U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT – ALASKA

BIOLOGICAL ASSESSMENT
FOR THE
WILLOW MASTER DEVELOPMENT PLAN
NORTH SLOPE, ALASKA

SUBMITTED TO THE

NATIONAL MARINE FISHERIES SERVICE

ALASKA REGIONAL OFFICE

SUBMITTED BY

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ACRONYMS AND ABBREVIATIONS

°	degrees
AIS	Automatic Identification System
ASAMM	Aerial Survey of Arctic Marine Mammals
BA	Biological Assessment
BLM	Bureau of Land Management
CPAI	ConocoPhillips Alaska, Inc.
CRD	Colville River Delta
Db	decibel
dB re 1 μPa rms	decibel referenced to 1 microPascal root mean square
DPS	distinct population segment
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FLIR	Forward-looking infrared
HDD	horizontal directional drilling
Hz	hertz
IAP/EIS	Integrated Activity Plan/Environmental Impact Statement
IWC	International Whaling Commission
kHz	kilohertz
km	kilometer
LS	lease stipulation
MDP	Master Development Plan
MLLW	mean lower low water
MMPA	Marine Mammal Protection Act
mph	miles per hour
MSDs	marine sanitation devices
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPR-A	National Petroleum Reserve in Alaska
NPRW	North Pacific right whale
NSSRT	North Slope Spill Response Team
ODPCP	Oil Discharge Prevention and Contingency Plan
PAHs	polycyclic aromatic hydrocarbons
PBFs	primary biological factors
Project	Willow Master Development Plan Project
PSO	Protected Species Observer
rms	root mean square
ROD	Record of Decision
SPLASH	Structure of Populations, Levels of Abundance, and Status of Humpback Whales
TL	transmission loss
USACE	U.S. Army Corps of Engineers

1.0 INTRODUCTION

This Biological Assessment (BA) assesses the potential impacts on listed species and critical habitat from the Willow Master Development Plan (MDP) Project (Project). The Project as proposed by ConocoPhillips Alaska, Inc. (CPAI) is a new development on federal oil and gas leases in the northeastern area of the National Petroleum Reserve in Alaska (NPR-A), managed by the Bureau of Land Management (BLM). The majority of the proposed facilities will be located inland on leased federal lands approximately 27 miles (43.5 kilometers [km]) from Nuiqsut. Supporting infrastructure, including road connections, pipeline tie-ins, and the gravel mine site, will be located on federal and Native corporation–owned lands, on non-unitized lands within the NPR-A, and on lands or waters owned and managed by the State of Alaska.

Section 7 of the Endangered Species Act (ESA) requires federal agencies to consult with the National Marine Fisheries Service (NMFS) prior to authorization of major construction projects to ensure that federally authorized actions are not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of their critical habitat (50 CFR 402). The federal action triggering the Section 7 consultation is the land use and permit authorization by the BLM and the U.S. Army Corps of Engineers (USACE) for CPAI to construct facilities on BLM-managed lands. A Supplemental Environmental Impact Statement (EIS) is being prepared by the BLM to consider alternatives to the proponent's proposed Project under the National Environmental Policy Act (NEPA). This BA describes the BLM's preferred alternative and preferred module delivery option and their potential effects on listed species and critical habitat managed by NMFS. Figure 1 shows the Project vicinity.

On April 1, 2022, NMFS designated critical habitat for the Arctic subspecies of ringed seals in waters of the Bering, Chukchi, and Beaufort Seas (87 FR 19232) off the Alaska coast. Previously proposed Project activity in the marine environment (i.e., screeding activity at an offshore barge lightering area) has been relocated approximately 0.36 nautical miles (0.67 km) southeast to avoid this recently designated ringed seal critical habitat (Figure 1); there is no change to planned activity (Section 3.2.1.1, *Screeding*).

Figure 1. Willow Project Vicinity

2.0 CONSULTATION AND EVALUATION HISTORY

In 2020, BLM adopted its Record of Decision (ROD) for the Integrated Activity Plan/Environmental Impact Statement (IAP/EIS) for the NPR-A (BLM 2020a). The IAP/EIS ROD allocated lands available and unavailable for oil and gas leasing, exploration, and development and included required operating procedures (ROPs) and lease stipulations (LSs) that would minimize impacts from these activities. The IAP/EIS (BLM 2020b) and the accompanying ROD (BLM 2020a) included a development scenario for which NMFS concurred (NMFS 2012) with the BLM's determination that the development scenario in the IAP/EIS may affect but was not likely to adversely affect whale and seal species. BLM recently issued a new NPR-A IAP/EIS ROD (BLM 2022a) and the new ROD will not impact this Section 7 consultation when completed by NMFS.

Each permitted project within the NPR-A must undergo its own NEPA analysis and ESA consultation. The Willow MDP is such a project.

3.0 PROJECT DESCRIPTION AND ACTION AREA

3.1 Definition of the Action Area

The action area as defined by the ESA is the area directly or indirectly affected by the Project (50 CFR 402.02) and generally extends outside the Project footprint to the point where there are no measurable effects from Project activities. The Project's action area for marine activities is the estimated distance to the NMFS acoustic harassment disturbance threshold for non-impulsive noise sources (120 decibels [dB] referenced to 1 microPascal root mean square [dB re 1 μPa rms]).

To estimate the distance to the 120-dB threshold for the barge route, a source level of 170 dB re 1 μPa rms at 3.28 feet (1 meter; Blackwell and Greene 2003) was used, as well as a transmission loss (TL) of 15 log(R), resulting in an estimated distance of 7,067 feet (2,154 meters) or 1.3 miles (2.1 km). This was rounded up to 1.5 miles (2.4 km), which is a distance consistent with other NMFS ESA and Marine Mammal Protection Act (MMPA) consultations in Alaska.

The Project's action area (Figures 1 and 2) is defined as:

- The area within 1.5 miles (2.4 km) of the barge transit route (i.e., a 3-mile [4.8-km] area along the entire route). The barge transit route extends from Dutch Harbor in the Aleutian Islands and southern Bering Sea, through the Chukchi and Beaufort Seas to the barge lightering area approximately 1.8 nautical miles (3.3 km) from Oliktok Dock.
- The area within 1.5 miles (2.4 km) of the support vessel and barge lightering route from the barge lightering area to Oliktok Dock.
- The area near the diesel and seawater pipelines horizontal directional drilling (HDD) crossing beneath the Colville River.

Because the marine transit route is estimated, it is not quantified for the BA, but is considered part of the action area.

3.2 Proposed Action

Most Project actions and facilities will occur inland (Figure 1), such as 30.3 miles (48.8 km) of new gravel roads, four drill site pads, a central processing facility, operations center, airstrip with associated air traffic, a gravel mine site, and pipelines. During Project construction, materials and sealift modules will be delivered to Oliktok Dock via barges with supporting tugboats. Because only marine components of the Project will overlap with NMFS listed species, only those components are included in the Proposed Action description. (The Draft Supplemental EIS [BLM 2022b] contain detailed descriptions of onshore Project components.)

Figure 2. Willow Offshore Action Area

3.2.1 Barge Delivery to Oliktok Dock

Sealift barges will be used to delivery processing and drill site modules, as well as other bulk construction materials (e.g., pipeline pipe), to the North Slope. Barge transit routes will follow existing, regularly used marine transportation routes. Bulk materials and smaller modules will be transported to Oliktok Dock and stored on an existing gravel pad located approximately 2 miles (3.2 km) south of the dock until they are moved to the Project area the following winter. Bulk materials and smaller modules will be hauled to the Project area over existing gravel roads and the annual Alpine Resupply Ice Road. Modules too heavy to cross the Colville River on the Alpine Resupply Ice Road will be transported to the Project area over a heavy-haul ice road with a Colville River crossing near Ocean Point using a grounded ice-bridge.

Sealift barges will make deliveries to Oliktok Dock during four open-water seasons in Project Years 2 through 4 and again in Year 6.

3.2.1.1 Screeding

To facilitate sealift barge delivery, CPAI will use lightering barges to transport materials the final 1.8 nautical miles (3.3 km) to Oliktok Dock. Lightering is the process of transferring cargo between vessels to reduce a vessel's draft, allowing it to reach shallower dock or port facilities. The water depth at Oliktok Dock (about 8 feet [2.4 meters]) is too shallow to accommodate the draft of a fully loaded sealift barge. As a result, a portion of the load on each barge will be lightered onto an empty barge in approximately 10 feet (3.0 meters) of water to provide the shallower draft required to reach the dock.

During lightering and unloading of the barges at Oliktok Dock, the barges will be grounded on the seabed, which will require screeding (i.e., redistributing or contouring the existing marine sediments). Screeding is typically accomplished by dragging a metal plate fixed to a screed barge adjusted to the bottom to move the sediments in a leveling operation. The amount of material moved is generally small and localized; no sediments will be removed from the water and no new fill material will be added. An excavator may be used to assist where required; however, the bucket will not be raised above the water surface during operations. The barge lightering area will require 9.6 acres of screeding, and 2.5 acres in front of Oliktok Dock will also require screeding.

The relatively flat seafloor from screeding prevents pressure points to the barge hull during the grounded offloading. Screeding will be completed in the summer shortly before the barges arrive and will take approximately 1 week to complete with bathymetry measured afterword to confirm the seafloor surface is acceptable to the barge operator. The screeding operations will be completed at each location each sealift season, for a total of 4 summer seasons (Project Years 2 through 4 and Year 6).

3.2.1.2 Oliktok Dock Improvements

Oliktok Dock was originally constructed in the early 1980s. To accommodate the 25-foot-high side-shell sealift barges expected to be used for the Project to deliver the large processing and drill site modules, CPAI will raise the existing dock surface approximately 6 feet by adding structural components and a gravel ramp.

Raising the dock surface 6 feet and constructing the ramp will be accomplished by adding geotextile and gravel layers near the existing seawater treatment plant. Rig mats will be laid over the new gravel surface and along the top of the dock face to provide a level surface that will distribute the load of the modules as they are offloaded from the barges. Two new 50-ton bollards will be installed at the dock face; the bollards will be set into pre-drilled holes and pile driving will not be required.

All modifications to the Oliktok Dock will be within the dock's existing footprint. There will be no in-water work to complete the dock modifications. Dock modifications will happen during the summer of Year 3 and will take approximately 4 weeks to complete.

3.2.1.3 *Sealift Barge Transport and Support Vessels*

Sealift barges will require support by crew boats to transport personnel, tugs supporting sealift barges, and screeding barges; anticipated marine vessel traffic is summarized in Table 1 by year. The barge route will extend from Dutch Harbor to the barge lightering area along the approximate route shown in Figure 2. Barges will be supported by tugs. Barges will require 8.0 million gallons of seawater for ballast. Support vessels will travel between the lightering area and Oliktok Dock, 1.8 nautical miles (3.3 km).

Table 1. Barge and Support Vessel Traffic by Year

Marine Transport Type	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Sealift Barges - Dutch Harbor to Oliktok Dock[a]	0	0	8	0	1	**9**
Other Barges - Dutch Harbor to Oliktok Dock[b]	6	8	5	0	2	**21**
Tugs - Dutch Harbor to Oliktok Dock	9	12	20	0	9	**50**
Support Vessels - Lightering Area to Oliktok Dock[c]	66	88	106	0	25	**285**
Total Vessels	**81**	**108**	**139**	**0**	**37**	**365**

[a] Includes large-module sealift barges only
[b] Includes barges for small modules and bulk materials (i.e., material small enough that it can be transported to the Willow area via the Alpine annual resupply ice road)
[c] Includes crew boats, tugs supporting sealift barges, screeding barge, and other support vessels

3.2.2 Colville River Pipeline Crossings

The Willow Pipeline will carry sales-quality crude oil processed at the Willow processing facility to a tie-in with the existing Alpine sales oil pipeline near Alpine CD4N (Figure 1). From there, the Project will use existing infrastructure (i.e., the existing pipeline crossing of the Colville River just north of the Arctic Slope Regional Corporation mine site) to move the sales oil to the Trans Alaska Pipeline System.

The Project will also construct seawater and diesel pipelines, which will be installed beneath the Colville River using HDD in winter. The HDD crossing of the Colville River will be located near existing facilities constructed for the Alpine Sales Pipeline HDD crossing and will require one new gravel pad on each side of the river where the pipeline transitions from aboveground to belowground on either side of the river. Each pipeline will be approximately 60 feet (18 meters) apart. Pipelines will be insulated and placed within an outer pipeline casing, which will inhibit heat transfer to permafrost, contain fluids in the event of a leak or spill, and provide structural integrity. A third HDD bore for a smaller pipe will provide for anodes for cathodic protection to decrease potential corrosion in the buried pipes. The three pipes will be about 30-feet apart each other and located approximately 400 feet downstream (north) of the existing Alpine sales pipeline HDD crossing. The pipelines and casing pipes will meet leak detection standards stipulated in 18 AAC 75.047 and 18 AAC 75.055.

The HDD process will involve drilling a borehole under the river large enough to accommodate the pipeline. The HDD entry and exit locations will be set back more than 300 feet (90 meters) from the riverbanks, and the total borehole length will be approximately 4,490 feet (1,370 meters). The depth below the river channel bottom at the center of the HDD crossing will be approximately 70 feet (21 meters). Throughout the process of drilling and enlarging the borehole, a slurry made of naturally occurring nontoxic materials (typically bentonite clay and water) will be circulated through the drilling tools to lubricate the drill bit, remove drill cuttings, and hold the borehole open. Pipeline sections will be staged and welded together to form segments long enough to pull through the entire HDD crossing once the borehole is complete. Drill cuttings and drilling fluids (also called mud) from the HDD process will not be discharged to surface water or the tundra but will be transported to an existing permitted underground injection control well for disposal or will be temporarily stored until an on-site Class I underground injection control disposal well is operational.

The HDD crossing will be constructed during the winter of Project Year 4 using two single-season ice pads (approximately 42 total acres), with one on each side of the Colville River. Infrastructure on the gravel pads will include a rectifier (west bank only) to support cathodic protection systems equipment (i.e., anti-corrosion system) and thermosyphons (east and west banks). The pads will be elevated to elevated to protect them against ice and high-water events.

3.2.3 Spill Prevention and Response

Though the likelihood of a spill from an onshore Project facility reaching the marine environment would be very low (approaching zero), spill prevention and response measures will be in place should an event occur. Onshore facilities will be designed to mitigate spills, and CPAI will implement a pipeline maintenance and inspection program and an employee spill-prevention training program to further reduce the likelihood of spills. Production facility design will include provisions for secondary containment for hydrocarbon-based and hazardous materials. Spill prevention and response measures to be used during construction, drilling, and operations will be outlined in a Project Oil Discharge Prevention and Contingency Plan (ODPCP) and Spill Prevention Control and Countermeasures Plan, consistent with NPR-A ROP A-3 (BLM 2022a).

The Project's ODPCP will demonstrate readily accessible inventories of fit-for-purpose oil spill response equipment and personnel at Project facilities. In addition, a state-registered primary response action contractor will serve as CPAI's primary response action contractor and would provide trained personnel to manage all stages of a spill response, including containment, recovery, and cleanup.

Threats to rivers and streams from a possible pipeline spill will be minimized by quickly intercepting, containing, and recovering spilled oil near the waterway crossing point once detected. Valves will be installed on each side of pipeline crossings at Fish Creek and Judy (Iqalliqpik) Creek, which will isolate produced fluids pipelines on either side of the creeks to minimize the potential spill impact in the event of a pipeline leak or break. Spill response equipment will be pre-staged at strategic locations across the Project area for rapid deployment, as outlined in the Project's ODPCP. During the summer, pre-staged containment booms will be placed at strategic locations near selected river channels to facilitate a rapid response. Pre-deployed booms may also be placed within select stream channels to mitigate a spill, should one occur. During the summer, spill containment equipment will likely be staged or deployed using helicopters or boats. In the event of a spill, response measures could include helicopter and watercraft (e.g., jetboats, airboats) use to access affected areas.

Dedicated oil spill response equipment will be stored in connexes at dedicated storage locations throughout near the pipeline and HDD crossing of the Colville River. Pre-staged equipment will be placed in close proximity to facilities and infrastructure, and in areas that are easily accessible, allowing for quick deployment. This includes equipment pre-staged along the east bank of the Colville River, just north of the existing Alpine HDD pipeline crossing (CPAI 2018).

Spill response team personnel may also pre-deploy diversionary or exclusion booms in the rivers each summer including in the Colville River Delta (CRD). Specific boom-laying configurations, and exact footage lengths of booms pre-staged at each site may vary in response to seasonal changes in the river channel and weather-driven fluctuations in the river currents. At each pre-staging site, boom sections and anchors will be staged on the shoreline in a manner that optimizes its intended use for containment and recovery. Response equipment will be maintained in such a manner that it could be deployed rapidly and in a condition for immediate use. CPAI will routinely inspect and test on-site response equipment. CPAI's spill response contractor also performs routine inspection and maintenance of all response equipment. In addition to the pre-staged and pre-deployed response equipment, CPAI has additional spill response equipment stores at Alpine, Kuparuk, and Deadhorse.

CPAI provides regular training for its employees and contractors on preventing oil or hazardous material spills, in addition to other environmental and certification classes. The CPAI Incident Management Team participates in regularly scheduled training programs and conducts spill response drills in coordination with federal, state, and local agencies. Employees are encouraged to participate in the North Slope Spill Response Team (NSSRT), and as part of the NSSRT, members receive regularly scheduled spill response training to ensure the continuous availability of skilled spill responders on the North Slope.

CPAI is required to conduct visual examinations of pipelines and facility piping at least monthly during operations. CPAI will provide aerial overflights as necessary to allow both visual and forward-looking infrared (FLIR) inspection using aircraft or from the ground using handheld systems. FLIR technology can detect warm spots (i.e., oil) in low-light conditions or when other circumstances (e.g., light fog, drifted snow) limit visibility. CPAI will also conduct regular visual inspections of facilities and pipelines from gravel and ice roads, and from aircraft for sections of pipelines not paralleled by gravel roads.

3.3 Minimization, Avoidance, and Mitigation

3.3.1 Proponent's Avoidance and Minimization Measures

A complete list of CPAI's avoidance and minimization measures are in Appendix A, *Design Features to Avoid and Minimize Impacts*. Generally, these measures are intended to:

- Reduce the overall Project footprint (i.e., direct impacts from Project facilities).
- Reduce potential human health impacts (especially those relating to air quality and subsistence).
- Reduce impacts to wildlife, subsistence resources (especially caribou), and subsistence use areas.
- Reduce risks related to spills or other accidental releases.
- Reduce effects to water resources and floodplains, including marine habitat.

CPAI's design features 18, 56, 67, 79, 87, 92, 93, 94, 95, 97 through 108, and 115 will directly or indirectly prevent adverse effects to ESA species analyzed in this BA (whales, sea lions, and seals) and minimize the destruction or adverse modification of critical habitat (Appendix A).

3.3.2 Applicable Existing Lease Stipulations and Required Operating Procedures

Table 2 summarizes existing NPR-A IAP LSs and ROPs that will apply to the Project and are intended to mitigate impacts to wildlife from development activity (BLM 2022a). The LSs and ROPs will reduce impacts to species and habitats protected by the ESA associated with the construction, drilling, and operation of oil and gas facilities. Full text of the LS and ROP requirements is provided in the NPR-A IAP/EIS ROD (BLM 2022a).

Table 2. Summary of Applicable Existing Lease Stipulations and Required Operating Procedures Intended to Mitigate Impacts to Species and Habitats Protected by the Endangered Species Act

LS or ROP	Description or Objective	Requirement or Standard
ROP A-1	Protect the health and safety of oil and gas field workers and the general public by disposing of solid waste and garbage in accordance with applicable federal, State, and local law and regulations.	Areas of operation shall be left clean of all debris.
ROP A-2	Minimize impacts on the environment from non-hazardous and hazardous waste generation. Encourage continuous environmental improvement. Protect the health and safety of oil field workers and the general public. Avoid human-caused changes in predator populations.	Lessees/permittees shall prepare and implement a comprehensive waste management plan for all phases of exploration and development, including seismic activities. The plan shall be submitted to the AO for approval, as part of a plan of operations or other similar permit application. Waste generation shall be addressed in the following order of priority: 1) prevention and reduction, 2) recycling, 3) treatment, and 4) disposal. The plan shall consider the following requirements: a. The plan shall identify precautions that are to be taken to avoid attracting wildlife to food and garbage. b. Requirements prohibit the burial of garbage. Users shall have a written procedure to ensure that the handling and disposal of putrescible waste will be accomplished in a manner that prevents the attraction of wildlife. All putrescible waste shall be incinerated, backhauled, or composted in a manner approved by the AO. All solid waste, including incinerator ash, shall be disposed of in an approved waste-disposal facility. The burial of human waste is prohibited. c. BLM requires all pumpable solid, liquid, and sludge waste be disposed of by injection in accordance with EPA, ADEC, and AOGCC regulations and procedures. d. BLM prohibits wastewater discharges or disposal of domestic wastewater into bodies of water, including wetlands, unless authorized by a National Pollutant Discharge Elimination System or State permit.
ROP A-3	Minimize pollution through effective hazardous-materials contingency planning.	A hazardous materials emergency contingency plan shall be prepared before transportation, storage, or use of fuel or hazardous substances. The plan shall include a set of procedures to ensure prompt response, notification, and cleanup in the event of a hazardous substance spill or threat of a release. The plan shall include a list of resources available for response. In addition, contingency plans shall include requirements to: a. Provide refresher spill-response training to NSB and local community spill-response teams on a yearly basis b. Plan and conduct a major spill-response drill annually c. Develop spill prevention and response contingency plans and participate in the North Slope Subarea Contingency Plan [superseded by the Alaska Inland Area Contingency Plan] for Oil and Hazardous Substances Discharges/Releases for the NPR-A operating area.

LS or ROP	Description or Objective	Requirement or Standard
ROP A-4	Minimize the impact of contaminants on fish, wildlife, and the environment, including wetlands, marshes, and marine waters, as a result of fuel, crude oil, and other liquid chemical spills. Protect subsistence resources and subsistence activities. Protect public health and safety.	Before initiating any oil and gas or related activity or operation, develop a comprehensive spill prevention, control, and countermeasure plan per 40 CFR 112. The plan shall consider the following requirements: a. Sufficient oil-spill-cleanup materials shall be stored at all fueling points and vehicle-maintenance areas and shall be carried by crews on all overland moves. b. Fuel and other petroleum products and other liquid chemicals shall be stored in proper containers at approved locations. Fuel, petroleum products, and other liquid chemicals that in total exceed 1,320 gallons shall be stored within an impermeable lined and diked area or within approved alternate storage containers. Within 500 feet of waterbodies, fuel containers are to be stored within appropriate containment. c. Liner material shall be compatible with the stored product and capable of remaining impermeable during typical weather extremes expected throughout the storage period. d. Permanent fueling stations shall be lined or have impermeable protection. e. All fuel containers shall be marked with the responsible party's name, product type, and year filled or purchased. f. Notice of any reportable spill (as required by 40 CFR 300.125 and 18 AAC 75.300) shall be given to the authorized officer as soon as possible, but no later than 24 hours after occurrence. g. All oil pans (i.e., “duck ponds”) shall be marked with the responsible party’s name.
ROP A-5	Minimize the impact of contaminants from refueling operations on fish, wildlife, and the environment.	Refueling of equipment within 500 feet (150 meters) of the active floodplain of any waterbody is prohibited. Fuel storage stations shall be located at least 500 feet (150 meters) from any waterbody with the exception that small caches (up to 210 gallons [795 liters]) for motorboats, float planes, ski planes, and small equipment.
ROP A-9	Reduce air quality impacts.	All operations (vehicles and equipment) that burn diesel fuels must use “ultra-low sulfur” diesel as defined by the EPA.

LS or ROP	Description or Objective	Requirement or Standard
ROP A-10	Prevent unnecessary or undue degradation of the lands and protect health.	This measure includes the following elements: a. BLM may require a project proponent to provide a minimum of one year of baseline ambient air monitoring data for any pollutants of concern. If BLM determines baseline monitoring is required, this pre-analysis data must meet ADEC and EPA air monitoring standards and cover the year prior to the submittal. b. BLM may require monitoring for the life of the project, depending on the potential air emissions' magnitude, proximity to a federal Class I area, Class II area, or population center, proximity to a non-attainment or maintenance area, meteorological or geographic conditions, existing air quality conditions, existing area development, or issues identified during the project's NEPA analysis. c. For an application to develop a potential substantial air pollutant emission source, the proponent shall prepare an emissions inventory that includes quantified emissions of regulated air pollutants from all direct and indirect sources related to the proposed project. d. For an application to develop a potential substantial air pollutant emission source, BLM may require the proponent to provide an emissions reduction plan. e. For an application to develop a potential substantial air pollutant emission source, the AO may require air quality modeling analyzing the project's direct, indirect or cumulative impacts to air quality. The modeling shall compare predicted impacts to all applicable local, State, and federal air quality standards and increments, as well as other scientifically defensible significance thresholds. f. BLM may require air quality mitigation measures and strategies within its authority, in addition to regulatory requirements and proponent committed emission reduction measures. g. If ambient air monitoring indicates project-related emissions are causing or contributing to impacts that would cause undue degradation, exceedances of NAAQS, or fail to protect health, the AO may require changes to reduce emissions. h. Publicly available reports on air quality baseline monitoring, emissions inventory, and modeling results shall be provided by the project proponent to the NSB and to local communities and Tribes.
ROP E-5	Minimize impacts of the development footprint.	Facilities shall be designed and located to minimize the development footprint. Issues and methods to be considered include: a. Use of maximum extended-reach drilling for production drilling. b. Sharing facilities with existing development. c. Collocation of all oil and gas facilities, except airstrips, docks, and seawater-treatment plants, with drill pads. d. Integration of airstrips with roads. e. Use of gravel-reduction technologies (e.g., insulated or pile-supported pads). f. Coordination of facilities with infrastructure in support of offshore development. Note: Where aircraft traffic is a concern, consideration shall be given to balancing gravel pad size and available supply storage capacity with potential reductions in the use of aircraft to support oil and gas operations.
ROP E-19	Provide information to be used in monitoring and assessing wildlife movements during and after construction.	GIS-compatible shapefiles of all new infrastructure construction shall be provided to the AO. Infrastructure includes all gravel roads and pads, facilities built on pads, pipelines and independently constructed powerlines.

LS or ROP	Description or Objective	Requirement or Standard
LS K-5	*Coastal Area Setbacks* Protect coastal waters and their value as fish and wildlife habitat (including, but not limited to, that for waterfowl, shorebirds, and marine mammals), minimize hindrance or alteration of caribou movement within caribou coastal insect-relief areas; protect the summer and winter shoreline habitat for polar bears, and the summer shoreline habitat for walrus and seals; prevent loss of important bird habitat and alteration or disturbance of shoreline marshes; and prevent impacts to subsistence resources and activities.	a. Drill pads and central processing facilities would not be allowed in coastal waters or on islands between the northern boundary of the NPR-A and the mainland, or in inland areas within 1 mile (1.6 km) of the coast. Other facilities necessary for oil and gas production within NPR-A that necessarily must be within this area (e.g., barge landing, seawater treatment plant, or spill response staging and storage areas) would not be precluded. Lessees/permittees shall consider the practicality of locating facilities that necessarily must be within this area at previously occupied sites such as various Husky/USGS drill sites and Distant Early Warning-Line sites. Before conducting open water activities, the lessee shall consult with the Alaska Eskimo Whaling Commission, NSB, and local whaling captains' associations to minimize impacts to subsistence whaling activities. b. Marine vessels used as part of a BLM-authorized activity shall maintain a 1-mile (1.6-km) buffer from the shore when transiting past an aggregation of seals, Steller's sea lions, or walruses using a terrestrial haulout. Marine vessels shall not conduct ballast transfers or discharge any matter into the marine environment within 3 miles (4.8 km) of the coast, except when necessary for the safe operation of the vessel.

Source: BLM 2022a

Note: AO (authorized officer); AOGCC (Alaska Oil and Gas Conservation Commission); BLM (Bureau of Land Management); ADEC (Alaska Department of Environmental Conservation); EPA (U.S. Environmental Protection Agency); GIS (geographic information system); km (kilometers); LS (lease stipulation); NAAQS (National Ambient Air Quality Standards); NEPA (National Environmental Policy Act); NPR-A (National Petroleum Reserve in Alaska); NSB (North Slope Borough); ROP (required operating procedure).

