UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

# Endangered Species Act (ESA) Section 7(a)(2) Biological and Conference Opinion

USCG Minor Waterfront Maintenance, Repair, and Replacement Projects

**NMFS Consultation Number:** AKRO-2021-01864

**Action Agencies:** National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division (Permits Division); and
United States Coast Guard (USCG)

**Potentially Affected Species and Effects Determinations:**

| ESA-Listed Species | Status | Is the Action Likely to Adversely Affect Species? | Is the Action Likely to Adversely Affect Critical Habitat? | Is the Action Likely To Jeopardize the Species? | Is the Action Likely To Destroy or Adversely Modify Critical Habitat? |
|---|---|---|---|---|---|
| Steller Sea Lion, Western DPS (*Eumetopias jubatus)* | Endangered | Yes | No | No | No |
| Humpback Whale, Western North Pacific DPS (*Megaptera novaeangliae*) | Endangered | No[1] | No | No | No |
| Humpback Whale, Mexico DPS (*Megaptera novaeangliae*) | Threatened | Yes | No | No | No |
| Fin Whale (*Balaenoptera physalus*) | Endangered | Yes | NA | No | NA |
| North Pacific Right Whale (*Eubalaena japonica*) | Endangered | No[1] | No | No | No |
| Sperm Whale (*Physeter macrocephalus*) | Endangered | No[1] | NA | No | NA |

[1] USCG made a no effect determination for this species in their final Biological Assessment submitted to NMFS on 03/31/2022.

| | | | | | |
|---|---|---|---|---|---|
| Sunflower Sea Star (*Pycnopodia helianthroides*) | Proposed Threatened | Yes | NA | No | NA |

**Consultation Conducted By:** National Marine Fisheries Service, Alaska Region

**Issued By**: ______________________
Jonathan M. Kurland
Regional Administrator

**Date**: November 22, 2023

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## TERMS AND ABBREVIATIONS

| | |
|---|---|
| µPa | Micro Pascal |
| AKR | Alaska Region |
| ASLC | Alaska SeaLife Center |
| BA | Biological Assessment |
| CV | Coefficient of Variance |
| dB re 1µPa | Decibel referenced 1 microPascal |
| DPS | Distinct Population Segment |
| EEZ | Exclusive Economic Zone |
| ESA | Endangered Species Act |
| °F | Fahrenheit |
| FR | Federal Register |
| ft | Feet |
| Hz | Hertz |
| IHA | Incidental Harassment Authorization |
| IPCC | Intergovernmental Panel on Climate Change |
| ITS | Incidental Take Statement |
| kHz | Kilohertz |
| km | Kilometers |
| kn | Knots |
| m | Meter |
| mi | Mile |
| MMPA | Marine Mammal Protection Act |
| ms | Milliseconds |
| µPa | Micro Pascal |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic and Atmospheric Administration |
| OC | Organochlorine |
| Opinion | Biological Opinion |
| Pa | Pascals |
| PAH | Polycyclic aromatic hydrocarbons |
| PCB | Polychlorinated biphenyls |
| PTS | Permanent Threshold Shift |
| RMS | Root Mean Square |
| RPA | Reasonable and Prudent Alternative |

| | |
|---|---|
| s | Second |
| SEL | Sound Exposure Level |
| SONAR | Sound Navigation And Ranging |
| SSL | Steller Sea Lion |
| TTS | Temporary Threshold Shift |
| USCG | United States Coast Guard |
| yr | Year |

# 1. INTRODUCTION

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. § 1536(a)(2)) requires each Federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a Federal agency's action "may affect" a protected species, that agency is required to consult with the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending upon the endangered species, threatened species, or designated critical habitat that may be affected by the action (50 CFR § 402.14(a)). Federal agencies may fulfill this general requirement informally if they conclude that an action may affect, but "is not likely to adversely affect" endangered species, threatened species, or designated critical habitat, and NMFS or the USFWS concurs with that conclusion (50 CFR § 402.14(b)).

Section 7(b)(3) of the ESA requires that at the conclusion of consultation, NMFS and/or USFWS provide an opinion stating how the Federal agency's action is likely to affect ESA-listed species and their critical habitat. If incidental take is reasonably certain to occur, section 7(b)(4) requires the consulting agency to provide an incidental take statement (ITS) that specifies the impact of any incidental taking, specifies those reasonable and prudent measures necessary or appropriate to minimize such impact, and sets forth terms and conditions to implement those measures.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order grating the government's request for voluntary remand with vacating the 2019 regulations. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation, we considered whether the substantive analysis and conclusions articulated in the biological opinion and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different. New proposed rules were published in the *Federal Register* on June 22, 2023 (88 FR 40753).

In this document, the action agencies are the United States Coast Guard (USCG) and the NMFS Office of Protected Resources Permits and Conservation Division (Permits Division). USCG proposes to complete minor waterfront maintenance, repair, and replacement activities at eight facilities ranging from Kodiak to Ketchikan. In addition, the NMFS Permits Division plans to issue a letter of authorization (LOA) pursuant to section 101(a)(5)(A) of the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. § 1361 *et seq*.), to USCG for harassment of marine mammals incidental to the proposed action (88 FR 26432, April 28, 2023). Wood Environment and Infrastructure Solutions, Inc. prepared the biological assessment (BA), marine mammal monitoring and mitigation plan (4MP), and Letter of Authorization (LOA) application for USCG. The consulting agency for this proposal is NMFS's Alaska Region. This document represents NMFS's biological opinion (opinion) on the effects of this proposal on endangered and threatened species and designated critical habitat. Specifically, it addresses potential effects to Mexico distinct population segment (DPS) humpback whales (*Megaptera novaeangliae*), fin whales (*Balaenoptera physalus*), Western DPS Steller sea lions (*Eumetopias jubatus*), and sunflower sea stars (*Pycnopodia helianthroides*), as well as critical habitat for Mexico DPS humpback whales and Steller sea lions. USCG made no effect determinations for Western North Pacific DPS humpback whales (*Megaptera novaeangliae*), North Pacific right whales (*Eubalaena japonica*), and sperm whales (*Physeter macrocephalus*), as well as critical habitat for Western North Pacific DPS humpback whales and North Pacific right whales.

The opinion and ITS were prepared by NMFS Alaska Region in accordance with section 7(b) of the ESA (16 U.S.C. § 1536(b)), and implementing regulations at 50 CFR part 402.

The opinion and ITS are in compliance with the Data Quality Act (44 U.S.C. § 3504(d)(1)) and underwent pre-dissemination review.

### 1.1 Background

This opinion is based on information provided in March 2022 biological assessment (USCG 2022a), January 2022 LOA application (USCG 2022b), and April 2022 4MP (USCG 2022d); email and phone conversations among NMFS AKR, USCG, Wood Environment and Infrastructure Solutions, Inc (herein: Wood), and NMFS Permits Division; and other sources of information. A complete record of this consultation is on file at NMFS's Anchorage, Alaska office.

The proposed action involves the routine maintenance of eight USCG facilities across Southcentral and Southeast Alaska. Maintenance work will include pile driving, down-the-hole drilling, power-washing, and other similar activities. Work is expected to be completed at all facilities within five years.

This opinion considers the effects of minor maintenance, repair, and replacement of piles and deck features, and the associated proposed issuance of a LOA, on the threatened, endangered, and proposed species and critical habitats listed in Section 1.

### 1.2 Consultation History

Our communication with NMFS Permits Division, USCG, and Wood regarding this consultation is summarized as follows:

- July 9, 2021: NMFS AKR received a request from USCG to initiate formal Section 7 consultation.
- August 6, 2021: NMFS AKR submitted comments on the draft BA to USCG and Wood.
- October 5, 2021: USCG submitted a revised BA to NMFS AKR.
- November 16, 2021: NMFS AKR submitted comments on the revised BA to NMFS Permits Division, USCG, and Wood.
- November 17, 2021: NMFS AKR and NMFS Permits Division conducted an "Early

Review Team" (ERT) meeting to discuss potential changes needed for the project

- April 1, 2022: NMFS AKR received an updated BA from USCG and Wood.
- August 12, 2022: NMFS AKR received a memo from USCG and Wood requesting an addendum to the MMPA-compliant take authorization to include composite piles (vs. the originally requested timber piles), which may be a more durable replacement for timber and would likely generate lower levels of underwater sound.
- December 8, 2022: NMFS AKR asked USCG if they would be amenable to shutting down power-washing activities within the Level B harassment zone at Moorings Valdez to avoid a substantial number of potential exposures of fin and Mexico DPS humpback whales. The reduction in exposures due to power-washing would allow NMFS AKR and NMFS Permits Division exposure estimates to be comparable as NMFS Permits Division did not analyze effects of non-pile driving sound sources. On December 13, 2022, USCG responded via email that they were amenable to shutting down at this site.
- April 14, 2023: NMFS AKR informed USCG that NMFS was proposing to list the sunflower sea star as threatened under the ESA and asked if USCG wanted to include a conference opinion on this species in the consultation.
- June 14, 2023: NMFS AKR received a memo from USCG that contained background, mitigation measures, and effects determinations with rationale for the sunflower sea star. A revised memo was received on June 15, 2023 and consultation was initiated.

