NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7
BIOLOGICAL OPINION

Title: Biological and Conference Opinion on the Issuance of Scientific Research Permit No. 23858 to investigate seal populations and their ecology in the North Pacific Ocean, Arctic Ocean, and the adjacent coastal regions of Alaska.

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

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1 INTRODUCTION

The Endangered Species Act of 1973 (ESA), as amended (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 National Marine Fisheries Service (NMFS) for threatened or endangered species (ESA-listed), or designated critical habitat that may be affected by the action that are under NMFS jurisdiction (50 C.F.R. §402.14(a)). If a Federal action agency determines that an action "may affect, but is not likely to adversely affect" endangered species, threatened species, or designated critical habitat and NMFS concurs with that determination for species under NMFS jurisdiction, consultation concludes informally (50 C.F.R. §402.14(b)).

The Federal action agency shall confer with NMFS for species under NMFS jurisdiction on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat (50 C.F.R. §402.10). If requested by the Federal agency and deemed appropriate, the conference may be conducted in accordance with the procedures for formal consultation in §402.14.

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 agency for this consultation is the NMFS Office of Protected Resources, Permits and Conservation Division (Permits Division). The Permits Division proposes to issue a scientific research permit pursuant to Section 104 of the Marine Mammal Protection Act of 1972 (MMPA), as amended (16 U.S.C. 1361 *et seq*.), and Section 10(a)(1)(A) of the ESA to the NMFS Alaska Fisheries Science Center's Marine Mammal Laboratory (MML). The permit would authorize scientific research on seals that includes two listed as threatened under the ESA, the Beringia Distinct Population Segment (DPS) of bearded seals (*Erignathus barbatus*) and the Arctic subspecies of the ringed seal (*Phoca hispida hispida*). Permitted research activities could occur throughout the North Pacific Ocean (including the Bering Sea), Arctic Ocean (including the Chukchi and Beaufort seas), and all coastal and offshore regions of Alaska.

This consultation, biological and conference opinion (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. §§401-17), and agency policy and guidance. This consultation was conducted by the NMFS Office of Protected Resources Endangered Species Act Interagency Cooperation Division (hereafter referred to as "we," "us," or "our"). We prepared this opinion and incidental take statement in accordance with section 7(b) of the ESA and implementing regulations at 50 C.F.R. §402.

This document represents our opinion on the effects of these actions on the following ESA-listed species and designated critical habitats: Beringia DPS of bearded seals, Arctic subspecies of ringed seals, the Western DPS of Steller sea lions (*Eumetopias jubatus*) and their critical habitat, Cook Inlet DPS of beluga whales (*Delphinapterus leucas*) and their critical habitat, blue whales (*Balaenoptera musculus)*, bowhead whale (*Balaena mysticetus*), fin whales (*Balaenoptera physalus*), the Western North Pacific DPS of gray whales (*Eschrichtius robustus*), the Mexico DPS and Western North Pacific DPS of humpback whales (*Megaptera novaeangliae*), North Pacific right whales (*Eubalaena japonica*) and their critical habitat, sei whales (*Balaenoptera borealis*), sperm whales (*Physeter macrocephalus*) and leatherback turtles (*Dermochelys coriacea*).

This opinion includes analysis of effects from the proposed activities to the proposed critical habitat of Arctic ringed seals and humpback whales (Mexico DPS and Western North Pacific DPS) to have an effects determination prepared in case those critical habitats become designated sometime prior to or during the 5 year seal research program proposed by the MML for authorization by the Permits Division. A complete record of this consultation is on file at the NMFS Office of Protected Resources in Silver Spring, Maryland.

1.1 Background

The MML conducts research to investigate population trends, distribution, health, and ecology of pinnipeds in Alaska to fulfill federal conservation and management obligations under the MMPA and ESA. The Permits Division has authorized similar research projects subject to ESA section 7 consultations that concluded the authorized activities were not likely to jeopardize the continued existence of ESA-listed species, or result in the destruction or adverse modification of designated critical habitat. Recent examples include opinions for the following pinniped research projects: Permit No. 22289 for Steller sea lions, Permit No. 22678 for Guadalupe fur seals, Permit No. 22677 for Hawaiian monk seals, and Permit No. 20466 for ice seals in Alaska.

1.2 Consultation History

This opinion is based on information provided in the Permits Division's initiation package, which satisfied consultation initiation criteria (50 CFR 402.14), that included: a biological assessment, draft permit, maps, directed and incidental take estimates, permit application, and

annual reports from the preceding MML ice seal research Permit No. 19309. Our communication with the Permits Division regarding this consultation is summarized as follows:

- June 19, 2020: The Permits Division shared permit application documents with us.
- July 23, 2020: The Permits Division submitted an initiation package to us for a Section 7 Consultation.
- August 25, 2020: We notified the Permits Division that the initiation package was sufficient to initiate consultation as of 8/21/20.

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 (50 C.F.R. §402.02).

An ESA section 7 assessment involves the following steps:

Description of the Proposed Action (Section 3): We describe the activities proposed for authorization by the Permits Division, including measures to avoid and minimize impacts to ESA-listed species and designated critical habitat. We describe aspects (or stressors) of the proposed action that may have effects on the physical, chemical, and biotic environment.

Action Area (Section 4): We describe the action area with the spatial extent of the stressors from the action.

Endangered Species Act Resources That May be Affected (Section 5): We identify the ESA-listed species and designated critical habitat under NMFS jurisdiction that may occur within the action area that may be affected by the proposed action.

Species and Critical Habitat Not Likely to be Adversely Affected (Section 6): We identify the ESA-listed species and designated critical habitat that are not likely to be adversely affected by the stressors produced by the proposed action.

Status of Species and Critical Habitat Likely to be Adversely Affected (Section 7): We examine the status of ESA-listed species that may be adversely affected by the proposed action as well as the condition of designated critical habitat throughout the action area and discuss the condition and current function of designated critical habitat.

*Environmental Baseline (*Section 8): We describe the environmental baseline as the condition of ESA-listed species or its designated critical habitat in the action area, without the consequences caused by the proposed action. 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 proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impacts of State or private actions that are contemporaneous with the consultation in process. The consequences to ESA-listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 C.F.R. §402.02; 84 FR 44976 published August 27, 2019).

Effects of the Action (Section 9): Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur (50 C.F.R. §402.02). Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. These are broken into analyses of exposure, response, and risk as described below for the species and/or critical habitat that are likely to be adversely affected by the action.

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 sub-populations to which those individuals belong. Similarly, we identify the designated or proposed critical habitat likely to be exposed and the critical habitat unit. We evaluate the available evidence to determine how individuals of those ESA-listed species are likely to respond to the stressors given their probable exposure. We also consider whether the action will result in impacts to the physical and biological features of designated critical habitat. We assess the consequences of the 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 risk analysis also considers the impacts of the proposed action on the function of the physical and biological features and the conservation value of designated or proposed critical habitat.

Cumulative Effects (Section 10): 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 CFR §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 12): We begin with problem formulation that identifies and integrates the stressors of the action with the species' and critical habitat status and the environmental baseline and formulate risk hypotheses based on the anticipated exposure of listed species and critical habitat to stressors and the likely response of species and habitats to this exposure. We consider the effects of the action within the action area on populations or subpopulations and on physical and biological 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; or
- Appreciably diminish the value of designated critical habitat for the conservation of an ESA-listed species.

Conclusion (Section 13): The results of our jeopardy and destruction or adverse modification analyses are summarized in this section.

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 or proposed 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.

In addition, we include an *Incidental Take Statement* (Section 14) that specifies the amount of incidental take when possible or extent of incidental when the amount cannot be estimated numerically, 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 15) that may be implemented by the action agency (50 C.F.R. §402.14(j)). Finally, we identify the circumstances in which *Reinitiation of Consultation* (Section 17) is required (50 C.F.R. §402.16).

2.1 Evidence Available for the Consultation

To comply with our obligation to use the best scientific and commercial data available, we collected information identified through searches of *Google Scholar*, 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;
- Government reports (including NMFS biological opinions and stock assessment reports);
- National Oceanic and Atmospheric Administration (NOAA) technical memorandums;
- Peer-reviewed scientific literature.

These resources were used to identify information relevant to the potential stressors, animal density and distribution to estimate likely exposure, and responses of ESA-listed species and designated or proposed 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 or proposed 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 (50 C.F.R. § 402. 02).

The Permits Division proposes to issue a scientific research permit (No. 23858) pursuant to Section 104 of the MMPA, and Section 10(a)(1)(A) of the ESA. Permit No. 23858 would be issued to the MML (Responsible Party: John Bengston). Upon issuance, the permit would authorize approaches for aerial and vessel surveys, ground sampling activities, capture and handling for biological sampling and application of telemetry devices, and unintentional mortality associated with captures. This research would continue similar efforts by the MML currently authorized under Permit No. 19309 until March 25, 2021.

The objective of the research is to collect data on species biology and ecology to understand what regulates population abundance and distribution for harbor seals and 4 species of ice-associated seals: bearded, ringed, ribbon, and spotted. Work focuses on building a baseline of information by which future studies can evaluate the impacts of long-term changes in the climate, sea ice, and marine ecosystem conditions.

Proposed research activities for permitting are expected to result in take of phocids in Alaska and are described in more detail in the subsections that follow. Directed takes that are proposed for authorization include two ESA threatened species, the Arctic ringed seal (Table 1) and the Beringia DPS of bearded seals (Table 2).

Table 1. Annual research activities proposed for authorization to male and female Arctic subspecies ringed seals.

Authorized Take	Takes Per Animal	Take Action	Observe/ Collect Method	Procedures	Details
4000	1	Harass	Survey, aerial	Count/survey; Photogrammetry; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	Aerial survey (manned and unmanned)
3000	1	Harass	Survey, ground	Incidental disturbance	During capture activities and sample collection (e.g., scat collection independent of captures)

110	1	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Capture and instrumentation - no intentional recaptures.
20	2	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Remote vehicle, aerial (fixed-wing); Remote vehicle, aerial (VTOL); Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Intentional recapture and intentional 2nd take

20	1	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Instrument, internal (e.g.,PIT); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Includes instrument, internal (LHX2 tags or similar).
5	1	Unintentional mortality	Other	Intentional (directed) mortality; Salvage (carcass, tissue, parts); Unintentional mortality	Up to 5 unintentional mortalities per species per year including humane euthanasia by an attending veterinarian; not to exceed 15 mortalities per species over duration of permit; necropsy
300	9999	Import/export/ receive only	Import/export /receive only	Import/export/receive samples from animals sampled by this program or other collaborators	Import or export of samples collected during research or salvage

Table 2. Annual research activities proposed for authorization to male and female Beringia DPS bearded seals.

Authorized Take	Takes Per Animal	Take Action	Observe/ Collect Method	Procedures	Details
250	1	Harass	Survey, aerial	Count/survey; Photogrammetry; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	Aerial survey (manned and unmanned)
3000	1	Harass	Survey, ground	Incidental disturbance	During capture activities and sample collection (e.g., scat collection independent of captures)
90	1	Capture/Handle/Release	Net, other	Acoustic, active playback/broadcast; Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Capture and instrumentation - no intentional recaptures.

20	2	Capture/Handle/Release	Net, other	Acoustic, active playback/broadcast; Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Intentional recapture and intentional 2nd take
20	1	Capture/Handle/Release	Net, other	Acoustic, active playback/broadcast; Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Remote dart captures

20	1	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Instrument, internal (e.g.,PIT); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Includes instrument, internal (LHX2 tags or similar).
5	1	Unintentional mortality	Other	Intentional (directed) mortality; Salvage (carcass, tissue, parts); Unintentional mortality	Up to 5 unintentional mortalities per species per year including humane euthanasia by an attending veterinarian; not to exceed 15 mortalities per species over duration of permit; necropsy
300	9999	Import/export/receive only	Import/export /receive only	Import/export/receive samples from animals sampled by this program or other collaborators	Import or export of samples collected during research or salvage

3.1 Aerial Surveys

Aerial surveys will be used to obtain fundamental assessment data: population estimates, seasonal abundance and distribution estimates, haul-out behavior and habitat requirements. Rotary or fixed-wing occupied or unoccupied aircraft will be used to photograph harbor, bearded, ringed, spotted, and ribbon seals at any time of the year, but primarily during spring through late fall. This covers periods of pupping, breeding, and molting for these seals, when the greatest proportions of the populations are hauled out and available to be seen.

3.1.1 Manned Aircraft

Ice seal surveys will include the Arctic ringed seals and the Beringia DPS of bearded seals, as well as non ESA-listed spotted and ribbon seals. Ice seal surveys will be conducted primarily in the spring/early summer, between March and June, during the breeding and molting periods. Ice seal surveys are conducted in fixed-wing aircraft at an altitude of 1,000 feet and air speed of 90 to 120 knots. Ice seal surveys are flown along transect lines that are likely to be spaced 10–20 kilometers apart, and there are no plans to survey a given track line more than once a year. The primary data collection method will be infrared and color photography. Infrared images are used for detection of seals while color images are used to identify seal species and age class as well as habitat characteristics.

3.1.2 Unmanned Aircraft Systems (UAS)

Digital and infrared photography captured by an unmanned/unoccupied aerial/aircraft system (UAS) will be used to supplement survey efforts. UAS technologies are developing rapidly and permitting is not requested to specific platforms, but researchers will only use platforms with modern safety features and an appropriate airworthiness certification from the Federal Aviation Administration (FAA). Any UAS will only be operated by an appropriately licensed pilot and under proper authority and approval of the FAA and in consultation with the NOAA Office of Marine and Aviation Center (OMAO) Aircraft Operations Center. These requirements are formalized in a set of required procedures for UAS operations at the MML, overseen by a designated UAS Mission Commander.

Previous UAS surveys of ice-associated seals involved the use of a fixed-wing, long endurance platform (e.g., ScanEagle). Hexacopters (e.g., the APH-22 recently used for successful surveys of Steller sea lions and Hawaiian monk seals, FreeFly Alta used for photogrammetry surveys of gray seals in the northwestern Atlantic) or similar short range, shorter endurance UASs may also prove useful for seal surveys in Alaska (e.g., DJI Phantom 4 Pro in the Pribilof Islands for harbor seals). The UAS may either be launched from a vessel or a suitable ground- or ice-based launch site at a minimum distance of approximately 100 m from animals. UASs such as the ScanEagle can operate for several hours and cover large survey transects. Hexacopters, such as the APH-22, have a flight duration of approximately 30 minutes, so flights might not exceed 20 minutes to allow for a battery reserve.

Flights will be conducted at altitudes generally at or above 150 ft but as low as 50 ft when application of advanced photogrammetry technologies such as Structure from Motion (SfM) and other imaging analytics, to improve the ability to measure body condition and morphometrics in less invasive ways, require it and disturbance potential is low. Rotary systems will avoid prolonged hovering and rapid changes in altitude to reduce disturbance to animals. Some research objectives (e.g., large scale surveys of the Bering, Chukchi, and Beaufort seas for ice-associated seals; long range surveys of the Aleutian Islands for harbor seals) would require the UAS to operate beyond line-of-sight.

NOAA and NASA are cooperating on implementation of a long-range UAS capable of beyond line-of-sight operation for pinniped surveys in Aleutian Islands. The Viking 400 is a representative platform that is being considered for this project. Operational and data range is >70 nautical miles with an endurance of 8-12 hours depending on payload weight integrated. The Viking 400 has a wingspan of 6 meters and an empty weight of 145 kg. Cruising speed is 60 knots with a dash speed of 90 knots. Target altitudes for the long-range UAS surveys is between 800 and 1200 ft with occasional surveys as low as 500 feet when ceilings require.

3.2 Capture, Handling, and Sampling

Up to 150 each of the Artic subspecies ringed seals (Table 1) and Beringia DPS bearded seals (Table 2) of both sexes and all age classes (including nursing pups) could be captured, handled, and released as part of the authorized research activities each year. To limit impacts during the first few days of birth, mother and pup pairs will not be targeted for capture if the presence of a very fresh birth site is noted and/or there are visible folds in the skin of the pup. When working with nursing (dependent) pups, researchers will abbreviate protocols to reduce handling time.

Some seals may inadvertently be taken more than once but this is not a planned procedure and is expected to be infrequent due to the nature of these species and the difficulty of re-capturing specific individuals. If inadvertent re-capture occurs or there is a rare opportunity to obtain unique data, or recover an instrument of high value, up to 20 seals of each species each year may be intentionally recaptured. If an animal is re-captured and an attached tag is no longer operational, then researchers would attempt to remove the tag. This would be done as long as doing so would not further harm the animal or cause additional safety risks to researchers.

All of the proposed procedures for capturing, handling, and sampling of animals were reviewed and approved by the NOAA Fisheries Alaska/Northwest Science Centers' Institutional Animal Care and Use Committee. All take activities will be performed by research personnel under the supervision of the Principal Investigator (PI) or one of the named Co-Investigators (CI). For some activities, a veterinarian or veterinary technician will provide additional consultation or supervision.

3.2.1 Capture Methods

One of the following five capture methods could be utilized on all life stages, except where noted below: 1) beach seines to capture seals as they enter the water from haul-out sites on shore or ice;

2) hoop nets or a long-handled dip net, approximately 1 m in diameter attached to a 2 m pole or similar to capture individual seals on shore or ice; 3) passive entanglement with sections of monofilament or nylon tangle nets; 4) remote sedation via sonic-tag equipped dart (adult and sub-adult bearded seals only); or 5) mechanical or radio-controlled closure of an access hole in the sea ice with a net or door, after a seal has surfaced in the hole or hauled out onto the surface nearby.

Beringia DPS bearded seals may be captured by tangle net or beach seine deployed from boats. For beach seines, a lead boat (e.g., 22 ft skiff with outboard motor) deploys the capture net in shallow water across as much of the seals' escape route as possible. The remaining boats, usually inflatable skiffs, are used to bring support personnel, the net, and any entangled seals ashore. In some situations the shoreline substrate does not allow pulling the net ashore (e.g. rocky reefs). In these areas, the net is left in place while the seals are disentangled and transferred first to hoop nets in the small boats and later to a larger support vessel or work area ashore for sampling. The capture net ranges in size depending on the application and environment (approximately 90 to 360 ft in length and 24 ft in depth), and the netting can be nylon, monofilament, or a variation of these, dyed green or shades of other colors, with a stretched mesh size of 12–13 in. A very lightweight lead line is used at the bottom of the net to allow entangled seals to reach the surface for breathing. The typical duration of time from initial set of the net to all seals disentangled is less than 30 minutes but could be longer when the number of entangled seals is large (> 15).

Arctic ringed seals and young Beringia DPS bearded seals that are hauled out on ice floes or on land, but in areas not suitable for a tangle net or beach seine because of shallow or uneven bottom topography, will be captured using large landing nets or hoop nets. Two to three small boats approach slowly from different directions to discourage alert seals from leaving and then captured on the ice or land with a large landing net.

To capture seals in the water using the passive entanglement method, researchers will deploy tangle nets in the water around terrestrial haulouts or ice floes. This differs from the beach seine method as the nets are left to hang in the water around the haulout or ice, allowing the seals to passively swim into the nets, instead of actively dragging nets around the seals. The exact size and dimensions of the nets used are dependent upon the species of interest and capture environment. The nets will be checked continually for seals that happen to become entangled as they swim through the area. When seals swim into the nets, researchers will immediately disentangle them, transfer them to hoop nets in the small boats, and then to a larger support vessel or work area ashore for sampling. Depending on a range of factors from weather to seal behavior to research schedule, the duration a passive tangle net is left in the water could be anywhere from 15 minutes to an hour. Nets will not be left unattended in the water.

Artic ringed seals occupy fast-ice habitats and their capture is managed by eliminating their ability to escape after surfacing in their breathing holes. Two previously developed approaches to capture ringed seals (Kelly 1996, Bengtson 2005) may be applied. The first uses a specially designed cinch-net, which is placed into a hole, where it is held in place on the underside of the

ice. When it is set under the ice, the net is open around the hole, so the seal can enter the hole to get to the ice surface. When seals swim through the net up to the breathing hole, they trigger a weight, which is attached to a purse line at the bottom of the net. When the weight is triggered, it drops, pulling the net down into the water and cinching the purse line, which closes the net around the seal. Seals can move freely in the water and up in the hole within the net. After a seal is trapped in the net, a radio alarm is sent to researchers waiting nearby. Researchers will immediately go to the hole, wait for the seal to surface, and pull the seal out by its flippers. Details about the design, size, mechanics, and deployment of these nets are described in Kelly (1996). As a precaution, nets and the holes will be checked periodically in case the radio alarm does not sound. However, this will be done minimally as seals are sensitive to disturbances and presence at the hole.

A second method involves nets placed under the ice and are open around the hole, allowing the seal to swim through and haul out on the ice. Researchers will use a helicopter, or a UAS if feasible, to survey the holes after nets are placed under the ice; if seals are hauled out on the ice, the net will be triggered by radio to close under the hole, trapping the seals on the surface of the ice. Researchers will land on the ice and pull the seal out of the hole for sampling (Bengtson et al. 2005).

3.2.2 Acoustic Playback

Acoustic playback devices may be used to further attract and entice Beringia DPS bearded seals to the capture nets (e.g., attaching a speaker to the net or deploying a speaker from the boat near the net). Playback will only consist of bearded seal vocalizations recorded from the capture region and playback source levels will be at or below expected levels for seals in the wild. Source levels will not exceed 158 dB. Playback sessions will not exceed 60 seconds in length, with a minimum of 30 seconds between sessions. Individual seals will not be exposed to more than 2 hours of playback within a 24 hour period. All playbacks will be underwater and source levels are expected to be lower than 158 dB at 1m. A playback will not start when an animal is within 1 meter of the source.

3.2.3 Remote Darting

Remote darting can improve targeting of specific individuals and enable easier handling of larger animals such as adult bearded seals. Up to 20 adult Beringia DPS bearded seals per year (Table 2) may be chemically immobilized via dart-delivered sedatives. Bearded seals will be darted while out of the water, resting on ice floes. Target seals will be weight-estimated and the location will be evaluated for safe and effective darting. All of the initial darting will be done by a veterinarian experienced in darting pinnipeds. Additional darters will only be approved if they have been trained by an experienced veterinarian.

To aid in tracking and recovery of sedated bearded seals that enter the water and swim away, researchers developed a remote sedation dart with an integrated acoustic transmitter that allows for tracking of a darted animal up to 1 km away (Frankfurter and Johnson).

Darts are fired aiming to deliver sedatives intramuscularly (IM) into the hips and tibia lumbar muscle or into muscle over the shoulders (Haulena and Heath 2001). Sedatives will be a combination of medetomidine (0.02 mg/kg, range 0.02–0.25 mg/kg) and midazolam (0.3 mg/kg, range 0.3–0.35 mg/kg). This dose allowed for hoop or seine net captures approximately 10–40 minutes post-injection in gray seals (Halichoerus grypus). The remote darts will be similar to a 3.0 ml Daninject or Pneu-Dart dart with a 1–2.5 inch barbed needle. The exact needle size used in combination with the dart package will be dependent upon the size and expected blubber thickness of the target animal. The darts will be fired from a Pneu-Dart Model 389 or similar cartridge fired projector that operates similar to standard rifle or, for example, a Pneu-Dart X-caliber CO2 fired projector. A custom tailpiece will be used to hold an acoustic transmitter. The transmitter will be similar to a VEMCO V9-1H continuous acoustic transmitter. The transmitter is approximately 9 mm in diameter by 24 mm in length, weighing 3.6 g in air and 2.2 g in water. Power output will be set no greater than 147 dB re 1uPa@1m. The transmitter will continuously transmit with a ping every 2 seconds at 69 khz.

Once darted, the seal is expected to enter the water and the immobilizing drugs will take approximately 12–15 minutes to reach peak levels. The drug combination induces a deep sedation that does not inhibit spontaneous respiration. The sedated seal should float on the surface and maintain respiration.

When the sedated animal is located (either visually or via the sonic tag), the animal will be initially observed for any obvious adverse reactions to the sedatives. If members of the research team or the veterinarian are concerned at any point that continued sedation or interaction with the animal would result in unexpected harm, remote administration of the reversal drugs will be attempted. Sedatives are reversed with an IM dose of atipamezole (0.15 mg/kg) and flumazenil (0.015 mg/kg). If the animal appears calm and is remaining at the surface, the team will slowly approach the animal in one or more boats and deploy a small seine or similar net to further secure the animal. Once the animal is secure, the team will transfer the animal from the water to a nearby stable ice floe. The dart will be removed by making a small incision around the needle with a scalpel in order to remove the needle and barbs. Handling and sampling protocols commence while the animal is sedated (see Handling and Sampling methods subsections). If any conditions with the environment or the seal suggest immediate release, sedatives can be reversed via intramuscular injection.

If a seal is darted but there is no apparent sedative effect after 15 minutes, it will be assumed that the dart did not discharge and based on previous applications with harbor seals, the dart it is expected to dislodge from the seal within 48 hours.

3.2.4 Handling and Restraint Methods

Once captured, sampling and instrumentation of each seal will commence immediately unless transport to a vessel or work location (less than 5 miles, usually less than 1 mile, and typically via small inflatable boats) is required. When transport is required, sampling will commence within 2 hours. Handling time, once at a vessel or safe work location (e.g., ice floe, beach, reef),

is typically 30 to 45 minutes for these procedures but may be as long as 6 hours if all authorized procedures are performed or additional holding or observation time is required after consultation with a veterinarian. Researchers will prioritize efforts to hold the animal for the minimal amount of time required and any increases beyond the time periods described will only be done in consultation with a veterinarian. When handling mother-pup pairs, if either seal becomes distressed and the PI/CI or veterinary staff decide it should be released, sampling will cease on both mother and pup and they will be released together.

Seals are intended to be restrained by physical means and the need for additional, chemical restraint depends on the species and individual seal behavior. To reduce animal stress and increase human safety, the default procedure will be to use some level of chemical restraint on all sub-adult and adult animals. The decision about whether to use chemical restraint is considered on a case by case basis. The decision will take into account such aspects as the health, behavior, and size of each individual seal. Veterinary (or veterinary technician) guidance will be used when determining drug dosages. When chemical restraint is used, the seal will be given an intravenous or muscular injection of sedative (typically diazepam or midazolam [0.1 – 0.4 mg/kg]; see Table 3). Sedatives will be administered by a licensed veterinarian or veterinary technician, or by research personnel who are supervised by, or who have been previously trained by a veterinarian or veterinary technician.

Sterile, disposable needles will be used for injections to prevent infection. One or more members of the field team will be responsible for monitoring the seal's respiratory behavior and other vital signs during restraint. Any member of the field team can call for a pause or halt in the sampling procedures if at any time he or she has a concern about the well-being of the seal. At this time, PI/CI or veterinary staff will determine if it is safe to continue with the procedures. If the seal develops complications associated with restraint and sampling, the veterinarian or trained researcher may administer drugs to reverse the anesthetic agents or counteract any adverse side effects (Table 4). The veterinarian or trained researcher will be prepared to perform endotracheal intubation and provide ventilatory assistance if a seal exhibits a prolonged period of apnea.

Table 3. Immobilizing agents for harbor seals and ice-associated seals. Route: IM=intramuscular; IV=intravenous; SC=subcutaneous.

Drug	Dosage (mg/kg)	Route Administered
Butorphanol	0.05 – 0.2	IV, IM
Diazepam	0.1 – 0.3	IV, IM
Ketamine	2.0 – 6.0	IV, IM
Medetomidine	0.03	IV, IM
Midazolam	0.15 – 0.4	IV, IM
Propofol	2.0 – 6.0	IV

Local anesthetic: Lidocaine (optionally, with sodium bicarbonate)	2.0 – 6.0	SC

Table 4. Drugs used for the reversal of sedative agents and anesthetic emergencies during capture and chemical restraint. IM=intramuscular; IV=intravenous; OM=oral mucosal; SC=subcutaneous.

Drug	Dosage (mg/kg)	Route Administered	Uses
Atipamezole	0.15	IV, IM	Reversal
Atropine	0.02 – 0.04	IV, IM	Bradycardia (reverse)
Doxapram	1.0 – 5.0	IV, IM, OM	Apnea (reverse)
Epinephrine	0.05 – 0.5	IV, IM, SC	Cardiovascular resuscitation; topical hemorrhage
Flumazenil	0.005 – 0.015	IV, IM	Benzodiazepine reversal
Naltrexone	0.1	IV, IM	Reversal
Prednisolone sodium succinate	5 – 10	IV, IM	Shock

3.2.5 Sampling Methods

The sampling procedures listed in Table 1 and Table 2 are described in greater detail in the following subsections. Sampling requested for authorization each permit-year includes 150 each of the Beringia DPS bearded seals and the Arctic ringed seals. In order to collect life history and population health data, seals will be: weighed, measured, sexed, assessed for status of molt, pregnancy, and lactation (when possible); and photographed during release to document pelage patterns and instrument placement. All seals that are handled will be sampled for genetics by taking 1 or 2 small clips or discs (1 cm or less in diameter) of hind-flipper skin. Skin snips will be collected with a sterile biopsy punch or with a stainless steel ear notcher and forceps. The ear notcher and forceps will be disinfected before use by soaking for at least 5 minutes in a disinfectant solution such as a hydrogen peroxide product (e.g., Rescue®), or a 70% alcohol solution. All seals that are sedated will be tagged with one Allflex, Temple, Dalton Supertag, or similar tag placed in the interdigital webbing of one rear flipper (details under Identifiable Numbered Tag).

Most seals will also have blood drawn and an instrument (typically a satellite tag) attached. All seals may also receive one or more of the following procedures: blubber and muscle biopsy, skin biopsy, serial blood draws, ultrasound; sampling of vibrissae, hair, and nails; nasal, rectal,

conjunctival, and urogenital swabs; fecal enemas; the attachment of additional external instruments (up to 3 in total); and the intraperitoneal implantation of up to two life history transmitters (LHX). Animals that are recaptured and resampled may receive all procedures a second time (except LHX deployment).

Morphometric measurements

All seals captured will be weighed with a hanging scale and a bipod or tripod if on land or ice, or with a crane if on a ship. A measuring tape will be used to measure lengths and girths in cm (e.g., standard length, curvilinear length, axillary girth, maximum girth, hip girth).

Blood sampling

Blood will be taken from all ages and both sexes of captured seals for health screening, physiological purposes, and diet studies. A minimum of 37 ml of serum, plasma, and red blood cells (roughly equivalent to 75 ml of whole blood depending on hematocrit) is needed to perform the following analyses: hematology (hematocrit, hemoglobin, specific gravity, plasma, and whole blood water content), clinical blood chemistry, fatty acid composition, metabolic chemistry, serology, virology assays, stable carbon and nitrogen isotope content, haptoglobin, stress hormone, sodium bromide concentration, serum iron content, domoic acid assay, growth hormone, and dietary bioindicators (e.g., trimethylamine-N-oxide [TMAO]). Any additional serum or plasma is archived for future retrospective analyses and sample requests made by other researchers. If less than 75 ml of whole blood is drawn, then a subset of these analyses are prioritized.

Two different accepted methods will be used to determine the amount of blood that can be safely collected during a single blood draw from marine mammals for research. First method uses the animal's body weight to calculate the amount of blood that can be taken; up to 1% of the animal's body weight can be safely taken at one time (Hoff 2000). If body weight in kilograms is used for the calculation, the volume result will be in liters (e.g, 15 kg animal; safely take 0.15 L or 150 ml of blood). A second method uses circulating blood volume (CBV) to calculate a safe amount of blood to be taken. A conservative estimate of CBV for phocid seals is 100 ml/kg, and 10–15% of that CBV can be safely taken at once (Diehl et al. 2001; Ponganis et al. 2011). Using the example of a 15 kg seal would have 1,500 ml of CBV, 10% of which would be 150 ml and 15% of which would be 225 ml; 150–225 ml of blood could be safely collected. The amount of blood needed for identified analysis and proper archival is expected be less than 100 ml of whole blood. Estimating the amount of blood to safely collect from marine mammals using body weight or circulating blood volume allows enough blood to be collected from all ages of animals for the various assays and tests needed to assess and monitor health and condition. Researchers will not exceed 1% of body weight or 10% of estimated CBV when collecting blood.

Samples will be drawn from the extradural intravertebral vein (Geraci and Smith 1975) or from a vein in the interdigital webbing of a hind flipper, using a 1 in, 2.5 in, or 3.5 in, 18 or 20 gauge spinal needle, and collected in various types of Vacutainer® blood tubes (e.g., heparinized,

ethylenediamine tetraacetic acid [EDTA], and serum), appropriate for the targeted analysis. Exact protocol details will be up to the discretion of the personnel performing the procedure, the PI/CI, or veterinarian/veterinary technician, following standard methodology for sampling blood from pinnipeds (Gulland et al. 2018). Before the blood sample is collected, the skin surface is cleaned and the injection site wiped with gauze soaked with Nolvasan® Surgical Scrub, alcohol, or iodine. Wiping the injection site will remove dirt, sand, feces, etc., which reduces the possibility of getting debris and bacteria into the skin when the needle is inserted and helps to prevent infection. Sterile, disposable needles will be used to collect blood.

Mucus membrane (e.g., nasal, rectal, conjunctival, urogenital) sampling

Any seal that is handled will have up to eight sterile swabs used to take two samples of each mucus membrane area for virology and bacteriology. Swabs will be placed in media appropriate to the analysis. These samples will be taken by research personnel who have been trained or instructed by a consulting veterinarian or veterinary technician or a trained PI or CI.

Fecal loops and enemas

Fecal loops and enemas are not a regular part of the collection protocols and will be performed on a case by case basis, as requested by collaborators or required for specific health related assessments. These samples will be taken by research personnel using appropriately sterile techniques who have been trained or instructed by a consulting veterinarian or veterinary technician or a trained PI or CI. The volume of water injected will be case and species dependent. In general, the amount used will be just enough until solid fecal material is presented.

Blubber biopsy

Biopsy sampling of blubber will be performed either by a veterinarian or veterinary technician, or by research personnel who are supervised by, or who have been previously trained by a veterinarian or veterinary technician. Biopsies will be collected for either fatty acid analysis or contaminant investigations. The consulting veterinarian or technician will determine the most suitable combination of physical restraint, sedation, and analgesics. An approximate 3 cm x 3 cm area on the posterior flank, will be shaved and cleaned with isopropyl alcohol, iodine, or Nolvasan® Surgical Scrub. Lidocaine (2.0–6.0 mg/kg) will be administered subcutaneously around the site as a local anesthetic. A single incision through the skin will be made for an appropriate sized (e.g., 6 mm) sterile, single-use biopsy punch. Researchers will collect up to two blubber cores (approximately 100–300 mg) down to the fascia, avoiding penetration of the muscle, but inadvertent collection of muscle tissue is possible (thus, muscle biopsy is listed in the take table procedures in the event that muscle tissues are inadvertently obtain). The blubber core will be transferred to a vial using forceps. At the discretion of the veterinarian or technician, the incision will be left to heal naturally or will be closed with a single loose absorbable suture and then sprayed with a topical antibiotic. The entire process takes approximately 4–5 minutes, primarily due to the time for the lidocaine to take effect.

Measuring blubber

Blubber volume and depth are determined non-invasively in the field by measuring blubber depth at sites along the body using a portable ultrasound unit (e.g., Edge® ultrasound machine, Sonosite, Inc.). Readings are taken by applying a water-soluble gel or alcohol and placing the transducer upon the skin. This is a non-invasive and rapid method long utilized in pinniped studies (Fedak and Anderson 1982; Gales and Burton 1987; Mellish et al. 2004). Ultrasonographic units that provide real-time image displays provide accurate measures of blubber depth (Mellish et al. 2004), and only require external application of an interface media (water, alcohol, or ultrasound gel). This ultrasonography will be performed by researchers trained in the use of the ultrasonographic equipment.

Whisker (vibrissae), hair, and nail collection

When seals are restrained, no more than two of the longest whiskers will be plucked using forceps or pliers. Vibrissae are typically analyzed for mercury concentration or used for stable isotope research on trophic relations and prey sources. Hair (1 g) will be collected using a razor or scissors and used for stable isotope and mercury concentration. Hair will also be collected from shedding seals undergoing their annual molt, simply by plucking tufts of hair with fingertips or forceps or combing the seal's coat. By collecting both molted hair and shaving existing hair, stable isotope and other chemical analyses can span different timelines (shaved hair for time since last molt, molted hair for previous molt year). In some cases, up to two nails may be clipped to provide additional, longer term time series data. Whisker pulling, hair collection, and nail clipping will be performed by members of the research team under supervision of the PI or one of the CIs.

Identifiable numbered tag

A single livestock ear tag (e.g., Allflex, Dalton) or similar will be attached to a rear flipper of all research animals that were sedated, unless animal health (e.g., flipper disfigurement, signs of previous injuries) would prohibit proper attachment. These tags are recommended for long-term use with phocids (Testa and Rothery 1992). A tag will not be placed on the same flipper as a satellite or VHF flipper-mounted transmitter. Each tag will have a unique identification number along with contact information for the program. When attaching both a numbered tag and a flipper-attached satellite transmitter, the numbered tag will be attached to interdigital webbing of the left flipper and the satellite transmitter to the interdigital webbing of the right flipper. If animal health issues prohibit proper attachment of both tags to the rear flippers, attachment of the satellite transmitter will take precedence. The tag will be applied using manufacturer specified applicators and, in some cases, a small punch may be taken from the flipper prior to application. This provides a genetic tissue sample and improves tag application efficiency. Tag applicators will be disinfected before and after they are used to attach a tag. The applicators will be soaked for at least 5 minutes, then wiped down with a disinfectant solution, such as a hydrogen peroxide product (e.g., Rescue®) or a 70% alcohol solution before they are used.

Scat, spew, shed skin, and urine collection

Scats (feces), spew, and shed skin will be collected from haul-out sites, either incidentally to seal captures or capture attempts, or deliberately. Urine will be collected only incidentally to seal captures when a portion of a voluntarily released stream of urine can be caught in a sampling vial or when urine can be collected from ice floes. In deliberate collection of scats, spew, or shed skin, scientists will approach either on foot, by small boat, or by floatplane (landing ¼ mile offshore and slowly taxiing toward the haul-out site). The number of any seals hauled out will be counted prior to approach. Once a count is obtained, the haul-out site will be approached slowly and in such a manner as to ensure an orderly and safe escape by the seals into the water. Mothers with dependent pups will deliberately not be disturbed solely for the collection of scats or shed skin. Deliberate collection in this context does not refer to deliberately collecting feces from seals with a fecal loop or other more invasive procedures.

Scats provide foraging ecology study data and provide a long-term dataset with which to compare current and historical trends in diet. Spew samples have only recently been used for seal diet analysis but provide important information on prey size (Gudmundson et al. 2006). Each permit-year approximately 500 or more samples may be collected from the ground during research. Scat collections will be conducted by members of the research team under supervision of the PI or one of the CIs.

Sampling for animals that have signs of disease

If an animal is captured and shows signs of disease, researchers will collect all the samples that are planned for healthy animals, plus some additional samples (e.g., blood, swabs, biopsies). Samples from animals with signs of disease will be used for additional testing for bacterial and viral pathogens, fungal agents, trace elements, and harmful algal blooms. Sampling methods will be the same as described previously. Samples that we will take from seals that have signs of disease include: two nasal swabs, two rectal swabs, all of the blood tubes that would normally be collected (these should include at least two serum tubes and two EDTA tubes), and opportunistic scat or urine. If skin lesions are present, two full-thickness skin biopsies will be taken from the edge of a lesion to collect both healthy and affected skin; two swabs from two lesions, and hair from two small areas near the lesions will also be collected. When possible, digital photographs will be taken to document sampling and observations.

Sampling of pups and attendant mothers

For certain projects, researchers will attempt to capture mother and pup pairs. Pups are young animals that are dependent upon the female for milk. To limit impacts during the first few days of birth, mother and pup pairs will not be targeted for capture if the presence of a very fresh birth site is noted and/or there are visible folds in the skin of the pup. If a fresh (often red or pink in color) umbilicus is present, release of the animals will be expedited and researchers will leave the area as soon as possible. For the ice-associated seal species (which includes Arctic ringed and Beringia DPS bearded) pups are easily identified by the presence of lanugo hair. When capturing

pups in the water or from land or ice, mothers will usually remain nearby and within visual contact. If the mother and pup are captured together, they will be kept in close proximity to each other while being sampled to reduce stress and help maintain the mother-pup bond. If other seals are captured at the same time, priority will be given to processing the mother-pup pair first. Mother and pup pairs will be, generally, sampled at the location which they are captured. In some situations, depending on local conditions (ice, weather, wave action, etc.), the adult female and pup may be transported to a nearby site for processing. In other situations, the pair may be transported to a nearby larger vessel, taken to the nearest land, or the pair will be processed in a smaller support boat near the capture site. Pups will not typically be sedated, whereas the mother's status will be assessed and sedation given as needed as described in the Handling and Restraint section. After sampling, the mother and pup will be released together in the same area or habitat where they were captured, such as on an ice floe or rocky outcrop. During the release, researchers will make adjustments to encourage the pair to establish visual, olfactory, and/or acoustic contact prior to release.

It is possible that during an attempt to capture a mother-pup pair, only the pup and not the adult (or, more rarely, the adult and not the pup) will be captured successfully. In these situations, researchers will conduct an abbreviated sampling protocol to minimize the time that the pup and female are separated. During the abbreviated protocol, pups will be weighed, morphometrics will be taken, and researchers will collect blood samples, skin snips, nasal swabs, whisker, hair/lanugo, and any other samples that meet research needs and can be taken efficiently. Researchers may attach transmitters to seal pups, as well. Sampling with pups will be conducted by the smallest number of researchers possible while other researchers maintain an appropriate distance away in order to minimize interaction with the mother or other adults in the water. Typical handling time in these situations is anticipated to be less than 30 minutes.

When sampling is finished, researchers will attempt to keep the pup on the ice floe or at the location on land where it was captured, and then move away from the area quickly and quietly so that the mother and pup can rejoin as soon as possible. If a mother is captured first, efforts will immediately focus on capturing the pup, which will typically remain in the area where the mother was captured. If the pup eludes capture, the mother will be released without sampling as near to her pup as possible.

3.2.6 Bio-logging studies

Data obtained from bio-loggers deployed on seals contribute to investigations of seasonal movements, diving behavior, habitat selection, foraging ecology, and population abundance. Pups (nursing animals), young-of-the-year (weaned animals), juveniles, or adults may be instrumented with one or more bio-logging devices (e.g., Argos/FastlocGPS-based devices, time-depth recorder [TDR], sonic transmitter, multi-axis accelerometer, implantable life history transmitter [LHX] tags), as described below. The general operating procedure is to deploy two bio-loggers. One capable of Argos (satellite) communication and FastGPS calculations with additional sensors and processing for haul-out and dive behavior and oceanographic

observations. These devices are attached externally with adhesive and are not expected to be recovered. A second bio-logger device is attached, typically to the interdigital webbing of a rear flipper with two mounting holes and screws. To save weight and minimize size, this device is Argos only (no FastGPS) and limited to collecting haul-out behavior data. Dependent on research needs and available technology, a third external device may be attached and up to two implantable devices (e.g. LHX2). Total weight of instruments used will not exceed 2% of the body weight of any animal in air.

The majority of bio-loggers will be externally attached devices of the type, or similar, to the Wildlife Computers (Redmond, WA) SPLASH/Mk10 or SPOT bio-loggers. Best practices will be followed when deciding how and when devices are attached for different species and age classes (Horning et al. 2019). The SPLASH/Mk10 or SPOT bio-loggers are configured for attachment to the hair with adhesive or to the rear flipper through holes punched in the interdigital webbing. Attaching with adhesive allows for a larger device with longer life and finer scale data collection. Adhesive attachment is limited by the annual molt cycle and may remain attached for up to 11 months.

The flipper-mounted bio-loggers are not lost during the annual molt, providing critical, multi-year data on large scale movement and haul-out behavior. Both the adhesive and flipper-mounted bio-loggers will collect data on the haul-out behavior. The default standard operating procedure will be to attach one of each device type to every animal, not exceeding 2% of the animal's body weight. The locations on the body could include the top of the head, nape of the neck, between the shoulder blades, any dorsal region of the body, and the interdigital webbing of the rear flippers. Devices will be placed in order to maximize quality research results while minimizing long-term pain and suffering practicable to the seal. Age, sex, molt, other morphometrics, and animal health also play a role in determining which bio-loggers or how many are deployed on an animal. The PI, or one of the CIs, ultimately makes this decision in consideration of the research objectives as well as the protocols approved by the Institutional Animal Care and Use Committee. Device deployment is also subject to availability of the technology.

A case by case decision must be made for those bio-loggers adhered to the hair, whether to place the device on the head, nape of the neck, or the back. Attachment of the bio-logger to the head is the preferred option given the increased probability of obtaining at sea locations and behavioral data. This is dependent on the size of the device relative to the size and shape of the individual seal's head. Attachment to the head can also pose safety risks for research personnel and potentially increase handling time. Devices will be attached to the head when appropriate (footprint of the tag and adhesive material is smaller than the top of the skull and does not impinge upon the area near the eyebrows or eyes) and the individual animal has a calm disposition or is chemically restrained. Alternatively, devices may be adhered to the nape of the neck or back.

Flipper-mounted bio-loggers are attached to the interdigital webbing on one of the rear flippers. These bio-loggers are designed specifically for deployment on pinnipeds and are attached by

passing and securing one or more posts through holes in the webbing. The holes are created with sterile, single-use biopsy punches (approximately 6–8 mm in width). No analgesic is administered because the pain associated with this procedure is expected to be slight and momentary. Flipper attached devices could remain in place for years (max deployment to date is over 800 days) or may be removed if the animal is re-captured.

Deployments of other bio-loggers (e.g., conductivity-temperature-depth [CTD] instruments, TDRs, and accelerometers) are part of long-term research goals and objectives, but deployment of them will be dependent on funding for the purchase. If remotely-releasable platforms (e.g. Wildlife Computers Payload Recovery) or other release mechanisms become suitably reliable, these devices we will employed to retrieve data from instruments that do not transmit data remotely.

Dimensions and weights for the various bio-loggers currently available and considered for use are in Table 5, the list is subject to change based on availability and the potential to employ new technologies as they are developed.

Table 5. Representative bio-logging devices that under consideration for deployments.

Manufacturer	Model	Dimensions	Mass In Air
Wildlife Computers	SPLASH10-F-297	86 x 55 x 29 mm	132 g
Wildlife Computers	SPOT6-325A, Flipper	80 x 20 x 20 mm	50 g
Wildlife Computers	TDR10-Daily Diary	56 x 38 x 42 mm	165 g
Wildlife Computers	SPOT275B	50 x 27 x 19 mm	35 g
Wildlife Computers	Payload Recovery	117 x 88 x 29 mm	327 g
SMRU Instrumentation	CTD SRDL GPS	105 x 70 x 40 mm	545 g
WHOI	DTAG-4	40 × 33 × 180 mm	206 g
Wildlife Computers	LHX2 (implanted)	100 x 33 x 33 mm	58 g
CATS	CATScam/custom	130 x 83 x 56 mm	500 g
Little Leonardo	ORI1300-3MPD3GT	83.5 x 17 x 17 mm	43

Satellite-linked bio-loggers

Satellite-linked bio-loggers will be attached to the hair of seals with a fast-setting epoxy (Fedak et al. 1983; Stewart et al. 1989) or similar adhesive (e.g., Loctite) or combination of adhesives. Recently, bio-loggers of this type have ranged in size from a CTD tag that measures 105 mm (L) x 70 mm (W) x 40 mm (H) (Sea Mammal Research Unit, St. Andrews, Scotland) to a flipper-mounted device measuring 80 mm (L) x 20 mm (W) x 20 mm (H) (SPOT6; Wildlife Computers,

Redmond, WA). The largest units will be attached only to larger seals, generally those weighing more than 40 kg; only smaller units will be attached to smaller seals.

Time-depth recorders

Time-depth recorders (TDRs) are archival bio-loggers (e.g., MK9, 67 mm x 17 mm x 17 mm, <30 g air weight; Wildlife Computers, Redmond, WA) that record depth and other sensor parameters at predetermined intervals (e.g., every 2 seconds) and whether the animal is wet or dry. These units must be retrieved to obtain the data. Given the low likelihood of re-capturing individuals, the approach to instrument recovery involves the use of vacuum-pressed flotation material along with a small VHF transmitter to enable locating and retrieving the instrument once it is shed from the seal during the annual molt. The flotation package is hydrodynamically shaped to reduce drag. TDRs will be attached to the hair on the backs of seals using fast-setting epoxy or similar adhesives.

Acoustic recording bio-loggers

Acoustic recording bio-loggers (e.g., DTAG-4, Woods Hole Oceanographic Institution, Woods Hole, MA) will be used to record the sound exposure of free-ranging seals. These bio-loggers must be recovered for data to be downloaded. Deployments will use a remote-release device and flotation pack. Because of the additional size for a release mechanism (not to exceed 2% of body weight), the attachment location would be on the back of the seal.

VHF radio transmitters

Some seals may also be instrumented with small (2 cm x 2.5 cm x 5 cm) VHF radio transmitters attached to a flipper tag (Huber 1995) or glued to the hair with fast-setting epoxy (Fedak et al. 1983).

Accelerometers

Accelerometers provide information on acceleration in two or three axes. Accelerometers, in conjunction with dive recorders, can provide three-dimensional dive profiles and other fine-scale behavioral insights. Some accelerometers are incorporated with other bio-loggers. Dependent on research objectives, standalone devices may be preferred (e.g. Little Leonardo ORI1300-3MPD3GT). Recent miniaturization of accelerometers allows researchers to attach them to the mandible or head of marine animals to record signals related to foraging success and behavior (Laich et al. 2008; Shepard et al. 2008). Deployment of accelerometers and placement on the seal will be dependent upon the research question and specifications of the instrument but could include the head, jaw, and back (between shoulder blades).

Life history transmitter tags

Life history transmitter (LHX or LHX2) tags are used to quantify natality, survival, and causes of mortality including predation. They are also used to determine seasonal and age-related distributions of causes of individual mortality. These tags are surgically implanted in an animal's abdominal cavity and provide data when they emerge at the end of the animal's life. Up to 2

LHX2 tags will be implanted into 20 seals per year of all age classes excluding dependent pups of each species. In the unlikely situation where near-term pregnant females are captured (rare given typical timing of capture efforts), LHX surgeries will not be performed. Data is reliant on a tag reliably transmitting upon release from the carcass. A key assumption is that any tag not transmitting indicates the host seal is still alive. Release of an animal with two tags significantly minimizes the possibility a seal dies and no transmission is received. First generation LHX transmitters measure approximately 130 mm in length, 43 mm in diameter and have a mass of 112 g in air. The LHX2, second generation transmitters, measure approximately 100 mm in length, 33 mm in diameter and have a mass of 58 g in air.

Surgeries will be performed under standard, aseptic conditions, on a research vessel, inside a portable surgical room. All surgeries will be conducted under isoflurane inhalant gas anesthesia by qualified veterinarians. At no time will any procedures be conducted without the presence and direct oversight of a veterinarian with surgical experience. The surgical site will be cleaned and prepared with a surgical drape. The transmitters will be gas-sterilized utilizing ethylene oxide (EO) gas in suitable packaging permeable to gas but not to bacteria. Gas sterilized transmitters will be allowed to outgas for a period of 24 hours before implantation. Surgical instruments and moisture barrier surgical drapes will be purchased pre-sterilized or thoroughly washed, dried, packaged, and sterilized in an autoclave or using EO gas.

The animal will be positioned securely on a surgical table in dorsal recumbency. Anesthesia will be monitored by use of a respiratory or cardiac monitor. The surgical site will be between the caudal sternum manubrium and the pubic bones, palpated through the abdominal wall. An area approximately 12–15 cm long and 4–6 cm on either side of the midline will be shaved. The skin will be repeatedly scrubbed with alcohol (90% isopropyl) alternated with povidone iodine on clean gauze sponges. A nonporous sterile fenestrated drape will be placed over the surgical site and held with towel clamps.

The skin will be incised along the ventral midline, and the subcutaneous layer and blubber will be sharp dissected. The linea alba will be lifted with forceps to permit penetration of the abdominal wall with a scalpel blade. The linea alba is then sharp dissected with a scalpel blade or scissors, avoiding the viscera, to a length sufficient to insert the transmitter body (approximately 7–9 cm). The incision will be extended with sharp dissection through the subcutaneous and blubber layers and through the superficial layer of the lumbodorsal fascia.

When the muscular abdominal wall (transverse abdominal muscle) is reached, the fascial layer will be incised parallel to the muscle fibers for 1 to 2 cm and then blunt dissection will be used to enlarge the opening through the muscle and peritoneal layers to insert the transmitter. The abdominal wall will be held on either side of the incision with tissue hooks then lifted up and laterally while the transmitter (or both, if two are used) is inserted through the incision into the abdominal cavity; alternatively, a tapered trochar will be used to dilate the peritoneal opening and insert the transmitter. Bleeding will be controlled with hemostatic forceps and ligatures of absorbable monofilament suture (size #2-0), or with electrocautery.

The surgical incision will be closed in layers using absorbable sutures in a simple interrupted or mattress pattern. The skin will be closed using a subcuticular pattern of absorbable suture and over sewn with a simple interrupted pattern of non-absorbable suture on a reverse cutting needle. Oxygen supplementation will continue until the animal recovers sufficiently to allow removal of the endotracheal tube.

No LHX tag implant procedures on Steller sea lions, California sea lions (Zalophus californianus), and harbor seals to date have included prophylactic antibiotic treatment. As such, a similar protocol will be followed for LHX2 implants in seals under this permit and prophylactic antibiotics will not be routinely administered; an exception would be if it were determined to be warranted under evaluation and direction from an onsite veterinarian. Similar to protocols approved for Hawaiian monk seals (Neomonachus schauinslandi), after determination by a veterinarian, a long-term antibiotic such as Ceftiofur (brand name: Excede) may be administered.

Animals will be monitored for a minimum of two hours following cessation of isoflurane administration. Individuals will be maintained in clean, dry capture boxes or larger transport boxes during the recovery period. Seals will be released at the discretion of the PI and attending veterinarian, providing that they meet the following criteria:

1. They have recovered from anesthetic. The animal is alert, responsive to stimuli, and ambulatory;

2. There is no evidence of bleeding from the surgical site; and,

3. Available internal temperature readings (from hand-held reception of LHX tag) are within one degree Celsius of the established post-surgical range for pinnipeds (e.g., within 95.0–102.6 °F / 35.0–39.2 °C; post-surgical temperature range for pinnipeds was established from (Horning and Mellish 2014).

3.3 Unintentional Mortality

Although no mortalities or serious injuries are expected based on past efforts and continued improvements and modifications to protocols to mitigate mortalities, some risks are associated with the research activities, and unintentional mortality or serious injury could occur. The use of tangle nets poses a risk of potentially restricting a seal from reaching the surface to breathe, leading to a possibility of drowning. Serious injury or mortality could occur during handling or after release from effects of stress, adverse reaction to drugs, infection (from sampling, tagging, or surgery), complications from a pre-existing condition, or abandonment of dependent young.

Authorization is requested for the unintentional mortality or serious injury of up to five seals per year each species, including Arctic ringed seals and Beringia DPS bearded seals, not to exceed 15 mortalities per species over the duration of the permit.

In the event that a female dies or is seriously injured during activities that involve capture with their dependent pups, researchers will make all attempts to humanely provide for the orphaned

pup. Researchers will consult with the National Marine Fisheries Service Alaska Regional Office regarding potential transport to a captive rehabilitation facility. Phocid pups are precocial and may have a reasonable chance of survival at only a few weeks old. In consultation with the PI and a veterinarian under these situations, the pup may be released. In more unfortunate situations (e.g., pup less than a week old and in location where rehabilitation is not feasible), the humane course of action would be euthanasia.

The decision to euthanize an animal will not be made without close consultation with a veterinarian or veterinary technician and such actions will only occur in situations to avoid undue suffering and pain for the animal. In the extreme circumstances that an animal presents either life-threatening injuries, or is in a moribund state, the attending veterinarian may determine that euthanasia is the most humane option for the animal. Depending on the medical status of the animal, a sedative such as midazolam (0.3–0.4 mg/kg IM) or Telazol (2–4 mg/kg IM) may be administered to render the animal unconscious prior to administration of pentobarbital (1 mL per 10 lb of body weight administered via an intramuscular or intracardiac route). The attending veterinarian will confirm death. In rare instances if mechanical cardiac activity remains a second dose of pentobarbital may be administered to ensure successful euthanasia. If appropriate drugs are not available, or to avoid concerns regarding disposal of the carcass, an appropriate caliber gunshot to the back of the cranium will be administered by an experienced individual.

If a mortality occurs, tissues will be sampled for histopathology along with examination or collection of gastrointestinal and reproductive tracts. The carcass will be disposed of at sea unless it has significant value for research or education, in which case it will be retained for transfer to an appropriate museum collection. If the animal was euthanized with pentobarbital, the carcass will not be disposed of at sea and, instead, preserved and transported back to the Marine Mammal Laboratory or other appropriate institution. Drugs such as pentobarbital could adversely affect wildlife scavengers, including birds and carnivorous mammals if the carcass is not disposed of properly (AVMA 2020).

3.4 Import, Export, Receive Samples

The Permits Division proposes the authorization of the import/export and receipt of biological samples by the researchers to maintain international collaborations that advance the conservation and management of these species. Each seal species has a range that spans international boundaries and collaborative research efforts occur with international partners, e.g., Russia and Canada. Some disease and health screenings are conducted at laboratories outside of the United States and require export of samples. Import and export authority is being requested for all types of samples collected under this research permit to any country.

3.5 Conservation Measures

The Permits Division's proposed authorization requires mitigation measures to minimize potential adverse effects of the proposed research activities; these measures are included as conditions in Permit No. 23858 (see Appendix for the complete permit text). The Permits

Division requires the qualifications of individuals conducting the research and enhancement activities under the proposed scientific research permit are commensurate with their roles and responsibilities. The investigators authorized to conduct the research and enhancement should be able to handle the animals effectively to reduce impacts and recognize adverse responses and cease or modify their research and enhancement activities accordingly.

Measures to minimize effects are also included in the MML's permit applications. The list that follows summarizes those measures and they are considered for the Exposure and Response Analysis (Section 9.2) portion of this opinion. All of the procedures proposed by the MML for capturing, handling, and sampling of animals are reviewed and approved by the NOAA Fisheries Alaska/Northwest Science Centers' Institutional Animal Care and Use Committee. The MML proposes to use techniques that they have employed for many years in carrying out pinniped research.

Measures identified by the MML to minimize potential adverse effects of the proposed research including the following:
• Conducting all surgeries under isoflurane inhalant gas anesthesia, using sterilized equipment by qualified veterinarians;
• Monitoring will include visual observations and short-range transmission of body core temperature from LHX implants to nearby receivers (<30 m), for any temperature deviations due to anesthesia-related hypothermia or elevations associated with acute inflammatory responses;
• Minimizing any impacts of potential disturbance from UAS by focusing the photogrammetry effort on individual or small groups;
• Conducting aerial surveys at the highest possible altitude that allows for effective species, age, and sex classification to minimize potential disturbance to female-pup pairs;
• Not exceeding 2% of the animal's body weight for all external instruments combined, and attaching no more than three external devices on an individual seal;
• Releasing pups with a visible umbilicus immediately and not sampling them if captured;
• Using an abbreviated sampling protocol when working in the pack ice and a pup is captured without its mother to minimize the time that the mother and pup are separated;
• Using sterile, disposable needles, biopsy punches, and swabs during blood sampling and tagging procedures;
• Cleaning the sampling site on an animal with disinfectant before any blood collection or tagging;
• Carrying several veterinarian-approved drugs to reduce bleeding, if necessary.

4 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).

Research activities may occur throughout the North Pacific Ocean (including the Bering Sea), Arctic Ocean (including the Chukchi and Beaufort seas), and all coastal and offshore regions of

Alaska. Study locations include all areas within the Alaska Exclusive Economic Zone (EEZ) where the following seals may occur: harbor seals (Figure 1), Beringia DPS bearded seals (Figure 2), Arctic ringed seals (Figure 3), spotted seals (Figure 4), and ribbon seals (Figure 5).

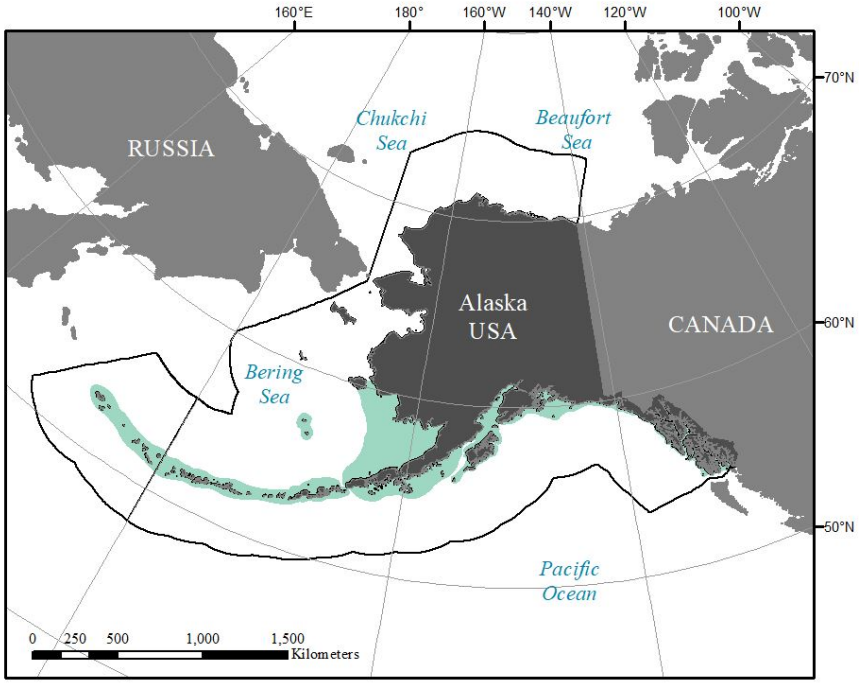


Figure 1. Approximate extent of harbor seals in Alaska waters (green shaded area). Solid black line delineates the boundary of the Alaska EEZ. Study locations include all areas where harbor seals may occur within the Alaska EEZ.

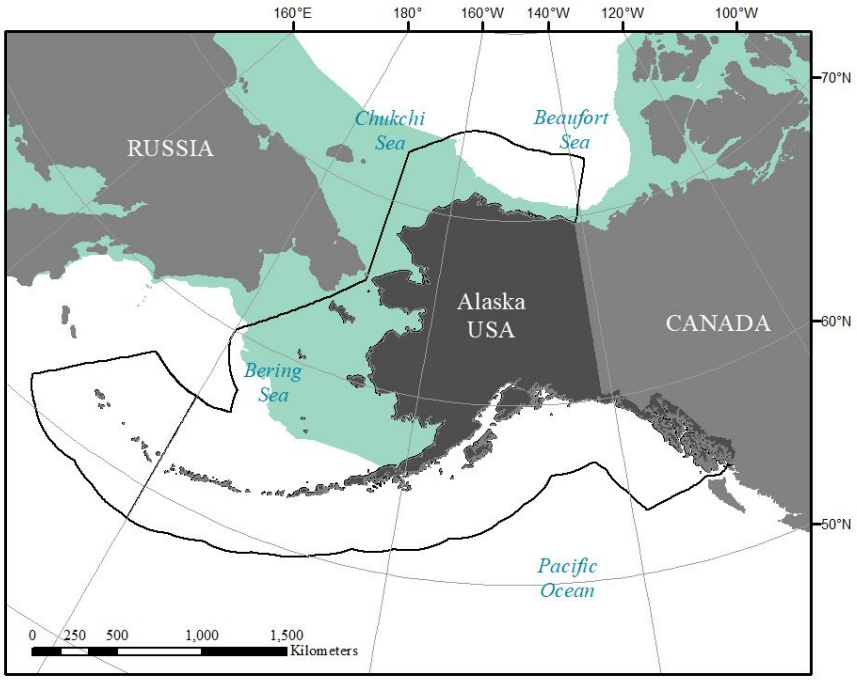


Figure 2. Approximate distribution of the Beringia distinct population segment of bearded seals (green shaded area). Solid black line delineates the boundary of the Alaska EEZ. Study locations include all areas where bearded seals may occur within the Alaska EEZ.

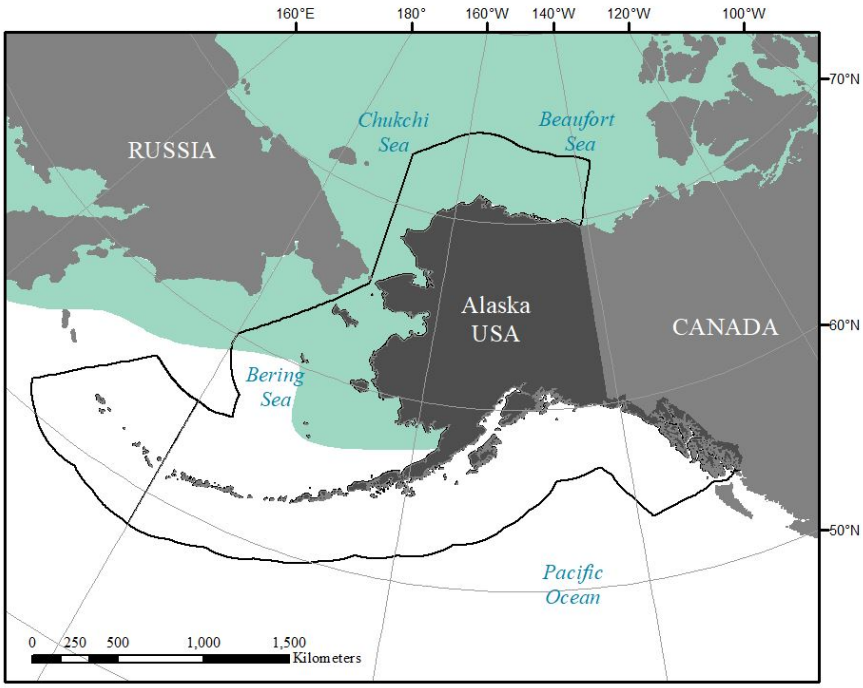


Figure 3. Approximate winter distribution of ringed seals (green shaded area). Solid black line delineates the boundary of the Alaska EEZ. Study locations include all areas where ringed seals may occur within the Alaska EEZ.

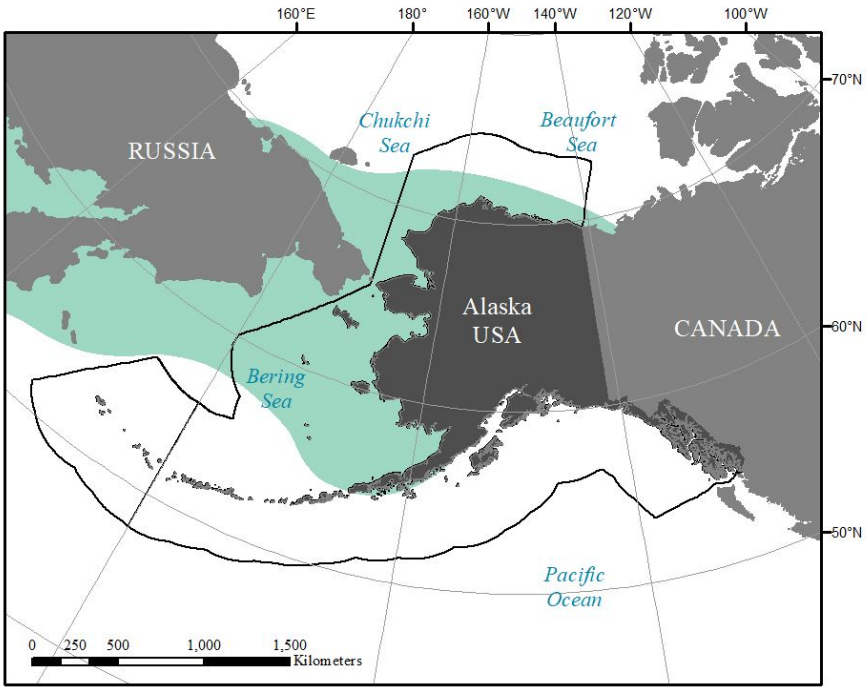


Figure 4. Approximate distribution of the Bering distinct population segment of spotted seals (green shaded area). Solid black line delineates the boundary of the Alaska EEZ. Study locations include all areas where spotted seals may occur within the Alaska EEZ.

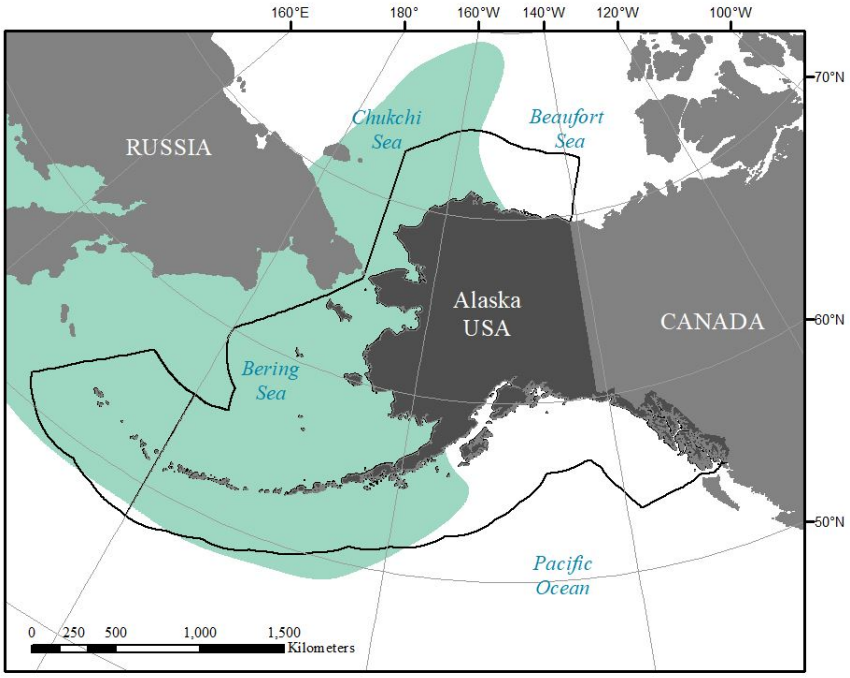


Figure 5. Approximate combined summer and winter distribution of ribbon seals (green shaded area). Solid black line delineates the boundary of the Alaska EEZ. Study locations include all areas where ribbon seals may occur within the Alaska EEZ.

5 ENDANGERED SPECIES ACT RESOURCES THAT MAY BE AFFECTED

The proposed research permit would authorize approaches for aerial surveys, ground sampling activities, capture and handling for biological sampling and application of telemetry devices, and unintentional mortality associated with captures. These activities would have the greatest potential impact for the targeted seal research subjects but could also result in stress to other animals that happen to be in the vicinity of active research operations. The ESA-listed species and designated or proposed critical habitat in Table 6 are under NMFS jurisdiction that may occur within the action area that may be affected by the proposed action. Critical habitat for the leatherback turtle does not occur in the action area, those designated areas occur along the coast of California, Oregon, Washington, and St. Croix in US Virgin Islands.

Table 6. Endangered Species Act-listed threatened and endangered species and critical habitat potentially occurring in the action area that may be affected.

Species	ESA Status	Critical Habitat	Recovery Plan
Sea Turtles			
Leatherback Turtle (*Dermochelys coriacea*)	E – 35 FR 8491	44 FR 17710 and 77 FR 4170 [1]	63 FR 28359 05/1998 – U.S. Pacific
Marine Mammals – Cetaceans			
Beluga Whale (*Delphinapterus leucas*) – Cook Inlet DPS	E – 73 FR 62919	76 FR 20179	82 FR 1325
Blue Whale (*Balaenoptera musculus)*	E – 35 FR 18319	-- --	07/1998
Bowhead Whale (*Balaena mysticetus*)	E – 35 FR 18319	-- --	-- --
Fin Whale (*Balaenoptera physalus)*	E – 35 FR 18319	-- --	07/2010 75 FR 47538
Gray Whale (*Eschrichtius robustus*) Western North Pacific Population	E – 35 FR 18319	-- --	-- --
Humpback Whale (*Megaptera novaeangliae*) – Mexico DPS	T – 81 FR 62259	84 FR 54354 (Proposed)	11/1991
Humpback Whale (*Megaptera novaeangliae*) – Western North Pacific DPS	E – 81 FR 62259	84 FR 54354 (Proposed)	11/1991
North Pacific Right Whale (*Eubalaena japonica*)	E – 73 FR 12024	73 FR 19000	78 FR 34347 06/2013
Sei Whale (*Balaenoptera borealis*)	E – 35 FR 18319	-- --	12/2011 76 FR 43985
Sperm Whale (*Physeter macrocephalus*)	E – 35 FR 18319	-- --	12/2010 75 FR 81584
Pinnipeds			
Bearded Seal (*Erignathus barbatus*) – Beringia DPS	T – 77 FR 76739	-- --	-- --
Ringed Seal (*Phoca hispida hispida*) – Arctic subspecies	T – 77 FR 76706	79 FR 73010 (Proposed)	
Steller Sea Lion (*Eumetopias jubatus*) – Western DPS	E – 55 FR 49204	58 FR 45269	73 FR 11872 2008

E=Endangered, T=Threatened, DPS=Distinct Population Segment

[1] Designated leatherback turtle critical habitat is not in the action area.

6 SPECIES AND CRITICAL HABITAT NOT LIKELY TO BE ADVERSELY AFFECTED

This section identifies the ESA-listed species as well as their proposed or designated critical habitat that may be affected, but are not likely to be adversely affected by the proposed action.

NMFS uses two criteria to identify the ESA-listed species or critical habitat that are not likely to be adversely affected by the 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, designated or proposed critical habitat. If we conclude that an ESA-listed species, designated or proposed 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, designated or proposed critical habitat that co-occurs with a potential stressor but is not likely respond to the stressor is also not likely to be adversely affected by the proposed action. These criteria were applied to the ESA-listed species in Table 2 and we summarize our results below.

The probability of an effect on a species, designated or proposed critical habitat is a function of exposure intensity and susceptibility of a species or habitat to a stressor's effects (i.e., probability of response). An action warrants a "may affect, not likely to be adversely affected" finding when its effects are wholly beneficial, insignificant, or extremely unlikely to occur. Beneficial effects have an immediate positive effect without any adverse effects to the species or habitat. Insignificant effects relate to the size or severity of the impact and include 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, such as harm or harassment. For effects that are extremely unlikely to occur, 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 affect a listed species or habitat), but the probability of this effect occurring is extremely low.

6.1 Leatherback Sea Turtle

Documented encounters of leatherback sea turtles in the north Pacific go up to the Aleutian Islands (NMFS and USFWS 1998), although reports of leatherbacks in Alaskan waters are very rare; only 19 leatherbacks have been reported in Alaska between 1960 and 2007.[1] Leatherback sea turtles are not expected to occur in the northern reaches of the Bering Sea, or in the Arctic Ocean (including the Chukchi and Beaufort seas).

Aerial surveys and capture related research activities are targeted on specific species of seals that would typically be hauled out on the shore or on ice, leatherback sea turtles would not be

[1] Alaska Dept of Fish and Game. http://www.adfg.alaska.gov/index.cfm?adfg=leatherbackseaturtle.main#:~:text=19%20leatherbacks%20have%20been%20reported,time%20in%20the%20open%20ocean. Accessed on 7/20/20.

expected to be in close proximity of the research targets. If any leatherback sea turtles were in the open waters near a seal haul that is targeted for research activities, exposures to the vessel, aircraft, or field team would be brief and not expected to significantly disrupt the normal behavioral patterns of the leatherback sea turtles. The likelihood of leatherback sea turtles being exposed to the proposed research activities is very low and any exposures would only be expected to result in minor, short-term responses. We concur with the Permits Division that the proposed action may affect, but is not likely to adversely affect leatherback sea turtles.

6.2 Endangered Species Act-Listed Mammals

The proposed action area overlaps with ESA-listed mammal species that are not research targets, such as the Western DPS of Steller sea lion, and several cetaceans including the: Cook Inlet DPS of beluga whale, blue whale, bowhead whale, fin whale, the Western North Pacific DPS of gray whale; the Mexico DPS and Western North Pacific DPS of humpback whale, North Pacific right whale, sei whale, and sperm whale.

The Permits Division proposes authorization of seal research activities that includes aerial surveys. During aerial surveys, manned aircraft will be required to fly at a minimum altitude of 400 feet and UAS will be required to fly at a minimum altitude of 150 feet. Aerial surveys will avoid flying over non-target species by altering their course or increasing their altitude to minimize the potential for disturbance. Any incidental noise or visual disturbance associated with the aerial surveys would be extremely brief in duration and not expected to significantly disrupt the normal behavioral patterns of these ESA-listed mammals. Any effects associated with aerial surveys are only expected to be minor, short-term responses, and not expected to rise to the level of harassment.

The Permits Division proposes authorization of research activities that includes sampling after active captures of seals requiring the use of small vessels and nets. All of the non-target mammal species are typically not found in close proximity to any of the targeted seal species. Additionally, the non-targeted species are conspicuous and the research personnel have experience identifying these protected species in Alaskan waters, so they are expected to avoid these species. If encountered, researchers will follow general guidelines for marine mammal observations and make every effort to minimize disturbance.

Research teams would utilize small vessels (e.g. 22 foot skiff) to slowly approach sites targeted for captures of seals and collect samples. Any disturbance from vessel operations associated with surveys to the ESA-listed cetaceans or Western DPS Steller sea lions is expected to be momentary and not expected to significantly disrupt the normal behavioral patterns, therefore, not rising to the level of harassment.

Beach seine nets are proposed for use to capture seals as they enter the water, they will set up immediately prior to that and handling procedures will then commence. The time that seine net is deployed is relatively short and focused on the targeted seal species site. The duration a passive tangle net is left in the water could be anywhere from 15 minutes to an hour. Nets will not be left

unattended in the water. Nets designed for Arctic ringed seal breathing holes, such as a cinch-net, will have triggers and radio alarms. Breathing holes will be surveyed prior to deployment and then periodically checked as a precaution. Given the small targeted areas, short deployment durations and monitoring precautions, the probability of adverse effects to non-targeted ESA-listed mammals is extremely low.

Acoustic playback devices that may be used to attract Beringia DPS bearded seals to the capture nets will only consist of bearded seal vocalizations recorded from the capture region. Proposed source levels will not exceed 158 dB at 1m and playback will not start when an animal is within 1 meter of the source. That source level is lower than what is used by the Permits Division as an acoustic threshold for harassment of marine mammals (160 dB re: 1 µPa rms). The playback will be at or below expected levels for seals in the wild, therefore not expected to have any adverse effects for the ESA-listed mammals.

We concur with the Permits Division that exposure to the proposed research activities, such as approach of survey aircraft, vessel and capture operations, are not likely to adversely affect Western DPS Steller sea lions or any of the cetaceans considered in this opinion.

6.3 Designated and Proposed Critical Habitat Not Likely to be Adversely Affected

As noted in the action area (Section 4), research activities proposed for authorization may occur throughout the areas of the Bering Sea, Chukchi Sea, Beaufort Sea, and all coastal and offshore regions of Alaska. This broad area contains designated critical habitat for the Western DPS of Steller sea lions, the Cook Inlet DPS of beluga whales, and North Pacific right whales. This broad area also contains proposed critical habitat for the Mexico DPS and Western North Pacific DPS of humpback whales, and for the Arctic subspecies of ringed seals.

In general, the proposed activities are not expected to alter the physical or biological environment. More specific features of the critical habitats are considered in the subsequent subsections.

6.3.1 Steller Sea Lion – Western DPS

Critical habitat designated for the Steller sea lion includes specific rookeries, haulouts, and associated areas, as well as three foraging areas that are considered to be essential for health, continued survival, and recovery of the species (Figure 6).

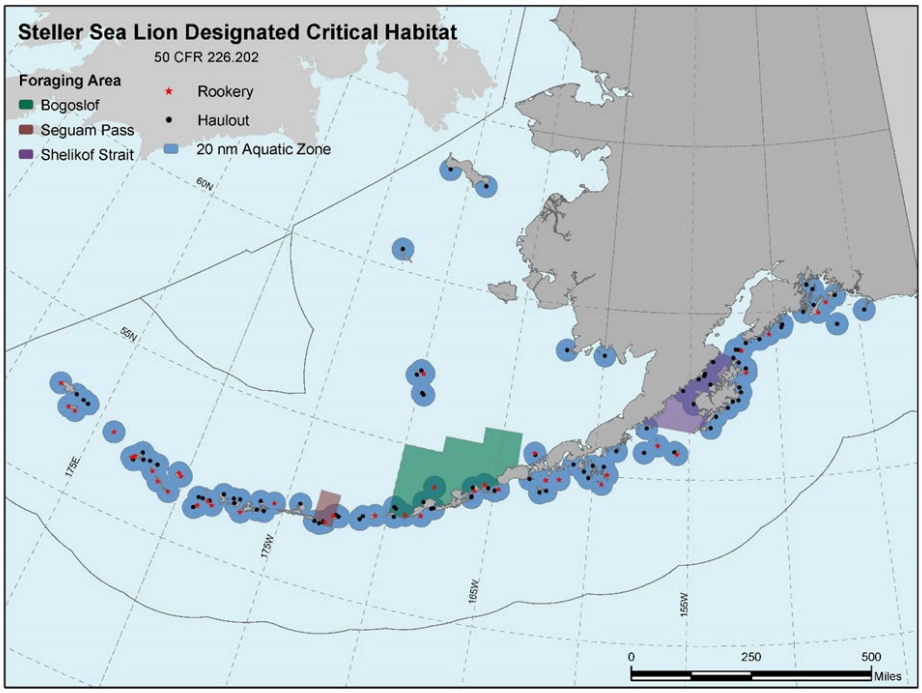


Figure 6. Map depicting designated critical habitat in Alaska for the Western distinct population segment Steller sea lion.

Designated critical habitat in Alaska includes terrestrial, air, and aquatic zones associated with the major Steller sea lion rookeries and major haulouts. No research is anticipated to occur on Steller sea lion rookeries. Associated terrestrial, aerial, and aquatic zones may overlap with the proposed research related activities, any interactions would be brief and transitory. The physical and biological features identified for the aquatic areas of Steller sea lion designated critical habitat that occur within the action area are those that support foraging, such as adequate prey resources and available foraging habitat. Research activities are not expected to impact the availability of prey species or the ability of Steller sea lions to access these prey species. Proposed research activities may affect, but are not likely to adversely affect critical habitat designated for the Steller sea lion.

6.3.2 Beluga whale - Cook Inlet DPS

Designated critical habitat for the Cook Inlet DPS beluga whale includes two areas in Cook Inlet (Figure 7). Area 1 contains shallow tidal flats, river mouths or estuarine areas and is important as foraging and calving habitats. Area 2 includes near and offshore areas of the mid and upper Inlet, and nearshore areas of the lower Inlet.

The physical and biological features essential to the conservation of Cook Inlet beluga whales found in these areas include: (1) intertidal and subtidal waters with depths less than 30 feet (mean lower low water) and within five miles of high and medium flow 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.

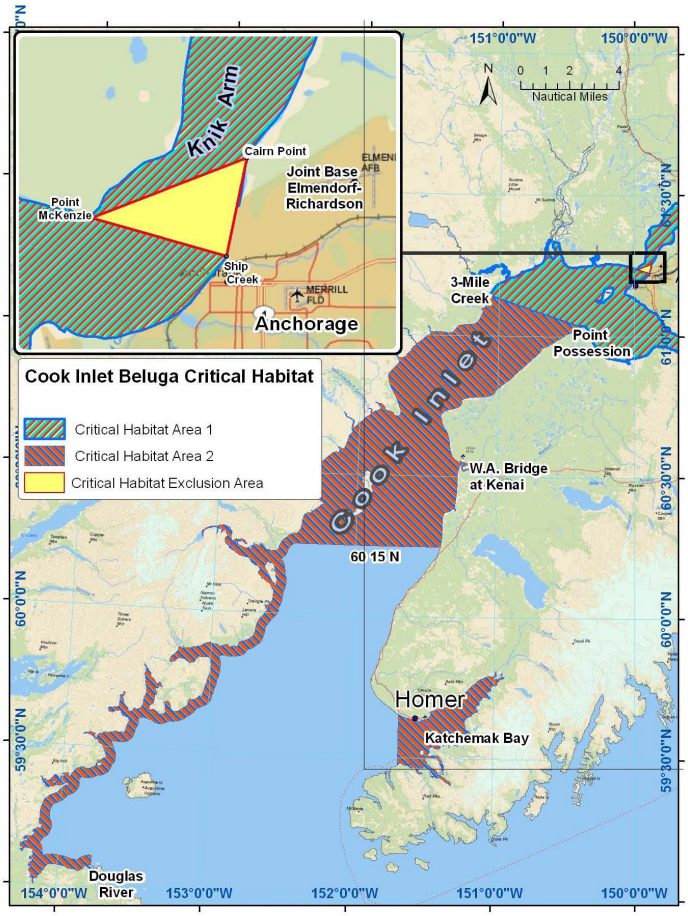
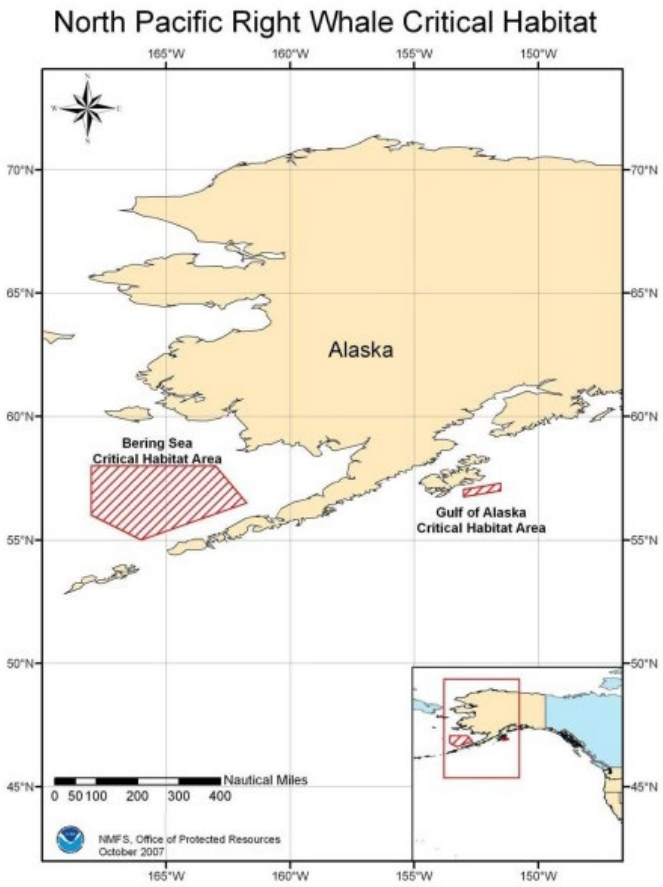


Figure 7. Designated Critical Habitat Areas for Cook Inlet DPS Beluga Whale.

Research activities proposed for authorization could potentially overlap with some portions of the Cook Inlet DPS beluga whale. Any interactions with the areas or features would be brief and there would be no impacts expected to prey species or danger of harmful toxin exposures. The greatest source of noise during research activities that could be conducted in Cook Inlet would be from the vessel or possibly from survey aircraft. Research vessels would not be larger than most vessels that already transit Cook Inlet, therefore not adding greater noise levels, as there are several developed areas on the surrounding shores; including Anchorage, Alaska's largest city.

Research aircraft would also not be expected to be add any significant amount of noise as there are several active airfields adjacent to Cook Inlet. The proposed action may affect but is not likely to adversely affect the designated critical habitat for the Cook Inlet DPS beluga whale.

6.3.3 North Pacific right whale



Designated critical habitat for the North Pacific right whale includes an area in the Southeast Bering Sea and an area south of Kodiak Island in the Gulf of Alaska (Figure 7). The designated areas are influenced by large eddies, submarine canyons, or frontal zones which enhance nutrient exchange and act to concentrate high densities of zooplankton such as copepods and euphausiids that serve as prey species for North Pacific right whale. Proposed research activities are not expected to occur in these designated critical habitat areas and will not affect the abundance or distribution of the prey species. Therefore, the proposed action will have no effect on North Pacific right whale critical habitat.

Figure 8. 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.

6.3.4 Humpback whale - Mexico DPS and Western North Pacific DPS

On October 9, 2019, NMFS proposed critical habitat for three distinct population segments of humpback whale: Central America, Mexico, and Western North Pacific DPSs. The proposed critical habitat for the Central America DPS is off the coasts of Washington, Oregon, and California, which are not a part of the action area and therefore will not be considered here.

The proposed critical habitat for the Mexico DPS includes marine waters in Washington, Oregon, California, and a portion in southeast Alaska (Figure 9). All of the proposed critical habitat for the Western North Pacific DPS is in waters near the Alaskan peninsula (Figure 10).

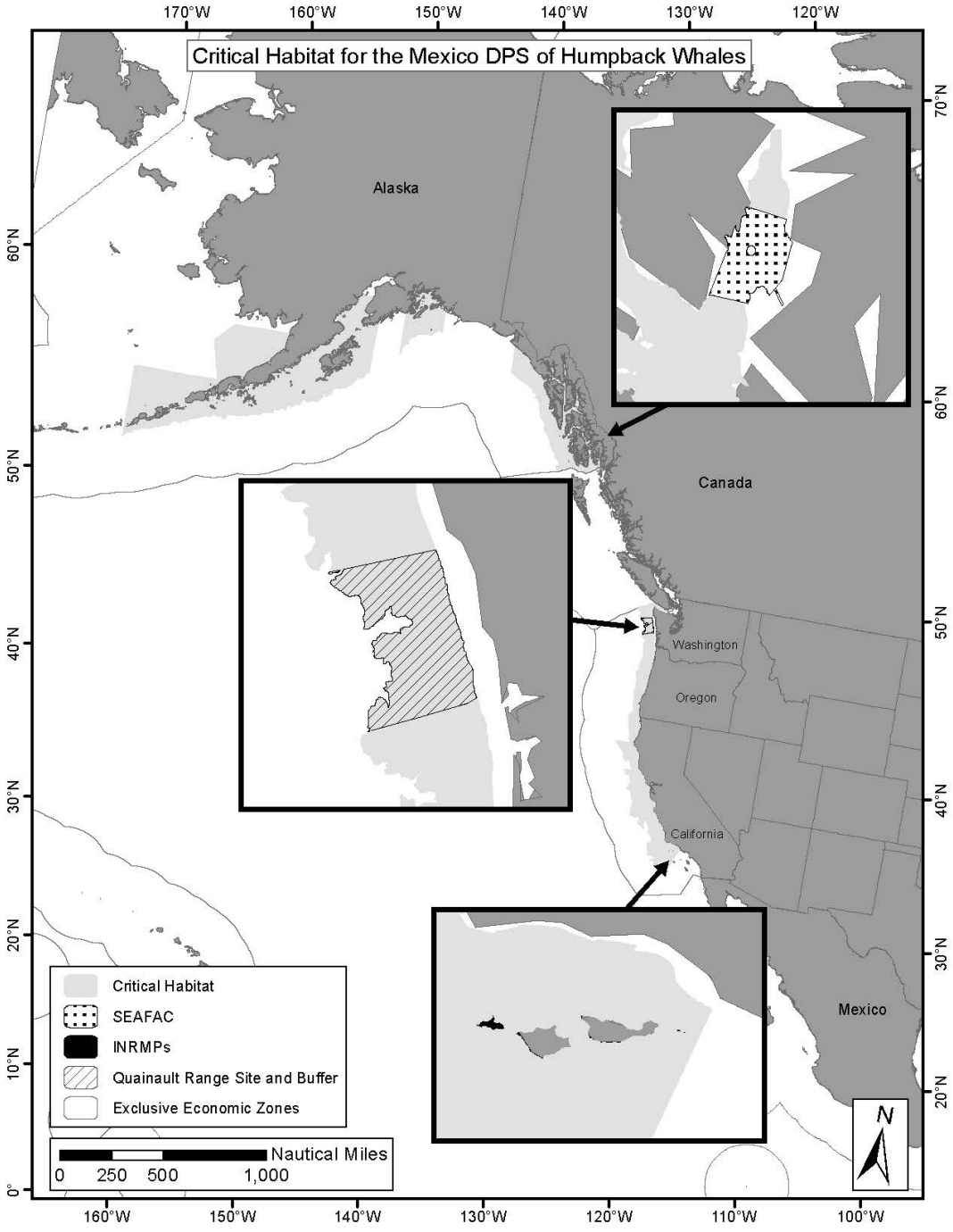


Figure 9. Proposed critical habitat for the Mexico DPS of humpback whales.

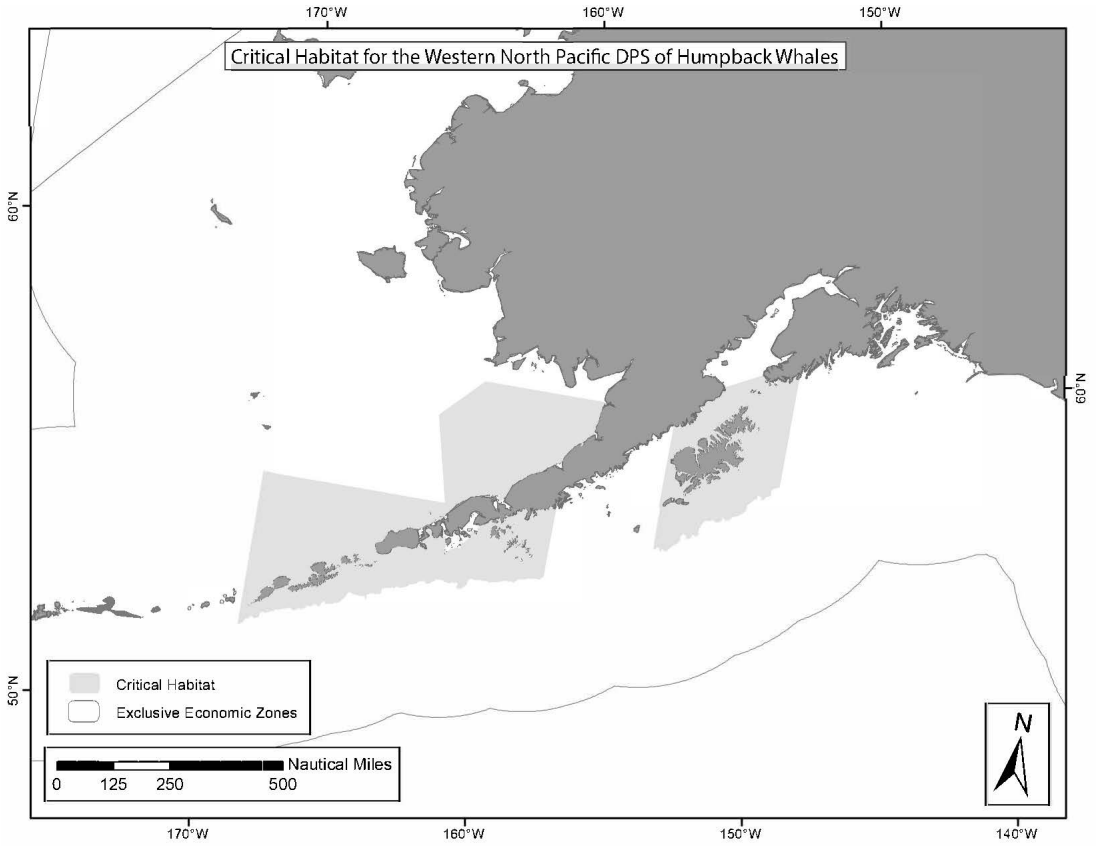


Figure 10. Proposed critical habitat for the Western North Pacific DPS of humpback whales.

The essential feature for these humpback whale critical habitats is prey species, primarily euphausiids and small pelagic schooling fishes of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth.

Operations associated with the research activities proposed for authorization could potentially overlap with some portions of either the Western North Pacific DPS or Mexico DPS proposed critical habitat areas. Any interactions with the areas would be transient and the activities are targeted on seals with no impacts expected to humpback prey species, quality, abundance, or accessibility. Therefore, the proposed action will have no effect on Western North Pacific DPS or Mexico DPS proposed critical habitat.

6.3.5 Arctic subspecies of ringed seals

On December 3, 2014, NMFS proposed critical habitat for Arctic subspecies of ringed seals and submitted a corrected proposal on December 9, 2014. Critical habitat is proposed in the northern Bering, Chukchi, and Beaufort seas of Alaska. Physical or biological features essential to the conservation of the species included sea ice habitat suitable for the formation of pupping lairs that provide protection from freezing and predation, sea ice habitat suitable as a platform for basking and molting, and primary prey resources to support Arctic ringed seals such as Arctic cod, saffron cod, shrimps, and amphipods.

Research activities proposed for authorization may occur on sea ice but work will only occur on firm pack ice with no evidence of seal lairs. Any alterations of ice habitat during capture operations is expected to be extremely minor. There are no impacts expected to prey species. Permitted seal research activities may affect, but are not likely to adversely affect critical habitat proposed for the Arctic ringed seal.

7 STATUS OF SPECIES LIKELY TO BE ADVERSELY AFFECTED

The evaluation of the consequences of adverse effects in this opinion begins by summarizing the biology and ecology of those species that are likely to be adversely affected and what is known about their life histories. 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. This helps to inform the description of the species' current "reproduction, numbers, or distribution" that is part of the jeopardy determination 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 the NMFS Web site: https://www.fisheries.noaa.gov/species-directory/threatened-endangered.

The proposed action is the authorization of research on seals, which includes the Beringia DPS bearded seals and Arctic ringed seals. The proposed research activities include intentional directed take of those two ESA threatened seals and their status is examined in the subsequent subsections.

7.1 Bearded Seal - Beringia DPS

Two subspecies of bearded seals are recognized by NMFS: *Erignathus barbatus nauticus* in the Pacific and *Erignathus barbatus barbatus* in the Atlantic (Figure 11). Bearded seals in the Pacific are distributed from 85º N south to Sakhalin Island (45º N), including the Chukchi, Bering and Okhotsk Seas.

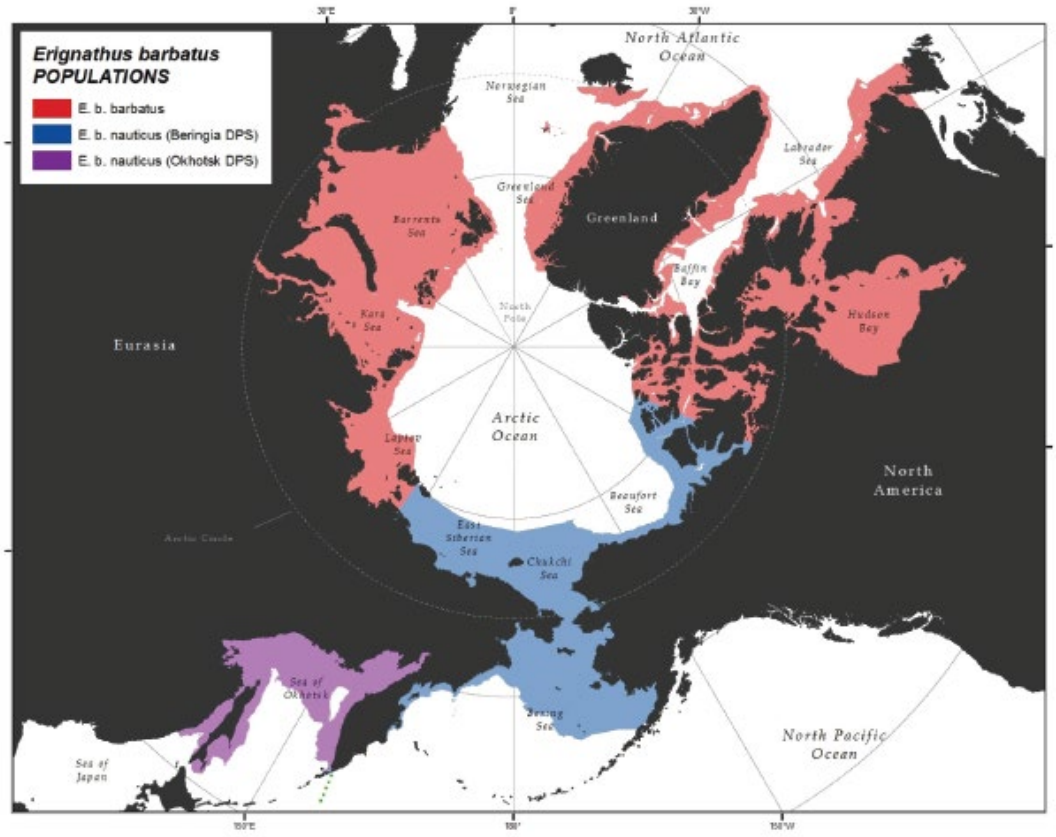


Figure 11. Map identifying the range of the two sub-species of bearded seal, *E. b. barbatus* and *E. b. nauticus*, and the Beringia and Okhotsk distinct population segments. (from Cameron et al. 2010).

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 12).

Figure 12. Bearded seal. Photo: NOAA

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, NMFS issued a final determination to list the Beringia DPS and Okhotsk DPS as threatened under the ESA.

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. 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.

We used information available in the final listing, the status review (Cameron et al. 2010), stock assessment reports and other available literature to summarize the status of the bearded seal, as follows.

7.1.1 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-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 fifteen days. Dependent pups spend about fifty percent of their time in the water. Nursing females spend more than ninety 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.

7.1.2 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 Beringia DPS of the bearded seal.

The estimated population size of the Beringia bearded seal DPS is 155,000 individuals (Status review: 75 FR 77496). There is substantial uncertainty around this estimate, however, and reliable data for a population trend of this DPS is not available. An estimate of bearded seals in the western Bering Sea (63,200; 95 percent CI 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).

There has been some study of the population structure of bearded seals, but it has not been possible to determine if Okhotsk DPS bearded seals are genetically distinct from other Pacific bearded seals (E.b. nauticus) (Cameron et al. 2010; Davis et al. 2008). The DPS determination was made on the basis that the Kamchatka Peninsula behaviorally isolates the breeding population in the Sea of Okhotsk.

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.

7.1.3 Status

The Beringia bearded seal DPS has a relatively large and 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 minimum estimated mean annual Alaska Native subsistence harvest of Beringia DPS bearded seals between 2013 and 2017 is 549, this is a minimum estimate because only a small proportion of the communities that harvest ice seals are surveyed each year (Muto et al. 2020). Additional threats to the species include fisheries interactions, disturbance from vessels, noise from seismic exploration, and oil spills.

7.1.4 Critical Habitat

Critical habitat has not been designated and there is none currently proposed for the Beringia DPS bearded seal.

7.1.5 Recovery Goals

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

7.2 Arctic Ringed Seal

Ringed seals have widespread, circumpolar distribution, and are found throughout the Arctic Ocean, as well as in the Sea of Okhotsk, Baltic Sea, Lake Ladoga and Lake Saimaa (Figure 13). There are five subspecies of ringed seals recognized: Ladoga (*P. h. ladogensis*), Saimaa (*P. h. saimensis*), Okhotsk (*P. h. ochotensis*), Baltic (*P. h. botnica*) and Arctic (*P. h. hispida*).

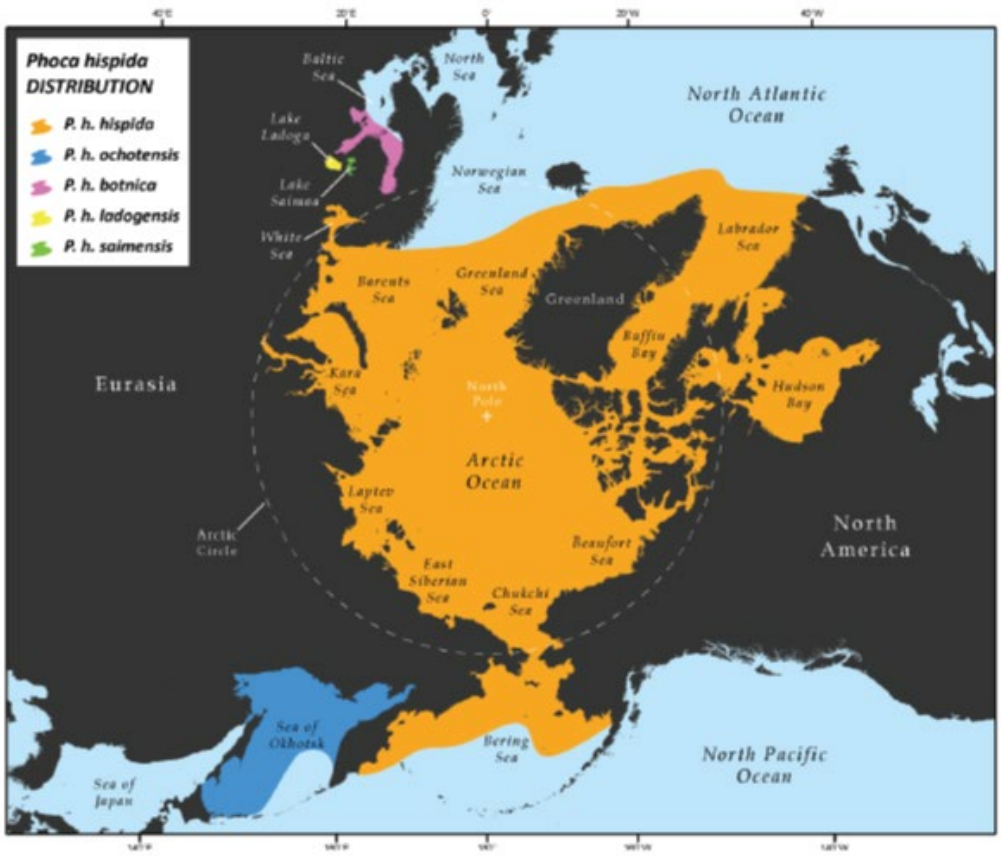


Figure 13. Map identifying the range of the five sub-species of ringed seal. (from Kelly et al. 2010)

Figure 14. Ringed seal. Photo: NOAA.

Ringed seals have a dark coat with silver rings (Figure 14). Adults can be up to five feet (1.5 meters) and weigh between 110 and 150 pounds (50 and 70 kilograms). Saimaa ringed seals can weigh up to 240 pounds (110 kilograms).

All ringed seals in Alaska are part of the threatened Arctic subspecies. On December 28, 2012, NMFS issued a final determination to list the Arctic subspecies as threatened under the ESA. The U.S. District Court for the District of Alaska issued a decision that vacated the ESA listing of the Arctic subspecies of ringed seal on March 11, 2016 (Alaska Oil and Gas Association v. National

Marine Fisheries Service et al., Case 4:14-cv-00029-RRB). NMFS appealed that decision and a federal appeals court ruling reinstated the listing in May of 2018.

We used information available in the final listing, recent stock assessment reports, the status review (Kelly et al. 2010), and other available literature to summarize the status of the ringed seal, as follows.

7.2.1 Life History

Ringed seals are uniquely adapted to living on the ice. They use stout claws to maintain breathing holes in heavy ice, and excavate lairs in the snow cover above these holes to provide warmth and protection from predators while they rest, pup, and molt. The timing of breeding, whelping, and molting varies spatially and is dependent on the availability of sea ice, with populations at lower latitudes performing these activities earlier in the year. Females give birth in late winter to early spring to a single pup annually; they nurse for five to nine weeks. During this time, pups spend an equal amount of time in the water and in the lair. Females attain sexual maturity at four to eight years of age, males at five to seven years. The average lifespan of a ringed seal is fifteen to twenty-eight years. They are trophic generalists, but prefer small schooling prey that form dense aggregations (Kelly et al. 2010).

7.2.2 Population Dynamics

No reliable population estimates for the entire Arctic ringed seal population due to the species' widespread distribution across political boundaries. In the status review, the population was estimated at approximately two million individuals; however, NMFS considers this a crude estimate, as it relies on outdated data collected in a variety of ways and does not include all areas of its range. 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. This is most likely an underestimate of the true abundance because surveys in the Beaufort Sea were limited to within forty kilometers of the shore (Kelly et al. 2010). Due to insufficient data, population trends for the Arctic subspecies cannot be evaluated.

The Arctic ringed seal is the most abundant of the ringed seal subspecies and has a circumpolar distribution. Arctic ringed seals are widely distributed throughout the Arctic Ocean, in waters of Russia, Canada, Greenland, Finland and the United States (Figure 13). In U.S. waters, Arctic ringed seals are found around Alaska in the Bering, Chukchi and Beaufort Seas. Most seals move seasonally, following the extent of the sea ice. The genetic population structure of the Arctic ringed seal is poorly understood. It is likely that population structuring exists in the species, but the extent to which it occurs is unknown.

7.2.3 Status

The Arctic ringed seal is threatened due to climate change, especially from the expected loss of sea ice and snow cover in the foreseeable future. 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. There are many subsistence communities in Alaska that are not surveyed, and the current statewide level of subsistence harvest is not known. The minimum estimate of the average annual harvest of ringed seals from 11 communities from 2009 to 2013 is 1,040 ringed seals (Muto 2016). The minimum estimated mean annual Alaska Native subsistence harvest of Arctic ringed seals between 2013 and 2017 is 697(Muto et al. 2020). The estimates are a minimum because only a small proportion of the communities that harvest ice seals are surveyed each year.

In summary, the Arctic ringed seal has an apparently large population, making it resilient to immediate perturbations. However, since it is threatened by climate change in the long-term, the species is likely to become endangered in the future. Additional threats to the species include fisheries interactions (including entanglement), disturbance from vessels, noise from seismic exploration, and oil spills.

7.2.4 Critical Habitat

Critical habitat for Arctic ringed seals was proposed for designation in the Bering, Chukchi, and Beaufort seas in Alaska. Physical or biological features essential to the conservation of the species included sea ice habitat suitable for the formation of and maintenance of subnivean birth lairs, sea ice habitat suitable as a platform for basking and molting, and primary prey resources to support Arctic ringed seals.

7.2.5 Recovery Goals

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

8 ENVIRONMENTAL BASELINE

The "environmental baseline" refers to the condition of the listed species or its designated or proposed critical habitat in the action area, without the consequences to the listed species or designated or proposed critical habitat caused by the proposed action. 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. The consequences to listed species or designated or proposed critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 C.F.R. §402.02; 84 FR 44976 published August 27, 2019).

The subsections of this environmental baseline present impacts from natural phenomena and from human activities that contribute to the status of the ESA-listed Arctic ringed seals and Beringia DPS bearded seals in the action area. Some of these activities, most notably hunting, occurred extensively in the past and continue at low levels, but no longer appear to significantly affect these threatened seal populations, although the effects of past reductions in numbers

persist today. The following discussion summarizes impacts that include predation, unusual mortality events, climate change, hunting, vessel activity, fisheries interactions, pollution, oil and gas activities, seismic surveys, military activities, and scientific research activities.

8.1 Predation

Different life stages of Arctic ringed seals serve as prey species for polar bears, Arctic foxes, walruses, killer whales, Greenland sharks, common ravens, and glaucous gulls (Kelly et al. 2010). In the Beaufort Sea, ringed seals make up 98 percent of polar bear diets (Kelly et al. 2010). Kelly et al. (2010) concluded that predation poses a medium to high threat to ringed seals given their importance to the diet of polar bears and because climate change could lead to greater exposure to predators if snow continues to melt early and hence lose protective habitat.

Polar bears are the primary predators of bearded seals but the remains of bearded seals have also been found in the stomach contents of walruses and killer whales (Cameron et al. 2010). The predicted reduction in seasonal sea ice could reduce predation by polar bears but could lead to increased predation by walruses and killer whales, as well as possible predation on pups by wolves, foxes, and bears (Cameron et al. 2010). Overall, predation does not currently appear to pose a significant threat to bearded seals.

8.2 Unusual Mortality Events

Under the MMPA, an unusual mortality event (UME) is defined as "a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response."

A UME occurred from May 1, 2011 to December 31, 2016, involving primarily the ringed seal, but also included bearded seals, ribbon seals, and spotted seals in northern and western Alaska. The minimum estimate of the total number of impacted seals was 657 seals, which included 233 dead stranded seals, 179 subsistence hunted seals, and 245 live seals that stranded or were sampled during permitted health assessments studies. The investigation identified that clinical signs were likely due to an abnormality of the molt, but a definitive cause for the abnormal molt and the UME was not determined.

Another UME has been occurring since June 1, 2018, as a result of elevated strandings for bearded, ringed and spotted seals in the Bering and Chukchi seas in Alaska. A total of 311 seals have been reported as of October 2020: 94 bearded, 74 ringed, 49 spotted, and 94 unidentified. The investigation process has yet to determine a cause.

More information about the current UME and the past UME can found here: https://www.fisheries.noaa.gov/alaska/marine-life-distress/diseased-ice-seals

8.3 Climate Change

There is a large and growing body of literature on past, present, and future impacts of global climate change, exacerbated and accelerated by human activities. Climate change effects include, changes in air and water temperatures, changes in precipitation and drought patterns, increased frequency and magnitude of severe weather events, and sea level rise; all of which are likely to impact ESA resources. Annual average temperatures have increased by 1.8 degrees Celsius across the contiguous U.S. since the beginning of the 20th century with Alaska warming faster than any other state and twice as fast as the global average since the mid-20th century (Jay et al. 2018). Globally, there are more frequent heatwaves in most land regions and an increase in the frequency and duration of marine heatwaves (IPCC 2018). Additional consequences of climate change include increased ocean stratification, decreased sea-ice extent, altered patterns of ocean circulation, and decreased ocean oxygen levels (Doney et al. 2012). NOAA's climate information portal provides basic background information on these and other measured or anticipated climate change effects (see https://climate.gov).

Climate change has the potential to impact species abundance, geographic distribution, migration patterns, and susceptibility to disease and contaminants, as well as the timing of seasonal activities and community composition and structure (MacLeod et al. 2005); (Kintisch 2006; Robinson et al. 2005); (Learmonth et al. 2006); (McMahon and Hays 2006); (Evans and Bjørge 2013); (IPCC 2014). Marine species ranges are expected to shift as they align their distributions to match their physiological tolerances under changing environmental conditions (Doney et al. 2012).

As carbon dioxide concentrations increase in the atmosphere, more carbon dioxide is absorbed by the oceans, causing lower pH and reduced availability of calcium carbonate. Because of the increase in carbon dioxide in the atmosphere since the Industrial Revolution, ocean acidity has increased by 26 percent since the beginning of the industrial era and is predicted to increase considerably between now and 2100 throughout the world's oceans (IPCC 2014). Ocean acidification negatively affects organisms such as crustaceans, crabs, mollusks, and other calcium carbonate-dependent organisms such as pteropods (free-swimming pelagic sea snails and sea slugs), the latter being an important part of the food web in Alaska waters. Reduction in prey items can create a collapse of the zooplankton populations, resulting in a potential cascading reduction of prey at various levels of the food web, thereby reducing the availability of the larger prey items of marine mammals.

In all regions except the Bering Sea, the duration of reduced ice cover in the summer has increased by 5-10 weeks and by more than 20 weeks in the Barents Sea between 1979-2013 (Laidre et al. 2015). Warming in the Arctic over the past few decades has been about twice the global mean (IPCC 2013). Even if greenhouse gases were to be limited immediately, sea ice loss, which has been faster than originally predicted by climate models, will still continue for several decades potentially leading to ice-free summers by 2040 (Laidre et al. 2015; Overland and Wang 2013; Wang et al. 2016). Changes in sea ice will also affect the food web through changes in the timing and quantity of primary production (spring phytoplankton blooms) that in turn would

affect lower trophic levels and benthic invertebrates and subsequently higher trophic levels (Wang et al. 2016).

Sea ice directly influences the distribution of ringed seals. Warm temperatures and reduced snow cover result in their protective birthing lair melting, collapse, and/or abandonment; hypothermia; and high rates of predation as predators have freer movement through ice-free water and over areas that are not snow covered. Harwood et al. (2000) reported reduced growth and survival rates because of an early spring break up of ice. Because the depth and duration of snow cover is projected to decrease through the range of the ringed seal Arctic DPS this century, increased juvenile mortality is likely (Kelly et al. 2010). Crawford et al. (2012) documented differences in habitat use between adult and subadult ringed seals during the winter-spring seasonal sea ice covers the Bering and Chukchi Seas. Adult seals made localized movements in shorefast or heavy pack ice in the southern Chukchi and northern Bering Seas, while subadults followed the advancing ice southward into the Bering Sea and made larger daily movements.

A majority of the Beringia DPS bearded seals pup in the Bering Sea where longer ice-free periods are forecasted. These bearded seals will likely have to shift their nursing, rearing, and molting areas to the ice covered seas north of the Bering Strait where food resources are poorer or to coastal haul-out sites on shore. Shore sites have increased risks of disturbance, predation, and competition for resources including space. The spring and summer ice edge may retreat to deep waters of the Arctic Ocean basin, which could separate sea ice suitable for maturation of pups and molting from benthic foraging habitat (Cameron et al. 2010).

Declining sea ice and increasing water temperatures are likely to promote favorable conditions for harmful algal blooms to expand northward, making algal toxins a growing concern in Alaskan marine food webs. Two of the most common algal toxins along the west coast of North America are the neurotoxins domoic acid and saxitoxin; both have been documented in ringed and bearded seals around Alaska (Lefebvre et al. 2016).

8.4 Hunting

Ringed seals have been an important subsistence resource for many Alaska Native communities along the coasts of the northern Bering, Chukchi, and Beaufort Seas but their harvest levels have decreased significantly since the 1970s (Kelly et al. 2010). Ringed seals are also harvested by Native communities in the Canadian Arctic for subsistence uses. Ringed seals are hunted commercially in Greenland, Svalbard, and Russia and some sport hunting in northern Norway (Kelly et al. 2010). Catches in the tens of thousands occur annually in Canada and Greenland. Catches in Svalbard and Norway are in the hundreds annually. Russia manages the harvest of ringed seals through a total annual catch system and issues permits to commercial and subsistence fishers. Catch limits vary with location with the largest harvests of thousands of seals allowed in the Bering and Chukchi Seas (Kelly et al. 2010).

Bearded seals have historically been an important subsistence resource for Native communities along the coasts of the northern Bering, Chukchi, eastern Siberian, and Beaufort Seas (Park

1999). Due to variations in reported harvest that may be due to changes in survey methodology, coverage, or reporting, it is not possible to accurately state the total number of bearded seals captured annually. However, based on the mean annual harvest reported from 1990-1998 and assuming 25-50 percent of seals struck are lost, Cameron et al. (2010) estimated the total annual hunt by Alaska Natives would range from 8,485 – 10,182 bearded seals. Total harvest of bearded seals by Siberian hunters in the Bering and Chukchi Seas is thought to have declined in the 1970s likely due to depletions from a growing commercial harvest in the 1960s and a shift to walrus hunting (Cameron et al. 2010). The last estimates for commercial or subsistence hunting in the Russian Bering and Chukchi Seas are from the early 1980s so it is unknown whether levels have increased (Cameron et al. 2010). Beginning in 1975, the Russian Federal Fisheries Agency has set total annual catch limits for the take of bearded seals in the western Bering and Chukchi Seas, Chukotka Peninsula, and eastern Siberia. Bearded seal hunting is also important in the western Canadian Arctic where the Inuvialuit use bearded seals though the ringed seal harvest is more important (Cameron et al. 2010). It was estimated that an average of approximately 25 bearded seals were taken annually by Native subsistence hunters from 1988-1997 (IHSWG 2003).

A co-management agreement was entered into by NMFS with the Ice Seal Committee in October 2006. The Ice Seal Committee is an Alaska Native Organization that represents ice seal subsistence users in the five regions of Alaska that harvest ice seals: Bristol Bay (Bristol Bay Native Association), Yukon-Kuskokwim Delta (Association of Village Council Presidents), Bering Sea (Kawerak, Inc.), Northwest Arctic (Maniilaq Association), and the Arctic Slope (North Slope Borough). The Ice Seal Committee is dedicated to conserving ice seal populations, habitat, and hunting and to preserving native cultures and traditions. The Ice Seal Committee co-manages ice seals with NOAA Fisheries by monitoring subsistence harvest and cooperating on needed research and education programs pertaining to ice seals. The Beringia DPS bearded seal and the Arctic ringed seal can benefit from the co-management goal of balancing sustainable subsistence use and conservation in Alaska.

8.5 Vessel Activity

Male bearded seals rely on underwater vocalizations to find mates and, although the impacts of vessel noise on bearded seals have not been studied, the frequencies of the predominant vocalizations overlap the range over which ship noise dominates ambient noise (Cameron et al. 2010). Bearded seals vocalize over broad distances so their calls are susceptible to interference from shipping noise (Cameron et al. 2010). Infrequent vessel transits would probably not have significant impacts on vocalization success, but as sea ice melts earlier, vessel activity in the Arctic is increasing and will likely continue to do so. This activity includes an increase in cruise ship traffic, transport of goods, as well as oil and gas development. The increased traffic could result in vessel noise becoming a more significant stressor in the region and there would also be increased risk of an oil spill that could have serious consequences for Arctic wildlife.

Icebreaking activities in the Arctic are also expected to increase, which increases the likelihood of impacts from noise, but especially severe consequences to habitat could result when ringed seals occupy their lairs (Kelly et al. 2010) or when bearded seals are trying to pup and molt (O'Rourke 2010).

8.6 Fisheries Interactions

Commercial fishing is a very important industry in Alaska and it provides the majority of all the fishery landings in the nation.[2] The U.S. fisheries in the North Pacific are managed to prevent overfishing of individual fish stocks, which is likely to reduce the potential indirect effects to seals associated with targeted fishing of their prey species. Commercial fishing can affect prey characteristics because larger fish are targeted, often leading to population shifts toward reproduction at earlier ages and smaller sizes. Bearded seals and ringed seals already adapt to natural variation in prey species so changes in prey sizes are not expected to have a significant impact on the seals unless fishing pressure increases (Kelly et al. 2010) (Cameron et al. 2010).

Groundfish trawling affects benthic habitat bearded seals use when foraging. In U.S. waters, modifications to trawl gear and restrictions in areas where groundfishing can be done are likely to minimize the potential impacts to bearded seals associated with habitat impacts from trawling (Cameron et al. 2010).

Monitoring of commercial fisheries in the Bering Sea-Aleutian Islands is conducted by shipboard observers. During the 1990s the mean annual mortality observed was less than one bearded seal in the groundfish trawl fishery (Angliss and Lodge 2002). From 2000 – 2004, there was a mean annual mortality of less than one bearded seal in the pollock trawl fishery (Angliss and Allen 2009). From 2002-2006, observer coverage was greater and mean annual incidental mortality was one bearded seals in the pollock trawl fishery (Allen and Angliss 2010). The minimum estimated mean annual mortality and serious injury rate incidental to U.S. commercial fisheries in the between 2013 and 2017 is 1.6 bearded seals, based exclusively on observer data of the Bering Sea/Aleutian Island pollock, flatfish, and Pacific cod trawl fisheries (Muto et al. 2020).

Based on observer data from the Bering Sea/Aleutian Islands fisheries since the 1990s, trawl fisheries for pollock and flatfish resulted in the occasional incidental capture of one animal in some years but annual average mortality of ringed seals due to commercial fisheries were less than one animal (Kelly et al. 2010). The average annual rate of mortality and serious injury incidental to U.S. commercial fishing operations from 2013 to 2017 is 2.4 ringed seals based exclusively on observer data of the Bering Sea/Aleutian Island flatfish trawl fishery (Muto et al. 2020).

[2] https://www.fishwatch.gov/sustainable-seafood/by-the-numbers#:~:text=Fish%20Landings,seafood%20valued%20at%20%245.6%20billion (Accessed 11/10/20)

8.7 Pollution

Heavy metals such as mercury, selenium, cadmium, and zinc have been reported in the tissues of ringed seals, particularly liver, kidney and muscle tissue, from different locations in the Arctic, although toxic effects were not detected (Kelly et al. 2010).

Concentrations of organochlorine pollutants, including DDT and PCBs, have been reported to increase with age in male ringed seals but were reduced in nursing females due to transfer of contaminants to nursing pups (Kelly et al. 2010). Concentrations of some of these pollutants in Arctic ringed seals did not change between 1981 and 2000 according to Addison et al. (2005).

Perfluorinated contaminants (PFCs), used in many industrial products such as flame retardants, insecticides and herbicides, lubricants, adhesives, and paints, have been detected in ringed seals in the Alaskan Bering and Chukchi Seas (Quakenbush and Citta 2008). The contaminants did not appear to bioaccumulate with age in male or female seals (Quakenbush and Citta 2008).

Organochlorine compounds and heavy metals have been found in bearded seal populations although contaminants research is limited compared to ringed seals (Cameron et al. 2010). Bearded seals bioaccummulate mercury in tissues and rates of accumulation appear to be somewhat higher than in ringed seals (Smith and Armstrong 1978), but toxic effects were not reported. Of six marine mammals tested in Alaska, bearded seals had the highest concentrations of DDT (Kelly 1988). Other organochlorine pesticides, dieldrin and lindane, were found in bearded seals but at less than half the concentration of DDT (Galster and Burns 1972). PFCs and related synthetic compounds have also been detected in bearded seals in the western Arctic (Powley et al. 2008). High concentrations of organochlorine compounds were found in the blubber of male bearded seals, particularly from Alaska and the White Sea in comparison to samples reported from other study areas (Bang et al. 2001; Muir et al. 2003; Quakenbush et al. 2010).

It was concluded that pollution poses a low to moderate threat to ringed seals (Kelly et al. 2010) and bearded seals (Cameron et al. 2010) considering changes in climate can influence the delivery pollutants to the Arctic. Reduced sea ice cover resulting in increased vessel traffic and petroleum projects are additional sources of potential pollution, especially from threats of oil spills.

8.8 Oil and Gas Activities

Oil and gas activities are conducted in Alaska and there is an active oil field on the Beaufort Sea coastline.[3] In the Chukchi Sea, exploratory wells have been drilled but there are no active oil fields to date. These activities are expected to continue and may even increase in the future if melting ice makes oil reserves more accessible. Currently there are no offshore oil or gas fields in development or production in the Bering Sea. Oil and gas exploration, development, and production activities include seismic surveys, drilling operations, fill placement, pipeline and

[3] https://www.boem.gov/alaska-ocs-region (Accessed 11/10/20)

shoreline facility construction, and vessel and aircraft operations. These activities have the potential to impact Arctic ringed and Beringia DPS bearded seals through noise, physical disturbance, and pollution.

In a study by Harwood et al. (2007) evaluating the potential impacts of exploratory drilling on ringed seals in the nearshore Canadian Beaufort Sea, seal breathing holes and lairs were not significantly different in distance from industrial activities during pre and post-drilling years. Similarly, the movements, behavior and home range size of tagged seals did not vary statistically during and post-drilling activity (Harwood et al. 2007). Richardson and Williams (2004) concluded there was little effect on ringed seals during their open-water period from the low to moderate level, low frequency industrial sounds emanating from the Northstar facility due to construction and drilling.

Disturbance, injury, or mortality from oil spills and/or other discharges associated with oil and gas activities are considered to be moderately significant threats to the Beringia DPS bearded seals and Arctic ringed seals (Cameron et al. 2010; Kelly et al. 2010). Oil spills would be difficult to clean up in the Arctic due to issues such as access and effectiveness of cleanup technologies. Bearded seal pups are not fully molted at birth and would be particularly prone to physical impacts from oiling. Seals could also be affected by oil exposure leading to skin irritation, disorientation, lethargy, conjunctivitis, corneal ulcers, and liver legions, as well as due to inhalation of vapors. Bearded seals are benthic foragers and could be affected by ingestion of contaminated prey. Spilled oil can cause disruptions in benthic communities and transfer of contaminants through the food web (Stowasser et al. 2004) with colder climates making these effects last longer.

Petroleum exploration and development activities are subject to ESA section 7 consultation processes as a result of actions for federal leases and MMPA incidental take authorizations that may have implications for ESA listed resources. Construction and operation of a drilling and production island in Foggy Island Bay, Beaufort Sea, Alaska, could incidentally harass up to 416 Arctic ringed seals and 64 Beringia DPS bearded seals over five years (2020-2025), there could also be up to 10 (2 per five years) unintentional Arctic ringed seal mortalities (84 FR 70274). Construction and maintenance of ice roads and trails over five years (2020-2025) for three drilling sites in the North Slope of Alaska could incidentally harass up to 125 Arctic ringed seals and could result in the mortality or serious injury of 12 Arctic ringed seals (85 FR 2988). The construction of a liquefied natural gas pipeline starting in 2021 into 2027 in Prudhoe Bay, Alaska, could incidentally harass up to 1,797 Arctic ringed seals and 305 Beringia DPS bearded seals (85 FR 43382).

8.9 Seismic Surveys

There are seismic survey activities involving towed airgun arrays that may occur within the action area. They are the primary exploration technique to locate oil and gas deposits, fault structure, and other geological hazards. These activities may produce noise that could impact ESA-listed cetaceans within the action area. These airgun arrays generate intense low-frequency

sound pressure waves capable of penetrating the seafloor and are fired repetitively at intervals of ten to 20 seconds for extended periods (NRC 2003). Most of the energy from the airguns is directed vertically downward, but significant sound emission also extends horizontally. Peak sound pressure levels from airguns usually reach 235 to 240 dB 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 seals (NMFS 2018a). Exposure of seals to very strong impulsive sound sources can result in auditory damage, such as changes to sensory hairs in the inner ear, which may temporarily or permanently impair hearing by decreasing the range of sound an animal can detect within its normal hearing ranges (reviewed in Finneran 2015).

In the U.S., all marine seismic surveys with the potential to impact marine mammals involve incidental take authorizations under the MMPA which undergo formal ESA section 7 consultation. These permits specify the conditions under which seismic sound sources can be operated, including mitigation measures to minimize adverse effects to protected species. Past marine seismic surveys in the region of the action area have consulted with NMFS to ensure their actions will not result in jeopardy for ESA-listed species, nor adversely modify or destroyed designated critical habitat, and there have been no significant impacts reported to the population of Arctic ringed seals or Beringia DPS bearded seals. There are no current seismic surveys authorized to take either of those threatened seal populations.

8.10 Military Activities

The U.S. Navy conducts training, testing, and other military readiness activities on range complexes throughout coastal and offshore areas in the United States and on the high seas. During training, existing and established weapon systems and tactics are used in realistic situations to simulate and prepare for combat. Testing activities are conducted for different purposes and include at-sea research, development, evaluation, and experimentation. There is a U.S. Navy Training and Testing range complex in the Gulf of Alaska and there is also training and testing activities associated with Ice Exercise (ICEX) north of Prudhoe Bay, Alaska.

The U.S. Navy's activities constitute a federal action and take of ESA-listed marine mammals considered for these activities have previously undergone separate ESA section 7 consultation. Through these consultations with NMFS, the U.S. Navy has implemented monitoring and conservation measures to reduce the potential effects from activities, such as vessel strike and underwater sound, on ESA-listed resources. Past U.S. Navy operations in the region of the action area have not significantly impacted the population of Arctic ringed seals or Beringia DPS bearded seals. There are no current operations authorized to take either of those threatened seal populations.

8.11 Scientific Research Activities

There are currently other permits (Table 7) that have been issued by the Permits Division for work that could affect ringed and bearded seals in areas that could overlap with the proposed action

area. Most permits authorize a smaller study area and it is unlikely that the exact location and timing of research under the various permits would overlap in time and space with the permitted research. The chance of repeated disturbance or take in the same day by more than one permit holder is further minimized by standard permit requirements to coordinate fieldwork among permit holders working in the same area. Most of the authorized research activities are expected to have no more than short-term effects and any incidental mortalities requested were very small numbers.

Table 7. Current NMFS scientific research and enhancement permits authorizing take of Beringia DPS bearded and Arctic ringed seals.

File Number	Applicant	Project Title
18890[4]	Alaska Department of Fish and Game	Movements, habitat use, and stock structure of cetaceans (bowhead, gray, humpback, and beluga) in Alaska.
18902[5]	Long Marine Laboratory	Psychological and physiological studies of captive pinnipeds at Long Marine Laboratory, Santa Cruz, CA and Alaska SeaLife Center, Seward, AK
19309[6]	MML	Application for a Permit for Scientific Research under the MMPA for the Assessment, Capture and Handling of Harbor, Spotted, Ringed, Ribbon, and Bearded Seals in Alaska
20466[7]	Alaska Department of Fish and Game	Population Status, Health, Movements, and Habitat Use of Ringed, Bearded, Spotted, and Ribbon Seals in the Bering, Chukchi, and Beaufort Seas
22298[8]	Alaska Department of Fish and Game	Steller sea lion recovery investigations in Alaska

[4] Authorizes unintentional harassment of pinnipeds, including ringed and bearded seals.
[5] Captive research permit.
[6] Will be replaced by the Proposed Permit No. 23858.
[7] Authorizes directed take of ringed and bearded seals.
[8] Authorizes unintentional harassment of pinnipeds, including ringed and bearded seals.

8.12 Synthesis of Environmental Baseline Impacts

Collectively, the stressors described above have had, and continue to have, impacts on Arctic ringed seals and Beringia DPS bearded seals. Some of these stressors result in mortality, such as hunting and commercial fisheries, whereas others are more likely to result in harassment, such as oil development and military exercises. Assessing the aggregate impacts on these seals across the baseline of stressors considered in this opinion is difficult to quantify.

We consider the best indicator of the aggregate baseline impact on ESA-listed species to be the status and trends of those species. Unfortunately, the abundance estimates for Arctic ringed seals and Beringia DPS bearded seals are not comprehensive and don't allow for sufficient trends analysis. Abundances based on surveys from portions of the ranges conservatively estimate Beringia DPS bearded seals greater than 150,000 individuals and Arctic ringed seals at 300,000, but there could be over a million (Kelly et al. 2010).

Among the baseline sources of impacts, climate change is a leading threat to both of these species due to their dependence on sea ice and the predicted continuing changes in the spatial extent of ice and timing of melting as well as the related impacts to prey species on which ringed and bearded seals depend. Major activities such as shipping, seismic surveys, petroleum development, commercial fisheries, and military exercises, could expand in areas where thick ice has formerly limited their extent. As these ice associated seals lose habitat they could be subject to greater exposure from these other sources of stress.

9 EFFECTS OF THE ACTION

Section 7 regulations were revised in August 2019 to define "effects of the action" as all consequences to ESA-listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur (50 C.F.R. §402.02). Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 C.F.R. §402.17). Section 7 regulations (50 C.F.R. §402.17) elaborate on this definition as follows:

- *Activities that are reasonably certain to occur* – A conclusion of reasonably certain to occur must be based on clear and substantial information, using the best scientific and commercial data available. Factors to consider when evaluating whether activities caused by the proposed action (but not part of the proposed action) or activities reviewed under cumulative effects are reasonably certain to occur include, but are not limited to: (1) past experiences with activities that have resulted from actions that are similar in scope, nature, and magnitude to the proposed action; (2) existing plans for the activity; and (3) any remaining economic, administrative, and legal requirements necessary for the activity to go forward.

- *Consequences caused by the proposed action* – To be considered an effect of a proposed action, a consequence must be caused by the proposed action (i.e., the consequence would not occur but for the proposed action and is reasonably certain to occur). A conclusion of reasonably certain to occur must be based on clear and substantial information, using the best scientific and commercial data available. Considerations for determining that a consequence to the species or critical habitat is not caused by the proposed action include, but are not limited to: (1) the consequence is so remote in time from the action under consultation that it is not reasonably certain to occur; or (2) the consequence is so geographically remote from the immediate area involved in the action that is not reasonably certain to occur; or (3) the consequence is only reached through a lengthy causal chain that involves so many steps as to make the consequence not reasonably certain to occur.

This section follows the stressor, exposure, response, and risk assessment framework described in Section 2. The effects analyses 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. 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 will 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-related physiological disruptions and potential unintentional mortality that may result in animals that fail to feed, reproduce, or survive because these responses could 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.

9.1 Stressors Associated with the Proposed Action

The potential stressors we expect to result from the proposed action are associated with the research activities proposed for authorization, as identified in the "Description of the Proposed Action" section, and proposed authorized take of Arctic ringed seals (Table 1) and Beringia DPS bearded seals (Table 2). Potential stress from aerial surveys, capture, handling, and sampling, are discussed in the exposure and response analysis that follows.

The proposed authorization of the import/export and receipt of biological samples by the researchers is not expected to have any additional harassment or take required above what is already requested for targeted research procedures. The exchange of samples are considered opportunistic without creating additional demand for ringed and bearded seal captures. The acquisition of data from sharing biological samples can benefit seal conservation efforts and

discussion of the import/export authorization does not need to be considered further in this opinion.

9.2 Exposure and Response Analysis

The *Exposure Analysis* identifies, as possible, the number, age (or life stage), and sex of the Arctic ringed seals and Beringia DPS bearded seals that are likely to be exposed to the stressors. The *Response Analysis* evaluates the available evidence to determine how individuals of those ESA-listed seals are likely to respond given their probable exposure.

9.2.1 Exposure Analysis

The Permits Division develops the proposed take authorization of Arctic ringed seals (Table 1) and Beringia DPS bearded seals (Table 2) from the permit application materials provided by the MML. The proposed take provides the foundation of the expected exposures to Arctic ringed seals and Beringia DPS bearded seals from the research activities.

Takes of both sexes and all age classes are summarized on an annual basis for the duration of the 5-year permit as follows:

- Up to 250 Beringia DPS bearded seals and up to 4000 Arctic ringed seals could be harassed from aerial surveys.
- Up to 3000 each of the Arctic ringed seals and Beringia DPS bearded seals could be incidentally disturbed as result of seal captures and sampling independent of captures.
- Up to 150 of each of the Arctic ringed seals and Beringia DPS bearded seals could be captured, handled, and sampled.
  Within those 150 for each species:
    - Up to 20 seals could be recaptured.
    - Up to 20 seals could be surgically implanted with life history bio-loggers.

  Within the 150 for Beringia DPS bearded seals:
    - Up to 20 seals could be captured using remote darts.
- Up to 5 unintentional mortalities per species per year; not to exceed 15 mortalities per species over the duration of the 5-year permit.

9.2.2 Response Analysis

Very few long-term adverse effects are expected as a result of the proposed seal research activities and we expect mostly short-term behavioral responses from disturbances related to capture, handling, and sampling. All of the procedures for capturing, handling, and sampling of animals proposed for authorization are reviewed and approved by the NOAA Fisheries Alaska/Northwest Science Centers' Institutional Animal Care and Use Committee. The methods have been developed and refined over many years with the goal of reducing negative effects on the seals. The subsections that follow examines the proposed authorized take and the research activities the MML proposes to conduct, and their corresponding effects on Arctic ringed seals and Beringia DPS bearded seals. The Permits Division calculates that occasionally, pinniped

capture and associated activities can result in serious injury and mortality of a small number of individuals. We recognize that this is a possible outcome, and consider the effects of mortality in our analysis.

Incidental Disturbance

Up to 3000 of each threatened seal species may be subject to harassment as an anticipated result of disturbance that is incidental to research activities conducted at haul-out sites. These seals may be at the site but are not targeted for capture. Researchers may collect samples at a haul out site (e.g., scat) and record observational data. Activities are planned such that the total time researchers are working at a haul-out site and the total number of times a site is disturbed is minimized. Only a small portion of a site is expected to be disturbed.

Disturbance resulting from these activities is expected to be extremely minor. Seals may raise their heads and take notice, attempt to move a short distance away, and if at the water's edge, could flush into the water. Any reactions are expected to be short term and without injuries. These cases of incidental disturbance are not likely to adversely affect Arctic ringed seals and Beringia DPS bearded seals.

Aerial surveys

There is potential for up to 250 Beringia DPS bearded seals (Table 2) and up to 4000 Arctic ringed seals (Table 1) could be harassed from manned and unmanned aerial surveys.

Ice seals (which includes ringed and bearded seals) do not form rookeries. In species that do form rookeries (e.g., fur seals, sea lions, and elephant seals), adult females aggregate with their pups in the presence of territorial males. Rookeries are densely concentrated for nursing and breeding, often distributed over large rocky areas, relatively far from the water. If those rookery forming species are sufficiently disturbed they may stampede, with potential for serious injury or mortality of pups due to trampling by much larger adults. Since ice seal species do not aggregate into large groups or rookeries, there is considerably less risk of injury from disturbance, especially for pups.

Ice seal surveys are planned for spring/early summer, between March and June, during the breeding and molting periods. This overlaps with the pup-dependent period for these species. If a mother and dependent pup are disturbed by the manned aerial survey aircraft and go into the water, there is a small potential for the pup to become separated from the mother, however briefly. Manned aircraft surveys for ice seals are planned to be at the minimum altitude required (1,000 feet) for effective species, age, and sex classification in order to minimize the potential for disturbance and any consequential separations. During previous MML surveys conducted from aircraft at 1,000 feet, rates were calculated for disturbance (e.g., actively moving away from the aircraft, diving into the water) and the highest disturbance rate was calculated for ringed seals at 17%.

Previous UAS surveys of ice seals conducted by MML were flown with the fixed-wing ScanEagle at altitudes of 300–400 feet, and photographs taken from the UAS show seals' reactions to the UAS. Seals occasionally lifted their heads and looked up towards the UAS, but none of the seals flushed into the water as the UAS flew overhead. Recent UAS survey efforts by MML have used DJI Phantom 4 quadcopter and SenseFly eBee fixed wing for harbor seal surveys. Those flights at 150 feet were done with very low levels of observed disturbance.

Photogrammetry studies utilize high resolution imagery that may require UAS survey altitudes as low as 50 ft. Lower altitudes could increase risk of disturbance, but the photogrammetry technology requires seals to remain still during image capture, so disturbance impacts the ability to collect useful data. Researchers plan to focus the photogrammetry efforts on individuals or small groups collecting the highest resolution imagery possible at the lowest altitude possible without disturbing seals.

Thus, we do not anticipate that UAS surveys will cause high disturbance to either ice-associated seals or harbor seals. Aerial surveys are not expected to reduce the fitness of any seal.

Both the manned and unmanned aerial surveys have the potential to cause disruptions to Beringia DPS bearded and Arctic ringed seals, although the amount of disturbance is expected to be low and reactions are not expected to have severe consequences. At most, a small percentage of seals may enter the water which has some energetic expense but that is within normal behavior and not expected to reduce the fitness of individual seals. The greatest concern for disturbance in this situation is for pups, fortunately these seal species do not tend to form dense aggregations and prefer ice floes instead rocky haul-outs, therefore significantly reducing the chance of injury. Entering the water is also within normal behavior for the pups, even at an early age both bearded seal and ringed seal pups spend about half their time in the water (Lydersen and Hammill 1993; Lydersen et al. 1994).

Capture and Handling

Up to 150 each of the Artic ringed seals (Table 1) and Beringia DPS bearded seals (Table 2) of both sexes and all age classes (including nursing pups) could be captured, handled, and sampled as part of the authorized research activities each year. Mother and pup pairs will not be targeted for capture if the presence of a very fresh birth site is noted and/or there are visible folds in the skin of the pup. In the rare occurrence a pup is captured, but not the mother, sampling efforts will be abbreviated in order to minimize the time that the mother and pup are separated.

Seals will likely suffer some level of stress as a result of capture activities. Chronic stress can impair the functionality of the immune and reproductive systems. Acute stress may result in hyperthermia. No studies of the capture stress response of ringed and bearded seals are available. However, MML researchers have captured and sampled hundreds of phocids in Alaska, observing that procedures seem to have little to no effect on the animals while monitoring after they are released.

Field team members use as little restraint as is practical to accomplish the procedures safely and avoid loud noises or rapid movements that might cause stress to the restrained seal. Animals are carefully monitored for signs of stress during all capture operations. If a captured animal shows signs of alarm reactions (e.g., overexertion, constant muscle tensions, abnormal respiration, or increased heart rate) that may lead to serious injury, disease conditions, or death, research-related procedures are immediately ceased to focus on the animal and treat the symptoms as determined appropriate by the PI, CI, or attending veterinarian.

Measurement, weighing, and ultrasound are commonly used to assess the condition of captured seals. These activities are not expected to result in adverse effects beyond discomfort from being restrained by a researcher or in a net. Behaviors such as remaining passive, vocalizing, or struggling to escape are not expected to result in any reductions of fitness of ringed and bearded seals.

Escape attempts during capture could lead to injuries that would reduce seal fitness. Injuries of could be noticed by researchers and would lead to the injured seal being held for treatment rather than released. The researchers did not report any of these injuries as a result of capture activities from 3/2016 through 3/2020 under the preceding permit (No. 19309) to do the same type of work as proposed in this action. Injury resulting from capture does not seem likely to occur.

Sedation and Anesthesia

Some level of chemical restraint for sub-adult and adult animals is expected to be applied. Sedation reduces animal stress and sampling procedures are completed faster when an animal is calm, which reduces the duration of handling. Most seals respond to the use of diazepam as a sedative by reducing activity and having a lower stress response (Harcourt et al. 2010) and the effects of this drug can be reversed using flumazenil. This combination has long been used for sedation and reversal on marine mammals.

Seals that are too deeply sedated exhibit slower or shallower breathing. If this happens or a seal is otherwise in need of emergency intervention due to sedation, the researchers will administer doxapram, a central nervous system and respiratory stimulant used to treat respiratory arrest. We expect the administration of this drug, which is commonly administered to reduce recovery time associated with anesthesia and for emergency resuscitation, to result in recovery, revival, or stimulation of breathing (Lynch et al. 1999). In case of an emergency, the researchers may also administer epinephrine. Both epinephrine and doxapram have been used to revive captive and wild pinnipeds (NMFS 2014). We expect similar responses from ringed and bearded seals if such measures are necessary due to sedation.

The researchers did not report any adverse reactions to drugs used under the preceding permit (No. 19309) to do the same type of work as proposed in this action. We do not expect the administration of sedatives and anesthesia to result in overall fitness reductions for Arctic ringed seals or Beringia DPS bearded seals.

Sampling, tagging and external bio-loggers

Less invasive procedures include swabbing mucus membranes (e.g., nasal, rectal, conjuntival, urogenital, lesions); fecal loops and enemas; using ultrasound to measure blubber depth; collecting whisker, hair, and nail; and collecting scat, spew, skin or urine. These less invasive procedures are not likely to result in adverse effects to any individual more than behavioral responses to being restrained and handled in general, which is temporary and not likely to reduce seal fitness. Whiskers are used as sensors to navigate in water and detect prey, because seals periodically shed their whiskers and lose or damage whiskers during normal foraging activities, we do not expect the collection of one whisker from each captured animal to interfere with the animal's ability to forage.

The proposed activities that pierce the skin (blood and biopsy sampling, invasive tagging) may cause stress, pain, wounding, and minor injury. Seals may have behavioral reactions to pain (vocalize or flinch), an immune response at the sample collection or tagging site, and tissue damage if tagging tears the flipper. Lidocaine will be used as a local anesthetic for blubber biopsies to reduce the potential for seals to suffer from pain and any discomfort is expected to be temporary. Areas on the animal will be cleaned with disinfectant before any blood sampling, blubber biopsy and tagging is performed. Procedures will use sterile, disposable needles, biopsy punches, and swabs. Sampling equipment and supplies are appropriately cleaned or sterilized for any procedures that may pose a risk of infection. The veterinarian will decide whether to let incisions heal naturally or if a single loose suture with a topical antibiotic will be used to close it. There are no reports of infection as a result of sampling and tagging during previously permitted work.

Veterinarians were consulted to determine the appropriate amount of blood that can be safely collected from different sized animals. Drugs are available to reduce bleeding, when necessary. Seals are expected to typically recover quickly from the sedation on their own, or there are reversal drugs (Table 4) that can be given to ensure the seals are alert and ready to be released. The potential for serious injury or long-term effects on individuals from sampling appears to be minimal and under the preceding permit there is a lack injurious effects (No. 19309).

Except for the implanted life history tags, the bio-loggers planned for deployment are externally attached satellite transmitters that are either attached to the hair with adhesive or to the rear flipper through holes punched in the interdigital webbing. Researchers will follow best practices when deciding how and when devices are attached for different species and age classes (Horning et al. 2019). When possible, one of each device type will be attached to a captured seal as long as the total combined weight does not exceed 2% of the animal’s body weight, and no more than three external devices will be deployed on an individual seal.

Seals may experience skin irritation due to the use of epoxy to secure some of the instruments. To date, no effects of epoxy use to secure instruments have been observed by MML who used the same method to place instruments on ice seals and harbor seals under their previous permit. Ice-associated seal species, including Arctic ringed seals and Beringia DPS bearded seals, are

born with a lanugo coat that is shed near time of weaning. Researchers will not attempt to adhere a bio-logger to a pup with a lanugo coat.

Instrumentation leads to questions of potential entanglement of animals, which could result in drowning, and complications due to drag caused by instruments that could affect foraging time and success and ability to escape predators. Based on results of the previously permitted research, it does not appear that the instruments lead to entanglement of seals or impacts to foraging or predator evasion behavior. This is likely due to the small size of the instruments versus the large body size of the seals. The tags proposed for use are approximately equal to or less than tag units currently authorized for use, and would therefore be expected to create the same or less hydrodynamic drag. In addition, the proportion of the tags to the animal's size and weight is such that the energetic demand on the seal would likely be insignificant. The size of flipper-mounted bio-loggers may not allow for attachment to the webbing of young pups. Technological advancements may result in smaller, and thus appropriately sized, bio-loggers in the next five years

The placement of on-board instruments on Beringia DPS bearded and Arctic ringed seals whether glue-on or flipper mounted is likely to result in adverse effects to ringed and bearded seals but these effects are expected to be minor and temporary. MML research projects have deployed externally attached bio-loggers on hundreds of phocid seals in Alaska, and data from these seals have shown that attaching tags externally does not negatively affect survival.

Sampling and tagging activities are likely to result in adverse effects to ringed and bearded seals but these effects are expected to be temporary and not expected to reduce the fitness of Arctic ringed and Beringia DPS bearded seals.

Life history transmitter tags

Life history tags (LHX or LHX2) will be surgically implanted in the abdominal cavity of Arctic ringed seals and Beringia bearded seals; up to 2 LHX2 tags into 20 seals per species of all age classes, excluding dependent pups, each year. Researchers will follow guidelines proposed by Markus Horning, the principal developer of the LHX system, who has published best practice recommendations based on results of previous studies (Horning et al. 2017).

A previous study was able to monitor 45 Steller sea lions in captivity that received LHX tags for several weeks after the surgeries, for comprehensive postoperative assessments of physiological changes, stress response, and behavioral indicators of pain. After five weeks, surgical wounds appeared healed, and the initial postoperative elevation of blood analytes had returned to pre-surgical levels. There were no differences in survival patterns between animals with implanted transmitters and animals held in captivity and then released with no transmitters (Horning et al. 2017; Shuert et al. 2015).

In 2016 the MML, in collaboration with the Alaska SeaLife Center and SeaWorld, successfully implanted dual intraperitoneal LHX2 transmitters in four adult and six subadult free-ranging harbor seals. The animals underwent implant surgery within 2–4 hours of capture and were

released 2–3 hours after recovering from anesthesia. The study analyzed seal behavior in the first 100 days post-release. Statistical tests indicated no acute (e.g., < 10-day) or chronic (e.g., > 10-day) effects for any of the behavioral metrics (haul-out, dive, and movements) analyzed.

The insertion of LHX transmitters requires surgery under anesthesia, which presents the risk of unintentional mortality. Only qualified veterinarians or other personnel with sufficient experience in the technique will perform the implant procedures. At the discretion of the attending veterinarian, animals may receive a line block local anesthetic (e.g., lidocaine, bupivacaine) and/or systemic analgesic (e.g., flunixin) to provide postoperative analgesia. Potential complications of this procedure could result from wound infection, wound dehiscence, or intraperitoneal septicemia or bacteremia. The likelihood of these will be minimized by conducting procedures in a clean and aseptic environment and by gas sterilization of transmitters in ethylene oxide. Although not expected, there is a possibility of mechanical stress on the incision site upon return to the haulout, and animals could encounter fecal matter or debris on shore.

Monitoring will include visual observations and short-range transmission of body core temperature from LHX implants to nearby receivers (<30 m), for any temperature deviations due to anesthesia-related hypothermia or elevations associated with acute inflammatory responses. In the rare event that transmissions are unavailable due to technical difficulties, animals may be released if they recover from anesthesia and there is no evidence of bleeding.

Study results suggest that LHX tags can be safely deployed in seals to collect valuable demographic data for managing and conserving these at-risk populations.

Unintentional mortality

Recognizing that there is some risk associated with the research activities, the MML requested authorization for the unintentional mortality or serious injury of up to five seals per year each species, including Arctic ringed seals and Beringia DPS bearded seals, not to exceed 15 mortalities per species over the duration of the permit. Serious injury or mortality could possibly result from capture activities, such as drowning in a net, handling, adverse reaction to drugs, infection (from sampling, tagging, or surgery), complications from a pre-existing condition, or abandonment of dependent young.

Although sedatives and anesthesia proposed for use have been applied numerous times in pinniped research activities and the risk of adverse reactions is low, some risk still remains. Of particular concern is the use of dart-delivered sedatives to capture Beringia DPS bearded seals, which includes the potential for a seal to drown if complications arise and researchers are not able to capture the darted animal or administer a counter-agent in a timely manner.

The researchers believe that the number of seals that die after capture activities is very few, if at all, but it is not possible to estimate accurately because current methods cannot distinguish mortality from transmitter loss or failure. The MML reports over 95% of seals that were tagged with satellite transmitters typically transmit data and exhibit apparently normal behavior longer

than one month after release. The tags that transmitted data for less than a month may have stopped working because the tag detached or the transmitter failed. Natural mortality would also contribute a significant portion of the short tag records, given that pup and juvenile mortality rates may exceed 3% per month, and adult mortality rates are approximately 1% per month.

Only three previous mortalities were reported during the past 20 years of harbor and ice seal research projects. Two harbor seals (working under permit for the Alaska Department of Fish and Game in 2002) and one ribbon seal (in 2007) during capture and sampling operations. The two harbor seals drowned in a monofilament tangle net during capture operations. The MML has revised their protocol to check the monofilament nets every 5 minutes (at a minimum). The single ribbon seal mortality occurred while the seal was being sampled on an ice floe. During sampling, the seal exhibited somewhat more rapid respiration than typical, and the breathing sounded raspy at times. When preparing to release the seal, it stopped breathing and they were unable to revive it. Now it is standard to have veterinary staff present during capture operations to assist with monitoring the seals during sampling and provide emergency resuscitation, if needed.

The researchers recognize that unforeseen events may occur that could result in an increased rate of unintentional mortalities, such as sampling diseased seals that may not be overtly ill, not knowing that an animal has a pre-existing condition until after the capture occurs. The request for authorized unintentional mortalities is a precautionary measure to avoid having unforeseen incidents impact continuation of research that requires significant effort and resources for work to be conducted in the remote regions of Alaska. If an increased rate of unintentional mortalities were to occur, the researchers would undergo a critical review of procedures and adjust accordingly to mitigate the impacts.

The risk of the authorized unintentional mortalities to the populations of Arctic ringed seals and Beringia DPS bearded seals is discussed in the next section.

9.3 Risk Analysis

Capture and related procedures (e.g., sedatives and instrumentation) is the authorized take category with the most associated risk from the proposed action to the health of individual Arctic ringed seals and Beringia DPS bearded seals. Research proposed by MML continues previous efforts that have captured a maximum of 81 harbor, 3 bearded, 12 ringed, 41 spotted, and 32 ribbon seals in one year. Requested takes are larger than the number captured in the past because MML plans to conduct additional effort in comparison to past years. Increased effort is driven by the critical need to research subarctic and Arctic species due to concerns related to climate change. Even with considerably increased effort, the capture of 150 Arctic ringed seals and 150 Beringia DPS bearded seals does not seem likely based on evidence provided in MML reports.

The most severe consequence from the proposed action would be unintentional mortality. The occurrence of up to 5 annual unintentional mortalities per seal species does not seem likely when considering that MML has reported only three previous mortalities during the past 20 years of

harbor and ice seal research projects. The current proposed research is expected to have greater efforts than in the past, therefore potentially increasing the unintentional mortality rate, and the ongoing unusual mortality event (UME) highlights the possibility of sampling diseased seals which can add unforeseen complications. As previously noted, if an increased rate of unintentional mortalities were to occur, the researchers would undergo a critical review of procedures and adjust accordingly to mitigate the impacts. The likelihood of having up to 15 unintentional mortalities over the duration of the permit seems extremely low.

Stock assessments for marine mammals that occur in Alaskan waters are conducted by the NMFS Alaska Fisheries Science Center to support conservation management and fulfill MMPA requirements. As previously stated, there is uncertainty regarding population wide abundance estimates for Arctic ringed seals and Beringia DPS bearded seals, but the most recent 2019 report contains information used to create minimum population estimates (N_{MIN}) and then subsequently calculates potential biological removal (PBR). As directed in the MMPA, the PBR is calculated as "...the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population."

An abundance estimate for the entire Beringia DPS bearded seal stock cannot be determined because reliable abundance estimates are not available for the Chukchi and Beaufort seas. Using the 2012 Bering Sea abundance estimate by Conn et al. (2014), an N_{MIN} of 273,676 bearded seals was calculated for the U.S. Bering Sea (Muto et al. 2020). Using that N_{MIN}, a PBR for bearded seals that overwinter and breed in the U.S. Bering Sea = 8,210 seals (Muto et al. 2020). A total of 15 unintentional mortalities of Beringia DPS bearded seals for the duration of the proposed permit would be 0.005% of the N_{MIN} for just the Bering Sea. Up to 5 annual unintentional mortalities of Beringia DPS bearded seals is 0.06% of the PBR for the Bering Sea.

An abundance estimate for the entire Arctic ringed seal stock of ringed cannot be determined because reliable estimates of abundance are not available for the Chukchi and Beaufort Seas. Using the 2012 Bering Sea abundance estimate by Conn et al. (2014), an N_{MIN} of 158,507 ringed seals was calculated for the U.S. Bering Sea (Muto et al. 2020). Using that N_{MIN}, a PBR for ringed seals in the U.S. Bering Sea = 4,755 seals (Muto et al. 2020). A total of 15 unintentional mortalities of Arctic ringed seals for the duration of the proposed permit would be 0.009% of the N_{MIN} for just the Bering Sea. Up to 5 annual unintentional mortalities of Arctic ringed seals is 0.1% of the PBR for the Bering Sea.

The loss of up to 5 individual seals annually, or up to 15 total seals over 5 years, represents a minute percentage of conservative estimates of N_{MIN} or PBR from a portion of the US range for Arctic ringed seals and Beringia DPS bearded seals. Such small numbers are not expected to have a measurable effect on the population size or viability of either of these ESA-listed seals.

10 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.

During the writing of this opinion, we searched for information on future state, tribal, local, or private (non-Federal) actions that were reasonably certain to occur in the action area. Based on our search of electronic media, including state agency information, we did not find information regarding additional state or private activities that are likely to occur in the action area during the foreseeable future that were not considered in the *Environmental Baseline* of this opinion.

11 INTEGRATION AND SYNTHESIS

The *Integration and Synthesis* section is the final step in our assessment of the risk posed to species as a result of implementing the proposed action. In this section, we add the *Effects of the Action* (Section 9) to the *Environmental Baseline* (Section 8) and the *Cumulative Effects* (Section 10) to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) appreciably reduce 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 the Species Likely to be Adversely Affected* (Section 7). For this consultation, only the risk to ESA-listed Arctic ringed seals and Beringia DPS bearded seals are discussed in this section, as effects were determined to not likely to adversely affect proposed critical habitat for Arctic ringed seals and this no designated or proposed critical habitat for Beringia DPS bearded seals.

The Arctic ringed seal and Beringia DPS bearded seal were listed as threatened under the ESA because the species are at risk of becoming endangered in the future due to change in sea ice resulting from changes in climate. Lack of population data across the range of these threatened seal populations precludes accurate estimates of population abundance and therefore analysis of population trends. Available evidence does indicate both species have relatively large population sizes, providing resilience to environmental perturbations and stressors including oil and gas exploration, shipping and transportation, subsistence hunting, fisheries interactions, pollution, and scientific research, as well as to unexplained mortality events.

The Permits Division proposes the issuance of Permit No. 23858 to MML for scientific research on harbor and ice associated seals, that includes the Arctic ringed seals and Beringia DPS bearded seals. The action area covers all coastal and offshore regions of Alaska. The research proposed for authorization would have both sublethal and lethal effects on these ESA-listed seals.

Activities that will be conducted under the proposed permit, including sampling and tagging, external and internal instrumentation, are likely to have adverse effects on individual animals but are not likely to result in loss of fitness of these animals. Aerial surveys are likely to affect Arctic ringed and Beringia DPS bearded seals due to the potential to provoke a behavioral response to the aircraft, but the effects of are expected to be brief and minor.

Aspects of research activities proposed for authorization have the potential to result in unintended mortalities, primarily related to captures of seals and the use of sedatives and anesthesia. Additional complications arise if seals are suffering from disease that is not noticeable prior to capture and drug administration. The authorization of up to 5 unintentional mortalities per year, up to 15 total during the 5 year permit, of each species will result in a reduction in numbers of each species. The loss of individuals that may be sexually mature also represent a loss of reproduction at an individual level. As discussed in the Risk Analysis (Section 9.3), the proposed unintentional mortalities would be an extremely small percent of either seal population based on conservative partial stock abundance calculations.

The minimum estimated mean annual level of mortality and serious injury from human related causes between 2013 and 2017 for Arctic ringed seals is 2.4 in U.S. commercial fisheries, 697 in the Alaska Native subsistence harvest, and 0.4 from permitted scientific research (Muto et al. 2020). Authorized oil and gas projects (Section 8.8) could result in up to 5 annual unintentional Arctic ringed seal mortalities. The mortalities from these human activities added to the 5 unintentional mortalities in the proposed research request adds up to 710 Arctic ringed seals annually, which is only 14% of the PBR for ringed seals in the U.S. Bering Sea (PBR: 4,755 seals) (Muto et al. 2020).

The oil and gas project authorizations (Section 8.8) do not include any Beringia DPS bearded seal mortalities. The minimum estimated mean annual level of mortality and serious injury from human related causes between 2013 and 2017 for Beringia DPS bearded seals is 1.6 in U.S. commercial fisheries, 549 in the Alaska Native subsistence harvest, and 0.4 from permitted scientific research (Muto et al. 2020). The mortalities from these human activities added to the 5 unintentional mortalities in the proposed research request adds up to 556 Beringia DPS bearded seals annually, which is only 7% of the PBR for bearded seals in the U.S. Bering Sea (PBR: 8,210 seals) (Muto et al. 2020) .

Future state or private actions are likely to continue and some potentially to increase in the action area. These cumulative effects include oil and gas exploration, shipping and transportation, hunting, fishing, and terrestrial development activities that lead to the transport of pollutants to marine waters.

Considering the status of Arctic ringed seals and Beringia DPS bearded seals, the environmental baseline and the effects of the action, we do not expect the proposed research activities to result in a significant reduction in numbers or reproduction of these ESA-listed seals or a change in the distribution of either population. Therefore, we expect that the proposed action will not

appreciably reduce the likelihood of both survival and recovery of ringed Arctic ringed seals and Beringia DPS seals in the wild.

12 CONCLUSION

After reviewing the current status of the ESA-listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS's biological opinion that the proposed action is not likely to jeopardize the continued existence of Arctic ringed seals or Beringia DPS bearded seals.

13 INCIDENTAL TAKE STATEMENT

Definitions of take, harm and harass are provided in Section 9.2.1 of this opinion. Incidental take is take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Section 7(o)(2) of the ESA provides 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 research activities associated with the issuance of Permit No. 23858 involve directed take for the purposes of scientific research. We do not expect the proposed action will incidentally take other threatened or endangered species.

14 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 provide the following conservation recommendations to further protect ringed and bearded seals from stressors associated with the proposed research activities and obtain information for future consultations involving the issuance of permits that may affect ESA-listed marine mammals:

- Researchers should consider a phased in approach for the use of the implanted life history transmitters (LHX/LHX2). For example, the first year of permitted research should implant the devices in no more than 10 seals of each ESA-listed species.
- The Permits Division should work to establish protocols for data sharing among all permit holders. Many researchers already collaborate, but having a national standard for data sharing among all researchers permitted by NMFS will reduce impacts to trusted resources by minimizing duplicative research efforts. We recommend basic reporting information be required from each researcher including the species, location, number of individuals, and age, sex, and identity (if known) at the expiration of each permit. This

information would further inform the tracking of impacts of multiple research activities on ESA-listed pinnipeds.

- The Permits Division's current permit tracking allows tracking of individual permit takes. For the purpose of 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. The Permits Division should 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. Such aggregate take tracking would be better enable us to evaluate the impacts of multiple, simultaneous research efforts on ESA-listed species.
- We recommend the MML consult with the ESA Interagency Cooperation Division on the funding and/or carrying out their research activities, in addition to the Permits and Conservation Division for the proposed issuance of scientific research permits, as they are also part of the same Federal agency that should ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or destroy or adversely modify their designated critical habitat.

In order for the 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.

15 REINITIATION NOTICE

This concludes formal consultation for the Permits Division's issuance of Permit No. 23858. Consistent with 50 C.F.R. §402.16 (a), reinitiation of formal consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and:

(1) The 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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17 APPENDIX A – PERMIT NO. 23858

The text below was taken directly from the proposed permit provided to us in the consultation package from the Permits and Conservation Division. The final permit may have minor changes that should not affect this opinion.

Permit No. 23858

Effective Date: March 26, 2021

Expiration Date: March 25, 2026

Reports Due: June 26, annually

PERMIT TO TAKE PROTECTED SPECIES[9] FOR SCIENTIFIC PURPOSES

I. Authorization

This permit is issued to National Marine Fisheries Service (NMFS) Marine Mammal Laboratory, 7600 Sand Point Way, NE, Seattle, Washington 98115, (hereinafter "Permit Holder", Responsible Party: John Bengtson, Ph.D.), pursuant to the provisions of the Marine Mammal Protection Act of 1972 as amended (MMPA; 16 U.S.C. 1361 *et seq.*); the regulations governing the taking and importing of marine mammals (50 CFR Part 216); the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq*.); and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226).

II. Abstract

The objectives of the permitted activity, as described in the application, are to investigate the foraging ecology, population abundance and trends, population structure, habitat requirements, health, vital rates, and effects of natural and anthropogenic factors for seals in the North Pacific Ocean, Bering Sea, Arctic Ocean and coastal regions of Alaska.

III. Terms and Conditions

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

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

A. Duration of Permit

1. Personnel listed in Condition C.1 of this permit (hereinafter "Researchers") may conduct activities authorized by this permit through March 25, 2026. This permit may be extended by the Director, National Marine Fisheries Service (NMFS) Office of Protected Resources or the Chief, Permits and Conservation Division (hereinafter "Permits Division"), pursuant to applicable regulations and the requirements of the MMPA and ESA.

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

   a. If serious injury or mortality[10] of protected species reaches that specified in Table 1 of Appendix 1.

   b. If authorized take[11] is exceeded in any of the following ways:

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

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

[10] 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.

[11] 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.

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

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

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

1. The table in Appendix 1 outlines the authorized species and stock or distinct population segment (DPS); number of animals to be taken; number of animals from which parts may be received, imported and exported; and the manner of take, locations, and time period.

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

3. The Permit Holder may use visual images and audio recordings collected under this permit, including those authorized in Table 1 of Appendix 1, in printed materials (including commercial or scientific publications) and presentations provided the images and recordings are accompanied by a statement indicating that the activity was conducted pursuant to NMFS ESA/MMPA Permit No. 23858. 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 of Pinnipeds

a. For pinnipeds observed on land during ground, vessel, and aerial surveys, count 1 take per animal per day for those animals that react to the permitted activities in these ways:

i. Movements of twice the animal's body length or more,

ii. Changes of direction greater than 90 degrees, or

iii. Retreats (flushes) to the water.

b. For pinnipeds observed in water during ground, vessel, and aerial surveys, count 1 take per animal per day for those that exhibit a noticeable adverse behavioral response from your activities.

c. Count every animal netted or captured even if immediately released.

d. Do not count takes of pinnipeds as you are transiting between locations and not actively conducting research or enhancement.

Manned Aerial Surveys

e. Researchers must conduct manned aerial surveys at an altitude of 400 feet or higher.

Unmanned Aircraft Systems (UAS)

f. Researchers may use up to one fixed wing or vertical take-off and landing UAS at a time.

g. Researchers must operate UAS at an altitude of 150 feet. The UAS may descend to no lower than 50 feet for photogrammetry purposes.

h. If animals react to the presence of UAS, Researchers must slowly increase the altitude/distance to minimize disturbance.

Capture and Handling

i. Researchers must carry out activities efficiently and use biologists experienced in capture and sampling techniques to complete the activities as quickly and safely as possible to reduce disturbance and minimize handling time.

j. To the maximum extent feasible to minimize disturbance:

   i. Take target animals, retrieve carcasses, or collect opportunistic samples (e.g., scat) when other pinnipeds are not in the immediate vicinity, particularly mother/pup pairs; and

   ii. Move carcasses to a secure area away from other pinnipeds for necropsies.

k. Efforts to approach and/or capture a particular pinniped or lactating female and pup must be immediately terminated if there is any evidence that the activities may be life-threatening to the animals.

l. Researchers must take reasonable steps to identify pups of lactating females before attempting to immobilize a lactating female during permitted activities.

m. Researchers must minimize the time lactating females are removed or otherwise separated from their dependent offspring as a result of permitted activities.

n. Researchers must use sterile disposable needles, biopsy punches, and other sampling tools to the maximum extent practicable (always use disposable needles for blood sampling and injections). Researchers must thoroughly

clean and disinfect non-disposable equipment between animals and, as needed, immediately prior to each use.

o. Researchers must immediately cease permitted procedures if a pinniped is showing signs (e.g., overexertion, constant muscle tension, abnormal respiration or heart rate) that may lead to serious injury, capture myopathy, other disease conditions, or death; and monitor and treat the animal as determined appropriate by the Principal Investigator (PI), Co-Investigator (CI), or attending veterinarian.

p. Researchers must ensure that pinnipeds that have been captured and anesthetized or administered immobilizing drugs have an opportunity to recover after release without undue risk of drowning or injury from other animals.

Remote Sedation

q. Researchers must halt the use of remote sedation and in-water capture/sedation techniques and consult with NMFS if three or more pinnipeds are sedated and disappear so that their fate cannot be determined or suffer unanticipated adverse effects, including entering the water and drowning.

Salvage

r. The Permit Holder must coordinate with the NMFS Alaska Region Stranding Coordinator (phone: 907-271-3448; email: barbara.mahoney@noaa.gov) as applicable prior to collecting samples or carcasses of any dead stranded ESA-listed marine mammals. The Stranding Coordinator may require the Permit Holder to collect specific data and samples and provide these to the NMFS Alaska Regional Office.

Mortalities

s. To the maximum extent practical without causing further disturbance, researchers must monitor study sites following any disturbance (e.g., surveys or sampling activities) to determine if any animals have been seriously injured or killed, or if any pups have been abandoned. Any observed serious injury to or death of a marine mammal or observed abandonment of a dependent pup is to be reported as indicated below and in Condition E.2.

t. In the rare event a nursing pup is orphaned as a result of any activities authorized in this permit, the pup must be humanely provided for (i.e., placed in a Stranding facility for rehabilitation or humanely euthanized). Rehabilitation must be done in consultation with the Marine Mammal Health and Stranding Response Program (MMHSRP) and under the authority of the MMHSRP permit. Pups that are euthanized count against the total number of animals authorized for unintentional mortality in Appendix 1, Table 1.

u. 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.2. 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.

Euthanasia

v. An experienced veterinarian or qualified researcher must conduct the euthanasia. After necropsy, parts not retained from pinnipeds chemically euthanized must be collected for environmentally safe disposal.

w. In the event a pinniped is euthanized, a written incident report must be submitted to the Chief, Permits Division in accordance with Condition E.2.

Non-target Species

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

Sea Otters:

y. For activities in areas where sea otters may be encountered, the Permit Holder or PI must follow these conditions to prevent interactions with sea otters:

i. Obey all speed zones and drive slowly in all areas with sea otters. Boat strikes are a cause of death for sea otters.

ii. If sea otters are observed prior to an encounter, avoid approaching them directly and maintain a minimum distance of 20 meters (66 feet) at all times.

iii. If sea otters approach, place boat engines in neutral and allow the animals to pass.

iv. If the sea otters are located during aerial surveys, altitudes should be increased to 500 feet and surveys should cease if the sea otters appear to be affected by the over flight.

z. During capture events in waters where sea otters may be present, the Permit Holder or PI must follow these conditions to prevent interactions with sea otters:

i. Netting activities must cease if a sea otter is sighted within 100 meters.

ii. If a sea otter is accidentally captured:

i. Devote all staff efforts to freeing the animal. Remember that a sea otter must surface approximately every few minutes. The Permit Holder or PI shall brief all participants to ensure that they understand that freeing a sea otter can be dangerous. This briefing will caution people to keep fingers out of the nets, that no jewelry should be worn, that sea otters can reach all parts of their body with their mouth (due to their lack of blubber and need to constantly groom) and deliver a bite that could result in serious injury, and that they give the animal adequate time and room to breathe as they are freeing it.

ii. As appropriate, turn off the vessel motors or put the engine in neutral. Propellers can seriously injure or kill sea otters.

iii. Release tension on the net to allow the animal the opportunity to free itself. Exercise caution when attempting to assist the animal. Sea otters can thrash violently if captured or entangled in a net. Quick action is essential to protect the sea otter.

Ensure that the animal does not escape with net still attached to it.

iv. Contact the USFWS offices to report any gear or vessel interactions with sea otters.

aa. If a sea otter is injured or killed during research activities, in addition to the requirements in Condition A.2.b above,:

i. Research must be suspended and the U.S. Fish and Wildlife Service (USFWS) immediately contacted (see contact information below); and

ii. Within 30 days of the injury or mortality, a report detailing the circumstances that led to the injury or mortality and suggesting measures to prevent or minimize the chances of future injuries or mortalities must also be sent to: USFWS Division of Management Authority (DMA) (phone: 1-800-358-2104; fax: 703-358-2281, e-mail: Permits@fws.gov); and the USFWS Ventura Fish and Wildlife Office (VFWO), 2493 Portola Road, Suite B, Ventura, CA 93003,(805-644-1766), Lilian_Carswell@fws.gov.

iii. In the event of a death of a sea otter, a necropsy should be performed by a qualified veterinarian and details of the cause of death included in the written report in 6.b. above.

iv. The USFWS may subsequently recommend continuation of the suspended activities with any necessary modifications/conditions.

Pacific Walruses:

bb. For activities in areas where Pacific walruses may be encountered, the Permit Holder or PI must follow these conditions to prevent interactions with walruses:

i. Avoid concentrations or groups hauled out onto land or ice and conduct activities at the maximum distance possible from known or observed concentrations of animals.

ii. Drive slowly in all areas with walruses and steer around the animals when observed in water. Boat strikes can result in death.

iii. Avoid multiple changes in direction and speed and do not restrict the animals' movements.

iv. If walruses approach, place boat engines in neutral and allow the animals to pass.

cc. If a walrus is injured or killed while conducting the activities authorized under this permit:

i. Such activity must be suspended unless it would result in the death of the animal(s) being rescued.

ii. Immediately contact the USFWS for instruction (see contact information below).

iii. For any activities which result in the injury or death of a walrus, a written report must be submitted to USFWS Division of Management Authority (DMA) and the appropriate regional or field office (see contact information below) within 30 days detailing the circumstances that led to the injury or mortality and suggesting measures to prevent or minimize the chances of future injuries or mortalities. A necropsy (if applicable) should be performed by a qualified veterinarian and details of the cause of death included in the written report.

iv. The USFWS may subsequently recommend continuation of the suspended activities with any necessary modifications/conditions.

Polar Bears:

dd. For activities in areas where polar bears may be encountered, the Permit Holder or PI must follow these conditions to prevent interactions with polar bears:

i. Be alert to potential presence of polar bears, visually monitor the area and adjacent waters.

ii. Avoid individuals, family groups, or larger aggregations of polar bears on land, ice, and water. Conduct activities at the maximum distance possible from individuals or known or observed concentrations of animals.

iii. Do not use nets if polar bears are in the water, are on land within 1 mile of the coast, or are on barrier islands and associated spits.

iv. Navigate slowly, steer around polar bears, and do not force the bears to change direction when observed in the water.

v. Avoid multiple changes in direction and speed and do not restrict the animals' movements.

vi. Do not conduct activities within a mile of known or suspected polar bear dens.

ee. If a polar bear is injured or killed while conducting the activities authorized under this permit:

i. Such activity must be suspended unless it would result in the death of the animal(s) being rescued.

ii. Immediately contact the USFWS for instruction (see contact information below).

iii. For any activities which result in the injury or death of a polar bear, a written report must be submitted to USFWS Division of Management Authority (DMA) and the appropriate regional or field office (see contact information below) within 30 days detailing the circumstances that led to the injury or mortality and suggesting measures to prevent or minimize the chances of future injuries or mortalities. A necropsy (if applicable) should be performed by a qualified veterinarian and details of the cause of death included in the written report.

iv. The USFWS may subsequently recommend continuation of the suspended activities with any necessary modifications/conditions.

6. The Permit Holder must comply with the following conditions, and the regulations at 50 CFR 216.37, for biological samples[12] acquired[13] 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 per Conditions at B.6.d.

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

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

      ii. Date of collection or acquisition;

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

      iv. Origin (i.e., where collected from); and

      v. Legal authorization for original sample collection.

   c. For temporary transfers:

      i. The Permit Holder may designate Authorized Recipients (ARs) for analysis and curation of samples related to the permit objectives. The Permit Holder must maintain a record of the transfer including the following:

         1. Name and affiliation of the AR;

         2. Address of the AR;

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

[12] 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.
[13] Authorized methods of sample acquisition are specified in Appendix 1.

4. Type of analysis; and

5. Whether samples will be consumed in analysis, returned to the Permit Holder, curated, or destroyed.

ii. The Permit Holder must provide a written copy of the AR designation and the permit per Condition D.3 when transferring samples to the AR.

iii. Samples remain in the legal custody of the Permit Holder while in the possession of ARs. The Permit Holder remains responsible for the samples, including any reporting requirements.

d. For permanent transfers: If the Permit Holder wishes to permanently transfer marine mammal samples (i.e., relinquish custody) recipients must have separate authorization pursuant to 50 CFR 216.37 (e.g., permit, regional authorization letter) prior to transfer.

e. Samples cannot be bought or sold.

f. After meeting the permitted objectives, the Permit Holder may continue to possess and use biological samples acquired under this permit, including after permit expiration, without additional written authorization. The samples must be maintained as specified in the permit and a copy of the permit must be kept with the samples forever.

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 – Peter Boveng, Ph.D.

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

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

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

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

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

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

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

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

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

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

c. Individuals included for training purposes.

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

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

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

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

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

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

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

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

8. Submit requests to add CIs or change the PI by one of the following:

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

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

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

D. Possession of Permit

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

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

   a. Engaged in a permitted activity.

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

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

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

E. Reporting

1. The Permit Holder must submit incident and annual 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 APPS 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 APPS.

c. Additional information on reports can be found at https://www.fisheries.noaa.gov/national/reports-protected-species-permits.

2. Incident Reporting

a. If a serious injury or mortality occurs/the total number of mortalities is reached, or authorized takes have been exceeded as specified in Conditions A.2 and B.5, 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 March 26th to March 25th) must:

    a. Be submitted by June 25th each year for which the permit is valid, and

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

4. A joint annual/final report including a discussion of whether the objectives were achieved must be submitted by June 25, 2026, or, if the research concludes prior to permit expiration, within 90 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 upon request.

F. Notification and Coordination

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

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

    a. Notification must include the following:

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

        ii. Estimated dates of activities; and

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

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

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.

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

G. Observers and Inspections

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

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

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

H. Modification, Suspension, and Revocation

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

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

   a. In order to make the permit consistent with a change made after the date of permit issuance with respect to applicable regulations prescribed under Section 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[14] from the Permit Holder;

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

   e. If NMFS determines that the authorized activities will operate to the disadvantage of threatened or endangered species or are otherwise no longer consistent with the purposes and policy in Section 2 of the ESA.

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

I. Penalties and Permit Sanctions

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

[14] 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.

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.

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 Date

Director, Office of Protected Resources

National Marine Fisheries Service

_____ _____

John Bengtson, Ph.D. Date

Director, Marine Mammal Laboratory

Responsible Party

Appendix 1: Tables Specifying the Kind(s) of Protected Species, Location(s), and Manner of Taking

Table 1. Annual takes of pinnipeds. Research may occur year-round in all of coastal Alaska, as well as offshore in the Bering (including international waters within the "donut hole"), Chukchi, Beaufort, and Okhotsk Seas, and includes rivers and lakes (e.g., Iliamna Lake).

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
1	Seal, bearded	Beringia	Male and Female	250	1	Harass	Survey, aerial	Count/survey; Photogrammetry; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	Aerial survey (manned and unmanned)
2	Seal, harbor	Range-wide	Male and Female	6000	1	Harass	Survey, aerial	Count/survey; Photogrammetry; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	Aerial survey (manned and unmanned)
3	Seal, ribbon	Alaska Stock	Male and Female	45	1	Harass	Survey, aerial	Count/survey; Photogrammetry; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	Aerial survey (manned and unmanned)
4	Seal, ringed	Range-wide	Male and Female	4000	1	Harass	Survey, aerial	Count/survey; Photogrammetry; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	Aerial survey (manned and unmanned)
5	Seal, spotted	Alaska Stock	Male and Female	170	1	Harass	Survey, aerial	Count/survey; Photogrammetry; Photograph/Video; Remote vehicle, aerial (fixed wing); Remote vehicle, aerial (VTOL)	Aerial survey (manned and unmanned)

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
6	Sea lion, Steller	East of 144° Long (Eastern US)	Male and Female	500	1	Harass	Survey, aerial	Incidental disturbance	Incidental disturbance during harbor seal surveys
7	Seal, bearded	Beringia	Male and Female	3000	1	Harass	Survey, ground	Incidental disturbance	During capture activities and sample collection (e.g., scat collection independent of captures)
8	Seal, harbor	Range-wide	Male and Female	5500	1	Harass	Survey, ground	Incidental disturbance	During capture activities and sample collection (e.g., scat collection independent of captures)
9	Seal, ribbon	Alaska Stock	Male and Female	3000	1	Harass	Survey, ground	Incidental disturbance	During capture activities and sample collection (e.g., scat collection independent of captures)

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
10	Seal, ringed	Range-wide	Male and Female	3000	1	Harass	Survey, ground	Incidental disturbance	During capture activities and sample collection (e.g., scat collection independent of captures)
11	Seal, spotted	Alaska Stock	Male and Female	3000	1	Harass	Survey, ground	Incidental disturbance	During capture activities and sample collection (e.g., scat collection independent of captures)

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
12	Seal, bearded	Beringia	Male and Female	90	1	Capture/ Handle/Release	Net, other	Acoustic, active playback/broadcast; Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Capture and instrumentation - no intentional recaptures.

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
13	Seal, bearded	Beringia	Male and Female	20	2	Capture/ Handle/ Release	Net, other	Acoustic, active playback/broadcast; Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Intentional recapture and intentional 2nd take

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
14	Seal, bearded	Beringia	Male and Female	20	1	Capture/ Handle/ Release	Net, other	Acoustic, active playback/broadcast; Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Remote dart captures

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
15	Seal, harbor	Range-wide	Male and Female	210	1	Capture/ Handle/ Release	Net, other	Acoustic, active playback/broadcast; Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	.Capture and instrumentation - no intentional recaptures.

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
16	Seal, harbor	Range-wide	Male and Female	20	2	Capture/ Handle/ Release	Net, other	Acoustic, active playback/broadcast; Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Intentional recapture and intentional 2nd take

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
17	Seal, harbor	Range-wide	Male and Female	20	1	Capture/ Handle/ Release	Net, other	Acoustic, active playback/broadcast; Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Instrument, internal; Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Includes instrument, internal (LHX2 tags or similar).

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
18	Seal, ribbon	Alaska Stock	Male and Female	110	1	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Capture and instrumentation - no intentional recaptures.

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
19	Seal, ribbon	Alaska Stock	Male and Female	20	2	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Intentional recapture and intentional 2nd take

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
20	Seal, ringed	Range-wide	Male and Female	110	1	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Capture and instrumentation - no intentional recaptures.

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
21	Seal, ringed	Range-wide	Male and Female	20	2	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Remote vehicle, aerial (fixed-wing); Remote vehicle, aerial (VTOL); Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Intentional recapture and intentional 2nd take

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
22	Seal, spotted	Alaska Stock	Male and Female	110	1	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Capture and instrumentation - no intentional recaptures.

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
23	Seal, spotted	Alaska Stock	Male and Female	20	2	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Intentional recapture and intentional 2nd take
24	Seal, bearded	Beringia	Male and Female	5	1	Unintentional mortality	Other	Intentional (directed) mortality; Salvage (carcass, tissue, parts); Unintentional mortality	Up to 5 unintentional mortalities per species per year including humane euthanasia by an attending veterinarian; not to exceed 15 mortalities per species over duration of permit; necropsy

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
25	Seal, harbor	Range-wide	Male and Female	5	1	Unintentional mortality	Other	Intentional (directed) mortality; Salvage (carcass, tissue, parts); Unintentional mortality	Up to 5 unintentional mortalities per species per year including humane euthanasia by an attending veterinarian; not to exceed 15 mortalities per species over duration of permit; necropsy
26	Seal, ribbon	Alaska Stock	Male and Female	5	1	Unintentional mortality	Other	Intentional (directed) mortality; Salvage (carcass, tissue, parts); Unintentional mortality	Up to 5 unintentional mortalities per species per year including humane euthanasia by an attending veterinarian; not to exceed 15 mortalities per species over duration of permit; necropsy

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
27	Seal, ringed	Range-wide	Male and Female	5	1	Unintentional mortality	Other	Intentional (directed) mortality; Salvage (carcass, tissue, parts); Unintentional mortality	Up to 5 unintentional mortalities per species per year including humane euthanasia by an attending veterinarian; not to exceed 15 mortalities per species over duration of permit; necropsy
28	Seal, spotted	Alaska Stock	Male and Female	5	1	Unintentional mortality	Other	Intentional (directed) mortality; Salvage (carcass, tissue, parts); Unintentional mortality	Up to 5 unintentional mortalities per species per year including humane euthanasia by an attending veterinarian; not to exceed 15 mortalities per species over duration of permit; necropsy

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
29	Seal, bearded	Beringia	Male and Female	20	1	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Instrument, internal (e.g.,PIT); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Includes instrument, internal (LHX2 tags or similar).

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
30	Seal, ribbon	Alaska Stock	Male and Female	20	1	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Instrument, internal (e.g.,PIT); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Includes instrument, internal (LHX2 tags or similar).

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
31	Seal, ringed	Range-wide	Male and Female	20	1	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Instrument, internal (e.g.,PIT); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Includes instrument, internal (LHX2 tags or similar).

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
32	Seal, spotted	Alaska Stock	Male and Female	20	1	Capture/ Handle/ Release	Net, other	Administer drug, IM ; Administer drug, IV; Administer drug, subcutaneous; Administer drug, topical; Anesthesia, injectable sedative; Collect, molt; Collect, scat; Collect, spew; Collect, urine; Instrument, external (e.g., VHF, SLTDR); Instrument, internal (e.g.,PIT); Mark, flipper tag; Measure (standard morphometrics); Photograph/Video; Restrain, hand; Restrain, net; Sample, blood; Sample, blubber biopsy; Sample, clip hair; Sample, clip nail; Sample, fecal enema; Sample, fecal loop; Sample, fecal swab; Sample, muscle biopsy; Sample, nasal swab; Sample, ocular swab; Sample, oral swab; Sample, skin biopsy; Sample, swab all mucus membranes; Sample, vibrissae (pull); Ultrasound; Weigh	Includes instrument, internal (LHX2 tags or similar).
33	Seal, harbor	Range-wide	Male and Female	500	9999	Import/export/receive only	Import/export/receive only	Import/export/receive samples from animals sampled by this program or other collaborators	Import or export of samples collected during research or salvage
34	Seal, bearded	Beringia	Male and Female	300	9999	Import/export/receive only	Import/export/receive only	Import/export/receive samples from animals sampled by this program or other collaborators	Import or export of samples collected during research or salvage

Line	Species	Stock/ Listing Unit	Sex	Authorized Take	Takes Per Animal	Take Action	Observe / Collect Method	Procedures	Details
35	Seal, ribbon	Alaska stock	Male and Female	300	9999	Import/export/receive only	Import/export/receive only	Import/export/receive samples from animals sampled by this program or other collaborators	Import or export of samples collected during research or salvage
36	Seal, ringed	Range-wide	Male and Female	300	9999	Import/export/receive only	Import/export/receive only	Import/export/receive samples from animals sampled by this program or other collaborators	Import or export of samples collected during research or salvage
37	Seal, spotted	Alaska stock	Male and Female	300	9999	Import/export/receive only	Import/export/receive only	Import/export/receive samples from animals sampled by this program or other collaborators	Import or export of samples collected during research or salvage

Appendix 2: NMFS-Approved Personnel for Permit No. 23858.

Table 2. The following individuals are approved personnel pursuant to the terms and conditions under Section C (Qualifications, Responsibilities, and Designation of Personnel) of this permit.

Name	Role	Authorized Activities
Peter Boveng	Principal Investigator	All activities
Gavin Brady	Co-Investigator	All activities except drug administration, remote darting, instrumentation, blood, biopsy, and fecal sampling, and UAS
Michael Cameron	Co-Investigator	All activities except remote darting, internal instrumentation, biopsy, and UAS
Cynthia Christman	Co-Investigator	Aerial surveys, count/survey, collect molt/scat/spew, measure, photograph/video, hand restraint, hair and swab samples, and weigh
Paul Conn	Co-Investigator	Aerial surveys, count/survey, photograph/video
Shawn Dahle	Co-Investigator	All activities except remote darting, biopsy, and VTOL UAS
Stacy DiRocco	Co-Investigator and Veterinarian	Drug administration, internal instrumentation, blood, biopsy, hair, fecal, and swab samples, ultrasound, weigh
Stacie Hardy	Co-Investigator	Aerial surveys, count/survey, collect molt/scat/spew, measure, photograph/video, hand restraint, hair and swab samples, and weigh
John Jansen	Co-Investigator	All activities except remote darting, internal

		instrumentation, biopsy, and UAS
Shawn Johnson	Co-Investigator and Veterinarian	Drug administration, remote darting, internal instrumentation, blood, biopsy, hair, fecal, and swab samples, ultrasound, weigh
Josh London	Co-Investigator	All activities except remote darting
Brett McClintock	Co-Investigator	Aerial surveys, count/survey, photograph/video
Erin Moreland	Co-Investigator	Aerial surveys, count/survey, flipper tag, measure, photograph/video, weigh, and UAS
Erin Richmond	Co-Investigator	Aerial surveys, count/survey, photograph/video, hand restraint, hair and swab samples, weigh
Jay VerHoef	Co-Investigator	Aerial surveys, count/survey, photograph/video
Amy Willoughby	Co-Investigator	Aerial surveys, count/survey, photograph/video
Heather Ziel	Co-Investigator	All activities exceptremote darting and UAS