Due to technical constraints, some Project facilities will require deviations to ROP E-5; the deviations will not affect species covered in this BA. The Project will place new vertical support members along existing pipeline corridors due to pipe rack capacity limits (deviation to ROP E-5); the Project will separate the Project airstrip from roads due to Federal Aviation Administration regulations and operational safety concerns based on incident history at the Alpine integrated airstrip.

3.3.3 Other Mitigation

The mitigation measures below have typically been included in recent ESA consultations for oil and gas activities in the U.S. Arctic.

- Barges and support vessels will be staffed with dedicated Protected Species Observers (PSOs) to alert crew of the presence of marine mammals and to initiate adaptive mitigation responses.
- When weather conditions require, such as when visibility drops, vessel operators must reduce speed and change direction, as necessary (and as operationally practicable), to avoid the likelihood of injuring marine mammals.
- The transit of vessels is not authorized before July 1. This operating condition is intended to allow marine mammals the opportunity to disperse from the confines of spring leads in sea ice and minimize interactions with subsistence hunters. Exemption waivers to this operating condition may be issued by NMFS on a case-by-case basis, based on a review of seasonal ice conditions and available information on marine mammal distributions in the area.
- The marine transit route will avoid NMFS-identified, known fragile ecosystems.
- Vessels may not be operated in such a way as to separate members of a group of marine mammals from other members of the group.
- Operators should take reasonable steps to alert other vessel operators in the vicinity of marine mammals.
- Operators should report any dead or injured listed marine mammals to NMFS.

- Vessels will not allow tow lines to remain in the water, and no trash or other debris will be thrown overboard, thereby reducing the potential for marine mammal entanglement.
- Vessels will implement measures to minimize risk of spilling hazardous substances. These measures will include avoiding operation of watercraft in the presence of sea ice to the extent practicable and using fully operational vessel navigation systems composed of radar, chart plotter, sonar, marine communication systems, and satellite navigation receivers, as well as the Automatic Identification System (AIS) for vessel tracking.
- Vessel operators should avoid groups of 3 or more whales. A group is defined as being 3 or more whales observed within a 1,650-foot (500-meter) area and displaying behaviors of directed or coordinated activity (e.g., group feeding).
- All nonessential boat and barge traffic will be scheduled to avoid periods when bowhead whales are migrating through the area to where they may be affected by sound from the Project. Any non-essential boat, barge, or aircraft will be scheduled to avoid approaching the harvest area around Cross Island during the bowhead whale subsistence hunting season consistent with the Conflict Avoidance Agreement.
- If a vessel approaches within 1 mile (1.6 km) of observed whales, except when providing emergency assistance to whalers or in other emergency situations, the operator will take reasonable precautions to avoid potential interaction with the whales by taking one or more of the following actions, as appropriate:
    - Reducing vessel speed to less than 5 knots (5.8 miles per hour [mph]) within 900 feet (275 meters) of the whale.
    - Steering around the whale, if possible.
    - Operating the vessel to avoid causing a whale to make multiple changes in direction.
    - Checking the waters around the vessel to ensure that no whales will be injured when the propellers are engaged.
    - Reducing vessel speed to 9 knots (10.4 mph) or less when weather conditions reduce visibility to avoid the likelihood of injury to whales.
    - Vessels shall not exceed speeds of 10 knots (11.5 mph) in order to reduce potential whale strikes.
    - If a whale approaches the vessel and if maritime conditions safely allow, the engine will be put in neutral and the whale will be allowed to pass beyond the vessel. If the vessel is taken out of gear, vessel crew will ensure that no whales are within 165 feet (50 meters) of the vessel when propellers are re-engaged, thus minimizing risk of marine mammal injury.
    - Vessels will stay at least 1,000 feet (300 meters) away from cow-calf pairs, feeding aggregations, or whales that are engaged in breeding behavior.
- Consistent with NMFS marine mammal viewing guidelines (https://alaskafisheries.noaa.gov/pr/mm-viewing-guide), vessel operators will, at all times, avoid approaching marine mammals within 300 feet (90 meters). Operators will observe direction of travel and attempt to maintain a distance of 300 feet (90 meters) or greater between the animal and the vessel by working to alter course or slowing the vessel.
- If a listed marine mammal is struck by a vessel, it must be reported to NMFS within 24 hours. The following will be included when reporting vessel collisions with marine mammals:
    - Information that will otherwise be listed in the PSO Observation Record.
    - Number and species of marine mammals involved in the collision.
    - The date, time, and location of the collision.
    - The cause of the take (e.g., vessel strike).
    - The time the animal(s) was first observed and last seen.
    - Mitigation measures implemented prior to and after the animal was taken.
    - Contact information for PSO on duty at the time of the collision, ship's pilot at the time of the collision, or ship's captain.

- Special consideration of North Pacific right whale (NPRW) and their critical habitat:
  - Vessel operators will avoid transit in NPRW critical habitat. If this cannot be avoided, operators must exercise caution and reduce speed to 10 knots (11.5 mph) while in NPRW critical habitat.
  - Vessels transiting through NPRW critical habitat must have PSOs sighting marine mammals. Vessel operators will maneuver to keep 2,625 feet (800 meters) away from any observed NPRW, while within their designated critical habitat, and avoid approaching whales head-on, consistent with vessel safety.
  - Operators will maintain a ship log indicating the time and geographic coordinates at which vessels enter and exit NPRW critical habitat.
  - Sightings of NPRW (within or outside of NPRW critical habitat) should be reported to NMFS within 24 hours. These sighting reports will include the following information:
    - Date, time, and geographic coordinates of the sighting(s).
    - Species observed, number of animals observed per sighting event; and number of adults/juveniles/calves per sighting event (if determinable).
    - Because sightings of NPRWs are uncommon, and photographs that allow for identification of individual whales from markings are extremely valuable, photographs will be taken if feasible, but in a way that does not involve disturbing the animal (e.g., if vessel speed and course changes are not otherwise warranted, they will not take place for the purpose of positioning a photographer to take better photographs). Photographs taken of NPRWs will be submitted to NMFS.
- Vessel transit through Steller sea lion critical habitat or near major rookeries and haulouts
  - The vessel operator will not purposely approach within 3 nautical miles (5.5 km) of major Steller sea lion rookeries or haulouts where vessel safety requirements allow and/or where practicable. Vessels will remain 3 nautical miles (5.5 km) from all Steller sea lion rookery sites listed in paragraph 50 CFR 224.103(d)(1)(iii).

3.4 Schedule and Duration

Timing of the 30-year Project is based on several factors including permitting and other regulatory approvals, CPAI Project sanctioning, and the purchase and fabrication of long-lead time components. CPAI will construct the Project over approximately 8 years. Oliktok Dock improvements will be completed in Year 3 to support bulk material and module delivery by sealift barge. Sealift barges will arrive during the open-water seasons of Year 2 through Year 4 and Year 6. Each year, prior to sealift barge arrival, screeding will be completed in the barge lightering area and in front of the Oliktok Dock.

Project well drilling will begin in Year 4 and be completed by the end of Year 10. Processing and transport of produced fluids will begin in the fourth quarter of Year 5 and will last for the life of the Project (estimated to be Year 30).

The schedule is based on the current best available information and may be modified as detailed design progresses or circumstances require.

4.0 DESCRIPTION OF THE SPECIES AND THEIR HABITAT

Table 3 summarizes the listed species and critical habitat under NMFS jurisdiction that are addressed in this BA.

Table 3. Marine Mammals that May Occur in the Project Area

Species	ESA Status	Critical Habitat	Population Estimate	Occurrence in Action Area
Bowhead whale - Western Arctic stock (*Balaena mysticetus*)	Endangered	No	16,820[a] (N_{min})	Chukchi and Beaufort Seas
Blue whale - Eastern North Pacific stock (*Balaenoptera musculus*)	Endangered	No	1,647[b]	Gulf of Alaska/Bering Sea
Blue whale - Western/Central North Pacific stock (*Balaenoptera musculus*)	Endangered	No	133[b]	Gulf of Alaska/Bering Sea
Fin whale - Alaska stock (*Balaenoptera physalus*)	Endangered	No	3,168[a]	Bering and Chukchi Seas
North Pacific right whale - Eastern North Pacific stock (*Eubalaena japonica*)	Endangered	Yes	31[a]	Bering Sea
Gray whale - Western North Pacific stock (*Eschrichtius robustus*)	Endangered	No	140[c]	Bering and Chukchi Seas
Humpback whale - Western North Pacific DPS (*Megaptera novaeangliae*)	Endangered	Yes	1,107[a]	Gulf of Alaska/Bering and Chukchi Seas
Humpback whale - Mexico DPS (*Megaptera novaeangliae*)	Threatened	Yes	1,918[d]	Gulf of Alaska/Bering and Chukchi Seas
Sperm whale - North Pacific stock (*Physeter macrocephalus*)	Endangered	No	102,112[a]	Bering Sea
Ringed seal - Alaska stock of the Arctic subspecies (*Phoca hispida hispida*)	Threatened	Yes	158,507[a](N_{min})	Bering, Chukchi, and Beaufort Seas
Bearded seal - Beringia DPS/Arctic stock (*Erignathus barbatus* spp. *nauticus*)	Threatened	Yes	273,676[a] (N_{min})	Bering, Chukchi, and Beaufort Seas
Steller sea lion - Western DPS (*Eumetopias jubatus*)	Endangered	Yes	43,201[a] (N_{min})	Bering Sea

Note: > (greater than); ≥ (greater than or equal to); DPS (distinct population segment) ; ESA (Endangered Species Act).
[a] Muto et al. 2021
[b] NMFS 2018a
[c] Carretta et al. 2017
[d] Carretta et al. 2018

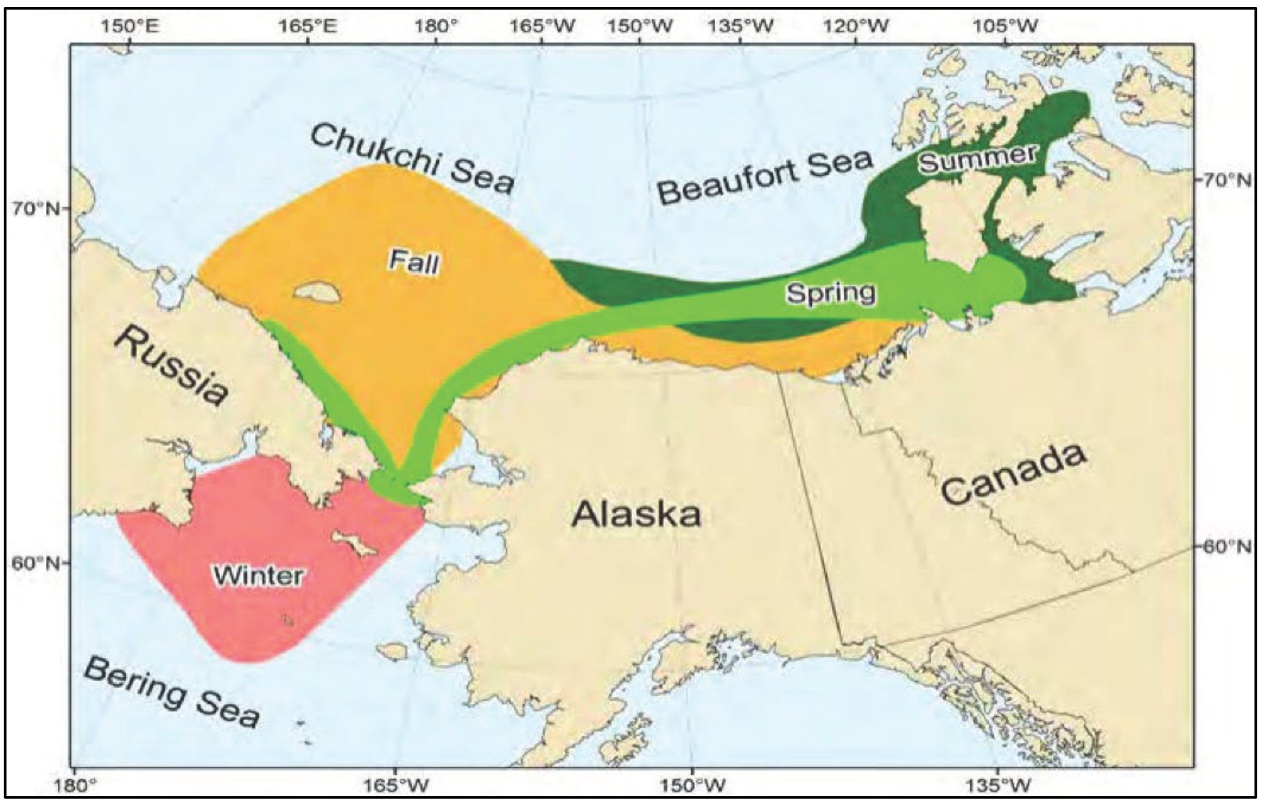
4.1 Bowhead Whale

4.1.1 Population

There are four stocks of bowhead whale (*Balaena mysticetus*) recognized globally by the International Whaling Commission (IWC), but only the Western Arctic stock, also referred to as the Bering-Chukchi-Beaufort stock or the Bering Sea stock, is found in Alaskan waters. The bowhead whale was listed as an endangered species under the ESA in 1973, and thus is considered depleted and a strategic stock under the MMPA. Historically, bowhead whales were commercially harvested, and all stocks were severely depleted. Prior to intensive commercial whaling, the Western Arctic stock was estimated between 10,400 and 23,000 individuals but was reduced to 1,000 to 3,000 individuals when commercial whaling ceased. The population increased 3.7% annually and more than tripled between 1978 and 2011, when it was estimated at 16,820 individuals (N_{min}) (Muto, Helker et al. 2021). An independent photographic identification survey in 2011 estimated 27,133 individuals (Givens, Mocklin et al. 2018); in 2018, the IWC deemed the photographic identification study’s estimate reasonable for use in the bowhead strike limit algorithm (International Whaling Commission 2018).

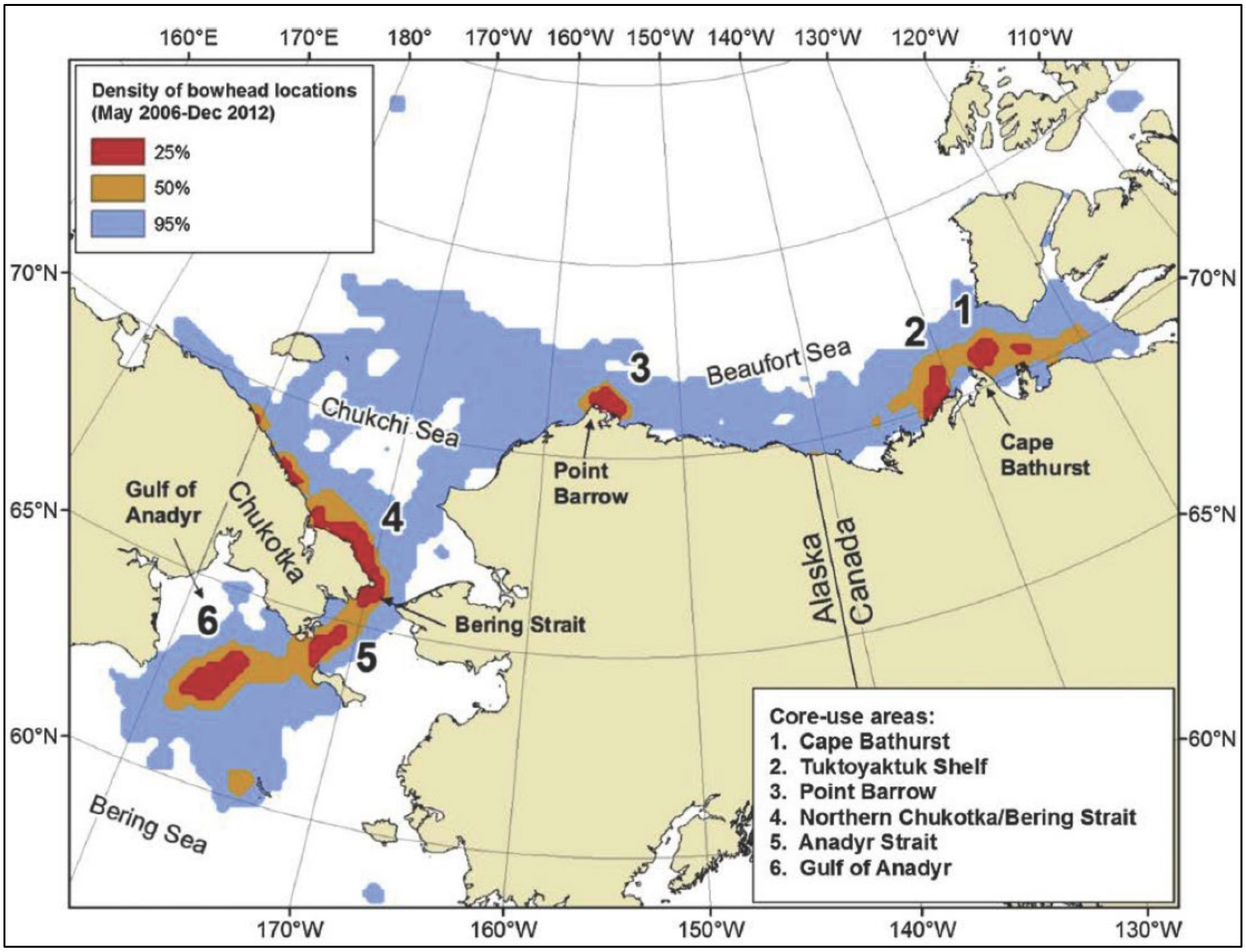
4.1.2 Distribution

Western Arctic bowhead whales are migratory and, depending upon the time of year, may be found in waters of Alaska, Canada, and Russia (Figure 3) (Quakenbush, Small et al. 2013). There are six recognized core-use areas: Cape Bathurst, Tuktoyaktuk Shelf, Point Barrow, Northern Chukotka/Bering Strait, Anadyr Strait, and the Gulf of Anadyr (Citta, Quakenbush et al. 2015) (Figure 3, Figure 4). In winter, bowheads are in the Bering Sea north of the southern sea ice boundary and regularly use areas with 100% ice cover. The spring migration begins in March and April, with most routes along the Alaska coastline through the Chukchi and Beaufort Seas corresponding with the shear zone between shorefast ice and mobile pack ice. A spring migratory corridor from the west side of St. Lawrence Island up through the Bering Strait has been identified as a Biologically Important Area (Clark, Berchok et al. 2015). Most whales pass Point Barrow between April and June on their way to the summering destination in the ice-free waters of the eastern Beaufort Sea near Cape Bathurst in Amundsen Gulf, Canada, but some whales migrate westward along the Chukotka coast and summer in the Chukchi Sea. The fall migration back to the Bering Sea typically begins between August and October, with whales in the Canadian Beaufort Sea heading west along the Alaskan coastline, passing Point Barrow and crossing the Chukchi Sea to the Chukotka coast before slowly heading south to the Bering Sea. During the fall migration, bowhead whales prefer shelf waters and are found closer to shore than to the ice edge (Druckenmiller, Citta et al. 2018). Most whales return to the Bering Sea by December. Clarke et al. (2017, 2019) report bowhead whales are observed generally outside of the 65-foot (20-meter) depth contour, or over 9.3 miles (15 km) offshore in both fall and summer in the Beaufort Sea.



Source: Quakenbush, Small et al. 2013

Figure 3. Range, Seasonal Occurrence, and Migration Corridors of Bowhead Whales in the Western Arctic Stock

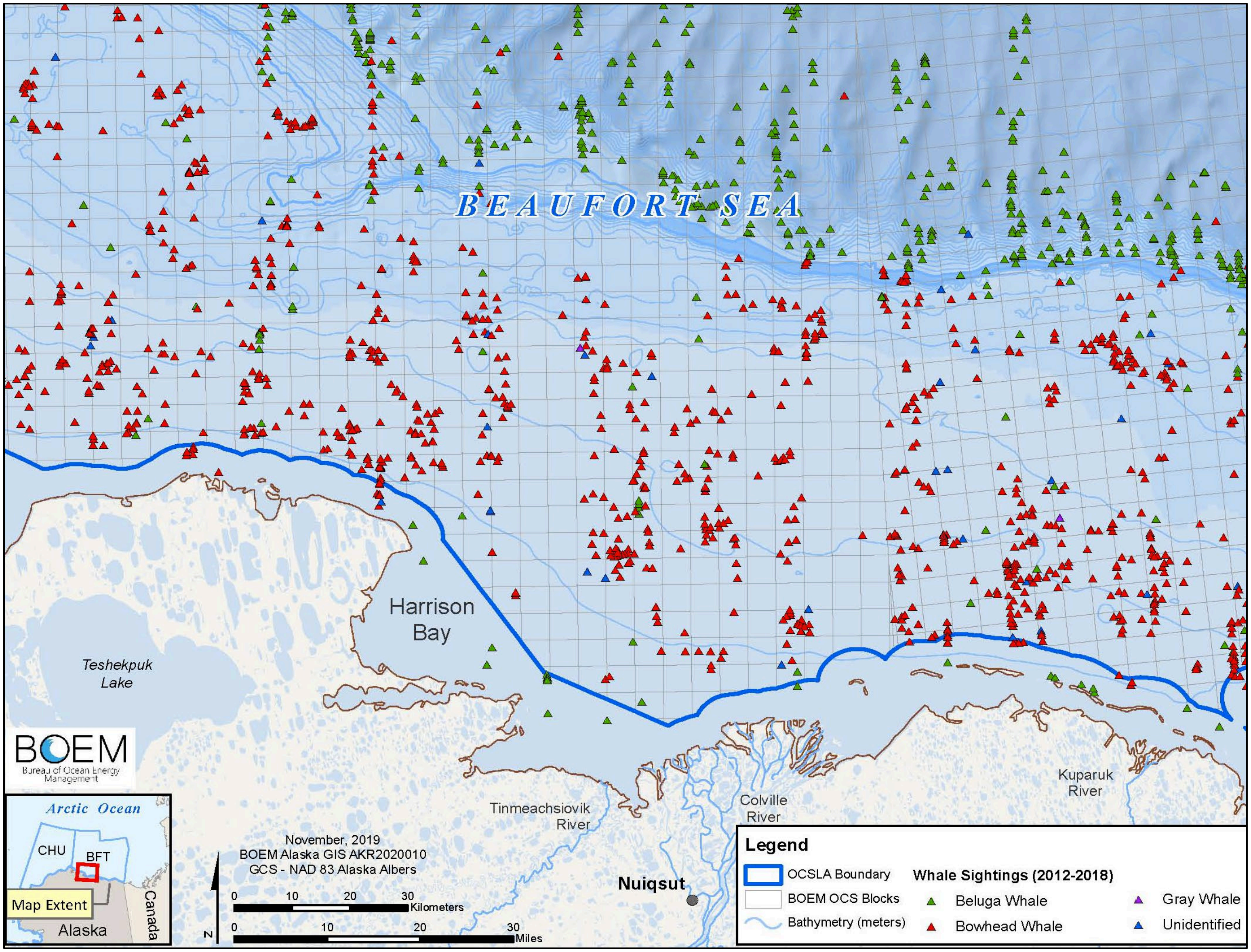


Source: Citta, Quakenbush et al. 2015

Figure 4. Locations and Density Distributions of Satellite-Tagged Bowhead Whales from the Western Arctic Stock from 2006 to 2012 and the Six Core-Use Areas

4.1.3 Distribution in Action Area

Bowhead whales could be encountered along the barge transit route in the fall as they migrate west across the Beaufort and Chukchi Seas. They migrate to the east in the spring, generally prior to when the barges will be transiting the action area. Bowhead whales have been reported all summer in Harrison Bay, although they generally remain outside of the barrier islands in waters over 65 feet (20 meters) in depth. They will not be expected to be within the action area near Oliktok Dock due to the area's shallow waters. Sightings of cetaceans in Harrison Bay for the period of 2012 through 2018 for the Aerial Survey of Arctic Marine Mammals (ASAMM) program are provided on Figure 5 (BOEM 2019a) illustrating that bowhead whales were not observed in the Oliktok Dock area.



Source: BOEM 2019a (Documented from Aerial Survey of Arctic Marine Mammals program.)

Figure 5. Cetacean Sightings in Harrison Bay Area from 2012 to 2018

4.1.4 Foraging Habitat

Bowhead whales are filter feeders that prey on zooplankton, principally on copepods and euphausiids. Dense aggregations of zooplankton are required to meet bowhead energetic requirements, resulting in bowhead whales foraging year-round, moving from one foraging location to another (Citta, Quakenbush et al. 2015). Several environmental processes drive zooplankton abundance and distribution; those processes may vary spatially and temporally, ultimately resulting in variability in bowhead whale distribution (Druckenmiller, Citta et al. 2018). But zooplankton are seasonally abundant in the six bowhead whale core-use areas, and the whales generally travel among these core-use areas in an annual circuit (Citta, Quakenbush et al. 2015). The timing of bowhead migration corresponds to when zooplankton are seasonally abundant in each core-use area. The whales' preference for shelf waters instead of deeper water is likely related to better feeding conditions, as shelf waters sometimes have elevated densities of zooplankton near the seafloor (Druckenmiller, Citta et al. 2018). As part of the ASAMM program in 2016, bowhead whales were observed feeding on the outskirts of Harrison Bay from early August through mid-September (Clarke, Brower et al. 2017). Bowhead whales typically feed in an area near Point Barrow in the late summer and fall, and feeding is not commonly observed in Harrison Bay (Figure 6).

4.1.5 Breeding and Calving Habitat

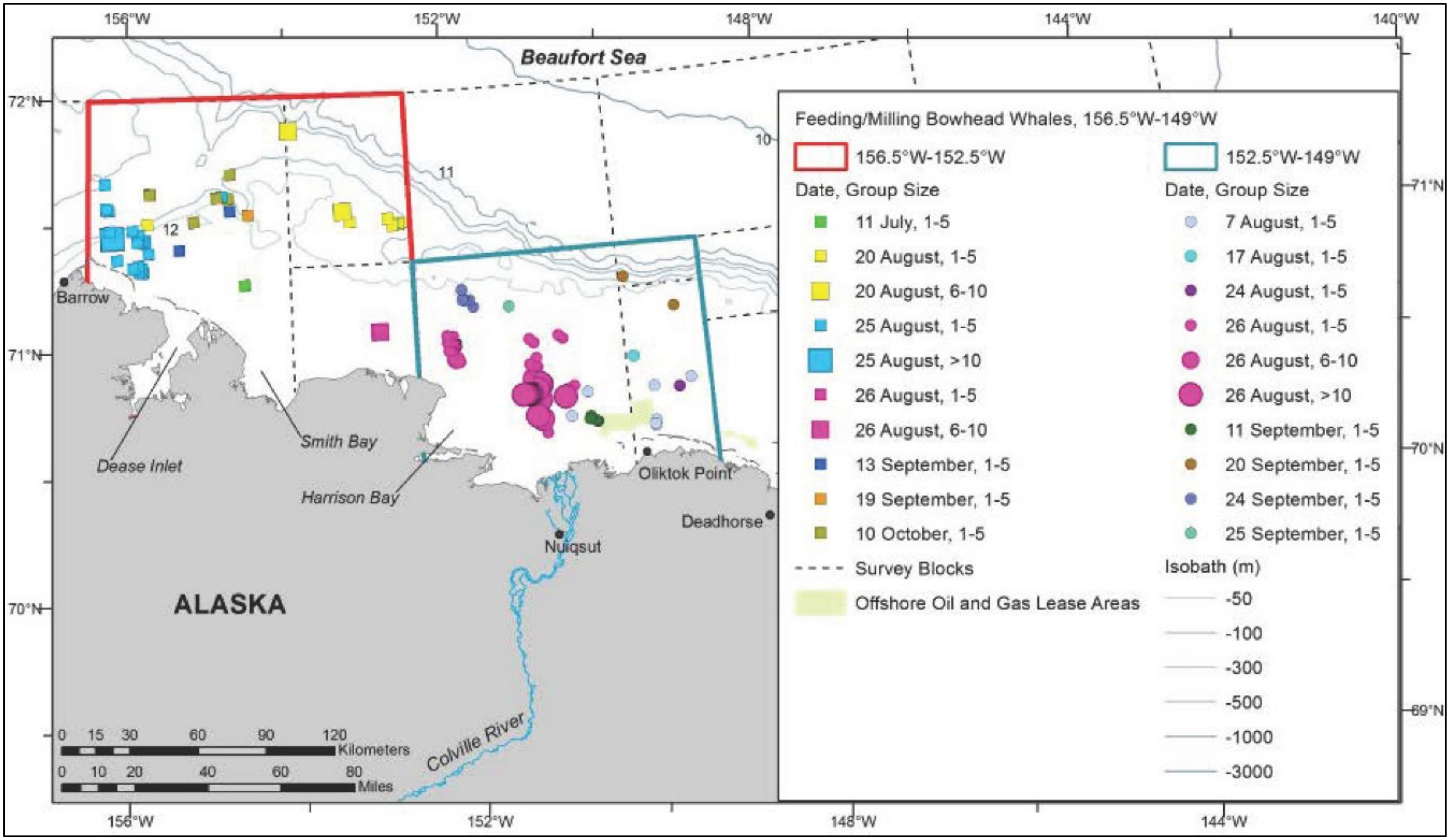
Bowhead whale mating behavior has been observed year-round, but most conceptions are believed to occur during late winter or spring, when most bowhead whales are in the Bering Sea (Muto, Helker et al. 2018). After a 13- to 14-month gestation period, most calving occurs during the spring migration, between April and early June, although mothers with calves have been reported along the Chukchi Peninsula in late March and early April (NMFS 2018b). Cows with calves are often reported in July and August during aerial surveys of the western Beaufort Sea (Muto, Helker et al. 2018).

4.1.6 Hearing

All baleen whales are categorized as low-frequency cetaceans, and no studies have directly measured the sound sensitivity of baleen whales. Instead, hearing sensitivities are extrapolated from the frequencies in which they vocalize, their behavioral responses to sounds at various frequencies, inner ear anatomy studies, and predictive models. Baleen whales are thought to be the most sensitive to sounds that range from tens of hertz (Hz) to about 10 kilohertz (kHz), with a generalized hearing range for low-frequency cetaceans of between 7 Hz and 35 kHz (NMFS 2018c; Southall, Bowles et al. 2007). Clark, Berchok et al. (2015) documented singing bowhead whales in the Bering Sea dominating the 250 to 1,000 Hz frequency band.

4.1.7 Critical Habitat

There is no critical habitat designated for bowhead whales.



Source: Clarke, Brower et al. 2017 (Documented from Aerial Survey of Arctic Marine Mammals program.)

Figure 6. Bowhead Whale Feeding and Milling Sites near Utqiaġvik (Barrow) and Harrison Bay, July through October 2016

4.2 Blue Whale

4.2.1 Population

Worldwide there are five subspecies of blue whale (*Balaenoptera musculus*). The Northern subspecies (*B. m. musculus*) includes blue whales in the north Pacific and north Atlantic. NMFS recognizes two stocks in the North Pacific: the Eastern North Pacific stock and the Western/Central North Pacific stock. Individuals from both stocks may be found in Alaska. Blue whales are listed as an endangered species under the ESA and are considered depleted and a strategic stock under the MMPA.

The best current available abundance estimate for the Western/Central North Pacific stock is 133 whales; however, this estimate is based on a survey effort of the Hawaiian Islands during the summer and fall, when the whales will be expected to be at higher latitude feeding grounds. The minimum population size is estimated to be 63 blue whales within the Hawaiian Islands Exclusive Economic Zone (EEZ). Currently, insufficient data exists to assess population trends for this stock. For the Eastern North Pacific stock, 1,647 is considered the best estimate and is based on photographic mark-recapture data from 2005 through 2011 (NMFS 2018a).

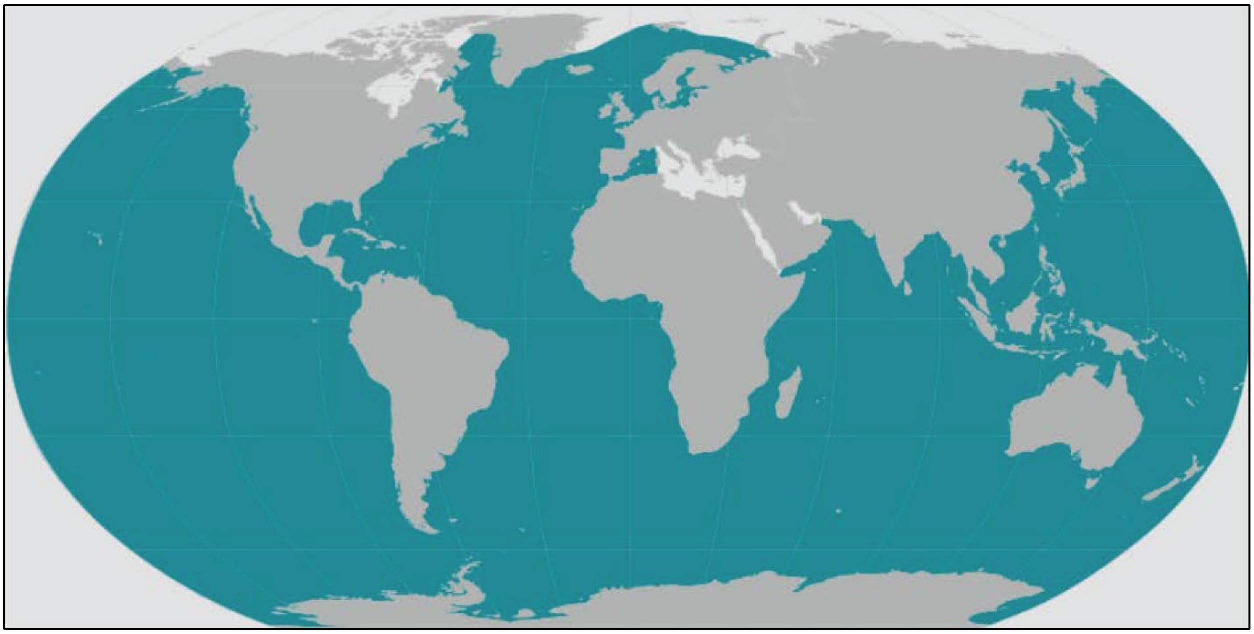
4.2.2 Distribution

Blue whales are found in all oceans except the Arctic Ocean (Figure 7), with few sightings in the Bering Sea or Sea of Okhotsk (NMFS 2018a). Branch, Palacios et al. (2016) compiled various data sets (historical catches, sighting surveys, acoustic recordings, satellite tag locations), including blue whale sightings in Alaskan waters from 1905 through 2016 and determined that most blue whales in Alaska are from the Western/Central North Pacific stock.

The Western/Central North Pacific stock inhabits waters southwest of Kamchatka, south of the Aleutians, and in the Gulf of Alaska in the summer (Stafford 2003; Watkins, Daher et al. 2000), migrating to lower latitudes in the western and central Pacific, including Hawaii, in the winter (Stafford, Nieukirk et al. 2001). The Eastern North Pacific stock includes whales found in the eastern North Pacific, from the northern Gulf of Alaska to the eastern tropical Pacific (Carretta, Forney et al. 2018). Some of these whales may range as far west as Wake Island in the western Pacific and as far south as the Equator (Stafford, Nieukirk et al. 1999, 2001).

4.2.3 Distribution in Action Area

Blue whales could be encountered along the barge transit route in the southern Bering Sea. They have not been reported in the Chukchi or Beaufort Seas, and thus will not occur near Oliktok Dock.



Source: NMFS 2019c. (Blue area depicts blue whale distribution.)

Figure 7. Worldwide Blue Whale Distribution

4.2.4 Foraging Habitat

Blue whales primarily eat krill and generally occur in areas with high concentrations of krill. Blue whales feed at both the surface and at depths over 328 feet (100 meters). This may be tied to coastal upwelling that creates high concentrations of phytoplankton (Bailey, Mate et al. 2009) or because of vertical movements of prey through the water column (NMFS 2018a).

Foraging habitat for the Western/Central North Pacific stock includes areas southwest of Kamchatka, south of the Aleutians, and in the Gulf of Alaska during the summer months (Stafford 2003). For the Eastern North Pacific stock, the U.S. west coast is one of the most important feeding areas in the summer and fall, with feeding to the north and south of this area increasing in recent years (Carretta, Forney et al. 2018). Most of this stock migrates south to high-productivity areas off Baja California, in the Gulf of California, and on the Costa Rica Dome for the winter and spring (Carretta, Forney et al. 2018).

4.2.5 Breeding and Calving Habitat

Reproductive activities, including birthing and mating, take place during the winter months. Breeding is thought to occur in unproductive, low-latitude areas (Bailey, Mate et al. 2009).

4.2.6 Hearing

All baleen whales are categorized as low-frequency cetaceans, and no studies have directly measured the sound sensitivity of baleen whales. Instead, hearing sensitivities are extrapolated from the frequencies in which they vocalize, their behavioral responses to sounds at various frequencies, inner ear anatomy studies, and predictive models. Baleen whales are thought to be the most sensitive to sounds that range from tens of Hz to about 10 kHz, with a generalized hearing range for low-frequency cetaceans of between 7 Hz and 35 kHz (NMFS 2018c; Southall, Bowles et al. 2007). Blue whales make calls at a fundamental frequency of between 10 and 40 Hz that last between 10 and 30 seconds.

4.2.7 Critical Habitat

There is no critical habitat designated for blue whales.

4.3 Fin Whale

4.3.1 Population

Fin whales in the United States have been divided into four stocks, including Hawaii, California/Oregon/Washington, Alaska (Northeast Pacific), and Western North Atlantic. Reliable population estimates for the Alaska stock are not currently available. Dedicated line-transect surveys were conducted in the offshore waters of the Gulf of Alaska in 2013 and 2015, and abundance estimates of 3,168 and 916 fin whales, respectively, were reported. The higher estimate of 3,168 fin whales calculated for the 2013 survey effort better represents a minimum abundance for this stock because it is more precise and encompasses a larger survey area. The minimum population estimate is currently 2,554 whales; however, this is based on surveys that covered a small portion of the known range, and this number is considered an underestimate for the entire stock (Muto, Helker et al. 2021).

The fin whale is listed as endangered under the ESA and depleted under the MMPA.

4.3.2 Distribution

Fin whales are widely distributed throughout the world's oceans, with the exception of the Arctic Ocean, where they have only recently begun to appear (BOEM 2015). There are discrete metapopulations in the North Atlantic, the North Pacific, and the Southern Hemisphere (Mizroch, Rice et al. 2009). Fin whales of the Alaska stock can be found in the Chukchi Sea, the Sea of Okhotsk, around the Aleutian Islands, and the Gulf of Alaska (BOEM 2015) (Figure 8). Surveys conducted along the Bering Sea shelf indicated that fin whales were the most common large whale sighted, with the whales distributed in an area of high productivity along the edge of the eastern Bering Sea continental shelf and in the middle shelf area (Friday, Waite et al. 2012; Friday, Zerbini et al. 2013; Springer, McRoy et al. 1996).

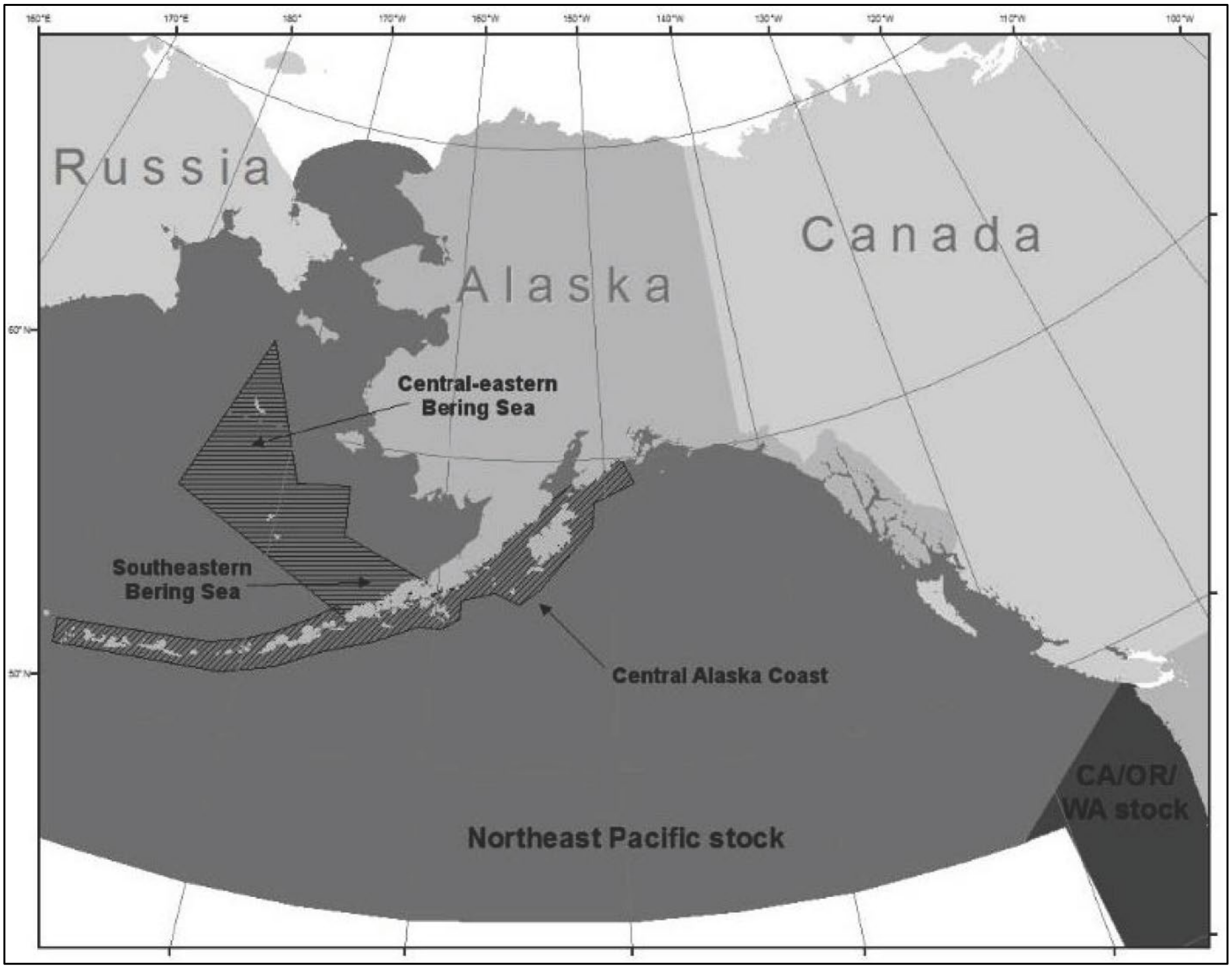
Mizroch, Rice et al. (2009) described the patterns of distribution and movements of fin whales in the North Pacific using whaling harvest records, scientific surveys, opportunistic sightings, acoustic data from offshore hydrophone arrays, and from recoveries of marked whales. Based on this information, fin whales range from the Chukchi Sea south to 35 degrees (°) North on the Sanriku coast of Honshu, to the Subarctic Boundary (42° North) in the western and central Pacific, and to 32° North off the coast of California. Fin whales have also been observed around Wrangel Island (BOEM 2015).

4.3.3 Distribution in Action Area

Fin whales could be encountered along the barge transit route in the Bering or Chukchi Seas. Fin whales have not been reported in the Beaufort Sea, and thus will not occur near Oliktok Dock.

4.3.4 Foraging Habitat

Fin whales feed on krill, small schooling fish (e.g., herring, capelin, sand lance), and squid in the summer. They feed by lunging into schools of prey with their mouth open, using throat pleats to gulp large amounts of food and water. Fin whales fast in the winter while they migrate to warmer waters. A foraging Biologically Important Area has been identified in the summer in the Bering Sea, spanning from the middle shelf domain to the slope (Ferguson, Curtice et al. 2015).



Source: Muto, Helker et al. 2018

Figure 8. Range of the Alaska (Northeast Pacific) Stock of Fin Whales; Striped Areas Represent Vessel Surveys from 1999 through 2010

4.3.5 Breeding and Calving Habitat

Little is known about fin whale social and mating systems, and breeding and calving habitat has not been studied. Females give birth to single calves in tropical and subtropical areas during the midwinter months.

4.3.6 Hearing

All baleen whales are categorized as low-frequency cetaceans, and no studies have directly measured the sound sensitivity of baleen whales. Instead, hearing sensitivities are extrapolated from the frequencies in which they vocalize, their behavioral responses to sounds at various frequencies, inner ear anatomy studies, and predictive models. Baleen whales are thought to be the most sensitive to sounds that range from tens of Hz to about 10 kHz, with a generalized hearing range for low-frequency cetaceans of between 7 Hz and 35 kHz (NMFS 2018c; Southall, Bowles et al. 2007). Fin whale vocalizations have been studied extensively. Fin whales produce a variety of low-frequency sounds in the 10 to 200 Hz band, with the most typical signals occurring in the 18 to 35 Hz range (BOEM 2015).

4.3.7 Critical Habitat

There is no critical habitat designated for fin whales.

4.4 North Pacific Right Whale

4.4.1 Population

The population of NPRWs was severely impacted by commercial whaling, primarily illegal whaling conducted by the Soviet Union in the 1960s. NPRWs have been listed as endangered under the ESA since 1970. Sightings of NPRWs in the mid-1990s prompted surveys for this species. A 2002 survey in the southeast Bering Sea documented seven right whale sightings (LeDuc 2004). In 2004, multiple right whales were located acoustically, and photographs from a subsequent vessel sighting confirmed at least 17 individuals, including 10 males and 7 females (Muto, Helker et al. 2018). NMFS conducted a dedicated vessel survey for right whales using visual and acoustic methods while following tracklines on the shelf and in deeper waters to the south and east of Kodiak Island in 2015 (Rone, Zerbini et al. 2017). Right whales were acoustically detected twice on the shelf, but none were visually observed. Wade, De Robertis et al. (2011) calculated an abundance estimate of 31 individuals in the Bering Sea and Aleutian Islands based on mark-recapture data collected from 1998 through 2008. The current minimum estimate of abundance for NPRWs is 26, based on photographic identification estimates (Muto, Helker et al. 2021).

From 2009 to 2015 acoustic moorings were deployed in the center of Unimak Pass annually. The acoustic moorings detected various types of North Pacific right whale vocalizations on 37 of 1,778 days. Vocalizations were detected across all years and seasons (Wright, Castellote et al. 2018). These acoustic detections suggest that North Pacific right whales use Unimak Pass throughout the year and that this may be important habitat for the species. North Pacific right whales have also been visually observed in and around Unimak Pass as recently as February 2022. Commercial fisherman reported sighting at least two right whales just outside of the pass in February, providing the first visual confirmation of the species in the area during that time of year (87 FR 41271; July 12, 2022).

Further, in August 2021, two pairs of North Pacific right whales were sighted by NOAA Fisheries scientists: one pair was feeding at the edge of critical habitat in Barnabas Trough area of the Gulf of Alaska, where there have been increased sightings and detections of North Pacific right whales in and around currently designated critical habitat. The other pair was in the vicinity of the southeast edge of the NMFS-designated feeding Biologically Important Area in the Gulf of Alaska. The identification of this Biologically Important Area is based on a diversity of data, recent visual sightings, and acoustic detections, and it suggests that North Pacific right whale use of areas in the Gulf of Alaska may extend beyond the currently designated critical habitat (87 FR 41271; July 12, 2022).

4.4.2 Distribution

Historically, and prior to commercial whaling activities, NPRWs were found in the Gulf of Alaska, eastern Aleutian Islands, south-central Bering Sea, Sea of Okhotsk, and Sea of Japan (Figure 9) (Muto, Helker et al. 2018). The majority of NPRW sightings have occurred from about 40° North to 60° North latitude. Most sightings of right whales in the past 20 years have been in the southeastern Bering Sea, with a few in the Gulf of Alaska (Muto, Helker et al. 2018).

Migratory patterns of NPRWs are largely unknown, although researchers suggest they migrate from high-latitude feeding grounds in the summer to more temperate waters during the winter. Vessel and aerial surveys and bottom-mounted acoustic recorders have documented right whales in the southeastern portion of the Bering Sea during most summers (Rone, Berchok et al. 2012). The whales remain in the southeastern Bering Sea from May through December, with a peak in September (Munger and Hildebrand 2004; Wright 2015). A few sightings have also been documented in the Gulf of Alaska.

4.4.3 Distribution in Action Area

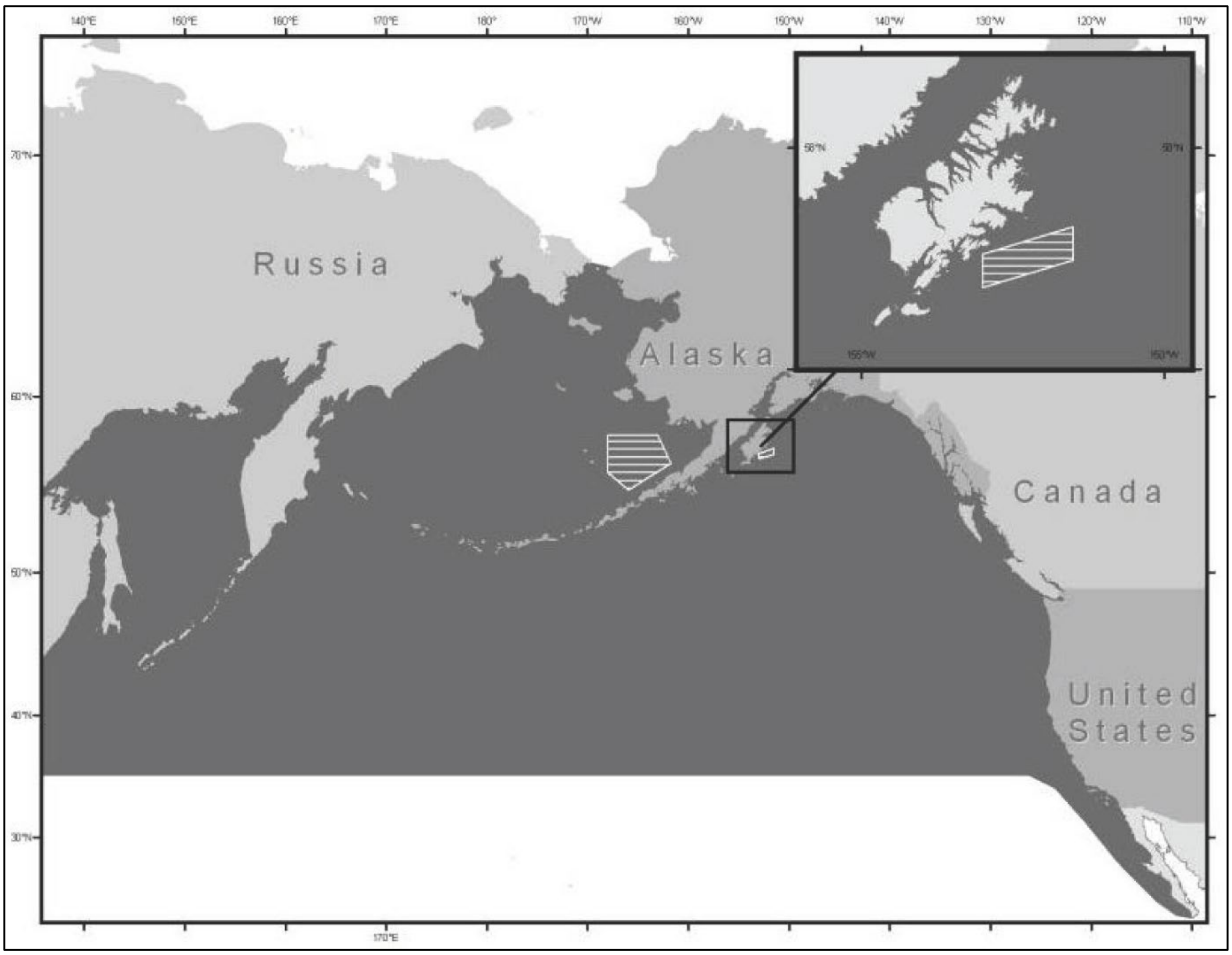
NPRWs could be encountered along the barge transit route in the Bering Sea. There is critical habitat in the barge transit route, but the route will be designed to avoid critical habitat. At the time of this publication, NMFS is undertaking a review of the currently designated critical habitat to determine whether a revision is warranted; however, no changes to critical habitat have been formalized. NPRWs have not been reported in the Beaufort Sea, and thus will not occur near Oliktok Dock.

4.4.4 Foraging Habitat

NPRWs prey upon a variety of zooplankton species, and the availability of these species greatly influences the whales' distribution on the feeding grounds in the southeastern Bering Sea. Right whales feed regularly during the spring and summer, and congregations of right whales can be found in areas with dense concentrations of copepods and other large zooplankton species.

4.4.5 Breeding and Calving Habitat

Breeding and calving habitat for NPRWs is unknown, and researchers speculate that the whales calve primarily offshore rather than in coastal waters (Clapham, Good et al. 2004).



Source: Muto, Helker et al. 2018

Figure 9. North Pacific Right Whale Range (dark shaded areas) and Current Critical Habitat (striped areas)

4.4.6 Hearing

All baleen whales are categorized as low-frequency cetaceans, and no studies have directly measured the sound sensitivity of baleen whales. Instead, hearing sensitivities are extrapolated from the frequencies in which they vocalize, their behavioral responses to sounds at various frequencies, inner ear anatomy studies, and predictive models. Baleen whales are thought to be the most sensitive to sounds that range from tens of Hz to about 10 kHz, with a generalized hearing range for low-frequency cetaceans of between 7 Hz and 35 kHz (NMFS 2018c; Southall, Bowles et al. 2007). Estimation of hearing ability based on inner ear morphology was completed for two mysticete species: humpback whale (700 Hz to 10 kHz; Houser et al. 2001) and North Atlantic right whale (10 Hz to 22 KHz; Parks, Ketten et al. 2007). North Pacific right whale vocalizations generally range from 80 to 200 Hz (McDonald and Moore 2002).

4.4.7 Critical Habitat

4.4.7.1 Description

Critical habitat for NPRWs was designated in 2006 and is located in the Gulf of Alaska and the Bering Sea (NMFS 2006), as shown in Figure 9. The Bering Sea critical habitat is delineated by the following coordinates: 58° 00′ North/168° 00′ West, 58° 00′ North/163° 00′ West, 56° 30′ North/161° 45′ West, 55° 00′ North/166° 00′ West, 56° 00′ North/168° 00′ West, and returning to 58° 00′ North/168° 00′ West. The Gulf of Alaska critical habitat is delineated by a series of straight lines connecting the following coordinates in the order listed: 57° 03′ North/153° 00′ West, 57° 18′ North/151° 30′ West, 57° 00′ North/151° 30′ West, 56° 45′ North/153° 00′ West, and returning to 57° 03′ North/153° 00′ West.

Principal habitat requirements for right whales are areas of dense concentrations of prey, such as large species of zooplankton (Clapham, Shelden et al. 2006). Potential threats to right whale habitat are linked to commercial shipping and fishing vessel activity. Fishing activity increases the risk of entanglement, while shipping activities increase the risk of vessel strikes and oil spills in right whale habitat.

The barge transit route is designed to avoid transiting through NPRW critical habitat. Vessels will follow the mitigation measures outlined in Section 3.3.3, *Other Mitigation*:

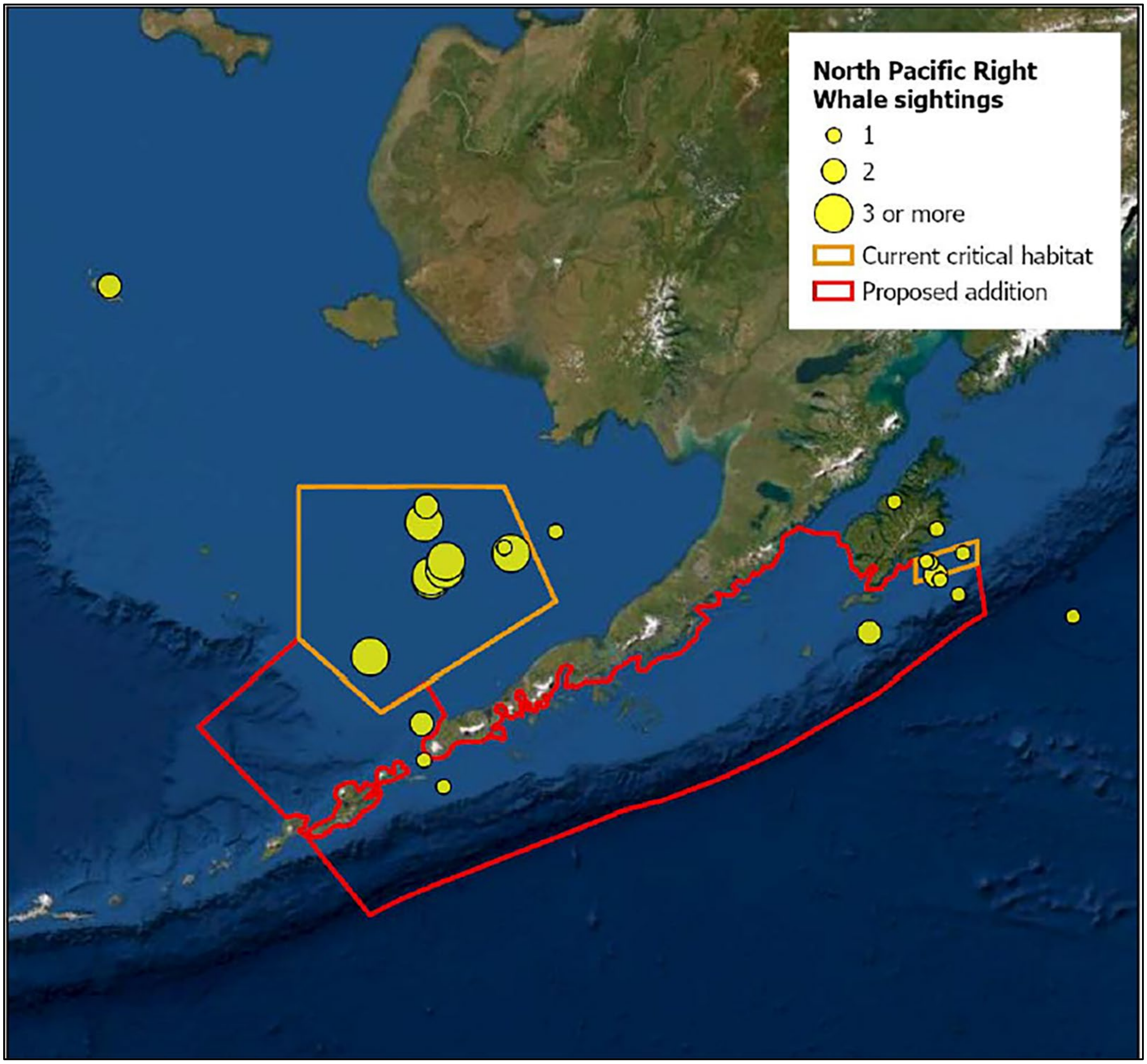
- Vessel operators will avoid transit in NPRW critical habitat. If this cannot be avoided, operators must exercise caution and reduce speed to 10 knots (11.5 mph) while in NPRW critical habitat.
- Vessels transiting through NPRW critical habitat must have PSOs sighting marine mammals. Vessel operators will maneuver to keep 2,625 feet (800 meters) away from any observed NPRW, while within their designated critical habitat, and avoid approaching whales head-on, consistent with vessel safety.
- Operators will maintain a ship log indicating the time and geographic coordinates at which vessels enter and exit NPRW critical habitat.
- Sightings of NPRW (within or outside of NPRW critical habitat) should be reported to NMFS within 24 hours.

4.4.7.2 Primary Biological Factors

NMFS considers primary biological factors (PBFs) when designating critical habitat. PBFs are characterized by “physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection.” These may include 1) space for individual and population growth (normal behavior), 2) nutritional and physiological requirements (e.g., food, water, air, light, minerals), 3) cover or shelter, and 4) breeding (e.g., reproduction, rearing of offspring) habitat protected from disturbance or of historic geographical and ecological distributions of species (NMFS 2006). The one PBF designated for the NPRW are the copepods *Calanus marshallae*, *Neocalanus cristatus*, and *N. plumchris*, and the euphausiid, *Thysanoessa raschii.* NPRW critical habitat and its associated PBFs lie outside of the action area and are unlikely to be impacted by the Project.

4.4.7.3 Proposed Critical Habitat

In July 2022, NMFS published a 90- day finding on a petition to revise the critical habitat designation for the North Pacific right whale by increasing the area (Figure 10; 87 FR 41271; July 12, 2022). Upon review of the petition, NMFS found that the petition presented new scientific information on the distribution and behavior of North Pacific right whales in the Gulf of Alaska and the Southeast Bering Sea sufficient to conclude that a revision of critical habitat may be warranted. As part of the review process and to ensure a comprehensive review, NMFS solicited scientific and commercial information from the public pertaining to this action. Information was to be provided to NMFS by September 12, 2022, and as of October 2022, NMFS is currently analyzing the information received.



Source: Center for Biological Diversity (2022)

Figure 10. The Current North Pacific Right Whale Critical Habitat Designated by NOAA Fisheries in 2008 (Gold Line) and the Requested Revision to Critical Habitat put forth by the Petitioners (Red Line)

4.5 Gray Whale

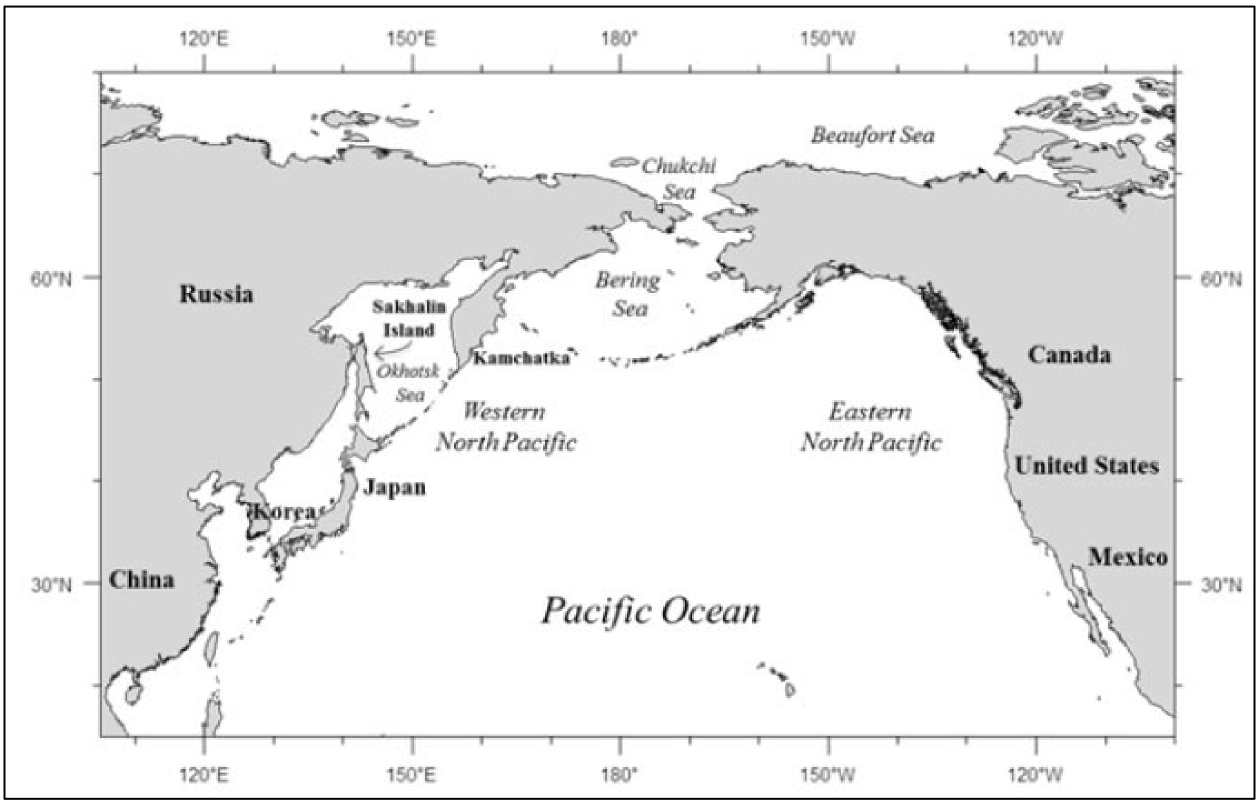
4.5.1 Population

There are two geographically isolated populations of gray whales in the North Pacific: the eastern North Pacific stock, found along the west coast of North America; and the western North Pacific, or "Korean" stock, found along the coast of eastern Asia. The western population is listed as endangered under the ESA and depleted under the MMPA. In 2012, NMFS convened a scientific task force to assess the currently recognized and emerging stock structure of gray whales in the North Pacific (Allen and Angliss 2015). They reported significant differences in both mitochondrial and nuclear DNA between whales sampled off Sakhalin Island and whales sampled in the eastern North Pacific, which provided sufficient evidence that a separate stock was warranted.

Photographic identification data collected on the summer feeding grounds off Sakhalin Island between 1994 and 2011 were used to calculate an abundance estimate of 140 non-calf whales in 2012 (Cooke, Weller et al. 2013). The western North Pacific stock remains highly depleted, and its continued survival is questionable, with a minimum population estimate of 135 gray whales (Carretta, Forney et al. 2017).

4.5.2 Distribution

Western North Pacific gray whales feed during the summer and fall in the Okhotsk Sea off northeastern Sakhalin Island, Russia; and southeastern Kamchatka in the Bering Sea (Figure 11) (Allen and Angliss 2015). Some gray whales observed feeding off Sakhalin and Kamchatka migrate during the winter to the west coast of North America in the eastern North Pacific while others migrate to areas off Asia in the western North Pacific (Allen and Angliss 2015). Figure 11 shows the whales' summering area off the coast of Russia and wintering areas in the western and eastern Pacific.



Source: Caretta, Forney et al. 2019. (All oceans within view are the current range of the species.)

Figure 11. Range of the Western North Pacific Stock of Gray Whales

4.5.3 Distribution in Action Area

The western stock of gray whales could be encountered along the barge transit route in the Bering and Chukchi Seas. The gray whales reported in the Beaufort Sea (Figure 11) are likely from the eastern stock of gray whales, which are not listed. Therefore, the western stock will not occur near Oliktok Dock.

4.5.4 Foraging Habitat

Gray whales are benthic feeders and suck sediment and amphipods from the sea floor. Western North Pacific gray whales feed during the summer and fall in the Okhotsk Sea off northeast Sakhalin Island and southeastern Kamchatka in the Bering Sea (Allen and Angliss 2015).

4.5.5 Breeding and Calving Habitat

Western North Pacific gray whales breed and calve in warmer, shallow waters off Asia in the western North Pacific.

4.5.6 Hearing

All baleen whales are categorized as low-frequency cetaceans, and no studies have directly measured the sound sensitivity of baleen whales. Instead, hearing sensitivities are extrapolated from the frequencies in which they vocalize, their behavioral responses to sounds at various frequencies, inner ear anatomy studies, and predictive models. Baleen whales are thought to be the most sensitive to sounds that range from tens of Hz to about 10 kHz, with a generalized hearing range for low-frequency cetaceans of between 7 Hz and 35 kHz (NMFS 2016, 2018c; Southall, Bowles et al. 2007). Gray whales produce knocks and pulses with most of the energy from less than 100 Hz to 2 kHz.

4.5.7 Critical Habitat

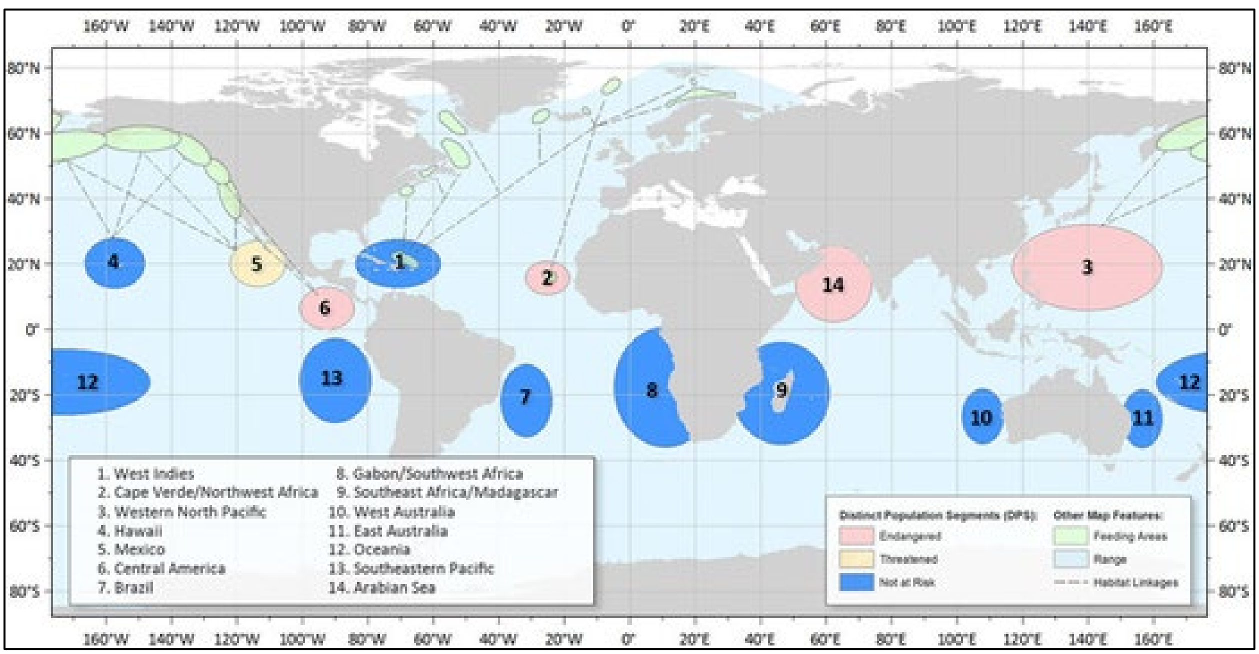
There is no critical habitat designated for gray whales.

4.6 Humpback Whale

4.6.1 Population

NMFS Stock Assessment Reports recognize three distinct stocks of humpback whales in the north Pacific Ocean based on genetic and photographic identification studies: the California/Oregon/Washington stock, the Central North Pacific stock, and the Western North Pacific stock (Muto, Helker et al. 2018).

The definition of these stocks has not yet been updated to match the distinct population segment (DPS) definitions created in the recent ESA final rulemaking for humpback whales (NMFS 2016) (Figure 12).



Source: NMFS 2019a

Figure 12. Fourteen Humpback Whale Distinct Population Segments and Each Population's Winter and Summer Feeding Areas

Individuals from the Western North Pacific DPS, the Mexico DPS, and the Hawaii DPS occur in Alaska. The Hawaii DPS was removed from listing under the ESA; the Mexico DPS was listed as threatened, and the Western North Pacific DPS was listed as endangered. Only the ESA-listed Western North Pacific

DPS and Mexico DPS are considered in this BA. Photographic identification data collected during the Structure of Populations, Levels of Abundance, and Status of Humpback Whales (SPLASH) project resulted in an abundance estimate of 1,107 whales in the Western North Pacific stock. The current minimum population estimate for the stock is 865 individuals, and abundance estimates suggest that the population is increasing at a rate of approximately 6.7% annually over the 1991 to 1993 estimates; however, this may be biased high due to the survey coverage between datasets (Muto, Helker et al. 2021).

The best estimate of abundance for the California/Oregon/Washington stock, which includes the Mexico DPS, is 1,918 whales. The minimum population estimate is 1,876 animals, and the growth rate is estimated to be 6% to 7%. These estimates are derived from combining both the California/Oregon and Washington/southern British Columbia feeding group estimates (Muto, Helker et al. 2018). The California/Oregon/Washington stock includes multiple DPSs, and the Mexico DPS population will be less than these estimates. In particular, virtually the entire Central American DPS (411 whales) migrates to California and Oregon to feed and are included in the abundance estimate for the stock (Wade, Quinn et al. 2016).

4.6.2 Distribution

The migratory destinations of the Western North Pacific DPS are not completely known. Research indicates movement between winter and spring locations off Asia, including several island chains in the western North Pacific, primarily to Russia, as well as the Bering Sea and Aleutians Islands during the summer months (Muto, Helker et al. 2018) (Figure 12). The humpback whale Mexico DPS winters in Mexico, and migrates to diverse feeding areas. Summer feeding areas for this DPS include the Aleutian Islands; the Bering, Chukchi, and Beaufort Seas; the Gulf of Alaska; southeast Alaska and northern British Columbia; southern British Columbia and Washington; and Oregon and California. Humpback whales from the Western North Pacific DPS, the Mexico DPS, and the Hawaii DPS overlap in summer feeding grounds.

4.6.3 Distribution in Action Area

Humpback whales could be encountered along the barge transit route in the Bering and Chukchi Seas; there is a very low potential for encounters in the Beaufort Sea as there are only a few sightings east of Point Barrow. Humpback whales are not expected to occur near Oliktok Dock. Sightings of cetaceans in Harrison Bay for the period of 2012 through 2018 for the ASAMM program are shown in Figure 6 (BOEM 2019a), illustrating that humpback whales were not observed in Harrison Bay or near Oliktok Dock.

4.6.4 Foraging Habitat

Humpback whales typically feed on euphausiids and small schooling fishes in shallow, cold, productive coastal waters during the summer months. Studies conducted at the Ogasawara Islands, Japan, documented movements of humpbacks between there and British Columbia (Darlings, Calambokidis et al. 1996), the Kodiak Archipelago in the central Gulf of Alaska (Calambokidis, Falcone et al. 2008) (Calambokidis, Steiger et al. 2001), and the Shumagin Islands in the western Gulf of Alaska (Witteveen, Straley et al. 2004). The SPLASH project indicated that Russia is likely the primary summer destination for Asian whales; however, some go to the Aleutian Islands, the Bering Sea, and the Gulf of Alaska (Calambokidis, Falcone et al. 2008). The majority of whales from the Mexico DPS forage in waters spanning from southern British Columbia to California (Wade, Quinn et al. 2016). Some migrate farther north to feed off of Alaska, and the probability of encountering a whale from the Mexico DPS in Alaskan waters ranges from approximately 6% to 11% (Wade, Quinn et al. 2016).

4.6.5 Breeding and Calving Habitat

Humpback whales give birth and likely mate from January to March in their wintering grounds. The winter migratory destination of the Western North Pacific DPS is not completely known but includes several island chains in the western North Pacific near Asia. Data also suggest that some whales from this DPS winter somewhere between Hawaii and Asia, possibly around the Mariana Islands, the Marshall Islands, and the northwestern Hawaiian Islands (Muto, Helker et al. 2018). The Mexico DPS aggregates in three main locations in the Mexican Pacific during the winter: the southern end of the Baja California Peninsula; the Bahia Banderas area, including the Islas Tres Marias and Isla Isabel, along the mainland Mexico; and the offshore Revillagigedo Archipelago (Wade, Quinn et al. 2016).

4.6.6 Hearing

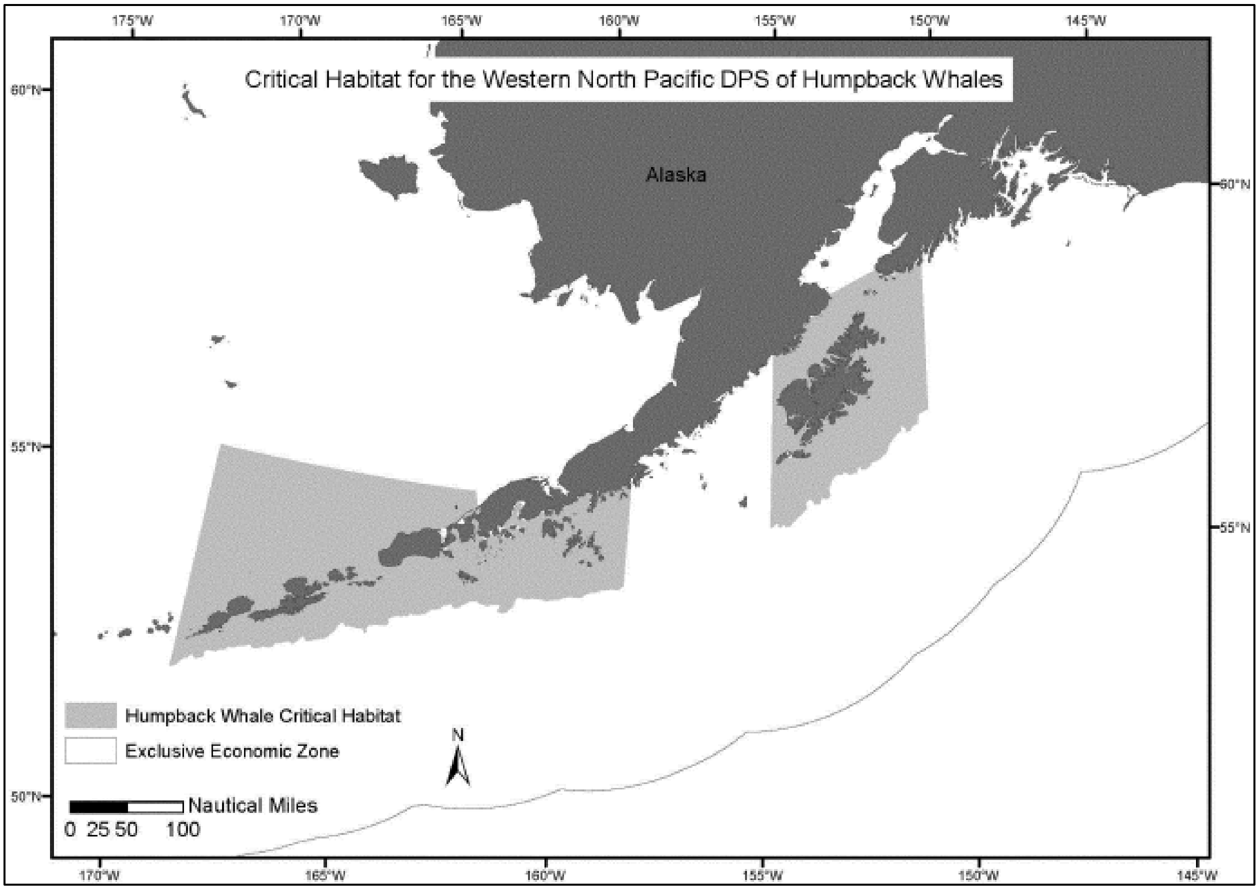
All baleen whales are categorized as low-frequency cetaceans, and no studies have directly measured the sound sensitivity of baleen whales. Instead, hearing sensitivities are extrapolated from the frequencies in which they vocalize, their behavioral responses to sounds at various frequencies, inner ear anatomy studies, and predictive models. Baleen whales are thought to be the most sensitive to sounds that range from tens of Hz to about 10 kHz, with a generalized hearing range for low-frequency cetaceans of between 7 Hz and 35 kHz (NMFS 2018c; Southall, Bowles et al. 2007). Estimation of hearing ability based on inner ear morphology was completed for two mysticete species: humpback whale (700 Hz to 10 kHz; Houser, Helweg et al. 2001) and North Atlantic right whale (10 Hz to 22 kHz; Parks, Ketten et al. 2007). Humpback whale vocalizations generally range from 30 Hz to 8 kHz.

4.6.7 Critical Habitat

Critical habitat for the Western North Pacific DPS and Mexico DPS of humpback whales was designated on April 21, 2021, and is present at the southern end of the barge transit route near Dutch Harbor.

4.6.7.1 Description

Critical habitat in Alaska designated for the Western North Pacific DPS includes the nearshore boundaries generally defined by the 3.28-feet (1-m) isobath relative to mean lower low water (MLLW) (Figure 13). On the north side of the Aleutian Islands, the seaward boundary of the critical habitat is defined by a line extending due west from 55° 41′ N, 162° 41′ W to 55° 41′ N, 169° 30′ W, then southward through Samalga Pass to a boundary drawn along the 6,560-feet (2,000-m) isobath on the south side of the islands. This isobath forms the southern boundary of the critical habitat, eastward to 164° 25′ W. From this point, the 3,280-feet (1,000-m) isobath forms the offshore boundary, which extends eastward to 158° 39′ W. Critical habitat for the Western North Pacific DPS also includes the waters around Kodiak Island and the Barren Islands (Figure 13).



Source: NOAA 2021.

Figure 13. Western North Pacific Distinct Population Segment of Humpback Whale Critical Habitat (shaded areas)

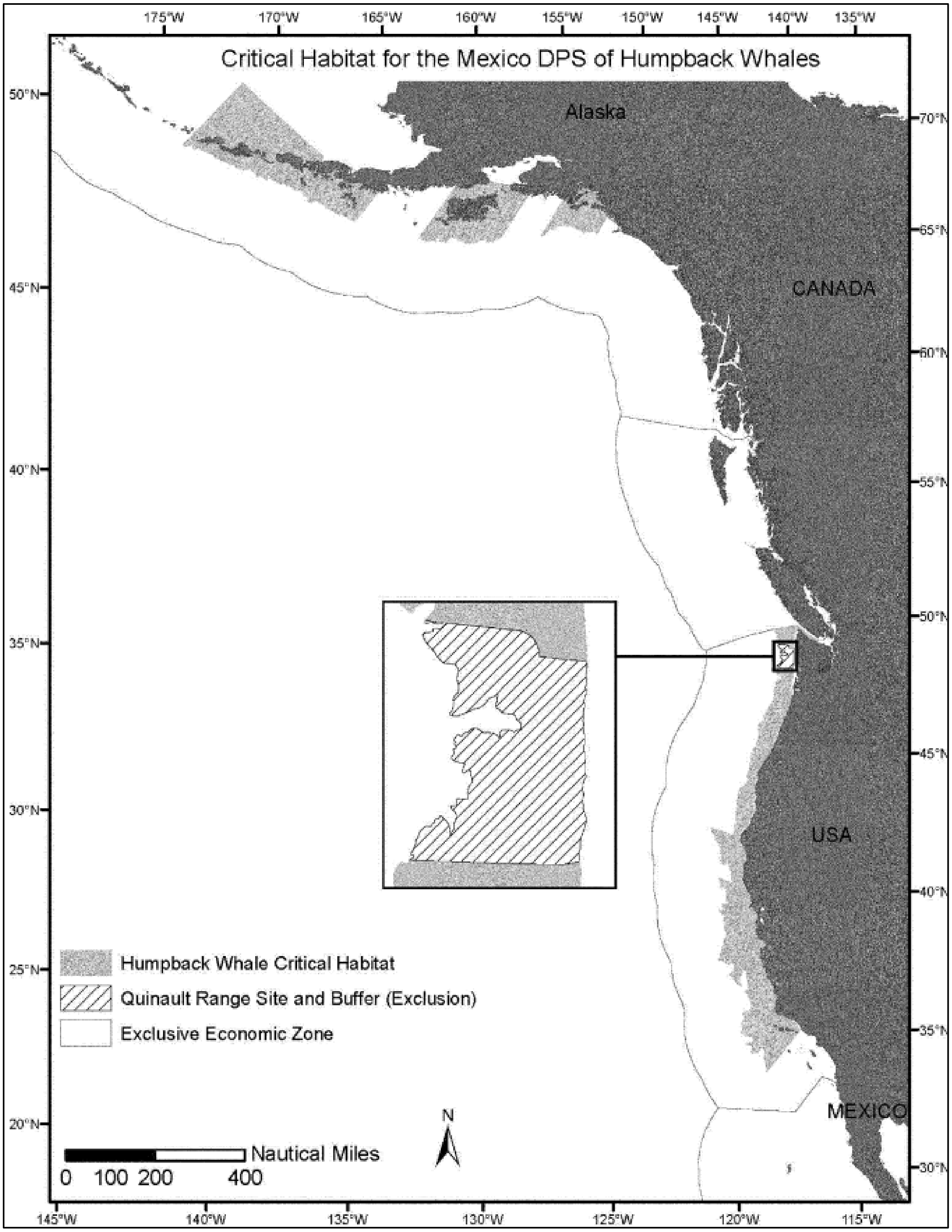
As for the Western North Pacific DPS, critical habitat in Alaska for the Mexico DPS also includes the nearshore boundaries generally defined by the 3.28-feet (1-m) isobath relative to MLLW (Figure 14). On the north side of the Aleutian Islands, the seaward boundary of the critical habitat is defined by a line extending from 55° 41 N, 162° 41′ W west to 55° 41′ N, 169° 30′ W, then southward through Samalga Pass to a boundary drawn along the 2,000-m isobath on the south side of the islands. This isobath forms the southern boundary of the critical habitat, eastward to 164° 25′ W. From this point, the 2,280-feet (1,000-m) isobath forms the offshore boundary, which extends eastward to 158° 39′ W.

For the Mexico DPS, critical habitat also includes the waters around Kodiak Island and the Barren Islands as well as an area in Prince William Sound and associated waters as shown in Figure 14, not located in the action area.

Vessels traveling along the barge transit route will follow the mitigation measures outlined in Section 3.3.3, *Other Mitigation*.

4.6.7.2 Physical and Biological Features

Humpback whale prey was identified as the sole essential biological feature of the occupied critical habitat and it was determined that the best available scientific information does not currently support recognizing additional essential features. In the waters off Alaska, including areas identified as critical habitat, humpback whales feed primarily on euphausiids (*Thysanoessa* and *Euphausia*) and small fishes, including capelin (*Mallotus villosus*), Pacific herring (*Clupea pallasii*), juvenile walleye pollock (*Gadus* *chalcogrammus*; formerly, *Theragra chalcogramma*), and Pacific sand lance (*Ammodytes personatus*) (86 FR 21082), all of which were determined to be significant or essential prey.



Source: NOAA 2021.

Figure 14. Mexican Distinct Population Segment of Humpback Whale Critical Habitat (shaded areas)

4.7 Sperm Whale

4.7.1 Population

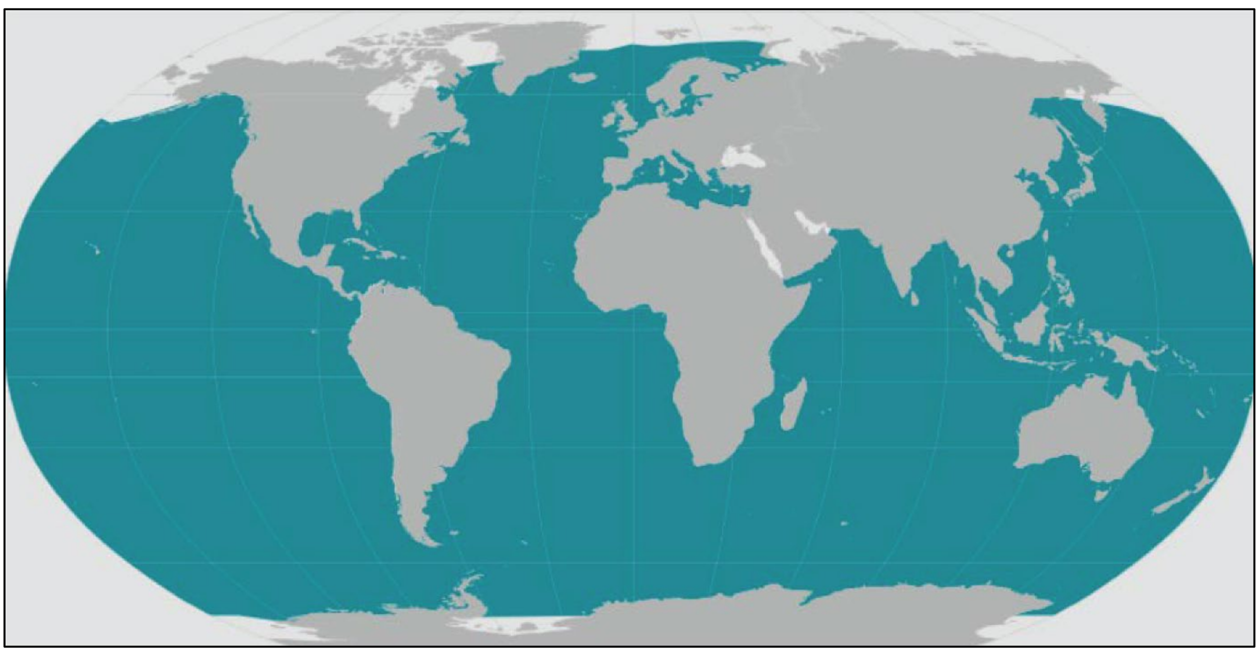
The sperm whale is listed as endangered under the ESA and depleted under the MMPA. There is currently no reliable estimate for the total number of sperm whales worldwide, including in the North Pacific. The abundance of sperm whales in the North Pacific was reported to be 1,260,000 prior to exploitation, but confidence intervals for these estimates are unknown (Muto, Helker et al. 2018). The number of sperm whales in Alaska waters is unknown, and a reliable estimate of abundance for the North Pacific stock is not available. Additionally, there is no reliable minimum population estimate for this species. Although Tamura and Ohsumi (2000) believe their estimate to be under-biased, their analysis suggested a total of 124,778 sperm whales in the western North Pacific and eastern tropical Pacific combined.

4.7.2 Distribution

Sperm whales are one of the most widely distributed marine mammal species; however, their population was depleted by commercial whaling over a period of more than 100 years. Sperm whales are widely distributed in the North Pacific, with the northernmost boundary extending from Cape Navarin to the Pribilof Islands (Figure 15). Extensive numbers of female sperm whales have been documented in the western Bering Sea and Aleutian Islands (Ivashchenko, Brownell Jr et al. 2014; Mizroch and Rice 2006). Males have been found in the Gulf of Alaska, the Bering Sea, and the waters around the Aleutian Islands in the summer (Ivashchenko, Brownell Jr et al. 2014; Mizroch and Rice 2013).

4.7.3 Distribution in Action Area

Sperm whales could be encountered along the barge transit route in the Bering Sea. They have not been reported in the Chukchi or Beaufort Seas, so they will not occur near Oliktok Dock.



Source: NMFS 2019b. (Blue area depicts sperm whale distribution.)

Figure 15. Approximate Range of Sperm Whales

4.7.4 Foraging Habitat

Sperm whales are primarily found in deep waters (greater than 3,280 feet [1,000 meters]). They live and forage in areas with water depths of 1,968 feet (600 meters) or more and are generally not found in waters of less than 984 feet (300 meters) deep. Sperm whales feed primarily on giant squid, octopus, other cephalopods, fish, and shrimp.

4.7.5 Breeding and Calving Habitat

Sperm whale breeding occurs during the summer months in deep offshore waters, and 12- to 13-foot-long (3.7- to 4-meter-long) calves are born after a 14- to 16-month gestation period.

4.7.6 Hearing

No studies have directly measured the sound sensitivity of large cetacean species. Summaries of the best available information on marine mammal hearing are provided in Richardson et al. (1995), Erbe (2002), Southall et al. (2007), and NMFS (2018c). But it is generally assumed that most animals hear well in the frequency ranges similar to those used for their vocalizations. NMFS has separated marine mammals into functional hearing groups with the generalized hearing range of mid-frequency cetaceans, where sperm whales are classified, between 150 Hz and 160 kHz. Sperm whales produce several types of click sounds: patterned clicks (codas associated with social behavior), usual clicks, creaks, and slow clicks (Weilgart and Whitehead 1988). Most of the acoustic energy from sperm whales is below 4 kHz, although energy above 20 kHz has been reported (Thode, Mellinger et al. 2002). Other studies indicate that the wide-band clicks of sperm whales contain energy between 0.1 and 20 kHz (Goold and Jones 1995; Weilgart and Whitehead 1997).

4.7.7 Critical Habitat

There is no critical habitat designated for sperm whales.

4.8 Ringed Seal

4.8.1 Population

NMFS recognizes five subspecies of ringed seal. Only the Arctic subspecies (*Phoca hispida hispida*) is found in Alaska, and its range extends broadly across the entire Arctic Ocean and into the Labrador Sea, Hudson Bay, and the Bering Sea. For stock assessment purposes, NMFS considers the Alaska stock as the portion of the Arctic subspecies that occurs within the U.S. EEZ of the Beaufort, Chukchi, and Bering Seas (Muto, Helker et al. 2021). The arctic ringed seal was listed as threatened under the ESA in 2012 (77 FR 79706).

Although there are no specific population estimates, available data suggest that the Arctic subspecies numbers in the millions (Kelly, Bengtson et al. 2010). The U.S. portion of data collected in 2012 and 2013 aerial abundance and distribution surveys over the ice-covered portions of the Bering Sea were used to calculate an abundance estimate of 171,418 ringed seals in the U.S. Bearing Sea (Conn, Ver Hoef et al. 2014).

Frost et al. (Frost, Lowry et al. 2004) conducted aerial surveys within 25 miles (40 km) of shore in the Beaufort Sea during May and June in 1996 through 1999 and observed ringed seal densities ranging from 0.81 seal per 0.4 square mile (1 square km) in 1996 to 1.17 seals per 0.4 square mile (1 square km) in 1999. Using these data, they estimated the total population in the Alaska Chukchi and Beaufort Seas to be at least 300,000 ringed seals.

4.8.2 Distribution

In Alaska waters, ringed seals may be found from the Beaufort Sea to as far south as Bristol Bay. Arctic ringed seals rarely come to shore, preferring to remain with the sea ice most of the year. Sea ice is used as a platform for pupping and nursing in late winter to early spring, for molting in late spring to early summer, and for resting at other times of the year. Their thick claws allow them to maintain breathing holes in ice 6 feet (1.8 meters) or more in thickness.

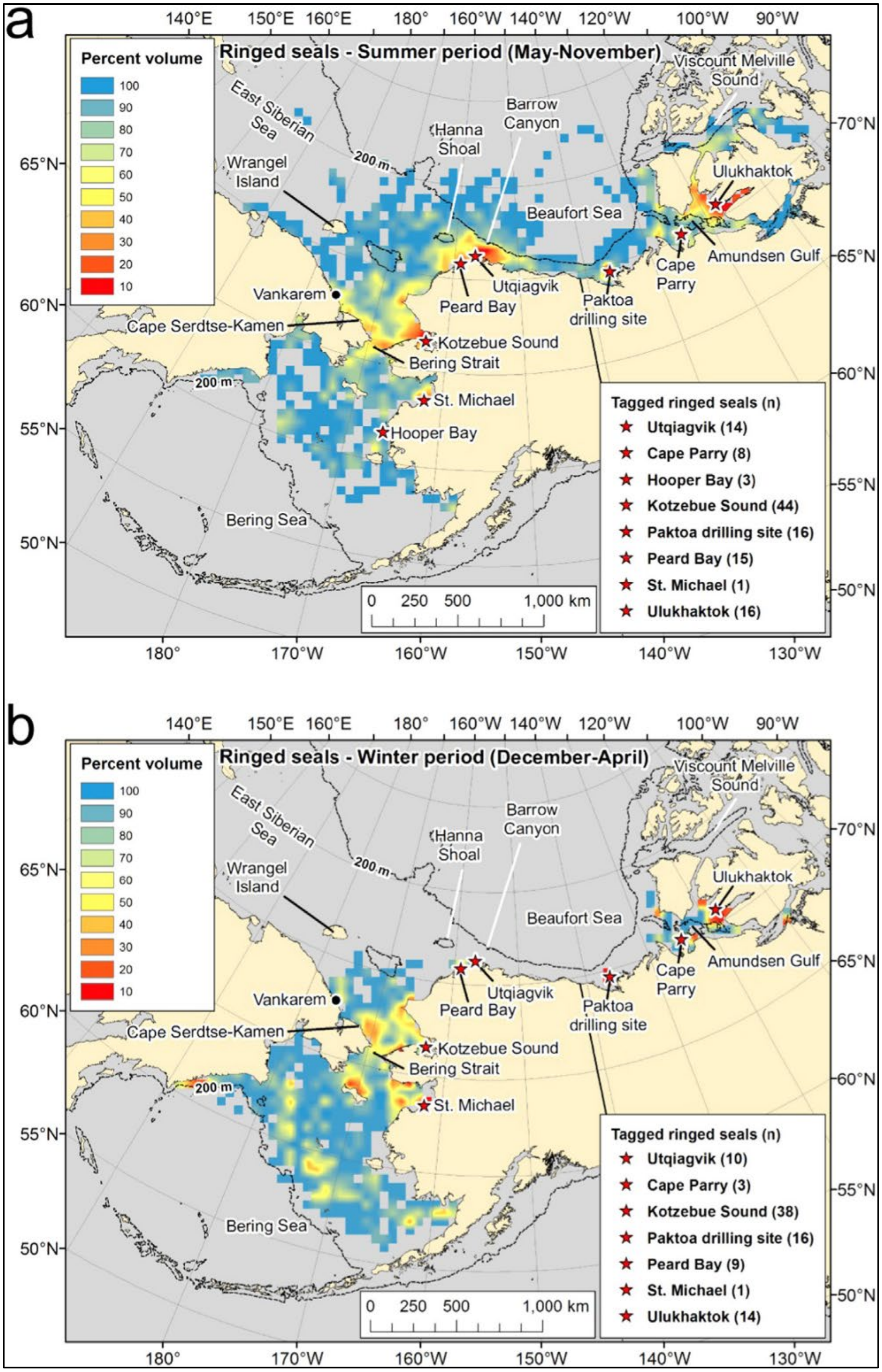
Ringed seals forage most intensively during the open-water period, rest in subnivean lairs on the ice in early winter through late May or early June, and bask and molt on the ice during the period between lair abandonment (May or June) and ice breakup (typically June or July) (Kelly, Bengtson et al. 2010). When not whelping, lactating, breeding, or molting, ringed seals travel widely and can be found in waters of nearly any depth and in open water, hundreds of miles from land or ice. Using data from 118 ringed seals satellite tagged in Alaska and Canada from 1999 to 2015, Citta, Lowry et al. (2018) documented the species disbursed in the northern Bering, Chukchi, Beaufort, and East Siberian Seas from May to November, with a reduced distribution from December to April into waters less than 656.2 feet (200 meters) deep in the southern Chukchi Sea and northern Bering Sea (Figure 16). It is important to note that the figure represents only those animals tagged, some ringed seals may occur in the action area during the winter or spring season.

4.8.3 Distribution in Action Area

Ringed seals could be encountered along the entire barge transit route and near Oliktok Dock. They are frequently observed in Harrison Bay and in waters adjacent to the CRD and Oliktok Point (Brandon, Thomas et al. 2011; Hauser, Moulton et al. 2008; Tetra Tech EC Inc. 2005, 2006, 2007). Bearded and ringed seals are often difficult to discern, so are often reported as bearded, ringed, or spotted seals.

4.8.4 Foraging Habitat

The diet of Arctic ringed seals is seasonally and regionally variable, but the most important prey for ringed seals in Alaska are Arctic cod, saffron cods, shrimps, and amphipods (NMFS 2014). Although ringed seals feed year-round, the most intensive foraging occurs during the open-water period and early freeze-up. Invertebrates are an important part of the diet of Arctic ringed seals in the open-water season, whereas cod tend to dominate from late autumn through early spring (Kelly, Bengtson et al. 2010).



Source: Citta, Lowry et al. 2018

Figure 16. Distribution of 118 Satellite-Tagged Ringed Seals during Summer and Winter

4.8.5 Breeding and Pupping Habitat

Ringed seals excavate subnivean lairs in drifts over their breathing holes in the ice during winter, in which they rest, give birth, nurse their pups, and find protection from the elements and predators. Snow depths of at least 19.7 to 25.6 inches (50 to 65 centimeters) are required for functional birth lairs, and such depths are typically found only where at least 7.8 to 11.8 inches (20 to 30 centimeters) of snow has accumulated on flat ice and then drifted along pressure ridges or ice hummocks (Muto, Helker et al. 2018). Shorefast ice is the preferred whelping habitat for Arctic ringed seals; however, whelping has also been observed on drifting pack ice (Kelly, Bengtson et al. 2010).

Mating is thought to take place in May under the ice in the vicinity of birth lairs while mature females are still lactating (Kelly, Bengtson et al. 2010). Gestation is approximately 8 months, but delayed implantation of the fertilized egg results in births occurring from March through May, peaking in April. Pups are weaned 5 to 9 weeks later. Ringed seal mothers continue to forage throughout lactation and move young pups between their network of lairs. Ringed seals of the Okhotsk subspecies do not use subnivean lairs, and recent observations of ringed seals in Kotzebue Sound suggest that some births occur on the surface of the ice (State of Alaska 2019).

4.8.6 Hearing

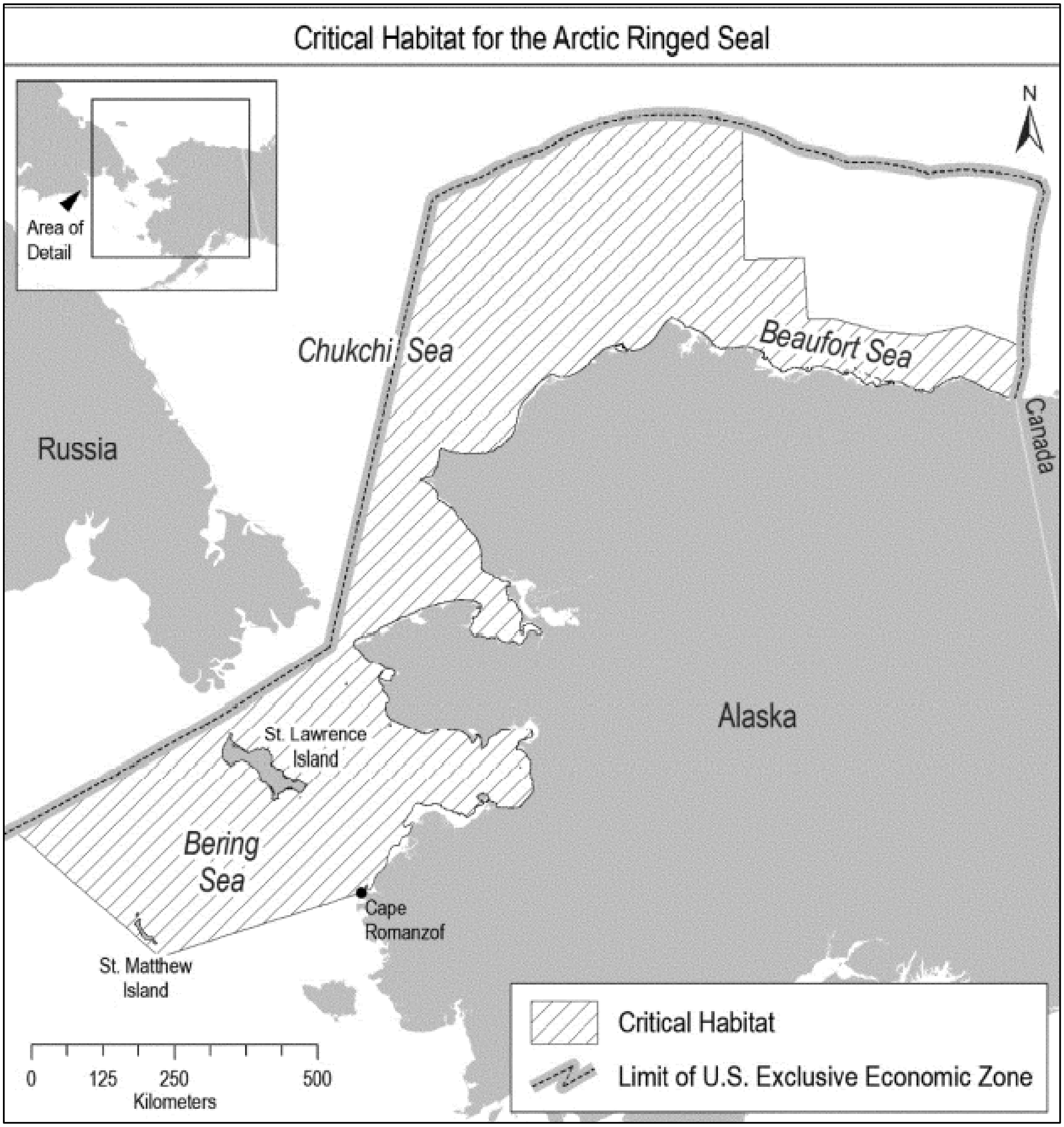
For management purposes, NMFS (2018c) classifies ringed seals in the hearing group with other phocid seals, which have generalized hearing ranges (underwater) from 50 Hz to 86 kHz. Audiograms of two captive ringed seals conducted by Sills, Southall et al. (2015) demonstrated that both ringed seals could hear underwater noises in frequencies ranging from 100 Hz (the lower limit of the test) to 43.1 kHz. The 2-year-old female showed much better hearing in the higher frequencies than the 16-year-old male, hearing sounds up to 72.4 kHz (the upper limit tested). Based on this study, ringed seal hearing is most sensitive at 49 dB re 1 μPa at 12.8 kHz in water, and 12 dB re 20 μPa at 4.5 kHz in air.

4.8.7 Critical Habitat

On April 1, 2022, NMFS designated critical habitat for the Arctic subspecies of ringed seals in waters of the Bering, Chukchi, and Beaufort seas (87 FR 19232) off the Alaska coast.

4.8.7.1 Description

Critical habitat for the Arctic subspecies of the ringed seal generally includes marine waters within the Bering, Chukchi, and Beaufort Seas, extending from the nearshore boundary, defined by the 10-foot (3-m) isobath relative to MLLW, to varying offshore limits within the U.S. EEZ (Figure 17). The easternmost coastal boundary is along the Alaska-Canada border, and the southernmost coastal boundary is near Cape Romanzof.



Source: NOAA 2022a.

Figure 17. Arctic Ringed Seal Critical Habitat (striped areas)

4.8.7.2 Physical and Biological Features

Physical and biological features identified as essential to the conservation of the ringed seals and used to determine the extent of ringed seal critical habitat in the Bering, Chukchi, and Beaufort Seas include:

1. Snow-covered sea ice habitat suitable for the formation and maintenance of subnivean birth lairs used for sheltering pups during whelping and nursing, which is defined as waters 10 feet (3 m) or more in depth (relative to MLLW) containing areas of seasonal landfast (i.e., shorefast) ice or dense, stable pack ice, that have undergone deformation and contain snowdrifts of sufficient depth to form and maintain birth lairs (typically at least 21 inches [54 centimeters] deep).

2. Sea ice habitat suitable as a platform for basking and molting, which is defined as areas containing sea ice of 15% or more concentration in waters 10 feet (3 m) or more in depth (relative to MLLW).
3. Primary prey resources to support Arctic ringed seals, which are defined to be small, often schooling, fishes, in particular Arctic cod, saffron cod, and rainbow smelt, and small crustaceans, in particular, shrimps and amphipods.

The barge lightering area is located near, but not within designated ringed seal critical habitat (Figure 1). When vessels are transiting through ringed seal critical habitat, the vessel operators will comply with the mitigation measures described in Section 3.3.3, *Other Mitigation*.

4.9 Bearded Seal

4.9.1 Population

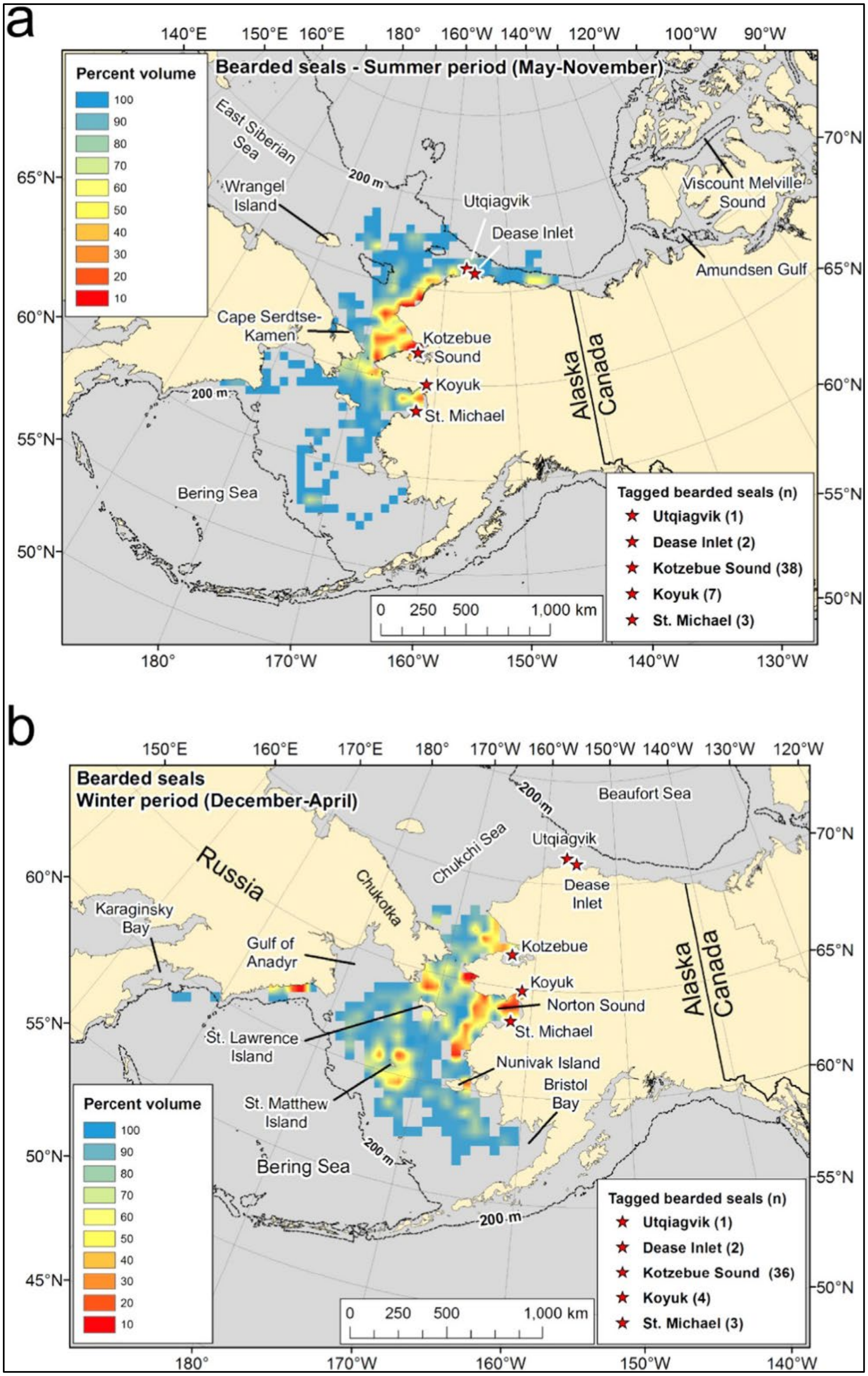
There are two subspecies of bearded seal (*Erignathus barbatus*): *E. b. barbatus*, inhabits the Atlantic sector (the Laptev Sea, Barents Sea, North Atlantic Ocean, and Hudson Bay), and *E. b. nauticus*, inhabits the Pacific sector (the remaining portions of the Arctic Ocean and the Bering and Okhotsk Seas); however, there are no conspicuous gaps in the ranges of these two subspecies, and they may overlap in areas along the central Canadian and northern Russian coasts (Muto, Helker et al. 2021). As part of a status review, Cameron et al. (2010) defined longitude 145° East as the Eurasian delineation and 112° West in the Canadian Arctic Archipelago as the North American delineation between the two subspecies. The *E. b. nauticus* subspecies was further divided into an Okhotsk DPS and a Beringia DPS, both of which are listed as threatened under the ESA. For stock assessments, the Beringia DPS is considered the Alaska stock of the bearded seal (Muto, Helker et al. 2021).

A reliable population estimate for the Alaska stock is not available, but new survey methods in recent years and preliminary analyses of 2012 data allows for a minimum population estimate of 273,676 bearded seals in Alaska waters (Muto, Helker et al. 2021).

4.9.2 Distribution

Bearded seals are closely associated with sea ice, particularly during the critical periods related to reproduction, molting, and resting between foraging trips. They prefer moving ice that produces natural openings and areas of open water, while avoiding areas of continuous, thick, shorefast ice (Cameron, Frost et al. 2018). The core distribution for bearded seals are areas of the known range that are in water less than 1,640 feet (500 meters) deep (Cameron, Bengtson et al. 2010); however, virtually all habitat used by 51 bearded seals tagged in Alaska from 2004 to 2015 was of shelf waters less than 656 feet (200 meters) deep (Citta, Lowry et al. 2018) (Figure 18). It is important to note that the figure represents only those animals tagged and some bearded seals may occur in the action area during the winter or spring.

Seasonal changes in sea ice distribution often dictate the seasonal movements of bearded seals. The Alaska stock winters across the Chukchi and Bering Seas and moves north with the sea ice as it breaks up and retreats in the late spring and summer. They spend the summer and early fall at the southern edge of the Chukchi Sea and Beaufort Sea pack ice and at the wide, fragmented margin of multiyear ice before moving south with the advancing ice edge back to their winter areas (Cameron, Bengtson et al. 2010; MacIntyre, Stafford et al. 2015). The southward migration is less defined and noticeable than the northward migration (Muto, Helker et al. 2021). Some seals do not follow these generalized migration patterns. Bearded seal vocalizations have been recorded year-round in the Beaufort Sea, indicating an unknown proportion of the population overwinters there (MacIntyre, Stafford et al. 2015). In the summer and early fall, some juvenile seals are found in bays, estuaries, and river mouths along the coasts of the Bering and Chukchi Seas (Cameron, Frost et al. 2018). It is rare for bearded seals of the Alaska stock to haul out on land; however, adults have hauled out on land in late summer and early fall while waiting for ice floes to form along the coast, and young bearded seals have hauled out near Wainwright and Utqiaġvik (Cameron, Bengtson et al. 2010).



Source: Citta, Lowry et al. 2018

Figure 18. Distribution of 51 Satellite-Tagged Bearded Seals during the Summer and Winter

4.9.3 Distribution in Action Area

Similar to ringed seals, bearded seals could be encountered along the entire barge transit route and near Oliktok Dock. They are frequently observed in Harrison Bay and in waters adjacent to the CRD and Oliktok Point (Brandon, Thomas et al. 2011; Hauser, Moulton et al. 2008; Tetra Tech EC Inc. 2005, 2006, 2007). Bearded and ringed seals are often difficult to discern, so they are often reported as bearded, ringed, or spotted seals. Figure 19 shows seal sightings in the Harrison Bay area 2012 through 2018.

4.9.4 Foraging Habitat

Bearded seals are primarily benthic feeders, foraging mostly on invertebrates and demersal fishes. They have highly sensitive vibrissae, which they use to scan the seafloor in search of prey, burrowing only when in pursuit of prey. This strategy effectively limits bearded seals' foraging habitat to areas with seasonal sea ice over relatively shallow waters, typically less than 656 feet (200 meters; Cameron, Frost et al. 2018). The shallow shelf waters of the Chukchi and Bering Seas provide the most continuous area of favorable foraging habitat (Cameron, Frost et al. 2018). Bearded seals' diet varies with age, location, season, and changes in prey availability, and they can forage on pelagic schooling fishes when available, which allows them to live in areas with deeper waters (Cameron, Frost et al. 2018). Bearded seals of all age classes have been documented remaining in the same general foraging area for weeks or months, suggesting there is some level of site fidelity to these feeding sites (Cameron, Bengtson et al. 2010).

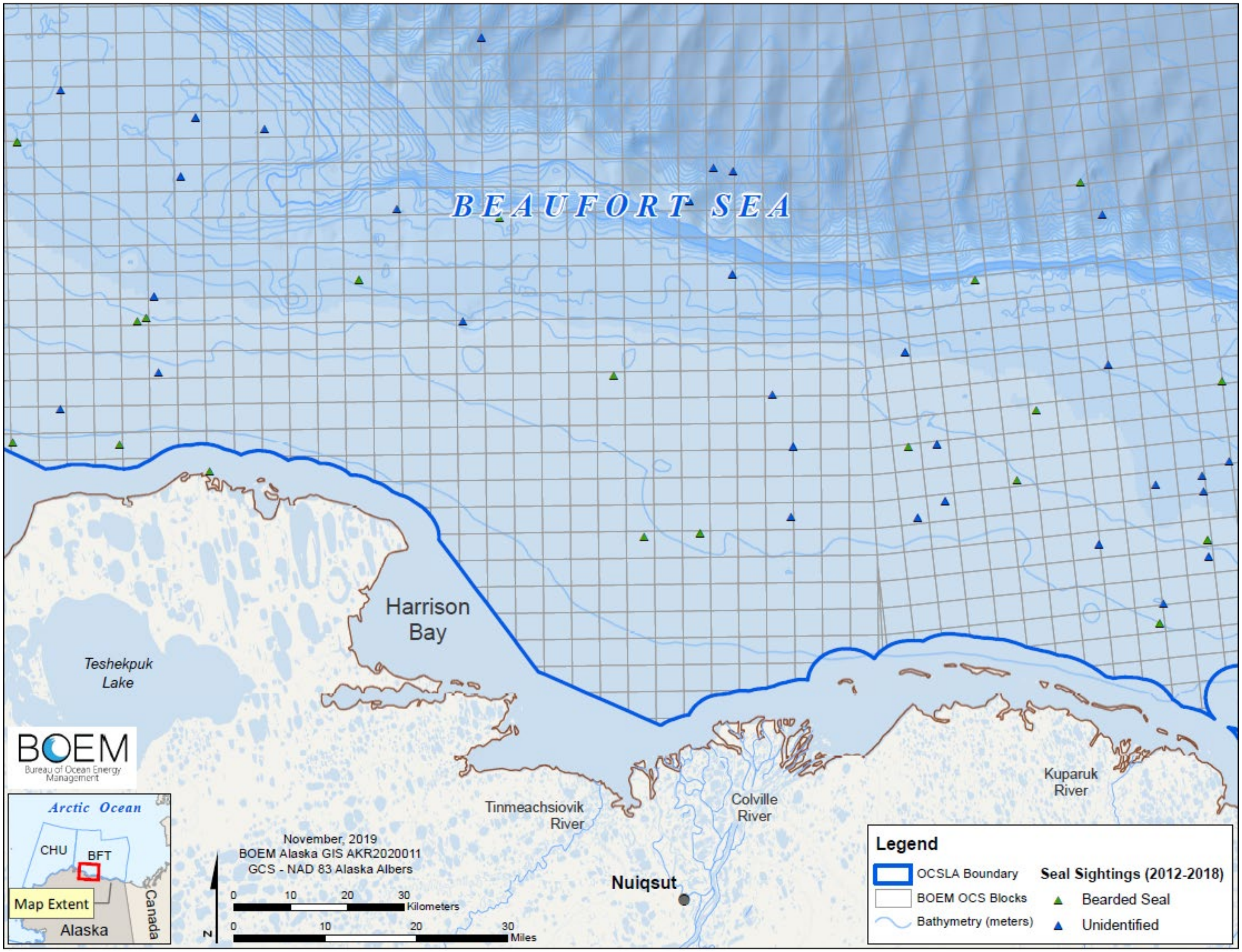
4.9.5 Breeding and Pupping Habitat

There are little quantitative data about bearded seal mating and reproduction of the Arctic stock; however, sea ice is considered a requirement for whelping, nursing, and molting (Cameron, Bengtson et al. 2010). Although whelping may occasionally occur in water, most births are believed to occur on the ice. Newborn pups have been observed from mid-March to early May, peaking in late April. Females lactate for 3 to 4 weeks, after which they ovulate, and mating is presumed to occur, likely at the surface of the water. It is unknown if mating also occurs underwater or on land or ice. Implantation of a fertilized egg may be delayed 2.5 months, resulting in a birth 11 to 11.5 months after mating. This suggests that pregnant females spend the winter on drifting ice in the Bering Sea, whelp and wean pups in about the same area, and then migrate northbound with the receding ice prior to molting. The annual molt occurs between May and August, after mating. During the molt, seals spend more time hauled out of the water.

4.9.6 Hearing

Recordings of bearded seal male vocalizations have been captured nearly year-round, ranging in frequency from 200 Hz to 6 kHz, and lasting up to 3 minutes (MacIntyre, Stafford et al. 2015). In the Bering, Chukchi, and Beaufort Seas, vocalizations peak from December through June and are closely related to the presence of sea ice (MacIntyre, Stafford et al. 2015).

No audiograms for bearded seals are published. For management purposes, NMFS (2018c) classifies bearded seals in the hearing group with other phocid seals, which have generalized hearing ranges (underwater) from 50 Hz to 86 kHz.



Source: BOEM 2019b (Documented from Aerial Survey of Arctic Marine Mammals program.)

Figure 19. Seal Sightings in Harrison Bay Area from 2012 to 2018

4.9.7 Critical Habitat

On April 1, 2022, NMFS designated critical habitat for the Beringia DPS of bearded seals in waters of the Bering, Chukchi, and Beaufort Seas (87 FR 19232) off the Alaska coast.

4.9.7.1 Description

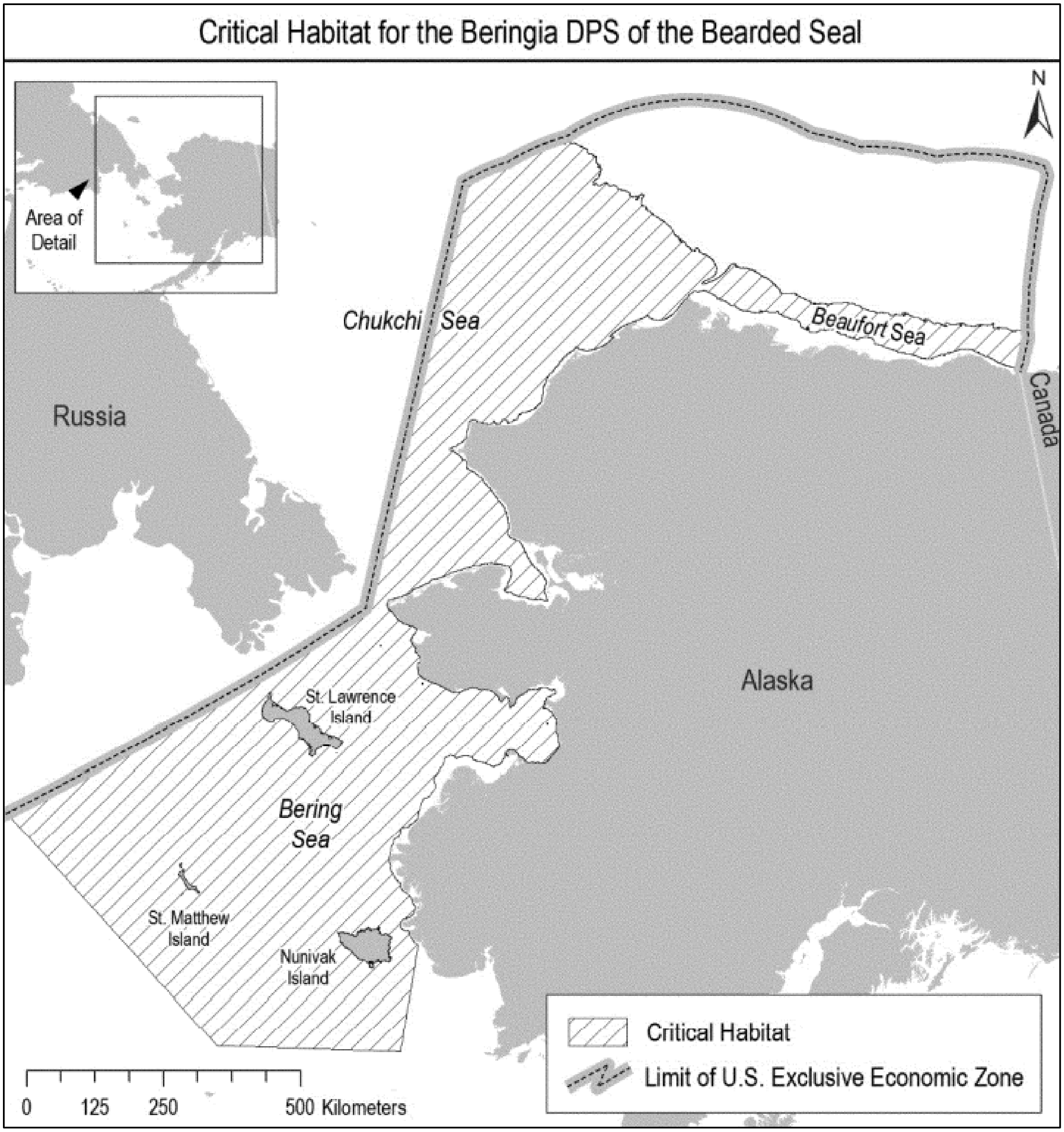
Bearded seal critical habitat includes marine waters within the Bering, Chukchi, and Beaufort seas, extending from the shoreward boundary to an offshore limit with a maximum water depth of 656 feet (200 meters) within the U.S. EEZ. The shoreward boundary follows the 65.6-feet (20-m) isobath (relative to MLLW) westward from the eastern limit of the U.S. EEZ in the Beaufort Sea and continues into the northeastern Chukchi Sea to its intersection with latitude 70°36' North south of Wainwright; then follows the 32.8-feet (10-m) isobath (relative to MLLW) to its intersection with latitude 65°35' North near Cape Price of Wales; then follows the 16.4-feet (5-m) isobath (relative to MLLW) to its intersection with longitude 164°46' West near the mouth of the Kolovinerak River in the Bering Sea, except at Port Clarence Bay where the shoreward boundary is defined as a continuous line across the entrance.

4.9.7.2 Physical and Biological Features

Physical and biological features identified as essential to the conservation of the bearded seal and used to determine the extent of bearded seal critical habitat in the Bering, Chukchi, and Beaufort Seas include:

1. Sea ice habitat suitable for whelping and nursing, which is defined as areas with waters 656 feet (200 m) or less in depth, containing pack ice of at least 25% concentration, and providing bearded seals access to those waters from the ice.
2. Sea ice habitat suitable as a platform for molting, which is defined as areas with waters 656 feet (200 m) or less in depth, containing pack ice of at least 15% concentration, and providing bearded seals access to those waters from the ice.
3. Primary prey resources to support bearded seals: Waters 656 feet (200 m) or less in depth containing benthic organisms, including epifaunal and infaunal invertebrates, and demersal fishes.

The barge lightering area is located near, but not within bearded seal critical habitat. When vessels are transiting through bearded seal critical habitat, the vessel operators will comply with the mitigation measures described in Section 3.3.3, *Other Mitigation*.



Source: NOAA 2022b.

Figure 20. Bearded Seal (Beringia Distinct Population Segment) Critical Habitat (striped areas)

4.10 Steller Sea Lion

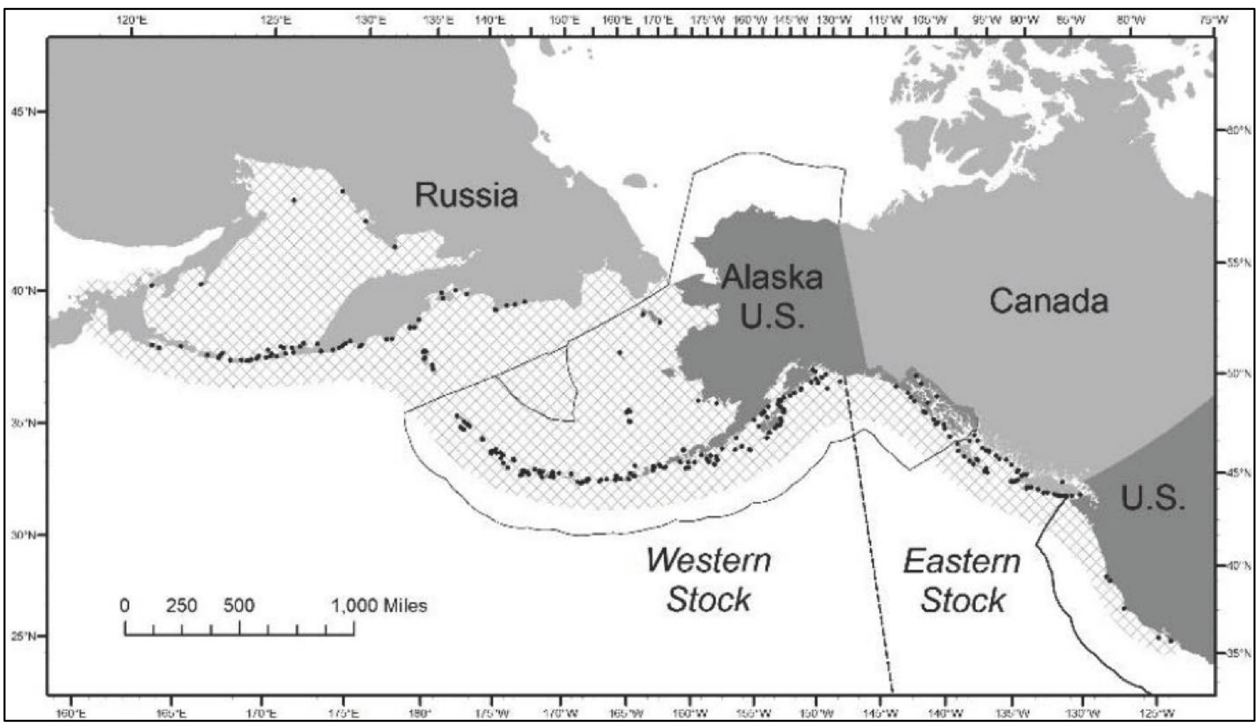
4.10.1 Population

Steller sea lions in the action area could belong to the western or eastern U.S. stock. This BA evaluates the endangered western DPS, as the eastern stock has been delisted from the ESA. Based on counts made in 2016, the current minimum population estimate for the western stock of the Steller sea lion is 53,303 individuals (Sweeney, Fritz et al. 2016). To calculate this estimate, pups were counted during the breeding season, and the number of births was estimated from the pup count. This population number is considered a minimum estimate as it has not been corrected to account for individuals that were at sea during the survey. Data collected through 2016 indicate that pup and non-pup counts of the western stock of Steller sea lions in Alaska were at their lowest in 2002 and 2003, respectively, and have increased at a rate of 2.19% and 2.24% per year, respectively, between 2003 and 2016 (Sweeney, Fritz et al. 2016). While, overall, the western stock population is increasing, there are strong regional differences in trends across the range in Alaska. Positive population trends have been observed east of Samalga Pass (about 170° West), including the eastern Bering Sea and Gulf of Alaska, with negative trends to the west in the central and western Aleutian Islands.

4.10.2 Distribution

Steller sea lion habitat extends around the North Pacific Ocean rim from northern Japan, the Kuril Islands and Okhotsk Sea, through the Aleutian Islands and Bering Sea, along Alaska's southern coast, and south to California (Figure 16; Muto, Helker et al. 2018). NMFS reclassified Steller sea lions as two DPSs under the ESA based on genetic studies and phylogeographical analyses from across their range (NMFS 1997). The eastern DPS includes sea lions born east of Cape Suckling, Alaska (144° West), and the western DPS includes animals born west of Cape Suckling (Loughlin 1997).

The western DPS breeds on rookeries in Alaska from Prince William Sound west through the Aleutian Islands. There are more than 100 haulout and rookery sites within the Steller sea lion range in western Alaska, with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands (Muto, Helker et al. 2018). Outside of the breeding season, during late May to early July, large numbers of individuals, both male and female, disperse widely. Steller sea lions are commonly found from nearshore habitats to the continental shelf and slope (Muto, Helker et al. 2018).



Source: Muto, Helker et al. 2018

Figure 21. General Distribution of Steller Sea Lions (dotted line delineates the eastern from the western stock, solid line delineates the U.S. Economic Exclusion Zone)

4.10.3 Distribution in Action Area

Steller sea lions will be encountered in the southern part of the barge transit route along the Aleutian Islands and Bering Sea. They do not inhabit the Chukchi or Beaufort Seas, so they will not occur near Oliktok Dock.

4.10.4 Foraging Habitat

Steller sea lions are capable of traveling long distances within a season and forage in both nearshore and pelagic waters. They are opportunistic predators, foraging and feeding primarily at night on a wide variety of fishes (e.g., capelin, cod, herring, mackerel, pollock, rockfish, salmon, sand lance), bivalves, cephalopods (e.g., squid, octopus), and gastropods. Their diet may vary seasonally, depending on the abundance and distribution of prey. They may disperse and range far distances to find prey but are not known to migrate.

4.10.5 Breeding and Pupping Habitat

Steller sea lions generally breed and give birth from mid-May to mid-July, with the mean pup birthdates in Alaska ranging from June 4 to 14 (Kuhn, Chumbley et al. 2017; Pitcher, Burkanov et al. 2001). Females remain onshore with their pups for a few days after birth before beginning a routine of alternating between foraging at sea and nursing on land. Pups remain at rookeries until about early to mid-September (Calkins, Mallister et al. 1999) and are likely weaned before reaching 1 year old.

4.10.6 Hearing

Steller sea lion reproduction, foraging, predator avoidance, and navigation are dependent on in-air and underwater hearing and communication. Steller sea lions have similar hearing thresholds in-air and underwater to other otariids. In-air hearing ranges from 0.25 to 30 kHz, with best hearing sensitivity ranging from 5.0 to 14.1 kHz (Mulsow and Reichmuth 2010). An audiogram of their underwater vocalizations shows the typical mammalian U-shape, and the range of best hearing was from 1 to 16 kHz. Higher hearing thresholds, indicating decreased sensitivity, were observed for signals below 16 kHz and above 25 kHz (Kastelein, van Schie et al. 2005). For management purposes, NMFS classifies Steller sea lions in the hearing group with otariid seals, which have generalized hearing ranges (underwater) from 60 Hz to 39 kHz (NMFS 2018c).

4.10.7 Critical Habitat

4.10.7.1 Description

Steller sea lion critical habitat for the western DPS was designated by NMFS on August 27, 1993 (Figure 17; NMFS 1993). Critical habitat designations are based on PBFs that make the habitat essential for conservation of the species. In the case of Steller sea lions, PBFs were not specifically identified, but the designation was based on the terrestrial and aquatic needs of the species. This included the physical and biological essential features that support reproduction, foraging, rest, and refuge.

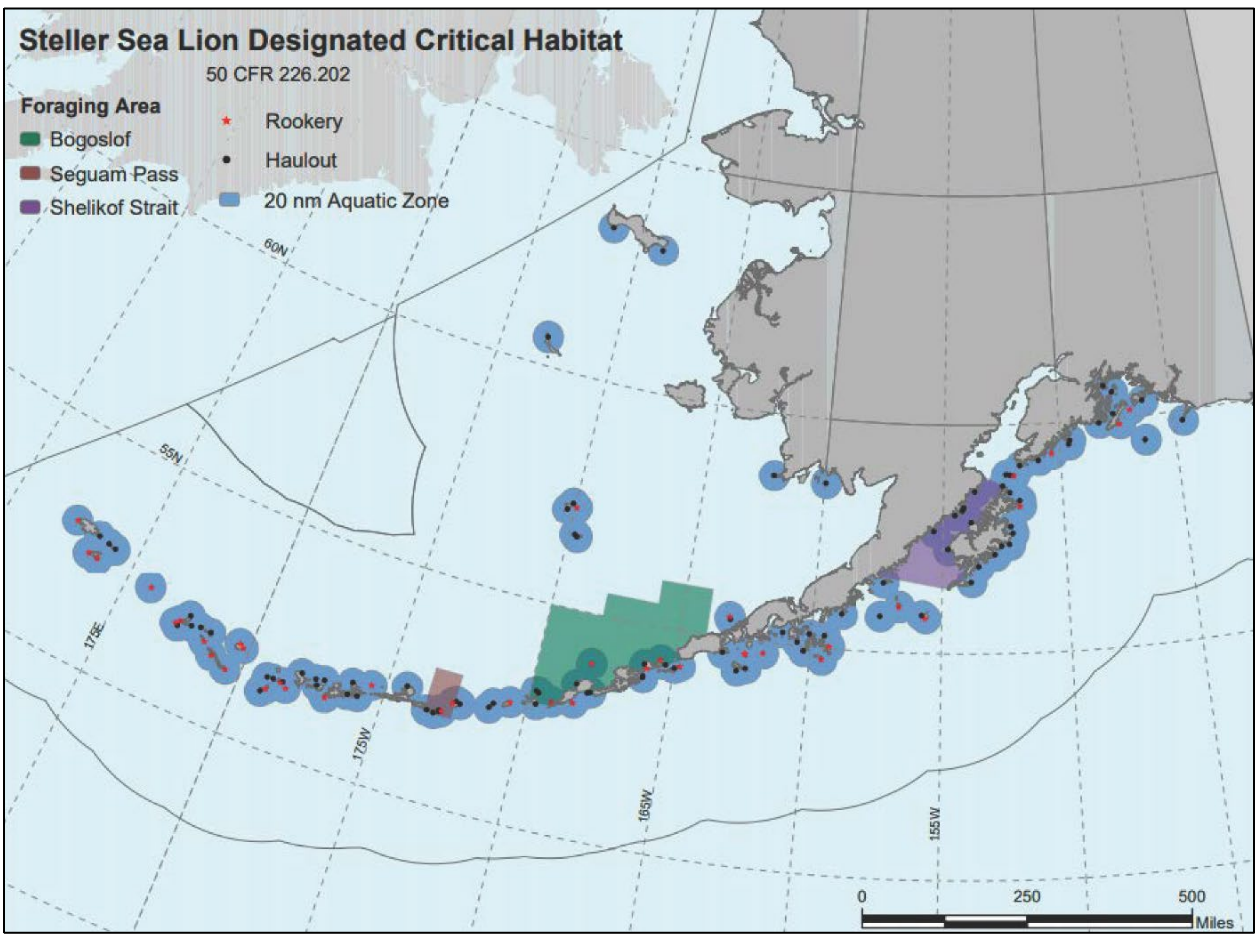
Rookeries and haulout sites are widespread throughout its range, and these locations change little from year to year. Typically, rookeries are located on relatively remote islands, rocks, reefs, and beaches, where access by terrestrial predators is limited. During the non-breeding season, rookeries may also be used as haulout sites, which frequently consist of rocks, reefs, and beaches. Substrate, exposure to wind and waves, the extent and type of human activities and disturbance in the region, and the proximity to prey resources are all factors that determine the suitability of an area as a rookery or haulout location (NMFS 1993).

Essential features for Steller sea lion aquatic habitat primarily revolve around feeding. Their diet varies geographically, seasonally, and over years in response to the availability and abundance of food resources. Foraging strategies and ranges also change seasonally and with the age and reproductive status of the individual. Tagging studies indicate that the waters in proximity to rookeries and haulout sites are critical foraging habitats. The aquatic areas surrounding rookeries are essential to postpartum females and young animals. The waters around haulout sites provide foraging and refuge habitat for non-breeding animals year-round and for reproductively mature animals during the non-breeding season (NMFS 1993).

Designated critical habitat includes all of the major Steller sea lion rookeries and major haulouts identified in the listing notice (NMFS 1993) and associated terrestrial, air, and aquatic zones. Critical habitat includes a terrestrial zone that extends 3,000 feet (0.9 km) landward from each major rookery and major haulout, and an air zone that extends 3,000 feet (0.9 km) above the terrestrial zone of each major rookery and major haulout. For each major rookery and major haulout located west of 144° West, critical habitat includes an aquatic zone (or buffer) that extends 20 nautical miles (37 km) seaward in all directions. Critical habitat also includes three large offshore foraging areas: the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area (NMFS 1993). NMFS has also prohibited vessel entry within 3 nautical miles (6.5 km) of all Steller sea lion rookeries west of 150° West.

The portion of the barge transit route near Dutch Harbor is located within designated critical habitat (Figure 22). When vessels are transiting in the Gulf of Alaska, the vessel operators will comply with the mitigation measures described in Section 3.3.3, *Other Mitigation*:

- The vessel operator will not purposely approach within 3 nautical miles (5.5 km) of major Steller sea lion rookeries or haulouts where vessel safety requirements allow and/or where practicable. Vessels will remain 3 nautical miles (5.5 km) from all Steller sea lion rookery sites listed in paragraph 50 CFR 224.103(d)(1)(iii).



Source: NPS 2019

Figure 22. Steller Sea Lion Critical Habitat

5.0 ENVIRONMENTAL BASELINE

The environmental baseline, as defined under the ESA, consists of past and present impacts of all federal, state, or private actions and other human activities in action areas; the anticipated impacts of all the proposed federal projects in an action area that have already undergone formal or early Section 7 consultation; and the impact of state or private actions that are contemporaneous with the consultation process (50 CFR 402.02).

Existing marine vessel traffic occurs throughout the Bering Sea and less frequently in the Beaufort Sea. The main port in the action area is Dutch Harbor in the Bering Sea, which has supported moderate year-round vessel traffic since the late 1970s and is the current operations center for the Bering Sea and Aleutian Islands commercial fishing industry (USACE 2019). Most vessel traffic transits northwest from Dutch Harbor toward Russia and Asia. The number of vessels traveling through the Bering Strait to or from Dutch Harbor is approximately 10% of that transiting west (Nuka Research and Planning Group 2016). There was an average of 393 annual transits of the Bering Strait between 2006 and 2015 (Nuka Research and Planning Group 2016), though vessel traffic has more than doubled since 2008, and more recent years (2015 and 2016) have seen approximately 458 to 470 vessel transits per year (Audubon Alaska 2017). Transits are predicted to grow to 2,000 transits by 2025 under moderate growth scenarios (International Council on Clean Transportation 2015). Not all traffic transiting the Bering Strait continues to the Beaufort Sea. The areas of the Beaufort Sea with the most vessel use appear to be near Barrow, Oliktok Point, and Deadhorse (Goldman, Smith et al. 2017).

Existing marine infrastructure at Oliktok Point includes a commercial sheet-pile dock, shoreline armoring, and a seawater treatment plant. In addition, Oooguruk Island, a 6-acre constructed gravel island with a pipeline to shore, is located near the mouth of the Colville River. Screeding occurs with seasonal regularity at Oliktok Dock prior to barge arrival and periodically at the intake for the Kuparuk Seawater Treatment Plant.

Other past and present actions in the Oliktok Point area are Alaska Native subsistence use and scientific research (not associated with oil and gas activities), which contribute additional vehicle, boat, air, foot, and off-road vehicle traffic. Subsistence harvest of marine mammals has occurred for over 2,000 years. Subsistence harvest of whales has been regulated by quotas set by the IWC and allocated by the Alaska Eskimo Whaling Commission since 1977. Alaska Native subsistence hunters, primarily from 11 Alaska communities, take approximately 0.1% to 0.5% of the population per annum (Philo, Shotts et al. 1993; Suydam, George et al. 2011).

Ringed and bearded seals are also harvested by subsistence users from approximately 64 Alaska Native communities in western and northern Alaska, from Bristol Bay to the Beaufort Sea (Ice Seal Committee 2016). From 2010 through 2014, the total annual ringed and bearded seal harvest estimates across 17 surveyed communities ranged from 695 to 1,286 and 217 to 1,176, respectively (Ice Seal Committee 2017).

5.1 Underwater Acoustic Environment of the Action Area

The underwater acoustic environment is composed of sounds from environmental, biologic, and anthropogenic sources. Underwater sound levels vary as these sources fluctuate on daily, seasonal, and annual scales. Environmental sources of sound include geologic processes, earthquakes, wind, lightning, thunder, rain, waves, ice, etc. Biologic sources include marine mammals and fish. Anthropogenic noises include vessels, offshore construction and operations, and aircraft.

The Bering Sea consists of an extensive continental shelf area and a deep oceanic region with a maximum depth of 11,500 feet (3,500 meters). The Chukchi Sea continental shelf is characterized by a very uniform water depth of 64 to 98 feet (30 to 50 meters). The Beaufort Sea has a narrow continental shelf that drops off to the north into the Beaufort Plateau, a deep basin with depths of roughly 6,500 to 10,000 feet (2,000 to 3,000 meters). The shallower waters of the continental shelves of the Bering, Chukchi, and Beaufort

Seas generally support long-range propagation of sounds at frequencies between 50 and 500 Hz. The shelf drop-off in the Beaufort and Bering Seas allow long-range propagation of high amplitude, low-frequency sounds on a basin-wide scale. Underwater sound levels in shallow water environments generally increase with increasing wind speed (Wenz 1962). Both the Beaufort and Chukchi Seas are covered by sea ice during most of the year. When there is 100% ice cover, the ambient sound field lacks sound from bubbles and agitation generated by surface waves so underwater sound levels tend to be lower compared to those for open-water conditions (Richardson, Greene et al. 1995). Further, there is less anthropogenic noise when there is ice cover.

Marine mammal vocalizations and anthropogenic sounds have been measured across the Bering Sea to the Beaufort Sea using seafloor-mounted passive acoustic monitoring devices since the late 1970s. Typical reported ambient levels range from 77 to 135 dB re 1 µPa (e.g., Greene Jr., Blackwell et al. 2008; Hannay, Delarue et al. 2013; Nystuen, Moore et al. 2010). The Bering Sea is home to one of the world's largest fisheries, so the contribution of fishing vessel sound is much greater than in the Chukchi and Beaufort Seas. Measurements in the Chukchi Sea indicated that sound levels at frequencies between 100 Hz and 3 kHz were roughly 10 dB less in winter than those recorded during the open-water season (Hannay, Delarue et al. 2013), primarily due to marine mammal sounds. Sea ice can, however, be an intermittent source of high-intensity sound during cracking, formation, and movement (Hannay, Delarue et al. 2013).

6.0 EFFECTS OF THE ACTION

6.1 Direct Effects

Direct effects on marine mammals could include disturbance or displacement from noise and human activity, habitat alteration, and injury or mortality from vessel strikes. Table 4 summarizes impacts to marine mammals from the Project. In addition to the effects in Table 4, if a spill or unintended release occurred (very unlikely), ESA species could be injured or killed from contamination.

Table 4. Summary of Direct Effects to Marine Mammals and Marine Mammal Habitat

Project Component	Effect to Marine Mammals	Project Component Details
Oliktok Dock improvements	Disturbance or displacement from airborne noise or human activity	No in-water work Airborne noise: 78 dBA at 50 feet (15.24 meters) 4 weeks first summer
Screeding	Temporary habitat alteration to benthic habitat Disturbance or displacement from airborne and underwater noise or human activity Displacement of benthic prey (fish and invertebrates) Injury or mortality form vessel strike	12.1 acres altered 2 to 3 occurrences prior to barge arrivals Underwater noise: 164 to179 dB rms at 3.28 feet (1 meter) Airborne noise: 65 to 76 dB at 328 feet (100 meters)
Barge and tug traffic	Disturbance or displacement from noise and human activity Injury or mortality from vessel strike	30 barges and 50 tugs over 4 years along barge transit route between Dutch Harbor and Oliktok Dock 145 to 175 dB rms at 3.28 feet (1 meter)
Support vessel traffic	Disturbance or displacement from noise and human activity Injury or mortality from vessel strike	285 support vessel roundtrips over 4 years between Oliktok Dock and the barge lightering area 145 to 175 dB rms at 3.28 feet (1 meter)

Note: dB (decibel); dBA (A-weighted decibels); rms (root mean square)

6.1.1 Noise

6.1.1.1 Applicable Noise Criteria

Under the MMPA, the NMFS has defined levels of harassment for marine mammals. Level A harassment is defined as the potential to injure, and Level B harassment is defined as the potential to disturb. Table 5 summarizes the thresholds for assessing potential impacts on marine mammals from underwater and airborne sound. For purposes of this BA, the calculated distance to the underwater Level B harassment (disturbance) threshold was used to define the action area (as described Section 3.1, *Definition of the Action Area*). A brief overview of underwater acoustics is provided in Appendix B, *Overview of Acoustics*.

Table 5. Marine Mammal Injury and Disturbance Thresholds for Underwater and Airborne Sound

Marine Mammals	Underwater Injury Threshold (Level A) Impulsive	Underwater Injury Threshold (Level A) Non-Impulsive	Underwater Disturbance Threshold (Level B) Impulsive	Underwater Disturbance Threshold (Level B) Non-Impulsive	Airborne Threshold (Level B)
Low-frequency cetaceans	219 dB L_{pk} 183 dB SEL	199 dB SEL	160 dB rms	120 dB rms	NA
Mid-frequency cetaceans	230 dB L_{pk} 185 dB SEL	198 dB SEL	160 dB rms	120 dB rms	NA
High-frequency cetaceans	202 dB L_{pk} 155 dB SEL	173 dB SEL	160 dB rms	120 dB rms	NA
Phocid pinnipeds[a]	218 dB L_{pk} 185 dB SEL	201 dB SEL	160 dB rms	120 dB rms	100 dB rms
Otariid pinnipeds	232 dB L_{pk} 203 dB SEL	219 dB SEL	160 dB rms	120 dB rms	100 dB rms
Polar bears, walrus, sea otters	190 dB rms	180 dB rms	160 dB rms	160 dB rms	NA

Note: NA (not applicable). All underwater sound levels are reported as decibels referenced to 1 microPascal (dB re 1 µPa) and all airborne sound levels are reported as dB re 20 µPa. Peak (L_{pk}) is instantaneous maximum sound level; sound exposure level (SEL) is the accumulative sound energy over a 24-hour period; root mean square (rms) is the arithmetic mean of the squares of the measured pressure of the sound.

[a] The airborne threshold for harbor seals is 90 dB rms; the airborne threshold for all other phocids is 100 dB rms.

6.1.1.2 Description of Noise Sources

The acoustic characteristics of each of Project activity in the marine environment are described in the following section and summarized in Table 6.

Table 6. Summary of Noise Sources

Activity	Airborne Sound Level (dBA re 20 µPa)	Underwater Sound Level (dB re 1 µPa)	Frequency	Reference
Screeding (tug and barge)	NA	164 to 179 dB rms at 3.28 feet	Range: 10 to 10,000 Hz Concentration: 10 to 2,000 Hz	Blackwell and Greene 2003
Ice trenchers (bulldozer)	64.7 dBA at 328 feet	114 dB rms at 328 feet	Range: 10 to 8,000 Hz Concentration: 31 to 400 Hz	Greene Jr. et al. 2008
Grading excavators (backhoe)	78 dBA at 50 feet	125 dB rms at 328 feet	Range: 10 to 8,000 Hz Concentration: 31 to 400 Hz	Airborne: USDOT 2006 Underwater: Greene Jr. et al. 2008
Ditch Witch	76.3 dBA at 328 feet	122 dB rms at 328 feet	Range: 10 to 8,000 Hz Concentration: 20 to 400 Hz	Greene Jr. et al. 2008
General vessel operations	NA	145 to 175 dB rms at 3.28 feet	10 to 1,500 Hz	Richardson et al. 1995; Blackwell and Greene 2003

Note: dB (decibels); dBA (A-weighted decibels); dB re 1 µPa (decibels referenced to 1 microPascal); Hz (hertz); NA (not applicable); rms (root mean square).

6.1.1.2.1 Oliktok Dock Improvements

Improvements at Oliktok Dock will occur onshore and will create airborne noise from use of heavy equipment, such as described in Table 6.

6.1.1.2.2 Screeding

The sea floor at the barge lightering area and at Oliktok Dock will be screeded prior to barge arrival. Screeding consists of scraping or dragging the substrate to produce a flat profile so the barges can be safely grounded. Sediment is not removed from the aquatic environment; soft substrates are redistributed using a plow or rake-like structure attached and controlled by a hydraulic forklift on the barge. The barge is also outfitted with excavators and an anchor-based mooring system; the excavators are used to groom significant humps or depressions on the seafloor too large for the screeding device. The barge is manipulated using two tugs.

Blackwell and Greene (2003) reported a source level of 164 dB re 1 µPa rms at 3.28 feet (1 meter) for the tug *Leo* pushing a full barge near the Port of Anchorage. The source level increased to 179 dB re 1 µPa rms at 3.28 feet (1 meter) when the tug was using its thrusters to maneuver the barge during docking. Most of the sound energy is in the band of 10 to 2,000 Hz, with a large peak at 50 Hz. There are no measurements available in Alaska of screeding, so these levels are used as a proxy for characterization of these activities.

In their analysis of Northstar Island, Greene Jr. et al. (2008) measured an underwater sound level of a bulldozer at 114.2 dB re 1 µPa rms at 328 feet (100 meters), a backhoe at 124.8 dB re 1 µPa rms at 328 feet (100 meters), and a Ditch Witch at 122 dB re 1 µPa rms at 328 feet (100 meters), with the center frequency between 10 and 63 Hz. They reported that broadband sounds from these activities diminished to the median background level of 77 to 116 dB re 1 µPa rms (10 to 10,000 Hz range) at distances between 0.62 and 3.1 miles (1 and 5 km).

The measured airborne levels of the bulldozer and Ditch Witch were 64.7 dB and 76.3 re 20 µPa rms at 328 feet (100 meters), respectively; airborne sound associated with the backhoe was not measured Greene Jr. et al. (2008). The U.S. Department of Transportation (2006) *Construction Noise Handbook* provides a summary of equipment with measured maximum levels at 50 feet. The handbook reports an airborne level of 78 A-weighted decibels at 50 feet (15 meters).

6.1.1.2.3 Vessels

Some vessels such as tugs and cargo ships can, under some circumstances, generate underwater sound exceeding the non-impulsive threshold of 120 dB due largely to the continuous cavitation sound produced from the propeller arrangement of both drive propellers and thrusters. Large ships produce broadband sound pressure levels of about 170 dB re 1 µPa rms at 3.28 feet (1 meter) (Blackwell and Greene 2003; Richardson, Greene et al. 1995). Thrusters have generally smaller blade arrangements operating at higher rotations per minute and therefore largely produce more cavitation sound than drive propellers.

6.1.1.3 Calculation of Distances to Thresholds

Distances from construction activities to the 120-dB underwater disturbance threshold and 100-dB airborne disturbance threshold were estimated assuming a TL of 15 log(R) and 20 log(R) respectively (Table 7). Airborne noise from construction activities will be below the 100-dB threshold at 21 feet (7 meters) from the source. Underwater noise from construction activities such as use of a backhoe, dozer, or Ditch Witch will be below the 120-dB threshold between 131 and 707 feet (40 and 215 meters) from the source. Underwater noise from vessels will be below the 120-dB threshold at approximately 7,067 feet (2,154 meters) or 1.3 miles from the source.

Table 7. Estimates of Distance to Noise Thresholds by Activity

Activity	Distance to 100-dB Airborne Disturbance Threshold (feet)	Distance to 120-dB Underwater Disturbance Threshold (feet)
Bulldozer	6	131
Backhoe	4	707
Ditch Witch	21	446
Screeding (tugs and barge)	NA	7,067 (1.3 miles)
Vessel	NA	7,067 (1.3 miles)

Note: dB (decibel); NA (not applicable). Estimates assume a transmission loss of 15 log(R) for underwater noise and 20 log(R) for airborne noise.

6.1.1.4 Effects of Noise on Marine Mammals

Marine mammals use hearing and sound transmission to perform vital life functions. Introducing sound into their environment could be disrupting to those behaviors. Sound (hearing, vocalization, and echolocation) serves four primary functions for marine mammals: 1) providing information about their environment, 2) communication, 3) prey detection, and 4) predator detection. The distances to which noise associated with the Project activities are audible depends on source levels, frequency, ambient noise levels, the propagation characteristics of the environment, and sensitivity of the receptor (Richardson, Greene et al. 1995).

In assessing potential effects of noise, Richardson et al. (1995) has suggested four criteria for defining zones of influence. These zones are described below from greatest influence to least influence.

Zone of hearing loss, discomfort, or injury – The area within which the received sound level is potentially high enough to cause discomfort or tissue damage to auditory or other systems. This includes temporary threshold shifts (temporary loss in hearing) or permanent threshold shifts (loss in hearing at specific frequencies or deafness). Nonauditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage.

Zone of masking – The area within which the noise may interfere with the detection of other sounds, including communication calls, prey sounds, or other environmental sounds.

Zone of responsiveness – The area within which the animal reacts behaviorally or physiologically. The behavioral responses of marine mammals to sound is dependent on a number of factors, including: 1) acoustic characteristics of the noise source of interest, 2) physical and behavioral state of animals at time of exposure, 3) ambient acoustic and ecological characteristics of the environment, and 4) context of the sound (e.g., whether it sounds similar to a predator) (Richardson, Greene et al. 1995; Southall, Bowles et al. 2007). However, temporary behavioral effects are often simply evidence that an animal has heard a sound and may not indicate lasting consequence for exposed individuals (Southall, Bowles et al. 2007).

Zone of audibility – The area within which the marine mammal might hear the noise. Marine mammals as a group have functional hearing ranges of 10 Hz to 180 kHz, with best thresholds near 40 dB (Kastak, Southall et al. 2005; Ketten 1998; Southall, Bowles et al. 2007).

In addition, habituation of animals to their environment is a significant factor in assessing the potential impacts of noise. The definition of habituation (Lorenz 1966) is "the elimination of the organism's response to often recurring, biologically irrelevant stimuli without impairment of its reaction to others." Habituation is ubiquitous in the animal kingdom. No study takes place without subjects habituating to their environments. More predictable sources of disturbance can lead to greater habituation than less predictable ones.

6.1.1.4.1 Effects of Noise from Oliktok Dock Improvements and Screeding

Modifications of Oliktok Dock will occur over 4 weeks in one summer season and be within the existing footprint of the dock; all work will be on shore, and no in-water work and no pile driving is proposed. Screeding at Oliktok Dock and the lightering area will occur each barge delivery year in the summer shortly before the barges arrive and will take approximately 1 week to complete. These activities could generate underwater (screeding) and airborne (screeding and dock improvements) noise. Bowhead and beluga whales generally transit outside of the barrier islands and are not observed in the shallow waters near Oliktok Dock; therefore, only seals are expected to be in the dock area during the summer. While the lightering area is closer to the barrier islands, it is still inside the barrier islands and only seals are expected to be in the area. Airborne noise from construction activities will be below the 100-dB airborne threshold at 21 feet (7 meters), so only seals transiting in the immediate vicinity (within 21 feet) of Oliktok Dock will be potentially disturbed from airborne noise. Underwater sound from screeding activities is expected to be similar to underwater backhoe grading, of which Greene Jr., Blackwell et al.

(2008) measured a marine mammal Level B acoustic harassment threshold distance of 2,545 feet (776 m) in the Beaufort Sea near Prudhoe Bay, Alaska.

There have been numerous studies associated with ringed seal responses to industrial activities near Northstar Island, indicating ringed seals tolerate construction noise (Blackwell, Lawson et al. 2004; Moulton, Richardson et al. 2003; Williams, Nations et al. 2006). Moulton, Richardson et al. (2003) conducted preconstruction (1997 to 1999) and postconstruction (2000 to 2001) aerial surveys during the spring when seals are basking on shorefast ice. They reported no change in seal density before and after construction. Blackwell, Lawson et al. (2004) observed behaviors of ringed seals during spring and winter during pile driving at Northstar Island and reported that none of the 23 ringed seals observed exhibited strong reactions to either acoustic or visual stimuli. Williams, Nations et al. (2006) reported that the abandonment rate of lairs or holes was not significantly different closer to Northstar Island and ice roads versus being farther away. This, plus associated aerial survey results (Moulton, Richardson et al. 2005), showed that if there was altered habitat use near Northstar Island, it was not detectable. Additionally, bearded seals were observed outside of Simpson Lagoon during BPXA's Simpson Lagoon OBC Seismic Survey in July through September 2012. Ringed seals were observed during the same survey both within and outside of Simpson Lagoon. Biologically significant exposures were only estimated to have occurred when airguns were operational, a sound much greater than screeding (BP Exploration Alaska Inc. 2013). During a dredging and screeding operation in 2018 at the Milne Point Unit F Pad Barge Landing within Simpson Lagoon, no marine mammals were observed (Hilcorp Alaska LLC 2018). Seal density near Oliktok Dock and in the lightering area is expected to be very low. Ringed seals are likely to be dispersed during construction and screeding activities, though some may move into coastal areas. Bearded seals are less likely to be present during construction and screeding activities, as they are more likely to be found with the ice pack (Bengston, Hiruki-Raring et al. 2005). Of those present, some seals may exhibit minor, short-term disturbance responses to airborne and underwater sounds from construction and screeding activities, including barge and/or vessels associated with screeding activities, at Oliktok Dock and the lightering area during the four summer seasons of barging activity; however, those effects will be localized and temporary in nature and will not result in population-level effects.

6.1.1.4.2 Effects of Vessel Noise

The barge transit route will traverse through the Bering, Chukchi, and Beaufort Seas, generally staying 10 to 40 miles (16 to 32 km) offshore, depending on weather, safety, and accepted transit routes. The barge lightering area and Oliktok Dock are in very shallow waters (less than 10 feet [3 m]) of Harrison Bay.

Vessel noise along the barge transit route from Dutch Harbor, Unalaska, to Harrison Bay may result in disturbance to whales and seals in the Bering, Chukchi, and Beaufort Seas. The Project includes 30 barge roundtrips over 4 years (Project Years 2, 3, 4, and 6) over this approximately 600-mile (965-km) route. Barges will be accompanied by tugs; there will be 50 tugs traversing the barge route over the same 4 years (Table 1). As noted in Table 7, marine mammals within 1.3 miles (2.1 km) of the barge transit route may be temporarily disturbed as the individual barges and tugs transit through the habitat. Given the slow speeds (10 knots [11.5 mph]) and low number of barges roundtrips, potential effects on NPRW and Steller sea lion will be minimal and temporary.

In regard to designated marine mammal critical habitats along the transit route; the barge route will be designed to avoid NPRW critical habitat in the Bering Sea. If the proposed NPRW critical habitat is finalized in the future, vessel traffic will follow the mitigation described in *3.3.3 Other Mitigation* as it traverses through NPRW critical habitat. In addition, the route will traverse Steller sea lion critical habitat near Dutch Harbor, the recently designated critical habitat for humpback whales (Figures 13 and 14) near Dutch Harbor (Figure 2), and the recently designated critical habitat for ringed and bearded seals in the Bering, Chukchi, and Beaufort Seas (Figures 17 and 20). Mitigation measures described in Section 3.3.3 will be applied to further reduce the potential for disturbance to the listed species. When applicable, discrete measures will be applied to individual species. For example, the barge transit route will avoid passing within 3 nautical miles (5.5 km) of known Steller's sea lion rookeries or haulouts. While vessel traffic may temporarily preclude animals from using critical habitat if vessels encounter individuals of designated species, we do not anticipate any long-term affects to designated critical habitats or their primary biological factors associated with transit activities.

The barge transit route is in the range of all of the cetaceans and pinnipeds discussed in Chapter 4.0, *Description of the Species and Their Habitat*, and may result in short-term behavioral disturbance of these species. The blue whale, fin whale, gray whale, humpback whale, NPRW, sperm whale, and Steller sea lion are included in this BA because of the barge transit route. Vessel noise along the barge route will be temporary and localized, and expected to have negligible impacts on these species. Results of Quintillion's work in 2016 and 2017 along a similar transit route provides substantiation that marine mammal response, if any, to vessels is not expected to rise to the level of harassment or take, and is not expected to significantly disrupt normal marine mammal behavioral patterns (e.g., breeding, feeding, sheltering, resting, migrating) Final marine mammal monitoring and mitigation summary reports (Blees, Green et al. 2017; Green, Blees et al. 2018) provided the following information (Note: vessels during this project also engaged in cable laying activities):.

- In 2016, reactionary behaviors were documented during only 3% of all cetacean observations. Reactions included change of direction (2 bowhead whales and 2 gray whales) and swimming speed increase (1 bowhead). One whale was observed swimming under the vessel and continued to swim away. None of the remaining 231 groups or 557 individuals exhibited a reaction to the presence of the cable ship.
- In 2017, reactionary behaviors were documented during only 2.5% of all cetacean observations and included avoidance (moving away from the vessel) by a group of 3 gray whales and a single unidentified whale. None of the remaining 78 groups or 112 individuals exhibited a reaction to the presence of the cable ship.
- In 2016, nearly 62% of pinniped groups and individuals did not react to vessel activities. The most commonly observed reaction was "look", meaning the animal acknowledged the presence of the vessel. Other reactions included diving, increased swimming speed, or clearly changing travel direction. No reactions were indications of the animals exhibiting threat or flee responses but were rather more curiosity or avoidance behaviors.
- In 2017, 39% of the pinniped groups did not react to vessel activities in the Quintillion project area, and another 53% simply noted the presence of the ship by looking at it. Other reactions included altering swimming direction, approaching the vessel, and splashing when diving.

The Project will require approximately 285 support vessels between Oliktok Point and the barge lightering area. Support vessels may potentially disturb bowhead whales migrating in the spring and fall along the coastline. Support vessels during transit may also disturb bearded and ringed seals within designated critical habitat. Similar to potential impacts through short-term disturbance of large whales along the barge transit route, impacts to bowhead whales from support vessels are likely to be temporary and localized. As described in Section 6.1.1.4, *Effects of Noise on Marine Mammals*, designated ice seals in this area are known to be tolerant of industrial activity. Potential effects on seals will be temporary during the activity and will not result in population-level effects.

6.1.2 Habitat Alteration

Project activities will not result in any permanent habitat loss for the marine mammals described in this BA, including critical habitat. Screeding at Oliktok Dock and the barge lightering area will result in temporary alteration to the substrate and water column due to redistributing sediment. However, Oliktok Dock is an active industrial facility that is screeded prior to any barge arrival. Thus, the area has been previously disturbed. Screeding will alter 12.1 acres of the sea bottom and temporarily increase suspended sediment in the water column, which will impact seals by reducing underwater visibility. Although increased turbidity has been shown to reduce the visual acuity of harbor seals (Weiffen, Möller et al. 2006), observations of blind harbor and grey seals indicated they were capable of foraging successfully enough to maintain body condition (McConnell, Fedak et al. 1999; Newby, Hart et al. 1970). High levels of turbidity are present in locations where marine mammals that do not use echolocation routinely forage, and laboratory studies have shown that seals are able to use other sensory systems to detect and follow potential prey without using their vision (Dehnhardt, Mauck et al. 2001). Thus, any increases in turbidity are likely to have limited or no direct effects on seals.

The potential indirect effects of screeding on seals through reduced feeding opportunities is described in Section 6.2.2, *Indirect Effects on Marine Mammal Prey*.

As all marine activities will occur in the summer and there will be no effects on seal pupping habitat. Thus, any potential habitat effects are expected to be localized and minor, affecting a small number of seals with no population-level effects.

6.1.3 Stranding, Injury, or Mortality of Marine Mammals

Whale injury or mortality from the Project could occur from ship strikes. Globally, the amount of shipping traffic has increased steadily over the past several decades and ship strike has been identified as a major factor potentially affecting complete recovery of whale populations to pre-exploitation levels. Fin whales are struck most frequently, but right, humpback, sperm, and gray whales also are regularly hit (Laist, Knowlton et al. 2001). There are less frequent records of collisions with blue, sei, and minke whales. Humpback whales in feeding (Hill, Karniski et al. 2017) and breeding (Lammers, Pack et al. 2013) grounds are known to experience ship strikes, and right whales are vulnerable in their feeding grounds in the northwest Atlantic (Knowlton and Kraus 2001). However, the transit route does not intersect these feeding and breeding grounds and therefore, strandings, injuries, or mortalities as a result of the Project are not expected.

In Alaska, from 1978 to 2011, 86% of reported ship strikes (from 93 reported incidents) were to humpback whales, and there were 15 cases where humpback whales struck anchored or drifting vessels (Neilson, Gabriele et al. 2012). An apparent lack of effective avoidance responses by large whales contributes to the risk of ship strike (McKenna, Calambokidis et al. 2015; Nowacek, Johnson et al. 2004).

Several studies have considered the risk of ship strike to fin and humpback whales in areas with heavy shipping traffic along the west coast of North America (Nichol, Wright et al. 2017; Rockwood, Calambokidis et al. 2017; Williams and O'Hara 2010). Places where high densities of whales overlapped with frequent transits by large and fast-moving ships were identified as high-risk areas. The most significant factor in ship strikes appears to be vessel speed. Most lethal and severe injuries to large whales resulting from documented ship strikes have occurred when vessels were travelling at 14 knots (16.1 mph), or greater (Laist, Knowlton et al. 2001); speeds common among large ships. When vessel speeds are greater than 15 knots (17.3 miles per hour), the probability of a lethal injury (mortality or severe injuries) from a ship strike approaches 1 (Vanderlaan and Taggart 2007). Similarly, Currie et al. (2017) found a significant decrease in close encounters with humpback whales in the Hawaiian Islands when vessel speeds were below 12.5 knots (14.4 mph). Reducing ship speeds to less than 10 knots (11.5 mph) has proven effective for reducing ship strikes of North Atlantic right whales (Laist, Knowlton et al. 2014; van der Hoop, Vanderlaan et al. 2015).

Sealift modules will be transferred between barges at the barge lightering area and offloaded at Oliktok Dock during the summers of Project Year 2, Year 3, Year 4, and Year 6. The vessels will be traveling slowly and on a similar route to other vessel traffic. Conceptual barge routes displayed in Figure 2 are based on known shipping corridors and plans for other, potentially concurrent projects. Barges will not likely strike whales because the vessels will be traveling slowly.

Vessel strikes of seals and sea lions are not anticipated because these pinniped species have good visual and auditory acuity and are agile in the water. Further, despite all the traffic in and around rookery haulout locations near Dutch Harbor, there have been no reported incidents of ship strikes with Steller sea lions (Muto, Helker et al. 2017).

Therefore, mortality or injury from ship strikes from either barge or support vessel traffic is considered unlikely for all the species considered in this BA.

6.1.4 Contamination

Increased barge and support vessel activity in the action area will temporarily increase the risk of accidental spills. If a spill to the marine environment were to occur from vessels used for the Project, it would be expected to be very small (less than 10 gallons) to small (10 to 99.9 gallons), limited to refined products (e.g., diesel, lubricating oil), localized to the immediate area of the barge or vessel route, and short in duration (less than 4 hours). The expected spill occurrence rates for these spill types would be low to very low and the spills would be expected to occur during construction at Oliktok Dock or originate from smaller watercraft (e.g., tugs that handle the module transport barges, support vessels). It would be possible, although of very low likelihood, that a medium (100 to 999.9 gallons) to very large (over 100,000 gallons) spill could occur along existing marine navigation routes leading to the barge lightering area or Oliktok Dock. This would only occur if a tug or barge runs aground, sinks, or its containment compartment(s) is breached, and the contents released (USACE 2012). The duration of these spill types would vary from about a day to up to several days, depending on the spill's location and the proximity of the shore-based response. Similarly, the geographic extent of these spills would vary and may or may not reach land, depending on the location of the spill and prevailing meteorological and oceanographic conditions at the time of the spill. Because the duration and frequency of marine vessel use for the Project will be limited, the likelihood of a spill of this nature is very low. A detailed analysis of spill risk is provided in Appendix C, *Spill Risk Assessment* (Chapter 4.0 of the Willow MDP Draft Supplemental EIS [BLM 2022b]) .

In the unlikely event there is an accidental release of contaminants from Project activities, it could adversely affect the health of exposed marine mammals. Due to the relatively small quantity of any potential accidental discharge from the construction or operational activities at Oliktok Dock, the implementation of safe operational protocols, and the low density of marine mammals in the area, any impacts on marine mammals from an accidental discharge from construction activity at Oliktok Dock would be minimal. Impacts from an accidental spill during barging on whales and pinnipeds in the action area would remain relatively small and would be minimized by maintaining safe operational and navigational conditions.

The Colville River HDD diesel and seawater pipeline crossing could also create a potential risk of a spill. However, the risk would be very low (approaching zero) since the pipelines will be insulated and placed within an outer pipeline casing, which will inhibit heat transfer to permafrost, contain fluids in the event of a leak or spill, and provide structural integrity. The existing Colville River HDD crossing for the Alpine Sales Oil Pipeline has had no spills to date; it was constructed in 1998 and 1999 and is similar in design and size as that proposed for the Project. Any unintended releases from the diesel pipeline within the outer pipeline casing would be detected and responded to quickly. It would be very unlikely that fluids would reach the Colville River or the CRD and expose marine mammals. If spilled fluids did, pre-staged spill response materials located throughout the CRD would allow a quick response and increase the likelihood of containment.

In the unlikely event there is an accidental release, toxic substances, such as oil, could impact marine mammals in the following ways: 1) acute toxicity caused by an event such as an oil spill can result in acute mortality or injured animals with neurological, digestive, and reproductive problems, and/or 2) can cause detrimental effects to the population through complex biochemical pathways that suppress the immune system or disrupt the endocrine system of the body causing poor growth, development, reproduction, and reduced fitness (NMFS 2008).

Evidence shows that cetaceans can see oil at the water surface, and some can detect it, often resulting in avoidance; however, some cetaceans have been observed swimming and foraging in the presence of oil. Therefore, the immediate reactions of cetaceans to oil spills vary depending on the behavioral state of the animal (Geraci 1990). Related affects from an oil spill on whales could include death or injury from swimming through oil (e.g., skin contact, ingestion of oil, respiratory distress from hydrocarbon vapors), contaminated food sources, or displacement from foraging areas (Matkin, Saulitis et al. 2008). Impacts from an oil spill on whales depend on the extent and duration the animals are in contact with the oil and the characteristics of the oil (type and age) (Matkin, Saulitis et al. 2008).

Oil has been implicated in the deaths of pinnipeds (St. Aubin 1990). Pinnipeds exposed to oil at sea through incidental ingestion, inhalation, or limited surface contact do not appear greatly harmed by the oil; however, pinnipeds found close to the source or that must emerge directly in oil appear substantially more affected. Fur seal pelts exposed to oil appear to lose thermal characteristics, causing energetic stress. Additionally, individuals or groups of species that are compromised by preexisting disease or stress are more vulnerable when exposed to oil (St. Aubin 1990).

Toxic substances, such as oil, may be a contributing factor in the decline of the Steller sea lion population (NMFS 2008). Sea lions exposed to oil through inhalation, dermal contact and absorption, direct ingestion, or through the ingestion of prey may become heavily contaminated with polycyclic aromatic hydrocarbons (PAHs). The *Exxon Valdez* oil spill occurred after the decline began in the Steller sea lion population; however, there were substantial mortalities from toxic contamination following the event. Twelve carcasses were discovered in Prince William Sound, and 16 were found near Prince William Sound, the Kenai coast, and Barren Island. The highest levels of PAHs were in the animals found dead after the spill (Matkin, Saulitis et al. 2008).

Individual marine mammals could show acute irritation or damage to their eyes, blowhole or nares, and skin; the fouling of baleen, which could reduce feeding efficiency; and respiratory distress from the inhalation of vapors (Geraci 1990). Long-term impacts from exposure to contaminants to the endocrine system could impair health and reproduction (Geraci 1990). Ingestion of contaminants could cause acute irritation to the digestive tract, including vomiting and aspiration into the lungs, which could result in pneumonia or death (Geraci 1990).

6.2 Indirect Effects

Indirect effects as defined under the ESA are those that occur later in time but are still reasonably certain to occur.

6.2.1 Indirect Effects on Marine Mammal Critical Habitat

Critical habitat is defined under the ESA as (1) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary of Commerce that such areas are essential for the conservation of the species (16 U.S.C. 1532(5)(A)). For the marine mammals listed under the ESA and potentially affected by the Project, critical habitat has been defined by presence of sea ice for basking, molting, whelping, and nursing; lairs (for ice seals), rookeries, and major haulouts for Steller sea lions; and the presence of prey species for all listed marine mammals.

The Project is anticipated to have no adverse modification on critical habitat of ESA-listed marine mammals. Sea ice will not be present during marine activities as all marine activities associated with the Project will occur during Summer. In addition, the barge transit route will traverse through small portions of the critical habitat designated for Steller's sea lions and humpback whales. In the event that the proposed North Pacific right whale critical habitat is promulgated in the future, barges may travel through a small portion of this critical habitat as well. While the transits will traverse longer portions of ringed and bearded seal critical habitat, effects of the barge traffic, such as a preclusion of using portions of critical habitat if vessels encounter individual animals, will be temporary as vessels move through the environment. The amount of marine mammal prey habitat affected in the action area will be small compared to the available prey habitat, as discussed in more detail in Section 6.2.3, *Indirect Effects on Marine Mammal Prey*. Thus, any potential effects to marine mammal prey will be localized and minor, affecting a small number of individuals, with no population-level effects.

When vessels are transiting in the Gulf of Alaska and Bering Sea, they will follow mitigation measures outlined in Sections 3.3, *Minimization, Avoidance, and Mitigation*. CPAI will provide vessel operators with spatial data files of marine mammal critical habitat for input into the vessel navigation system so that these areas can be avoided where possible. Vessels will be tracked with AIS so routes will be documented.

Project vessel traffic could impact prey if an unintended release of oil occurred. If a spill were to occur, it would most likely be a small fuel spill. If a portion of the prey resources become contaminated by a spill, it could alter the quality of critical habitat at a local scale. However, if a spill were to occur, most small, refined product spills are expected to evaporate and disperse quickly in offshore waters and not affect critical habitat. Furthermore, the likelihood of a spill occurring is very low (as described in Section 6.1.4, *Contamination*). There will be 30 barge roundtrips and 50 tugboat roundtrips over four open-water seasons.

The Project is not expected to significantly affect prey availability for marine mammals, as discussed in Section 6.2.3 *Indirect Effects on Marine Mammal Prey*. Therefore, effects on prey are not expected to result in adverse modifications of critical habitat for ESA-listed marine mammals.

6.2.2 Indirect Effects on Marine Mammal Habitat

6.2.2.1 Wastewater and Contaminants

All vessels with toilet facilities must have Type II or Type III marine sanitation devices (MSDs) that comply with 40 CFR 140 and 33 CFR 159 for sanitary wastes. A Type II MSD macerates waste solids so that the discharge contains less than 150 milligrams of suspended solids per liter and a bacteria count of less than 200 per 100 milliliters. Type III MSDs are more commonly used systems designed to retain or treat sanitary waste until it can be disposed of at proper onshore facilities. State and local governments regulate domestic and graywater discharges that consist of materials discharged from sinks, showers, laundries, safety showers, eyewash stations, hand wash stations, and galleys. Graywater discharges are not regulated outside the State's 3 nautical mile territory. Wastewater discharge from the Project could increase pollutants in the marine environment and these discharges may degrade habitat and increase toxicity to individual animals. However, it is unlikely that exposure to low level suspended solids discharged into the water within the 3 nautical mile boundary will cause adverse effects on marine mammals in the action area.

6.2.2.2 Invasive Species

Vessels can degrade habitat quality for marine mammals through the introduction of aquatic invasive species, which can impact food webs and outcompete native species.

All vessels that enter State of Alaska or federal waters are subject to U.S. Coast Guard regulations (33 CFR 151), which are intended to reduce the transfer of aquatic invasive organisms. Management of ballast water discharge is federally regulated (33 CFR 151.2025); discharge of untreated ballast water into the Waters of the U.S. is prohibited unless the ballast water has been subject to a mid-ocean ballast water exchange (at least 200 nautical miles offshore). Vessel operators are also required to remove "fouling organisms from the hull, piping, and tanks on a regular basis, and dispose of any removed substances in accordance with local, state, and federal regulations" (33 CFR 151.2035(a)(6)). Adherence to the 33 CFR 151 regulations will reduce the likelihood of Project-related vessels introducing aquatic invasive species.

6.2.3 Indirect Effects on Marine Mammal Prey

Project activities may indirectly affect listed marine mammals by temporarily affecting their food sources. Although individual prey species may be affected, the Project is not expected to significantly affect prey availability for marine mammals. The potential effects on fish and invertebrates from noise, habitat alteration, and contamination from potential spills are summarized below.

6.2.3.1 Noise and Habitat Alteration

Zooplankton is a food source for several whale species, including blue, humpback, bowhead, fin, and NPRWs. Zooplankton is also a food source for fish that are prey for marine mammals. Noise from screeding and vessel traffic are typically of low amplitudes, so it will not be expected to adversely affect zooplankton. Further, the areas that will be screeded are very shallow and previously disturbed (screeded most summer seasons during recent years), so zooplankton may not be common in this area. Noise and screeding at Oliktok Dock and the barge lightering area is not likely to affect the foraging ecology of marine mammal species that feed on zooplankton in the action area.

In addition to zooplankton, invertebrates and fish in the benthos provide food for various marine mammal species (e.g., bearded seals, ringed seals, fin whales, gray whales, sperm whales). Screeding at Oliktok Dock and the barge lightering area will disturb 12.1 acres of the seafloor and associated benthos, which could affect the prey of bowhead whales, ringed seals, and bearded seals. Benthic infauna abundance and diversity are very low in the Oliktok Dock area, probably due to shallow water depth (less than 13 feet [4 meters]), runoff from adjacent rivers (i.e., high sediment loads from the CRD), and ice-related stress (Carey, Boudrias et al. 1984). Freezing and thawing sea ice and river runoff during the summer melting season significantly affect coastal water mass characteristics and decrease salinity. River outflow and coastal erosion also transport significant amounts of suspended sediments (Dunton, Weingartner et al. 2006). Sea ice can scour and gouge the seafloor and move sediments, creating natural, seasonal disruptions of the seafloor. These factors will result in a less than favorable habitat for benthic organisms in the action area. Bottom disturbance is a natural and frequent occurrence in this nearshore region, resulting in benthic communities with patchy distributions (Carey, Boudrias et al. 1984).

Screeding will have highly localized, minor impacts on benthic populations. Oliktok Dock is not prime foraging habitat for bowhead whales, ringed seals, or bearded seals, and higher-quality foraging areas are available nearby. That coupled with the low nearshore densities of benthic prey items suggest that the Project will have no effect on the marine mammal feeding ecology.

Fish are a primary prey source for ringed seals, Steller sea lions, humpback whales, fin whales, and sperm whales. Fish are a primary biological feature in ringed seal critical habitat. As also discussed in Section 6.2.1, *Indirect Effects on Marine Mammal Critical Habitat*, any impacts to prey would be temporary, localized, and would not significantly affect prey availability. Both saltwater and anadromous species of fish inhabit the waters of the action area. Most are circumpolar and do not feed high in the water column. Arctic cod is the most abundant pelagic species in the northeastern Chukchi and Beaufort Seas and is the most important as a means of transferring energy from lower to higher trophic levels. Ringed seals rely on Arctic cod as a major food source (Frost and Lowry 1984). Project activities are not expected to result in changes to Arctic cod distribution, so there is no expected impact on this prey species. Other large fish species (e.g., salmonids) are present in the Bering Sea, but the low number of Project-related vessels during construction are not expected to affect fish distribution.

Fish have been shown to react when engine and propeller sounds exceed a certain level (Olsen, Angel et al. 1983; Ona 1988; Ona and Godø 1990). Avoidance reactions have been observed in fish such as cod and herring when vessel sound levels were 110 to 130 dB re 1 µPa rms (Ona and Godø 1990; Ona and Toresen 1988). Vessel sound source levels in the audible range for fish are typically 150 to 170 dB re 1 µPa/Hz (Richardson, Greene et al. 1995). Screeding could produce the highest sound levels of 164 to 179 dB root mean square at 3.28 feet (1 m) from the source. These sound pressure levels will be within the range that could cause behavioral avoidance in fish in the immediate area but will fall below levels that will injure or kill fish (Buehler, Oestman et al. 2015).

Avoidance will occur only when screeding or vessels are underway and thus will be temporary. It is unlikely that effects to marine mammal prey from noise will affect the foraging ecology of marine mammals.

The amount of marine mammal prey habitat affected in the action area will be small compared to the available prey habitat. Thus, any potential effects to marine mammal prey will be localized and minor, affecting a small number of individuals, with no population-level effects

6.2.3.2 Contamination

In the unlikely event of an accidental release of contaminants as described in Section 6.1.4, *Contamination*, contamination of lower trophic-level prey could reduce the quality and/or quantity of marine mammal prey in the area of the release. In addition, individuals that consume contaminated prey could experience long-term effects to health (Geraci 1990). Releases would likely be isolated to the immediate area and not affect large areas or important marine mammal foraging sites.

7.0 CUMULATIVE EFFECTS

Cumulative effects in the context of ESA Section 7 are the effects of future State, tribal, local, or private actions, not including federal activities, that are reasonably certain to occur in the action area (50 CFR 402.02). Future federal actions that are unrelated to Project activity are not considered because such actions will require their own Section 7 consultation. Because most commercial development has a federal nexus, these were not considered in the cumulative effects analysis. Nonfederal actions that are reasonably certain to occur include climate change, increased vessel traffic and commercial shipping as the extent of sea ice shrinks, and management and research actions by state agencies or private entities. The effects of these and other actions, such as, subsistence harvest of fish and wildlife, production of anthropogenic noise, unauthorized discharges (including spills) from non-federally permitted facilities or vessels, each constitute cumulative effects, in whole or in part and could contribute to cumulative effects on the whales and seals.

These actions could contribute to cumulative effects on marine mammals, particularly ringed and bearded seals, which are closely associated with sea ice. Warming global temperatures and the associated reductions in extent and duration of sea ice that are predicted to occur in the future may have substantial implications for these species.

Analysis of long-term data sets shows substantial decreases in both extent (area of ocean covered by ice) and thickness of sea ice cover during the past 30 years (Post, Bhatt et al. 2013; Wendler, Chen et al. 2014). These trends are projected to continue, possibly resulting in loss of summer sea ice by mid-century (Chapin, Trainor et al. 2014) and suggesting that all ice-dependent species may experience conditions that could result in declines of food availability and foraging and breeding habitat.

The effects of continuing climate change pose major challenges to the future well-being of marine species, possibly leading to population declines and range contraction for some ice-dependent species. However, the ability of federal agencies to influence the processes thought to be responsible for climate change (such as global greenhouse gas emissions) is extremely limited at present, absent an effective worldwide response to the problem.

The Project will add vessel traffic to the Bering, Chukchi, and Beaufort Seas at a time when traffic is expected to continue to increase due to changing climate and reduced sea ice extents. Project vessel traffic in combination with increased shipping and vessel traffic could increase the likelihood of vessel strikes of ESA species.

Management and research actions by State agencies or private entities could increase human presence as well as increase ground, air, and marine traffic, which could contribute to additional disturbance or displacement of marine mammals.

8.0 DETERMINATION OF EFFECTS

Table 8 summarizes the effects determination for each species described in the BA.

Table 8. Determination of Effects from the Project

Species	Status	Critical Habitat	Determination of Effects
Bowhead whale	Endangered	No	Not likely to adversely affect
Blue whale	Endangered	No	Not likely to adversely affect
Fin whale	Endangered	No	Not likely to adversely affect
North Pacific right whale Critical Habitat	Endangered	Yes	Not likely to adversely affect No adverse modification to critical habitat
Gray whale	Endangered	No	Not likely to adversely affect
Humpback whale – Mexico DPS Critical Habitat	Threatened	Yes	Not likely to adversely affect No adverse modification to critical habitat
Humpback whale – Western DPS Critical Habitat	Endangered	Yes	Not likely to adversely affect No adverse modification to critical habitat
Sperm whale	Endangered	No	Not likely to adversely affect
Ringed seal Critical Habitat	Threatened	Yes	Not likely to adversely affect No adverse modification to critical habitat
Bearded seal Critical Habitat	Threatened	Yes	Not likely to adversely affect No adverse modification to critical habitat
Steller sea lion Critical Habitat	Endangered	Yes	Not likely to adversely affect. No adverse modification to critical habitat.

Note: DPS (distinct population segment).

8.1.1 Effect on Bowhead Whale

The Project **may affect and is not likely to adversely affect** the bowhead whale due to noise associated with barging, support vessel traffic, and screeding. There will be 30 barge roundtrips and 50 tugboat roundtrips over 4 open-water seasons (Project Year 2, Year 3, Year 4, and Year 6), and though there is potential for ship strike, vessels will operate under strict marine mammal disturbance guidelines and will slow speed or alter course if marine mammals are encountered. Further, there are low numbers of known ship strikes along the barge transit route. Potential oil spills associated with a vessel grounding would be improbable, and spill prevention and response planning would be implemented. Support vessel traffic between Oliktok Dock and the barge lightering area will increase, but water in this area is shallower and closer to shore (0 to 1.8 nautical miles [3.3 km] from shore) than typical habitat used by bowhead whales (20 miles [32 km] offshore). Underwater noise levels from screeding may be detectable by bowheads but will not be at levels that will result in high levels of disturbance.

8.1.2 Effect on Blue Whale, Fin Whale, Gray Whale, and Sperm Whale

The Project **may affect and is not likely to adversely affect** blue, fin, gray, and sperm whales due to noise associated with the barge transit route. There will be 30 barge roundtrips and 50 tugboat roundtrips over 4 open-water seasons (Project Year 2, Year 3, Year 4, and Year 6), and though there is a potential for ship strike, vessels will operate under strict marine mammal disturbance guidelines and will slow speed or alter course if marine mammals are encountered. Further, there are low numbers of known ship strikes along the barge transit route. Potential oil spills associated with a vessel grounding would be improbable, and spill prevention and response planning would be implemented.

8.1.3 Effect on Humpback Whale and Its Critical Habitat

The Project **may affect and is not likely to adversely affect** the humpback whale due to noise associated with barging. There will be 30 barge roundtrips and 50 tugboat roundtrips over 4 open-water seasons (Project Year 2, Year 3, Year 4, and Year 6), which is a low number compared to the large amount of vessel traffic in and around the humpback whale critical habitat areas. There is a potential for ship strike, but vessels will operate under strict marine mammal disturbance guidelines and will slow speeds or alter course if marine mammals are encountered. Further, there are low numbers of known ship strikes along the barge transit route. Potential oil spills associated with a vessel grounding would be improbable, and spill prevention and response planning will be implemented.

The Project will have **no adverse modification on critical habitat** of the humpback whale because the barge transit route will traverse a small portion of the critical habitat available to the whales, barge traffic is temporary, and vessel transit activities are not expected to adversely affect humpback whale prey. When vessels are transiting in the Gulf of Alaska and Bering Sea, they will follow mitigation measures outlined in Sections 3.3.3, *Other Mitigation*. CPAI will provide vessel operators with spatial data files of humpback whale critical habitat for input into the vessel navigation system so that this area can be avoided where possible. Vessels will be tracked with AIS so routes will be documented. In addition, prey resources are the essential biological feature of critical habitat for humpback whales. Project vessel traffic could impact prey species if an unintended release of oil occurred. If a spill were to occur, it would most likely be a small fuel spill. If a portion of the prey resources become contaminated by a spill, it could alter the quality of critical habitat at a local scale. However, most small, refined product spills are expected to evaporate and disperse quickly in offshore waters and not affect humpback whale critical habitat. Furthermore, the likelihood of a spill occurring is very low (as described in Section 6.1.4, *Contamination*). There will be 30 barge roundtrips and 50 tugboat roundtrips over four open-water seasons.

8.1.4 Effect on North Pacific Right Whale and Its Critical Habitat

The Project **may affect and is not likely to adversely affect** the NPRW due to noise associated with barging. There will be 30 barge roundtrips and 50 tugboat roundtrips over 4 open-water seasons (Project Year 2, Year 3, Year 4, and Year 6), which is a low number compared to the large amount of vessel traffic in and around the NPRW critical habitat areas. There is a potential for ship strike, but vessels will operate under strict marine mammal disturbance guidelines and will slow speeds or alter course if marine mammals are encountered. Further, there are low numbers of known ship strikes along the barge transit route. Potential oil spills associated with a vessel grounding would be improbable, and spill prevention and response planning would be implemented.

The Project will have **no adverse modification on critical habitat** of the NPRW because the barge transit route will be designed to avoid the species' designated critical habitat in the Bering Sea. When vessels are transiting in the Gulf of Alaska and Bering Sea, they will follow the NPRW mitigation measures outlined in Sections 3.3.3, *Other Mitigation*, and 4.4.7, *Critical Habitat*. CPAI will provide vessel operators with spatial data files of NPRW critical habitat for input into the vessel navigation system so that this area can be avoided. Vessels will be tracked with AIS so routes will be documented. In addition, prey resources (copepods, which are the one PBF designated for NPRW) are the most essential feature of marine critical habitat for right whales. Though the vessel route will be outside of NPRW critical habitat, Project vessel traffic could impact it if an unintended release of oil occurred. If a spill were to occur, it would most likely be a small fuel spill. If a portion of the prey resources become contaminated by a spill, it could alter the quality of critical habitat at a local scale. However, most small, refined spills are expected to evaporate and disperse quickly in offshore waters and not affect NPRW critical habitat. Furthermore, the likelihood of a spill occurring is very low (as described in Section 6.1.4, *Contamination*). There will be 30 barge roundtrips and 50 tugboat roundtrips over four open-water seasons.

8.1.5 Effect on Ringed Seal and Its Critical Habitat

We conclude that the Project **may affect and is not likely to adversely affect** the ringed seal due to underwater noise from barges, support vessels, and screeding. Disturbance will be temporary and localized during the open-water season. Ringed seals have exhibited tolerance to construction activities near Northstar Island (Blackwell, Lawson et al. 2004; Moulton, Richardson et al. 2003; Williams, Nations et al. 2006) and will be expected to show little to no response to activities at Oliktok Dock and in the barge lightering area.

The Project will have **no adverse modification on critical habitat** of ringed seals. As all marine activities will occur in the summer, there will be no impact on snow-covered sea ice habitat suitable for the formation and maintenance of subnivean birth lairs used for sheltering pups during whelping and nursing or suitable as a platform for basking and molting. Potential effects on ringed seals may occur primarily from barges, support vessels, and screeding, but these would be temporary and localized in nature and will not occur during winter when sea ice habitat is present or have measurable effects on ringed seal critical habitat.

As described in more detail in Section 6.2.3.1, *Noise and Habitat Alteration*, noise and screeding at Oliktok Dock and the barge lightering area is not likely to affect the foraging ecology of seals that feed on invertebrates and fish in the action area. The screeding area near Oliktok Dock is not a prime foraging habitat for ringed seals and higher quality foraging areas are available nearby. Project activities are not expected to result in changes to Arctic cod distribution. Screeding could produce sound in the range that could cause behavioral avoidance in fish in the immediate area but will fall below levels expected to injure or kill fish (Buehler, Oestman et al. 2015).

Thus, any potential habitat effects are expected to be temporary, localized, and minor, affecting a small number of ringed seal prey, with no population-level effects.

Project vessel traffic could impact ringed seal critical habitat if an unintended release of oil occurred. If a spill were to occur, it would most likely be a small fuel spill. If a portion of the prey resources become contaminated by a spill, it could alter the quality of critical habitat at a local scale. However, most small, refined product spills are expected to evaporate and disperse quickly in offshore waters and not affect ringed seal critical habitat. Furthermore, the likelihood of a spill occurring is very low (as described in Section 6.1.4, *Contamination*).

8.1.6 Effect on Bearded Seal and Its Critical Habitat

The Project **may affect and is not likely to adversely affect** the bearded seal due to noise associated with barging, support vessel traffic, and screeding. However, disturbance will be temporary and localized. Bearded seals generally prefer water near ice on which they can haul-out, though seals may also swim in areas of open water. Seals swimming in the water are not strongly affected by vessel noise (Richardson, Greene et al. 1995). It is unlikely that there will be ice available for seals at Oliktok Dock during the summer when Project vessels will be transiting or staging for module offload.

The Project will have **no adverse modification on critical habitat** of bearded seals. As all marine activities will occur in the summer, there will be no impact on sea ice habitat suitable for whelping, nursing, or molting. Potential effects on bearded seals may occur primarily from barges, support vessels, and screeding, but these activities would be temporary and localized in nature and will not occur during winter or have measurable adverse effects on bearded seal critical habitat.

As described in more detail in Section 6.2.3.1, *Noise and Habitat Alteration, n*oise and screeding at Oliktok Dock and the barge lightering area is not likely to affect the foraging ecology of seals that feed on invertebrates and fish in the action area.

Many natural bottom disturbance factors result in less than favorable habitat for benthic organisms in the action area(Carey, Boudrias et al. 1984). The screeding area near Oliktok Dock is not a prime foraging habitat for bearded seals, and higher quality foraging areas are available nearby. Screeding could produce sound in the range that could cause behavioral avoidance in fish in the immediate area but will fall below levels expected to injure or kill fish (Buehler, Oestman et al. 2015).

Thus, any potential habitat effects are expected to be temporary, localized, and minor, affecting a small number of bearded seal prey, with no population-level effects.

Project vessel traffic could impact bearded seal critical habitat if an unintended release of oil occurred. If a spill were to occur, it would most likely be a small fuel spill. If a portion of the prey resources become contaminated by a spill, it could alter the quality of critical habitat at a local scale. However, most small, refined product spills are expected to evaporate and disperse quickly in offshore waters and not affect bearded seal critical habitat. Furthermore, the likelihood of a spill occurring is very low (as described in Section 6.1.4, *Contamination*).

8.1.7 Effect on Steller Sea Lion and Its Critical Habitat

The Project **may affect and is not likely to adversely affect** the Steller sea lion due to noise and presence of vessels associated with the barge transit route. There will be 30 barge roundtrips and 50 tugboat roundtrips over four open-water seasons (Project Year 2, Year 3, Year 4, and Year 6), and though there is a potential for ship strike, vessels will operate under strict marine mammal disturbance guidelines and will slow speed or alter course if marine mammals are encountered. Further, there are low numbers of known ship strikes along the barge transit route. Potential oil spills associated with a vessel grounding would be improbable, and spill prevention and response planning would be implemented.

The Project will result in **no adverse modification to critical habitat** for the Steller sea lion. When vessels are transiting in the Gulf of Alaska and Bering Sea, they will follow the Steller sea lion mitigation measures outlined in Sections 3.3.3, *Other Mitigation*, and 4.10.7, *Critical Habitat*. CPAI will provide vessel operators with spatial data files of Steller sea lion critical habitat and rookeries or haulouts for input into the vessel navigation system so that these areas can be avoided. Vessels will be tracked with AIS so routes will be documented. The essential features of Steller sea lion critical habitat include aquatic foraging habitat as well as rookeries or haulout sites for refuge and rest. The only aspect of the Project that overlaps with these essential features is the barge transit route near the Aleutian Islands. Project barges and tugs will not approach rookeries or haulouts within 3 nautical miles (5.5 km), so vessels will avoid the essential critical habitat features. Barges and tugs will transit through the Bogoslof foraging area, but with only 30 barge roundtrips and 50 tug roundtrips over four summer seasons, the effects on prey resources (e.g., fishes, bivalves, cephalopods) will be limited to temporary disturbance.

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