# 2. DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

## 2.1 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. 50 C.F.R. § 402.02. This opinion considers the effects on listed species from USCG's maintenance, repair, and replacement of piles and docking at eight USCG facilities and of NMFS Permits Division's issuance of an LOA to take marine mammals by harassment under the MMPA incidental to USCG's construction activities.

Minor maintenance, repair, and replacement of piles and deck features will take place at eight USCG facilities in Alaska. These activities are necessary to ensure the facilities meet the requirements for safe navigation and berthing of USCG vessels. The eight facilities are found in four zones throughout southcentral and southeast Alaska (Figure 1). Zone 1 is Kodiak Island, where USCG Base Kodiak is located in Womens Bay. Zone 2 is the Kenai Peninsula, which houses USCG Moorings Seward, located in the Seward Boat Harbor at the head of Resurrection Bay. Zone 3 is Prince William Sound, which hosts USCG Moorings Valdez and USCG Moorings Cordova, located in Port Valdez and just north of the Cordova Boat Harbor, respectively. Lastly, Zone 4 in southeast Alaska has four facilities: USCG Station Juneau in Gastineau Channel, USCG Moorings Sitka in Sitka Channel, USCG Moorings Petersburg near South Harbor, and USCG Base Ketchikan in Tongass Narrows. The facilities serve various purposes, including maritime and inland search and rescue, maritime/law enforcement missions, oil spill response, mooring and support for USCG vessels, and escorts for high capacity passenger vessels.

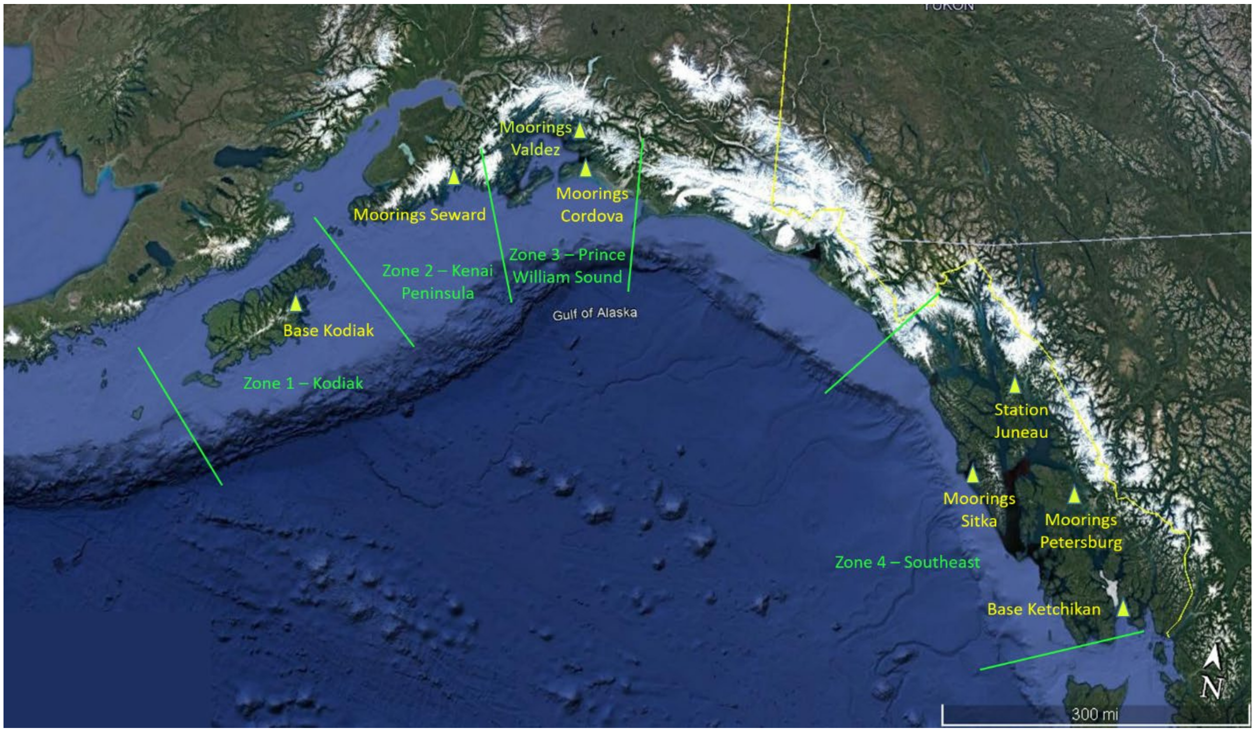


**Figure 1. USCG facility locations (yellow triangles) by geographic zone (indicated by green lines).**

### 2.1.1 Proposed Activities

The project will consist of pile repair, pile replacement, deck repair and/or replacement, and other maintenance activities (e.g., fender, gangway, and handrail repair and/or replacement; and power washing and cleaning of piles and decking). There will be ~two construction vessels (e.g., tugs and barges) associated with the following work at each facility. The type of activity and duration will vary by facility. See Table 1 for facility-specific details.

*Pile Repair*

When possible, existing piles with signs of deterioration will be repaired using a protective wrapping system. Repair includes installation of grouted fiberglass pile jackets. As some piles are located near the shoreline and may have rock armor in place, armor will be removed to access the full pile length, and then replaced once repairs are complete. Construction equipment including an excavator, crane, or similar will be used to remove and replace rocks. Wooden bracings for piles will be replaced as necessary during pile repair.

*Pile Replacement*

Deteriorated piles that are beyond repair will be replaced, with timber, steel, and concrete piles being replaced in-kind where possible (i.e., same pile size and materials will be used). Based on a memo received August 12, 2022, USCG may utilize composite piles to replace timber piles as appropriate (USCG 2022c). As needed, overlaying decking will be removed to provide access to piles so that they can be removed. New piles will be installed, followed by replacement of old decking, or installation of new decking as needed. While there may be site and pile-specific exceptions, pile extraction will be "dead pulling," vibratory extraction, or cutting. Installation of replacement piles may be vibratory or impact driving, or down-the-hole drilling (DTH) of rock sockets at sites with shallow bedrock (e.g., Bases Kodiak and Ketchikan). Across facilities, pile sizes to be replaced will range from 12-in to 24-in timber/composite, 8.5-in to 16-in steel, and 20-in concrete.

*Deck Repair and/or Replacement*

Similar to pile replacement, decking will be replaced in kind, and repair will be targeted based on damage, rot, and cracks (concrete). For concrete decking surrounding piles that need to be replaced, concrete will be removed using a concrete saw, a watertight form will be prepared post-pile installation, and uncured concrete will be pumped into the form to patch the void in the decking.

*Activities Involved in Repair and Replacement*

The following activities may be carried out during repair or replacement work: power-washing of timber and steel piles; vibratory extraction/installation of timber and steel piles; clipping of timber and concrete piles; use of a hydraulic chainsaw or diamond wire saw; impact driving of timber/composite, steel, and concrete piles; and DTH.

**Table 1. Work to be completed at each USCG facility by year.**

| | **Year 1** | | **Year 2** | | **Year 3** | | **Year 4** | | **Year 5** | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Facility** | **Work to be completed** | **# of days** | **Work to be completed** | **# of days** | **Work to be completed** | **# of days** | **Work to be completed** | **# of days** | **Work to be completed** | **# of days** |
| **Kodiak** | Replace 20 timber or steel piles | 20 | Replace 20 timber or steel piles | 20 | Replace 20 timber or steel piles | 20 | Replace 20 timber or steel piles | 20 | Replace 20 timber or steel piles | 20 |

| | Year 1 | | Year 2 | | Year 3 | | Year 4 | | Year 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Seward** | | | | | Replace 1 timber and 1 steel pile | 4 | | | | |
| **Valdez** | Pile repair/Wash; Replace 1 timber pile | 3 | Pile repair/Wash; Replace 1 timber pile | 3 | Pile repair/Wash; Replace 1 timber pile | 3 | Pile repair/Wash; Replace 1 timber pile; Replace 1 steel guide pile | 3 | Pile repair/Wash; Replace 1 timber pile | 3 |
| **Cordova** | | | Replace 3 steel piles | 6 | | | | | | |
| **Juneau** | Pile repair/Wash; Replace 10 timber piles | 20 | Pile repair/Wash; Replace 10 timber piles | 20 | Pile repair/Wash; Replace 10 timber piles | 20 | Pile repair/Wash; Replace 10 timber piles | 20 | Pile repair/Wash; Replace 10 timber piles | 20 |
| **Sitka** | Pile repair/Wash; Replace 5 piles | 10 | Pile repair/Wash; Replace 5 piles | 10 | Pile repair/Wash; Replace 5 piles | 10 | Pile repair/Wash; Replace 5 piles | 10 | Pile repair/Wash; Replace 5 piles | 10 |
| **Petersburg** | Pile repair/Wash; Replace 2 fender piles | 4 | Pile repair/Wash; Replace 2 fender piles | 4 | Pile repair/Wash; Replace 2 fender piles | 4 | Pile repair/Wash; Replace 2 fender piles | 4 | Pile repair/Wash; Replace 2 fender piles | 4 |
| **Ketchikan** | Pile repair/Wash; Replace 10 timber piles | 20 | Pile repair/Wash; Replace 10 timber piles | 20 | Pile repair/Wash; Replace 10 timber piles | 20 | Pile repair/Wash; Replace 10 timber piles | 20 | Pile repair/Wash; Replace 10 timber piles | 20 |

Of the proposed in-water activities described, we expect that vibratory pile extraction and installation, impact pile driving, and DTH (Bases Kodiak and Ketchikan only) may cause take of ESA-listed marine mammal species.

### 2.1.2 Mitigation Measures

In addition to the mitigation measures described below, the USCG has also agreed to carry out measures included in section 1.5 of the BA submitted to NMFS AKR, section 11 of the Letter of

Authorization Application submitted to the NMFS Permits Division (USCG 2022b), and the 4MP submitted to NMFS AKR and NMFS Permits Division (USCG 2022d).

General Mitigation Measures

1. The USCG will inform NMFS of impending in-water activities a minimum of one week prior to the onset of those activities.
2. If construction activities will occur outside of the time window specified in this opinion, the USCG will notify NMFS in writing within one week (as feasible) of this determination, with a detailed description of work to take place outside of the original time window and justification for the requested change.
3. In-water work will be conducted at the lowest points of the tidal cycle feasible.
4. Project-associated staff will cut all materials that form closed loops (e.g., plastic packing bands, rubber bands, and all other loops) prior to proper disposal in a closed and secured trash bin. Trash bins will be properly secured with locked or secured lids that cannot blow open, preventing trash from entering into the environment, thus reducing the risk of entanglement in the event that waste enters marine waters.
5. Project-associated staff will properly secure all ropes, nets, and other marine mammal entanglement hazards to ensure they do not blow or wash into the water.

Protected Species Observer (PSO)-related measures

*The following pre-clearance and shutdown zone measures are the same for all in-water activities. Additional mitigation measures specific to each activity are listed in subsections below.*

6. One or more PSOs will perform PSO duties onsite throughout all pile repair, removal, and installation activities at each of the 8 USCG facilities.
7. For each in-water activity, PSOs will monitor all marine waters within the indicated shutdown zone and Level B monitoring zone for that activity (Table 2 & Table 3).

**Table 2. Shutdown zones by activity (m).**

| Activity | Shutdown Radius (m) for low frequency cetaceans | Shutdown Radius (m) for all other species |
|---|---|---|
| Power-washing (Moorings Valdez only) | 5,412 | 5,412 |

| Activity | Shutdown Radius (m) for low frequency cetaceans | Shutdown Radius (m) for all other species |
|---|---|---|
| Vibratory Extraction/Installation (Timber/Steel)<br>Power-washing<br>Pile Clipping/Cutting | 20 | 20 |
| Impact Pile Driving (Timber/Composite) | 20 | 20 |
| Impact Pile Driving (Steel) | 220 | 20 |
| Down-the-Hole Drilling | 440 | 20 |

**Table 3. Level B zones to be monitored for in-water activities expected to cause harassment of listed marine mammals.**

| Activity | Level B (m) |
|---|---|
| **Non-Impulsive[a]** | |
| Vibratory Extraction/Installation – Timber (based on 14-inch piles) | 1,359 |
| Vibratory Extraction/Installation – Steel (based on 24-inch piles) | 6,310 |
| Clipper – Timber | 1,792 |
| Clipper – Concrete | 5,580 |
| Hydraulic Chainsaw | 1,166 |
| Diamond Wire Saw | 5,843 |
| **Impulsive[b]** | |
| Impact Drive – Timber | 46 |
| Impact Drive – Composite | 3 |
| Impact Drive – Steel | 1,000 |
| Impact Drive – Concrete | 46 |
| DTH Drive | 13,594 |

**a.** