permitted. Between 2009 and 2013 it is

estimated that a minimum 1,040 ringed seals from the Alaska stock were harvested for subsistence purposes (Muto et al. 2016). For this same time period, it is estimated that at a minimum 379 bearded seals from the Alaska stock were harvested for subsistence purposes (Muto et al. 2016). From 2004 to 2013 an average of 172.3 Western Stellar sea lions were harvested by Alaskan Natives (Muto et al. 2016).

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. This is especially true as sea ice melts in the Arctic, opening up previously unavailable shipping routes. 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 area 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. Within the action area there are several major ports that experience substantial amounts of commercial vessel traffic (U.S. Maritime Administration 2016). The most common type of commercial vessel found in these ports are tankers and container ships, both of which pose a risk of vessel strike to cetaceans, particularly large whales (Table 16).

Table 16: 2002-2015 Vessel calls at ports located along the west coast of the United States and Alaska.

Year	Tanker Calls	Container Calls	Dry Bulk Calls	Roll-On/Roll-Off Calls	Gas Carrier Calls	General Cargo Calls
2002	7,538	6,489	3,434	1,580	92	716
2003	7,528	6,782	2,828	1,433	100	852
2004	6,778	6,911	3,678	1,462	87	850
2005	7,384	6,680	3,772	1,541	125	1,004
2006	7,666	7,006	3,839	1,875	77	983
2007	8,350	6,939	3,516	1,804	66	963
2008	7,284	6,454	3,176	1,671	64	795
2009	7,388	6,046	2,761	1,162	47	659
2010	7,264	6,045	3,460	1,317	39	670
2011	8,284	6,904	4,058	1,545	46	752
2012	9,750	6,033	3,327	1,641	41	479
2013	3,171	5,889	1,603	1,442	39	813

Year	Tanker Calls	Container Calls	Dry Bulk Calls	Roll-On/Roll-Off Calls	Gas Carrier Calls	General Cargo Calls
2014	3,036	5,599	1,936	1,506	41	906
2015	2,993	5,098	1,785	1,609	56	888
2002 to 2015 Totals						
	94,414	88,875	43,173	21,588	920	11,330

The potential lethal effects of vessel strikes are particularly profound on species with low abundance. However, all large whale species have the potential to be affected by vessel strikes. The latest mortalities and serious injuries related to vessel strikes for the ESA-listed whale stocks most likely to be found in the action area are given in Table 17 below.

Table 17: Mortalities and serious injuries related to vessel strikes for ESA-listed whale stocks within the action area (Carretta et al. 2016a; Helker et al. 2016).

Species	Date Range	Vessel Strikes	Annual Average
Beluga whales (Cook Inlet DPS)	2010-2014	0	0
Blue whales	2010-2014	3	0.6
Bowhead whales	2010-2014	0	0
Fin whales	2010-2014	11	2.2
Humpback whales	2010-2014	22	4.4
Killer whale (Southern Resident DPS)	2010-2014	0	0
North Pacific right whales	2010-2014	0	0
Sei whales	2010-2014	0	0
Sperm whales	2010-2014	1	0.2

7.4 Whale Watching

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).

With the high densify of whales found off the west coast of the U.S. and Alaska, there are numerous whale watching operations (O'Connor et al. 2009). In fact, the west coast of the U.S. was likely home to the first commercial whale watching vessels back in the 1950s (Hoyt 2009). Much of the whale watching off California is focused on non-ESA listed gray whales, but whale watching operations here, and off the coast of Oregon and Washington target the ESA-listed whales considered in this opinion, and most operations in Alaska target ESA-listed humpback whales (O'Connor et al. 2009). Thus, the ESA-listed whales in the action area are almost certainly subject to many of the threats that can result from whale watching.

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 area 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. However, within the National Marine Sanctuaries located within the action area, some of these activities are banned or regulated (15 C.F.R. Part 922). 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 area (NRC 2003) (Section 7.3). Large vessels emit predominantly low frequency sound which overlaps with many mysticetes predicted hearing ranges [7 hertz to 35 kilohertz, (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 kilohertz 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 area 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 vessel traffic within the action area can be seen in Figure 35 below.

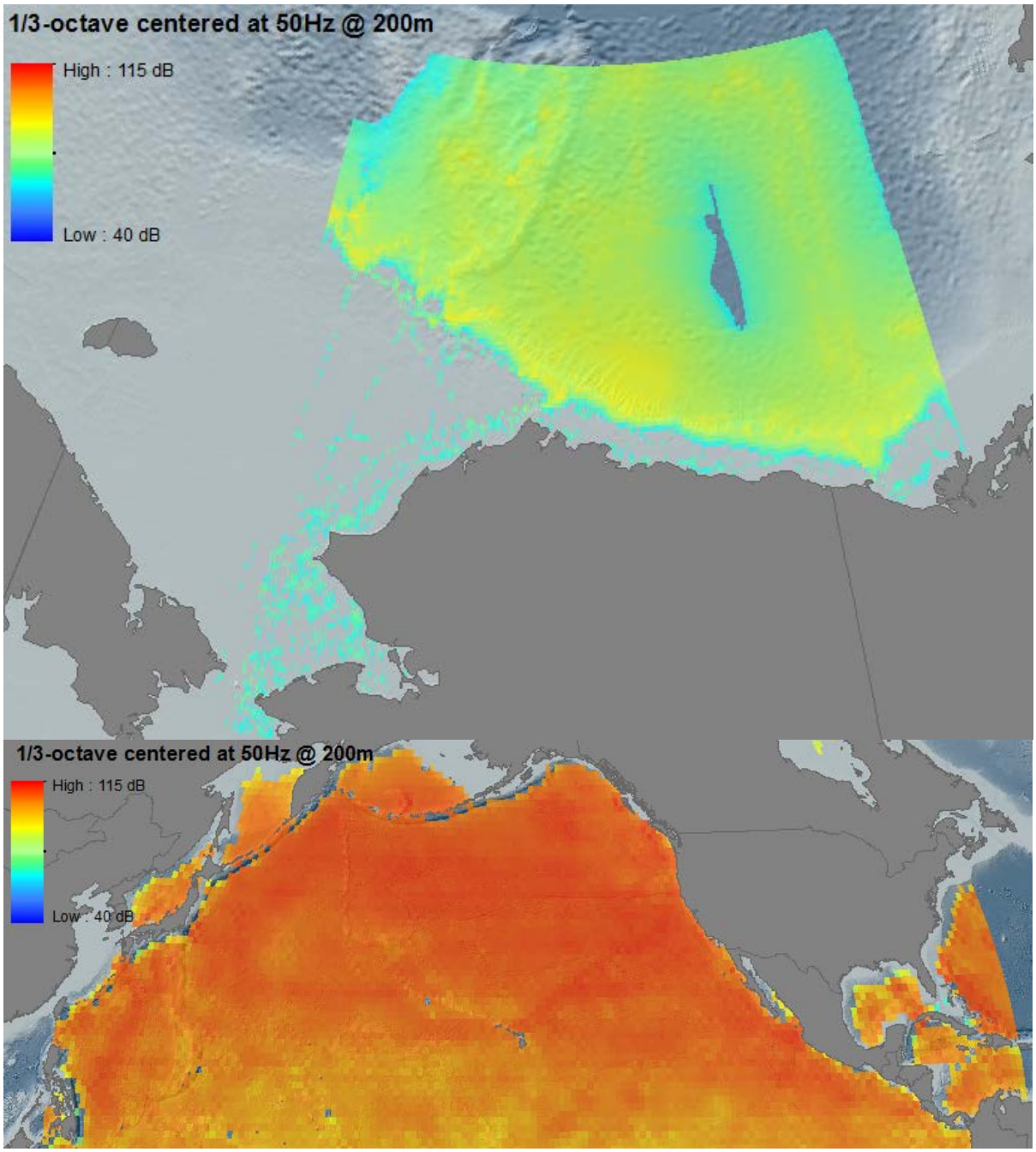

Figure 35: Vessel traffic sound in decibels at 50 Hertz at 200 meters depth within Arctic (top) and the North Pacific basin. Data from http://cetsound.noaa.gov/

Sonar systems are used on recreational, commercial, and military vessels and may also affect marine mammals (NRC 2003). Although little information is available on potential effects of multiple commercial and recreational sonars to marine mammals, 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).

Aircraft within the action area 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 active oil and gas leases within the action area, the operations of which may produce noise that could impact ESA-listed marine mammals within the action area. While no new oil and gas development is planned for most of the action area at least until 2022, a lease sale is proposed for Cook Inlet (BOEM 2017). In addition, scientific research and/or geological and geophysical seismic surveys involving airguns have and do 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 hertz (NRC 2003). Most of the sound energy is at frequencies below 500 hertz, which is within the hearing range of fin and sei whales (Nowacek et al. 2007). In the United States, 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.

Marine construction in the action area 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 and is often associated with wind farms. There are no current leases available for wind farms within the action area, but the Bureau of Ocean Energy Management has received one lease request (Trident Winds LLC 2016). Even so, it is unlikely that the construction of any such windfarm would begin before the expiration of Permit No. 20465.

7.6 Military Activities

The U.S. Navy conducts military readiness activities within three range complexes off the west coast of the U.S. and Alaska (Figure 36). These 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.

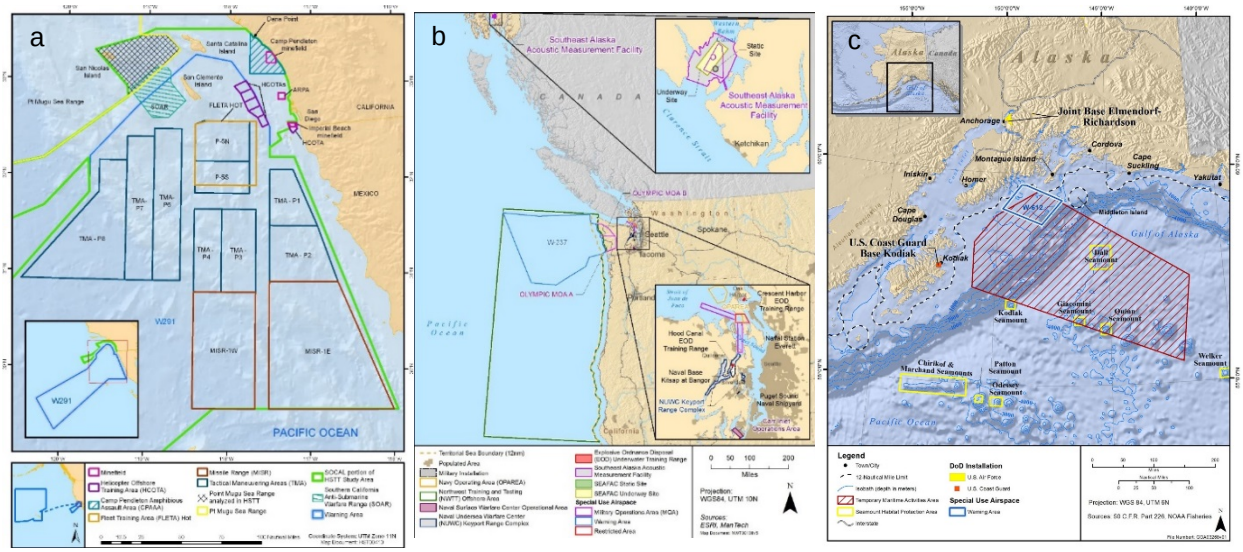

Figure 36: Map showing location of the a) Navy's Southern California Range Complex, b) Northwest Training Range Complex and c) Temporary Maritime Activities Area in the Gulf of Alaska.

U.S. Navy activities are likely to produce sound and visual disturbance to cetaceans and may result in vessel strikes (NMFS 2015b; NMFS 2015c; NMFS 2017a). Take of ESA-listed marine mammals considered in this opinion for these Navy activities that has been authorized and previously consulted on within the action area can be seen in Table 18. Due to the nature of the Navy's activities, the takes in Table 18 include takes for the Hawaii Range Complex. Thus, the overall takes that are authorized as the result of Navy activities within the action area are less than that in Table 18. Takes are listed according to the level of harassment as defined by the MMPA. For military readiness activities, Level B harassment under the MMPA is defined as: "any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered", and Level A harassment is defined as: "any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild" (16 U.S.C. 1361 et seq.). Even though our previous biological opinions considering the effects of Navy activities within the action area 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.

Table 18: Authorized annual take for Southern California Range Complex, Northwest Training Range Complex, and Temporary Maritime Activities Area in the Gulf of Alaska.

Species	Level B Harassment	Level A Harassment
Beluga whales (Cook Inlet DPS)	0	0
Bowhead whales	0	0
Blue whales	4,811	Up to two ESA-listed whales during the five-year period of the MMPA rule not to exceed one of each species
Fin whales	3,296	
Humpback whales	1,919	
Sei whales	8	

Species	Level B Harassment	Level A Harassment
Sperm whales	257	
Killer whale (Southern Resident DPS)	2	0
North Pacific right whales	3	0
Bearded Seal (Beringia DPS)	0	0
Ringed Seal (Arctic DPS)	0	0
Steller Sea Lion (Western DPS)	286	0

7.7 Fisheries

Entrapment and entanglement in fishing gear is a frequently documented source of human-caused mortality in marine mammals (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 marine mammals with the lowest abundance (e.g., Kraus et al. 2016). Nevertheless, all species of marine mammals may face threats from derelict fishing gear. The latest mortalities and serious injuries related to fishing gear entanglement for the stocks of ESA-listed marine mammals most likely to be found in the action area are given in Table 19 below.

Table 19: Mortalities and serious injuries related to fisheries interactions for ESA-listed marine mammal stocks within the action area (Carretta et al. 2016a; Helker et al. 2016).

Species	Date Range	Entanglements	Annual Average
Beluga whales (Cook Inlet DPS)	2010-2014	0	0
Blue whales	2010-2014	0	0
Bowhead whales	2010-2014	1	0.2
Fin whales	2010-2014	1	0.2
Humpback whales	2010-2014	74	14.8
Killer whale (Southern Resident DPS)	2010-2014	0	0
North Pacific right whales	2010-2014	0	0
Sei whales	2010-2014	0	0
Sperm whales	2010-2014	7	1.4
Bearded seal (Beringia DPS)	2010-2014	7	1.4
Ringed seal (Arctic DPS)	2010-2014	19	3.8
Stellar seal lion (Western DPS)	2010-2014	76	15.2

In addition to these direct impacts, marine mammals may also be subject to indirect impacts from fisheries. Many marine mammals species (particularly fin and humpback whales and stellar sea lions) 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 marine mammals. 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 marine mammals (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.

Marine mammals 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. Marine mammals often become entangled in marine debris (Johnson et al. 2005). 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 No. 20465 has and will continue to impact ESA-listed cetaceans within the action are. Currently, there are 29 active research permits that may affect the ESA-listed marine mammals considered in this opinion (Permit Nos. 14118, 14327, 14809, 15240, 15330, 15569, 16111, 16160, 16163, 16239, 16388, 17312, 17344, 17845, 18016, 18438, 18528, 18529, 18537, 18824, 18890, 19091, 19116, 19225, 19257, 19436, 19592, 20430). 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. It is important to note that the research activities that would be conducted under Permit No. 20465 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.

Twenty-nine research permits represents substantial research effort relative to species abundance in the action area with repeated disturbances of individuals likely to occur each 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 extending further than the limits of the action area considered in this Opinion. Nevertheless, these numbers represent a worst-case scenario for fin and sei whales in the action area.

As detailed further below in our response analysis, whales 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 2016a). The fact that multiple permitted "takes" of ESA-listed cetaceans is already permitted in the action area 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 marine mammals 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 No. 20465 would authorize several research activities that may expose ESA-listed marine mammals within the action area 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, the research activities directed only at non-ESA listed marine mammals that would be authorized under Permit No. 20465 are not expected to present any stressors to the ESA-listed marine

mammals found in the action area, and so these activities are not considered further. However, manned aerial surveys for all species are considered since they have the potential to incidentally harass ESA-listed pinnipeds.

Manned aerial surveys would expose marine mammals 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. Documentation and fecal, sloughed skin, and environmental DNA sampling are not expected to produce any stressors aside from those associated with vessel surveys and close approaches. 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 and implantable tags.

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 MML researchers and conditions specified in the permit, as proposed by the Permits Division.

The Principal (Phillip Clapham, PhD) and the Co-Investigators that would conduct research under Permit No. 20465 all have extensive experience conducting research on cetaceans within the action area using the methods described here (NMFS 2016b). Many of these individuals have been investigators on previous MML researcher permits and have on average approximately 20 years of experience conducting research on marine mammals. As noted in Section 1.1, all previous MML permits 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 permit application MML outlines the following mitigation measures designed to minimize exposure to ESA-listed species:

"*Aerial surveys*

Marine mammals seen during aerial surveys will generally be documented while the aircraft is flying through the area without any circling; however, if there are unusual sightings or if a sighting needs to be verified for identification, group size or presence of a calf or if aerial photographs are necessary, then circling will be done. An effort will be made to spend as little time as possible circling the animal. Surveys typically fly from 500 to 1,500 feet but may go as low as 300 feet. If disturbance is seen, efforts will be made to complete the work as quickly as possible before moving away from the animals. Because presence of the

aircraft would be the primary cause of disturbance, it is not practical to stay in the area to monitor for disturbance.

For Cook Inlet beluga whales, the proposed survey altitude and circling methods used to obtain counts are specifically designed to help minimize changes in beluga behavior during counting passes. Video is collected during each counting pass providing a record of beluga surfacing behavior. It is the intent of these surveys to obtain accurate counts of belugas in an area where they are not visible from the air once they dive below the muddy surface; therefore, every effort is made to minimize "avoidance" behaviors such as prolonged diving. In general, video efforts continue as long as whale behavior remains fairly consistent (i.e., travelling, foraging, etc.). Because video counting methods increases the accuracy of the aerial observer counts, fewer passes are necessary. A larger number of observer counts would be necessary without the video counts to achieve the same accuracy for a group size estimate.

We will implement mitigation measures to minimize disturbance to marine mammals. Potential measures that may be implemented, pending survey requirements, Unmanned aerial system operation regulations, and technological limitations, include: 1) limiting the selection of unmanned aerial systems to those within size and noise ranges that are unlikely to elicit disturbance to marine mammals; 2) flying a straight path at constant airspeed to reduce disturbance due to motion of the aircraft; 3) incorporating a real-time video link that can be monitored at the control station to detect potential marine mammal reactions and adjust operating protocols, as necessary, to minimize disturbance; and 4) requiring operator training for all personnel who will pilot the unmanned aerial systems. Furthermore, we will collect and report data on takes to document both the frequency and type of behavioral reactions observed and the number of overflights in which animals were sighted but no changes in animal behavior were observed.

Vessel Surveys for photo-ID and biopsy studies

Animals are always approached cautiously to assess their numbers and behavior, and to determine what a reasonable distance will be to carry out the research objective at the greatest distance possible. They are approached slowly either from the side (for photo-id of the dorsal fin region and biopsy) or from behind (photo-id of flukes for large whales). If from the side, they are then paralleled to match their speed and to keep a consistent distance from them. If from the back, they are followed at a distance until they resurface, when another slow approach is made to photograph their flukes during a terminal dive.

When approaching females with calves, we will immediately terminate efforts if there is any evidence that the activity may be interfering with pair-bonding or other vital functions, we will not position the research vessel between the mother and calf, we will approach mothers and calves gradually to minimize or avoid any startle response and we will discontinue the approach to any mother or calf if the calf is observed to be actively nursing. If possible, we will sample the calf first to minimize the mother's reaction.

Tagging studies

For remotely deployed whale tags, boat approaches will be moderate and conducted generally at slow speeds. All prudent precautions will be adopted to eliminate contaminants from tag anchor systems. Tags with attachment systems that penetrate the skin will be sterilized using ethylene oxide or hydrogen peroxide and sealed in a transport package before used in the field. Manipulation of the tags and anchors during and after sterilization immediately before deployment is carried out with surgical gloves or other sterilized equipment. If disinfection is necessary in the field where sterilization methods are not available, re-sterilization of the implantable portion of the tag with a 10 percent sodium hypochlorite will occur, followed by a dip rinse, spray rinse of sterile saline, and air dry. Topical or integrated slow-release antibiotics may be used to coat some satellite tags (e.g. integrated-implantable) prior to deployment and or sterilization.

Studies conducted by MML researchers and collaborators with Gulf of Maine humpback whales revealed design faults in articulated anchors and in the interface between the anchor and the transmitter of implantable tags (Robbins et al. 2016; Robbins et al. 2013). These structural failures resulted in remains of the tags being left inside the whale's body with potentially adverse effects to the animal's health. These findings led to the development of fully integrated tags, where electronics and the anchoring system are combined in a single unit, which resulted in a more robust tag with improved duration and reduced animal welfare issues (Zerbini et al. 2013). Only fully-integrated tags will be used in studies conducted by MML where the use of implantable tags is required.

Before tagging, attempts will be made to assess the body condition of the target animals to minimize the chances of deploying tags in potentially compromised health status. If available, previous information on the sex and health history of a target individual will be taken into consideration before tag deployment or capture."

In addition to these mitigation measures taken by MML, the Permits Division proposed to include the following terms and conditions, which include several mitigation measures:

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 month dd, 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[3] of protected species reaches that specified in Table 1 of Appendix 1.

   b. If authorized take[4] is exceeded in any of the following ways:

      i. More animals are taken than allowed in 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[5] acquired[6] under this permit after permit expiration without additional written authorization, provided the samples are maintained as specified in this permit.

B. Number and Kinds of Protected Species, Locations 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 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.

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[3] This permit allows for unintentional serious injury and mortality caused by the presence or actions of researchers up to the limit in Table 1 of Appendix 1. This includes, but is not limited to: deaths of dependent young by starvation following research-related death of a lactating female; deaths resulting from infections related to sampling procedures or invasive tagging; and deaths or injuries sustained by animals during capture and handling, or while attempting to avoid researchers or escape capture. Note that for marine mammals, a serious injury is defined by regulation as any injury that will likely result in mortality.

[4] 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.

[5] 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.

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

3. The Permit Holder may use images and audio recordings collected under this permit, including those authorized in 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. 20465. 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 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 combined for all approaches[7] in water, acoustic playbacks, and all attempts to remotely biopsy and/or tag the animal.

        i. If attempts to biopsy sample or tag an animal are successful, or unsuccessful but make contact with the animal, count the take for the day against the applicable sampling and/or tagging take row in Appendix 1.

[7] 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 whales and baleen whales except minke whales and 50 yards for all other cetaceans.

ii. If all biopsy sampling and tagging attempts on a single day for the same animal are unsuccessful but do not make contact with the animal, count the take against your take row for Level B harassment.

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

d. Any marine mammal observed in the appropriate isopleth during sound playback must be counted as a take by harassment and reported.

General

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

f. Activities must be discontinued if an animal exhibits repetitive, strong, adverse reactions to the activity or vessel.

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

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

g. For research in the inland waters of Washington state:

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.

Aerial Surveys

l. Aerial flights must not be conducted over pinniped haul outs and rookeries.

Manned Aerial Surveys

m. Manned aerial surveys must be flown at an altitude of 500 ft or higher. Descents for photography and calf detection must be no lower than 300 feet.

Unmanned Aircraft Systems (UAS)

h. Researchers are authorized to use a vertical take-off and landing (VTOL) UAS at an altitude of 30 feet or higher for imagery and observation.

Active Acoustics for Free Ranging Beluga Whales

i. Sound playback is limited to:
   i. Less than 10 hours for source levels below 150 dB re 1 µPa at 1 meter.
   ii. Less than 10 seconds for source levels over 170 dB re 1 µPa at 1 meter;

j. To prevent injury, the trial must be shut down if animals approach within the Level A exclusion zone 250? meters of the sound source.

Remote Biopsy and Tagging

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

l. Biopsy sampling: Where sampling is authorized in Appendix 1, the following age classes, including females accompanied by calves, may be biopsy sampled:

   - Dolphin and porpoise calves > 1 year old
   - Non-neonates of all other species.

m. Tagging: Where tagging is authorized in Appendix 1, the following age classes, including females accompanied by calves, may be tagged:

   - Suction cup tags: Animals > 6 mos.
   - Invasive tag designs: Adults & juveniles only

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

o. Researchers must avoid sampling or tagging a cetacean anywhere forward of the pectoral fin to avoid sensitive areas (e.g., blowhole, eyes, etc.).

p. Researchers must use sterile[8] biopsy tips, invasive tag anchors (darts, barbs, pins, etc.) and fully implantable tags. If any of these become contaminated (e.g., seawater, missed attempt, physical contact) in the field prior to use, a new sterile biopsy tip, anchors or fully implantable tag must be used. If a new, sterile equipment/tag is not available, the contaminated gear must be completely cleaned and disinfected[9] following the IACUC approved protocol described in the application.

q. Animals that receive a dart/barb tag or fully implantable tag may be biopsy sampled in subsequent field seasons for post-tag monitoring.

r. Researchers should avoid implantable tagging of animals exhibiting a compromised body condition, such as having noticeable reductions in body mass in the post-cranial region.

s. Where authorized in Appendix 1, whales may receive up to three tags at a time provided that only two are invasive, only one of which may be fully implantable.

t. Researchers must make reasonable efforts to monitor the effects of fully implantable tagging--the health (e.g., healing of the wound site) and future fecundity of tagged animals--through tracking and identification via photographic and genetic resightings. This information must be provided in annual reports.

Captures: General

In the event an animal dies as a result of research activities, the Permit Holder must, within two weeks, submit an incident report as described in Condition E.3. A necropsy should be performed, except where not feasible such as in remote areas with limited personnel. Gross necropsy findings should be included as part of an incident report. Final necropsy findings (e.g., histology and other analyses) must be submitted when complete.

Non-target Species

ss. For North Atlantic Right Whales:

[8] Sterilization = destroys or eliminates all forms of microbial life and is carried out by physical or chemical methods (CDC 2008).
[9] Disinfection= eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects usually by liquid chemicals (CDC 2008).

If a right whale is seen, Researchers must maintain a distance of at least 460 meters (500 yards) from the animal(s). Please report all right whale sightings to NMFS Sighting Advisory System:

- in any location to the U.S. Coast Guard on channel 16
- from VA to ME to 978-585-8473
- from NC to FL to 904-237-4220.

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).

      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.

   b. 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.

   c. 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.

d. The Permit Holder may grant written approval to additional Authorized Recipients for analysis and curation of samples related to the permit objectives. The Permit Holder must maintain a record of the transfer including:

v. name and affiliation of the recipient;

vi. address of the recipient;

vii. types of samples sent (species, tissue type); and

viii. 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 – Phillip Clapham, Ph.D.

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

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

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

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

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

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

d. Research Assistants (RAs) are individuals who work under the direct and on-site supervision of the PI or a CI. RAs cannot conduct permitted activities in the absence of the PI or a CI.

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

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

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

c. individuals included for training purposes.

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

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

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

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

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

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

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

8. 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

   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 the total number of mortalities is reached, or authorized takes have been exceeded as specified in Conditions A.2 and B.X. 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 month/day to month/day) must

a. be submitted by [insert date here] each year for which the permit is valid;

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

c. include 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.

4. A final report summarizing activities over the life of the permit must be submitted by (insert date 180 days post expiration), 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.

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, veterinarian, boat driver, animal restrainer, Research Assistant “in training”).

   b. Notification must be sent to the following Assistant Regional Administrator(s) 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, and CA:

      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; 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. Researchers must coordinate their activities with other permitted researchers to avoid unnecessary disturbance of animals or duplication of efforts. Contact the applicable Regional Office(s) 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[10] 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.

[10] 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.

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. Clapham, listed Co-Investigators, and research assistants. We anticipate that requiring that the research be conducted by experienced personnel will further minimize impacts to the ESA-listed marine mammals 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 specifies MML and the Permits Division's proposed exposure to ESA-listed species associated with aerial surveys, vessel surveys, close approaches, and documentation, biological sampling, and tagging. 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 their application, MML states the follow as justification for the proposed takes in Table 1:

> "Take numbers were developed based upon estimated minimum population sizes (N_{min}) as listed in the most current Stock Assessment Report for each listing unit/stock. By definition, N_{min} estimates are not considered the "best estimate" of abundance. The N_{min} estimate is a very conservative estimate and is defined as the 20th percentile (lower 60

percent confidence limit) of the log-normal distribution resulting from a point estimate of abundance and its coefficient of variation, or a direct count of animals such as a count of hauled-out pinnipeds (Wade and Angliss 1997). Per MMPA requirements, N_{min} must represent a level for which there is "reasonable assurance that the true population is larger" (Wade and Angliss 1997).

Beyond this, requested takes reflect a combination of other factors. These include the likely frequency of MML survey effort, and of encounters of the species/population in such surveys; the need for a sufficient sample size (and therefore take numbers) relative to the study concerned; and the practicability of specific sampling activities. For example, because satellite tagging of large whales is routinely difficult to accomplish, achievable sample sizes are generally small, and never exceed the numbers likely to capture all individual variation in movements (i.e., each new data point is valuable because existing sample sizes are generally low); consequently, we have not requested as large numbers of takes for this activity as we had in our previous permit because it is highly unlikely that they would ever be achieved or required. In a similar example, biopsy sampling is exceedingly difficult for harbor porpoise, so requesting numerous takes for this species would be unrealistic. For some other cetaceans (e.g. Dall's porpoise), they are not anticipated to be the primary focus of any research over the next few years, but there is sufficient interest for management that we are obliged to collect data on the species at least opportunistically; the requested takes of some species reflect this situation. A contrasting example would be gray and bowhead whales, which are expected to be encountered numerous times during Arctic aerial surveys; given the spatial scope of these surveys, and the fact that a primary objective of this work is to calculate density estimates with a relatively low degree of precision, large take numbers are required.

For Level A activities, efforts are routinely made to identify individuals in the field to minimize the possibility of unnecessary duplicate sampling. However, for biopsy sampling of small populations (notably killer whales, humpback whales, and North Pacific right whales), we are requesting potentially multiple takes for individual animals for intentionally repeated targeting and follow-up over the course of a year or field season. The success rate of Level A sampling is generally high: i.e., once an animal has been approached for biopsy or tagging, and an action has occurred that involves the actual initiation of a biopsy or tag attempt (a dart or gun fired), contact with the animal (a tag applied or a biopsy sample taken) occurs in approximately 50 to 75 percent of cases).

Some studies may intentionally repeat biopsy sample a population, such as Cook Inlet beluga whales, more than once in a year. For example, to detect a seasonal shift in prey from eulachon to salmon, we would sample from the population twice in the same year in different seasons. It would not be our intent to target the same individuals (and

> therefore, the number of takes per individual is one in the takes table), but because the population is small, there is a chance that an individual could be sampled more than once in the same year. Because individuals are difficult to tell apart, we would likely not know this had occurred until we received results from genetic analyses."

With this explanation of take number estimates, our own evaluation of these take numbers in comparison to MML's and other researchers' annual reports for similar species and activities (NMFS 2011c; NMFS 2015a; NMFS 2016d), and the conservative assumption that all take that the Permit Division authorized *could* occur, we adopt the exposure of ESA-listed species that is reasonably certain to occur as that specified in Table 1.

Despite their names, the columns titled *No. Animals* and *Takes Per Animal* in Table 1 do not necessarily reflect the number of animals that would be exposed or their repeat exposure, respectively (as further detailed below). Instead, *No. Animals* 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. This exposure could occur year-round, with the duration of each exposure ranging from a few seconds to several hours as described in Section 3.

Given the Permits Division's issuance and counting of takes[11] and the fact that researchers may often not be able to identify individual animals in the field, the number specified in *No. Animals* in Table 1 does not necessarily reflect the number of animals that would be exposed to the research activities under Permit No. 20465. For example, if researchers take a whale 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. This scenario also illustrates that researchers may unintentionally take the same whale 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, personnel availability, and weather for operations, etc.) and the vast areas these species inhabit, it is likely that many, if not all animals, would only be taken once or at most two to three times.

For all species except humpback whales, MML and the Permits Division estimated take (and thus exposure) according to the ESA listing unit (e.g., range-wide, DPS, etc.). However, for humpback whales MML estimated take based on the location in which research would occur, either along the west coast of the U.S. (CA/OR/WA) or off the coast of Alaska (AK). To calculate the exposure of individual humpback whale DPSs, we relied on NMFS internal guidance based on work by (Wade 2016) (NMFS 2016c; NMFS 2016h). First, we calculated the proportion each location specified in (Wade 2016) made up of the greater CA/OR/WA and AK areas. We then multiplied these proportions by the DPS percentages for that area as specified in

[11] 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.

(NMFS 2016c), and sum these percentages across the larger CA/OR/WA and AK areas. The final estimated DPS proportion breakdown for CA/OR/WA and AK can be seen below in Table 20. We recognize that that these percentages sum to greater than 100 for each MML area, 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 American DPS. The 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. 20465. At this time, this method of estimating humpback whale DPS exposure represent the best available data and method given the granularity MML is able to project in their research.

Table 20: Relative humpback whale Distinct Population Segment exposure estimates for Permit No. 20465.

MML Humpback DPS Breakdown	
AK	
Western North Pacific	3%
Hawaii	87%
Mexico	11%
Central America	0%
CA/OR/WA	
Western North Pacific	0%
Hawaii	7%
Mexico	83%
Central America	19%

Given researchers inability to identify each individual animal in the field, the *No. Animals* presented in Table 1 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 represents a relatively large number of animals from the populations found in the action area, in most cases for cetaceans the entire population. This high exposure is purposeful as MML is responsible for conducting stock assessment reports under the MMPA for marine mammals within the action area and their take estimates were based on the best available information on abundance.

8.4 Response Analysis

Given the exposure detailed above, in this section we describe the range of responses among ESA-listed marine mammals that may result from the stressors associated with the research activities that would be authorized under Permit No. 20465. These include stressors associated with the following activities: manned and unmanned aerial surveys, vessel surveys and close approaches, fecal, sloughed skin, and environmental DNA sampling, biopsy sampling, and tagging. 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 No. 20465 may lead to a variety of different stress related responses. However, given the relatively short duration of the activities (a few seconds to several hours) relative to marine mammal life histories (e.g., life expectancies of 15 to over 100 years), we do not anticipate these responses to result in negative fitness consequences. 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

Aerial surveys that would be authorized under Permit No. 20465 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 marine mammals 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 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, annual reports from MML from past permits indicated very few individuals exhibit behavioral responses (NMFS 2016d). For example, from past aerial surveys conducted by MML no responses were observed for beluga (Cook Inlet DPS), humpback (unknown DPSs), and fin whales. The only species that exhibited a behavioral response was bowhead whales, but even then only seven percent of animals responded. In addition, conditions in the permit would require researchers to discontinue aerial surveys if animals exhibit repetitive, strong, adverse reactions. 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.

Aerial surveys directed at cetaceans may also incidentally harass ESA-listed pinnipeds. However, as a condition in the permit, MML would not be authorized to conducted flights over pinniped haul outs and rookeries, and thus any incidental disturbance would likely occur over water, or occur over one or a few individuals on land or sea ice. Potential responses to aircraft

overflights by pinnipeds range from no response to temporary entry into the water. Born et al. (1999) conducted a systematic study on the response of ringed seals to aircraft disturbance; 302 of 5,040 hauled-out ringed seals (6 percent) entered the water in response to a low-flying (150 meters altitude) twin-engine plane (Born et al. 1999). In Baffin Bay, Alaska, 44 bearded seals did not react to a twin-engine turboprop plane flying at 100-200 meters altitude (Finley and Renaud 1980). Burns and Frost (1979) report that bearded seals raise their heads but usually remain on ice unless a plane passes directly overhead. Kelly et al. (1986) report that all ringed seals (n = 13) subsequently returned to their lairs and hauled out, after entering the water in response to anthropogenic disturbances. In two separate studies, some Steller sea lions have demonstrated awareness to fixed wing aerial surveys at elevations between 195 and 250 meters, but no sea lions left the beach or stampeded (Snyder et al. 2001; Wilson et al. 2012). From MML's past research, ESA-listed pinnipeds appear to show minimal response to aerial surveys (NMFS 2016d). MML has observed no response to aerial surveys by stellar sea lions (Western DPS), and only four and 13 percent of bearded (Beringia DPS) and ringed (Arctic DPS) seals exhibited behavioral responses. In sum, we expect ESA-listed pinnipeds to either exhibit no response to aerial surveys or exhibit mild short-term behavioral reactions but do not expect 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. 20465 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, humpback, and sperm whales, and observed no avoidance behaviors. Koski et al. (2015) used UAS over bowhead whales (*Balaena mysticetus*) at 120 meters with no behavioral responses noted. The 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 2017c). 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 will 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 would expose ESA-listed whales within the action area to vessel traffic, discharge, and visual and auditory disturbances. As noted previously, documentation does not present any stressors outside of those associated with vessel surveys and close approaches. The purpose of vessel surveys and close approaches are 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 as noted in Section 6.1.1, the transit of any vessel carries the risk of striking a whale. Responses to a vessel strike depend in part on the size and speed of the vessel, but can involve death, serious injury, or minor, non-lethal injuries (Conn and Silber 2013; Jensen and Silber 2004; Laist et al. 2001; Vanderlaan and Taggart 2007). However, as discussed in Section 6.1.1 we believe the likelihood of a research vessel striking a whale is extremely low given the low occurrence of such events from historical data, the slow speeds at which MML would operate, and the extensive experience MML researchers have in spotting large whales at sea. As such, we do not expect vessel strikes to occur, and in turn, we find effects from this stressor to be discountable and do not expect impacts to the fitness of individual whales.

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 area, it is unlikely that spills or discharges will occur. If discharge does occur, the amounts of leakage would be small, disperse into the water, and not affect fin or sei whales directly, or pose measurable hazards to their food sources. Therefore, we conclude that effects from this stressor are discountable, and it is not likely to affect the fitness of individual whales.

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

particularly 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 No. 20465 to be minimal for several reasons. First, MML has 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 negatively affect cetaceans ability to hear mates and other conspecifics (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 MML and more generally in the literature. Thus, based on accounts from MML, 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 stress responses, but will not significantly disrupt the normal behavioral patterns of whales to an extent that they would create the likelihood of injury. 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.

8.4.3 Biological Sampling

Under Permit No. 20465, MML would be authorized to collect a variety of biological samples. The only stressors associated with fecal, sloughed skin, and environmental DNA sampling would be those associated with a potential close vessel approach as described above. No additional response is expected for these activities. However, biopsy sampling presents the stressors of a minor puncture wound and tissue collection, and also requires a slightly closer approach than most other research activities aside from tagging. 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, *Eubalaena australis*) 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 No. 20465. This is because all biopsy dart tips that MML 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). 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 MML (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

MML would be authorized to tag several ESA-listed cetacean species with either implantable (Type I), dart/barb (Type II), or 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 or implantable 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

Whales 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 (two to 30 meters) we anticipate these responses will 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 and implantable tags, tag penetration and puncture wounds. However, current research examining how whales 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 whales themselves may not differentiate between the two stressors. As such, below we describe what is known about how whales 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 whales 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 whales exhibit to the application of invasive tags, such as dart/barb and implantable tags, are similar to those described for suction-cup tags and very close vessel approaches (Walker et al. 2012). Furthermore, despite the difference in depth of penetration and size between dart/barb and implantable tags, behavioral responses do not appear to drastically differ between the two tag types (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 and implantable 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 2016a; Robbins et al. 2016; Szesciorka et al. 2016; Walker et al. 2012; Weller 2008). However, since barb/darts would not penetrate beyond the blubber layer 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. While implantable tags create larger wounds and penetrate deeper (to the muscle-blubber interface), and so increase the risk of these more pronounced physiological responses (Moore et al. 2013), current evidence suggest such responses are rare (Mate et al. 2016; NMFS 2016a; 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 2016f; Weller 2008). However, given that MML 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/bar or implantable tags may break upon impact or soon after, leaving parts of these tags (e.g., petals) in the animal with no tag attached. However, such an event is unlikely given that recent tag modifications made by MML and other researchers have greatly reduced or eliminated tag breakage (Robbins et al. 2016; Szesciorka et al. 2016).

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 their permit application (NMFS 2016b), MML notes similar behavioral and physiological responses to the initial tag deployment to those described above. 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 and implantable 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 will 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, 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 extensive, 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 proposed here (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 MML in their application from previous work of which included the Robbins et al. (2016) study.

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 2016h). In contrast, dart/barb and implantable tags maintain long-term

(months, and up to a year) 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 2016b; 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 on southern right whales (*Eubalaena australis*), 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 a satellite tag 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 their 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. As discussed in Section 3.1.4.1, this flaw was recently addressed with the fully integrated implantable being proposed here, and more recent data using these tags does not currently show the same negative effect on reproduction.

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, many advances in tag technology have been made since the deployment of the tags discussed in the previous three studies. 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. 20465. With these improvements, the chances of long-term adverse effects are greatly reduced (Mate et al. 2007; NMFS 2016b; 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 2016f). 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. 20465 for several reasons. First, MML would not attempt to tag any individual that appears to be in poor health. Second, MML would follow stringent field sterilization methods as described above and further detailed in their application and Institutional Animal Care and Use Committee agreement (NMFS 2016b). Third, MML would use the latest tag technologies, such as the fully-integrated implantable tags to minimize chances of tag breakage. Finally, MML would only be authorized to use invasive tags on large whales, for which to date there are no records of tag-related mortalities (although see Calambokidis (2015) study on gray whales discussed above). Given these measures, we find it highly unlikely that the use of invasive tags on blue, bowhead, fin, humpback (Mexico, Central America, and Western North Pacific DPSs), North Pacific right, sei, and sperm whales would result in the death of any individual whale.

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 and implantable tags, we anticipate most wounds would heal with little to no complication and minimal scaring, with only a few animals exhibiting pro-longed healing and scaring. Given recent advances in tagging technologies and the mitigation measures proposed by the Permits Division and MML, we find it unlikely that mortality or a reduction in fitness will 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 effects to fitness from the invasive tags proposed here are not likely to occur, invasive tagging is not without risk.

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 fitness of any individual ESA-listed marine mammal. As such, the issuance of Permit No. 20454 is not expected to present any risk to individuals, populations, 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 area. 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 area. We did not find any information about non-Federal actions other than what has already been described in the *Environmental Baseline* (Section 6.2.10), which we expect will continue in the future. Anthropogenic effects include climate change, whaling and subsistence harvesting, 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 marine mammal 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 6.2.10) 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 separately summarize the probable risks the proposed action poses to threatened and endangered species and critical habitat that are likely to be exposed. These summaries integrate the exposure profiles presented previously with the results of our response analyses for each of the actions considered in this opinion.

As discussed in Section 6.1, several ESA-listed species and designated or proposed critical habitat occur within the action area and may be affected by Permit No. 20465. However, several are not likely to be adversely affected because the effects of the proposed actions are insignificant, or discountable. These include blue, fin, North Atlantic right, sei, and sperm whales in New England waters, gray whales (Western Pacific Population), and designated critical habitat for beluga whales (Cook Inlet DPS), killer whales (Southern Resident DPS), North Pacific right whales, North Atlantic right whales, and leatherback turtles and proposed critical habitat for ringed seals (Arctic DPS).

The remaining ESA-listed species that may be affected by the proposed action, beluga (Cook Inlet DPS), blue, bowhead, fin, humpback (Mexico, Central America, and Western North Pacific DSPs), killer (Southern Resident DPS), North Pacific right, sei, and sperm whales, bearded (Beringia DPS) and ringed (Arctic DPS), and Stellar sea lions (Western DPS) are likely to be adversely affected by the proposed action. On an annual basis over the five-year life of the permit, most individual ESA-listed cetaceans from the populations of these species found within the action area would be exposed to aerial surveys, with many individuals likely being exposed more than once. Small numbers of ESA-listed pinnipeds would also be exposed to aerial surveys, but likely only once given that they are not the target of research. In addition, a smaller, but still substantial, percentage of the each ESA-listed population of cetacean within the action area would be exposed to vessel surveys, close approaches, documentation, and non-invasive biological sampling (fecal, sloughed skin, and environmental DNA sampling). Finally, a small percentage of the each ESA-listed population of cetacean within the action area would be exposed to invasive procedures such biopsy sampling or tagging. 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, as well as 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. At least one of the blue whale populations within the action area is showing signs of recovery, with a relatively large, stable population that may even be approaching carrying capacity. Similarly, the bowhead and fin whale population within the action area are quite large and experienced or are experiencing increases in abundance. Of the three humpback whale DPSs within the action area, the Mexico DPS appears to be doing better

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. 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 but existing estimates indicate a small population within the action area, with an unknown population trend. Sperm whales are likely one of the most abundant large whale species, and thus globally are showing strong signs of recovery. Within the action area, little is known about the sperm whale populations but at least one appears to be of intermediate size. Bearded (Beringia DPS) and ringed (Arctic DPS) seals both appear to have large population sizes, but they face increasing threats from climate change with the loss of sea ice. Stellar sea lions (Western DPS) have a large population, but despite continued protection, they appear to still be in decline.

A variety of current and past anthropogenic threats impacts these ESA-listed marine mammals within the action area including climate change, whaling and subsistence harvesting, vessel strikes, whale watching, sound, military activities, fisheries, pollution, and scientific research. Perhaps the most significant direct anthropogenic threats these marine mammals currently face are vessel strikes and entanglement in fishing gear. 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 the ESA-listed species within the action area 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 No. 20465 will result in minor behavioral and physiological responses, which are not likely to result in negative consequences to the fitness of individual whales.

11 CONCLUSION

After reviewing the current status of the ESA-listed species, the environmental baseline within the action area, 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 North Atlantic right, gray (Western Pacific), beluga (Cook Inlet), blue, bowhead, fin, humpback (Mexico, Central America, Western North Pacific), killer (Southern Resident DPS), North Pacific right, sei, and sperm whales, bearded (Beringia DPS) and ringed (Arctic DPS) seals, and Stellar sea lions (Western DPS), or destroy or adversely modify designated critical habitat for beluga whales (Cook Inlet DPS), killer whales (Southern Resident DPS), North Pacific right whales, North Atlantic right whales, and leatherback turtles and proposed critical habitat for ringed seals (Arctic DPS).

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 No. 20465 involve directed take for the purposes of scientific research. Therefore, the 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 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 MML 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. **Aggregate Take Tracking**

   We recommend that the Permits Division develop a system for tracking and evaluating the extent of take issued and that which is realized for any given population of ESA-listed species. While the Permits Division's current permit tracking 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.

2. 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.

3. 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.

4. 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. 20465. 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. 20465 (April, 14 2017)

*Final permit may have minor changes that would not affect this opinion. Permit No. 20465

Expiration Date: May dd, 2022

Reports Due: month dd, annually

PERMIT TO TAKE PROTECTED SPECIES[12] FOR SCIENTIFIC PURPOSES

I. Authorization

This permit is issued to the National Marine Fisheries Service (NMFS), Alaska Fisheries Science Center Marine Mammal Laboratory (hereinafter "Permit Holder"), 7600 Sand Point Way NE, Seattle, WA 98115, (Responsible Party: Dr. John Bengtson), 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.*); the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226); and the Fur Seal Act of 1966 (16 U.S.C. 1151 *et seq.*).

II. Abstract

The objective of the permitted activity, as described in the application, is to evaluate trends, abundance and distribution of cetaceans in the North Pacific Ocean, Arctic Ocean, and New England waters of the Atlantic.

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

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

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 month dd, 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

b. If serious injury or mortality[13] of protected species reaches that specified in Table 1 of Appendix 1.

d. If authorized take[14] is exceeded in any of the following ways:

iv. More animals are taken than allowed in 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.

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

[13] This permit allows for unintentional serious injury and mortality caused by the presence or actions of researchers up to the limit in Table 1 of Appendix 1. This includes, but is not limited to: deaths of dependent young by starvation following research-related death of a lactating female; deaths resulting from infections related to sampling procedures or invasive tagging; and deaths or injuries sustained by animals during capture and handling, or while attempting to avoid researchers or escape capture. Note that for marine mammals, a serious injury is defined by regulation as any injury that will likely result in mortality.

[14] 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[15] acquired[16] under this permit after permit expiration without additional written authorization, provided the samples are maintained as specified in this permit.

B. Number and Kinds of Protected Species, Locations 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 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 images and audio recordings collected under this permit, including those authorized in 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. 20465. 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.

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

[15] 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.
[16] Authorized methods of sample acquisition are specified in Appendix 1.

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

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

v. Count and report 1 take per cetacean per day combined for all approaches[17] in water, acoustic playbacks, and all attempts to remotely biopsy and/or tag the animal.

ii. If attempts to biopsy sample or tag an animal are successful, or unsuccessful but make contact with the animal, count the take for the day against the applicable sampling and/or tagging take row in Appendix 1.

ii. If all biopsy sampling and tagging attempts on a single day for the same animal are unsuccessful but do not make contact with the animal, count the take against your take row for Level B harassment.

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

[17] 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 whales and baleen whales except minke whales and 50 yards for all other cetaceans.

x. Any marine mammal observed in the appropriate isopleth during sound playback must be counted as a take by harassment and reported.

General

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

z. Activities must be discontinued if an animal exhibits repetitive, strong, adverse reactions to the activity or vessel.

aa. 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

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

g. For research in the inland waters of Washington state:

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.

Aerial Surveys

l. Aerial flights must not be conducted over pinniped haul outs and rookeries.

Manned Aerial Surveys

m. Manned aerial surveys must be flown at an altitude of 500 ft or higher. Descents for photography and calf detection must be no lower than 300 feet.

Unmanned Aircraft Systems (UAS)

bb. Researchers are authorized to use a vertical take-off and landing (VTOL) UAS at an altitude of 30 feet or higher for imagery and observation.

Active Acoustics for Free Ranging Beluga Whales

cc. Sound playback is limited to:

i. Less than 10 hours for source levels below 150 dB re 1 µPa at 1 meter.

ii. Less than 10 seconds for source levels over 170 dB re 1 µPa at 1 meter;

dd. To prevent injury, the trial must be shut down if animals approach within the Level A exclusion zone 250? meters of the sound source.

Remote Biopsy and Tagging

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

ff. Biopsy sampling: Where sampling is authorized in Appendix 1, the following age classes, including females accompanied by calves, may be biopsy sampled:

- Dolphin and porpoise calves > 1 year old
- Non-neonates of all other species.

gg. Tagging: Where tagging is authorized in Appendix 1, the following age classes, including females accompanied by calves, may be tagged:

- Suction cup tags: Animals > 6 mos.
- Invasive tag designs: Adults & juveniles only

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

ii. Researchers must avoid sampling or tagging a cetacean anywhere forward of the pectoral fin to avoid sensitive areas (e.g., blowhole, eyes, etc.).

jj. Researchers must use sterile[18] biopsy tips, invasive tag anchors (darts, barbs, pins, etc.) and fully implantable tags. If any of these become contaminated (e.g., seawater, missed attempt, physical contact) in the field prior to use, a new sterile biopsy tip, anchors or fully implantable tag must be used. If a new, sterile equipment/tag is not available, the contaminated gear must be completely cleaned and disinfected[19] following the IACUC approved protocol described in the application.

kk. Animals that receive a dart/barb tag or fully implantable tag may be biopsy sampled in subsequent field seasons for post-tag monitoring.

ll. Researchers should avoid implantable tagging of animals exhibiting a compromised body condition, such as having noticeable reductions in body mass in the post-cranial region.

mm. Where authorized in Appendix 1, whales may receive up to three tags at a time provided that only two are invasive, only one of which may be fully implantable.

nn. Researchers must make reasonable efforts to monitor the effects of fully implantable tagging--the health (e.g., healing of the wound site) and future fecundity of tagged animals--through tracking and identification via photographic and genetic resightings. This information must be provided in annual reports.

[18] Sterilization = destroys or eliminates all forms of microbial life and is carried out by physical or chemical methods (CDC 2008).
[19] Disinfection= eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects usually by liquid chemicals (CDC 2008).

Captures: General [UNDER CONSTRUCTION; for non-listed species]

In the event an animal dies as a result of research activities, the Permit Holder must, within two weeks, submit an incident report as described in Condition E.3. A necropsy should be performed, except where not feasible such as in remote areas with limited personnel. Gross necropsy findings should be included as part of an incident report. Final necropsy findings (e.g., histology and other analyses) must be submitted when complete.

Non-target Species

ss. For North Atlantic Right Whales:

If a right whale is seen, Researchers must maintain a distance of at least 460 meters (500 yards) from the animal(s). Please report all right whale sightings to NMFS Sighting Advisory System:

- in any location to the U.S. Coast Guard on channel 16
- from VA to ME to 978-585-8473
- from NC to FL to 904-237-4220.

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

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.

l. The Permit Holder may grant written approval to additional Authorized Recipients for analysis and curation of samples related to the permit objectives. The Permit Holder must maintain a record of the transfer including:

xiii. name and affiliation of the recipient;

xiv. address of the recipient;

xv. types of samples sent (species, tissue type); and

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

m. 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.

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

o. 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 – Phillip Clapham, Ph.D.

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

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

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

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

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

   c. Co-Investigators (CIs) are individuals who are qualified to conduct activities authorized by the permit, for the objectives described in the

application, without the on-site supervision of the PI. CIs assume the role and responsibility of the PI in the PI's absence.

d. Research Assistants (RAs) are individuals who work under the direct and on-site supervision of the PI or a CI. RAs cannot conduct permitted activities in the absence of the PI or a CI.

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

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

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

c. individuals included for training purposes.

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

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

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

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

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

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

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

10. 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.

11. Submit requests to add CIs or change the PI 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

d. Engaged in a permitted activity.

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

f. 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

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:

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.

5. Incident Reporting

d. If the total number of mortalities is reached, or authorized takes have been exceeded as specified in Conditions A.2 and B.X. 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.

6. Annual reports describing activities conducted during the previous permit year (from month/day to month/day) must

a. be submitted by [insert date here] each year for which the permit is valid;

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

c. include 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.

4. A final report summarizing activities over the life of the permit must be submitted by (insert date 180 days post expiration), 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.

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, veterinarian, boat driver, animal restrainer, Research Assistant "in training").

d. Notification must be sent to the following Assistant Regional Administrator(s) 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, and CA:

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; 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

5. Researchers must coordinate their activities with other permitted researchers to avoid unnecessary disturbance of animals or duplication of efforts. Contact the applicable Regional Office(s) 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[20] 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

[20] 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.

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

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

Dr. John L. Bengtson

Director, Alaska Fisheries Science Center

Marine Mammal Laboratory

Responsible Party

Date Effective

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

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
1	Dolphin, Pacific white-sided	Range-wide	All	2000	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Includes sampling/tagging attempts that don't contact the animal; incidental take during work on other animals
2	Dolphin, Pacific white-sided	Range-wide	All	200	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
3	Dolphin, Pacific white-sided	Range-wide	Adult/ Juvenile	50	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	One suction cup tag on an animal at a time.

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
4	Dolphin, Risso's	Range-wide	All	550	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Includes sampling/tagging attempts that don't contact the animal; incidental take during work on other animals
5	Dolphin, Risso's	Range-wide	All	100	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
6	Dolphin, Risso's	Range-wide	Non-neonate	50	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. No biopsy < 1 year old. One suction cup tag on an animal at a time.
7	Narwhal	Range-wide	All	1000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
8	Porpoise, Dall's	Range-wide	Adult/ Juvenile	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging of animals < 6 mos, no biopsy < 1 year old. One suction cup tag on an animal at a time.
9	Porpoise, Dall's	Range-wide	All	550	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Incidental take during work on other animals
10	Porpoise, Dall's	Range-wide	All	5000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
11	Porpoise, harbor	Range-wide	All	500	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Other = eDNA sampling. Includes sampling/tagging attempts that don't contact the animal; incidental acoustic playback.
12	Porpoise, harbor	Range-wide	All	5000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
13	Porpoise, harbor	Range-wide	Adult/ Juvenile	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging animals < 6 mos; no biopsy < 1 year old. One tag on an animal at a time. Other = eDNA sampling
14	Sea lion, Steller	East of 144° Long (Eastern US)	All	10000	1	Harass	Survey, aerial	Incidental disturbance	During cetacean aerial surveys.
15	Sea lion, Steller	West of 144° Long	All	10000	1	Harass	Survey, aerial	Incidental disturbance	During cetacean aerial surveys.

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
		(Western US) (NMFS Endangered)							
16	Seal, bearded	Beringia DPS.	All	100	1	Harass	Survey, aerial	Incidental disturbance	During cetacean aerial surveys.
17	Seal, bearded	Range-wide	All	100	1	Harass	Survey, aerial	Incidental disturbance	Except Beringia DPS. During cetacean aerial surveys.
18	Seal, harbor	Bering Sea Stock	All	10000	1	Harass	Survey, aerial	Incidental disturbance	During cetacean aerial surveys and acoustic playbacks.
19	Seal, harbor	Gulf of Alaska Stock	All	10000	1	Harass	Survey, aerial	Incidental disturbance	During cetacean aerial surveys.
20	Seal, harbor	Southeast Alaska Stock	All	10000	1	Harass	Survey, aerial	Incidental disturbance	During cetacean aerial surveys.
21	Seal, Northern fur	Eastern Pacific Stock	All	10000	1	Harass	Survey, aerial	Incidental disturbance	During cetacean aerial surveys.
22	Seal, ribbon	Range-wide	All	100	1	Harass	Survey, aerial	Incidental disturbance	During cetacean aerial surveys.

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Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
23	Seal, ringed	Arctic DPS	All	100	1	Harass	Survey, aerial	Incidental disturbance	During cetacean aerial surveys.
24	Seal, ringed	Range-wide	All	100	1	Harass	Survey, aerial	Incidental disturbance	Except Arctic DPS. During cetacean aerial surveys.
25	Seal, spotted	Range-wide	All	10000	1	Harass	Survey, aerial	Incidental disturbance	During cetacean aerial surveys.
26	Whale, Baird's beaked	Range-wide	Non-neonate	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging animals < 6 mos. One suction cup tag on an animal at a time.
27	Whale, Baird's beaked	Range-wide	Adult/ Juvenile	20	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	One tag on an animal at a time

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
28	Whale, Baird's beaked	Range-wide	All	1000	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Includes sampling/tagging attempts that don't contact the animal; incidental take during work on other animals
29	Whale, Baird's beaked	Range-wide	All	500	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
30	Whale, beluga	Beaufort Sea Stock	All	3000	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Underwater photo/videography	Other = eDNA sampling. Includes sampling/tagging attempts that don't contact the animal; incidental take during work on other animals.
31	Whale, beluga	Beaufort Sea Stock	All	5000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
32	Whale, beluga	Beaufort Sea Stock	Non-neonate	200	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Other = eDNA sampling. No tagging animals < 6 mos. One tag on an animal at a time.
33	Whale, beluga	Beaufort Sea Stock	Adult/ Juvenile	30	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Other = eDNA sampling. Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin.

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
34	Whale, beluga	Bristol Bay Stock	Adult/ Juvenile	30	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Other = eDNA sampling. Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin.
35	Whale, beluga	Bristol Bay Stock	All	150	1	Harass/ Sampling	Survey, aerial/ vessel	Acoustic, active playback/broadcast; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Underwater photo/videography	Other = eDNA sampling

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
36	Whale, beluga	Bristol Bay Stock	Non-neonate	200	3	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	One tag on an animal at a time. Whales may be biopsied more than once. No tagging animals < 6 mos. Other = eDNA sampling.
37	Whale, beluga	Bristol Bay Stock	All	26000	20	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Underwater photo/videography	Other= eDNA. 20 days for photo-ID; Includes sampling/tagging attempts that don't contact the animal; incidental take during work on other animals and playbacks.
38	Whale, beluga	Bristol Bay Stock	All	25000	10	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	3+ surveys of entire population + flights to search for recoverable tags.

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
39	Whale, beluga	Cook Inlet Stock (NMFS Endangered)	All	6500	20	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Underwater photo/videography	Other=eDNA. 20 days for photo-ID; Includes sampling/tagging attempts that don't contact the animal; incidental take during work on other animals.
40	Whale, beluga	Cook Inlet Stock (NMFS Endangered)	All	8000	20	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	6 + surveys of population + flights to search for recoverable tags.
41	Whale, beluga	Cook Inlet Stock (NMFS Endangered)	Non-neonate	100	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Individuals may incidentally be biopsied more than once because of small pop. size. No tagging of animals < 6 mos. One tag on an animal at a time. Other = eDNA.

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
42	Whale, beluga	Eastern Bering Sea Stock	Non-neonate	200	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	No tagging animals < 6 mos. One suction cup tag on an animal at a time. Other = water sampling for eDNA.
43	Whale, beluga	Eastern Bering Sea Stock	All	3000	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Underwater photo/videography	Other=eDNA. Includes sampling/tagging attempts that don't contact the animal; incidental take during work on other animals and playbacks.
44	Whale, beluga	Eastern Bering Sea Stock	All	15000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
45	Whale, beluga	Eastern Bering Sea Stock	Adult/ Juvenile	30	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin. Other = water sampling for eDNA.
46	Whale, beluga	Eastern Bering Sea Stock	All	150	1	Harass/ Sampling	Survey, aerial/v essel	Acoustic, active playback/broadcast; Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Underwater photo/videography	Other = water sampling for eDNA

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
47	Whale, beluga	Eastern Chukchi Sea Stock	Adult/ Juvenile	30	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin. Other = water sampling for eDNA
48	Whale, beluga	Eastern Chukchi Sea Stock	All	3000	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Underwater photo/videography	Other=eDNA. Includes sampling/tagging attempts that don't contact the animal; incidental take during work on other animals.
49	Whale, beluga	Eastern Chukchi Sea Stock	All	12000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
50	Whale, beluga	Eastern Chukchi Sea Stock	Non-neonate	200	1	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Other; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	No tagging animals < 6 mos. One suction cup tag on an animal at a time. Other = water sampling for eDNA
51	Whale, blue	Range-wide (NMFS Endangered)	All	200	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
52	Whale, blue	Range-wide (NMFS Endangered)	All	500	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Includes sampling/tagging attempts that don't contact the animal.

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
53	Whale, blue	Range-wide (NMFS Endangered)	Non-neonate	75	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging animals < 6 mos. One suction cup tag on an animal at a time.
54	Whale, blue	Range-wide (NMFS Endangered)	Adult/ Juvenile	50	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin.
55	Whale, bowhead	Range-wide (NMFS Endangered)	Non-neonate	75	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video;	No tagging animals < 6 mos. One suction cup tag on an animal at a time.

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Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
								Sample, fecal; Sample, skin and blubber biopsy	
56	Whale, bowhead	Range-wide (NMFS Endangered)	Adult/ Juvenile	30	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin
57	Whale, bowhead	Range-wide (NMFS Endangered)	All	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Includes sampling/tagging attempts that don't contact the animal.
58	Whale, bowhead	Range-wide (NMFS Endangered)	All	11000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
59	Whale, Cuvier's beaked	Range-wide	All	300	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Includes sampling/tagging attempts that don't contact the animal; incidental take during work on other animals.
60	Whale, Cuvier's beaked	Range-wide	All	200	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
61	Whale, Cuvier's beaked	Range-wide	Non-neonate	200	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging animals < 6 mos. One suction cup tag on an animal at a time.

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
62	Whale, Cuvier's beaked	Range-wide	Adult/ Juvenile	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin
63	Whale, fin	California/ Oregon/ Washington Stock (NMFS Endangered)	Non-neonate	250	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging animals < 6 mos. One suction cup tag on an animal at a time.
64	Whale, fin	California/ Oregon/ Washington Stock (NMFS Endangered)	Adult/ Juvenile	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video;	Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
								Sample, fecal; Sample, skin and blubber biopsy	
65	Whale, fin	California/ Oregon/ Washington Stock (NMFS Endangered)	All	1000	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Includes sampling/tagging attempts that don't contact the animal.
66	Whale, fin	California/ Oregon/ Washington Stock (NMFS Endangered)	All	1000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
67	Whale, fin	Northeast Pacific Stock (NMFS Endangered)	All	500	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Includes sampling/tagging attempts that don't contact the animal.
68	Whale, fin	Northeast Pacific Stock (NMFS Endangered)	All	5000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
69	Whale, fin	Northeast Pacific Stock (NMFS Endangered)	Non-neonate	150	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging animals < 6 mos. One suction cup tag on an animal at a time.
70	Whale, fin	Northeast Pacific Stock (NMFS Endangered)	Adult/ Juvenile	50	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin
71	Whale, gray	Eastern North Pacific	Adult/ Juvenile	50	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id;	Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
								Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	
72	Whale, gray	Eastern North Pacific	Non-neonate	500	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging animals < 6 mos. One suction cup tag on an animal at a time.
73	Whale, gray	Eastern North Pacific	All	1000	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Includes sampling/tagging attempts that don't contact the animal.
74	Whale, gray	Eastern North Pacific	All	1000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
75	Whale, humpback	Range-wide (NMFS Endangered)	All	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring;	West coast work. Includes approaches for

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
								Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	sampling/tagging activities that don't contact the animal.
76	Whale, humpback	Range-wide (NMFS Endangered)	Non-neonate	30	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	West coast work. No tagging animals < 6 mos. One suction cup tag on an animal at a time.
77	Whale, humpback	Range-wide (NMFS Endangered)	Adult/ Juvenile	10	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	West coast work. Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin
78	Whale, humpback	Range-wide	All	400	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id;	Alaska work. Includes sampling/tagging attempts that

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
								Photogrammetry; Photograph/Video; Sample, fecal	don't contact the animal.
79	Whale, humpback	Range-wide	All	5000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	Alaska work.
80	Whale, humpback	Range-wide	Non-neonate	120	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	Alaska work. No tagging whales < 6 mos. One suction cup tag on an animal at a time.
81	Whale, humpback	Range-wide	Adult/ Juvenile	40	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	Alaska work. Up to 3 tags on an animal at a time w/no more than 2 that pierce the skin

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
82	Whale, killer	Eastern North Pacific Southern Resident Stock (NMFS Endangered)	All	550	3	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Includes sampling/tagging attempts that don't contact the animal. No dedicated studies.
83	Whale, killer	Eastern North Pacific Southern Resident Stock (NMFS Endangered)	All	500	3	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	No dedicated studies
84	Whale, killer	Eastern North Pacific Southern Resident Stock (NMFS Endangered)	Non-neonate	10	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging whales < 6 mos. One suction cup tag on an animal at a time. No dedicated studies.
85	Whale, killer	Range-wide	Adult/ Juvenile	50	2	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring;	2 takes for known individuals if tag attempt on individual hits but does not attach to

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Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
								Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	whale with 2nd attempt on different day; Up to 2 tags on an animal at a time w/no more than 1 that pierce the skin.
86	Whale, killer	Range-wide	Non-neonate	200	5	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Sample, skin and blubber biopsy; Underwater photo/videography	5 takes to resample a known individual up to three times on separate days and account for shots that do not result in a successful biopsy; One tag on an animal at a time. No tagging whales < 6 mos.
87	Whale, killer	Range-wide	All	3000	5	Harass/ Sampling	Survey, aerial/ vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry;	Includes approaches for sampling/tagging that don't contact the whale;

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
								Photograph/Video; Remote vehicle, aerial (VTOL); Sample, fecal; Underwater photo/videography	incidental takes during work on other whales.
88	Whale, killer	Range-wide	All	1000	5	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
89	Whale, minke	Range-wide	All	200	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
90	Whale, minke	Range-wide	All	1000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
91	Whale, minke	Range-wide	Non-neonate	50	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video;	No tagging of animals < 6 mos. One suction cup tag on an animal at a time.

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
								Sample, fecal; Sample, skin and blubber biopsy	
92	Whale, minke	Range-wide	Adult/ Juvenile	50	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin
93	Whale, right, North Pacific	Range-wide (NMFS Endangered)	Non-neonate	60	5	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. Possibility of biopsy sampling an individual up to 3 times on separate days and also account for any shots that do not result in a successful biopsy; Only 1 suction cup

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
									tag on an whale at a time.
94	Whale, right, North Pacific	Range-wide (NMFS Endangered)	Adult/ Juvenile	30	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin
95	Whale, right, North Pacific	Range-wide (NMFS Endangered)	All	100	3	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
96	Whale, right, North Pacific	Range-wide (NMFS Endangered)	All	300	10	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
97	Whale, sei	Range-wide (NMFS Endangered)	All	200	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
98	Whale, sei	Range-wide (NMFS Endangered)	All	200	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
99	Whale, sei	Range-wide (NMFS Endangered)	Non-neonate	75	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. One suction cup tag on an animal at a time.

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
100	Whale, sei	Range-wide (NMFS Endangered)	Adult/ Juvenile	30	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin
101	Whale, sperm	Range-wide (NMFS Endangered)	Non-neonate	125	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. One suction cup tag on an animal at a time.
102	Whale, sperm	Range-wide (NMFS Endangered)	Adult/ Juvenile	90	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, implantable (e.g., satellite tag); Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id;	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
								Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	
103	Whale, sperm	Range-wide (NMFS Endangered)	All	1000	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
104	Whale, sperm	Range-wide (NMFS Endangered)	All	1000	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video	
105	Whale, Stejneger's beaked	Range-wide	All	100	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal	Included are approaches for sampling and tagging activities that did not result in contact with the animal.
106	Whale, Stejneger's beaked	Range-wide	All	100	1	Harass	Survey, aerial	Count/survey; Observation, monitoring; Observations, behavioral;	

Table 3. Authorized annual take of marine mammals in the North Pacific and Arctic Ocean during vessel and aerial surveys. Some animals may be taken multiple times per year.

Line	Species	Stock/Listing Unit	Life Stage	No. Animals	Takes Per Animal	Take Action	Observe /Collect Method	Procedures	Details
								Photo-id; Photogrammetry; Photograph/Video	
107	Whale, Stejneger's beaked	Range-wide	Non-neonate	50	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No tagging of animals < 6 mos. One suction cup tag on an animal at a time.
108	Whale, Stejneger's beaked	Range-wide	Adult/ Juvenile	10	1	Harass/ Sampling	Survey, vessel	Collect, remains for predation study; Collect, sloughed skin; Count/survey; Instrument, dart/barb tag; Instrument, suction-cup (e.g., VHF, TDR); Observation, monitoring; Observations, behavioral; Photo-id; Photogrammetry; Photograph/Video; Sample, fecal; Sample, skin and blubber biopsy	No more than 3 tags on an animal at a time w/no more than 2 that pierce the skin.

Appendix 2: NMFS-Approved Personnel and Authorized Recipients for Permit No. 20465.

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
Dr. John Smith	Aerial surveys
Dr. Jane Doe	All research activities
	[UNDER CONSTRUCTION]

Biological samples authorized for collection or acquisition in Tables 1-3 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
Researchers name, affiliation, City, State	Whole blood and serum	UNDER CONSTRUCTION]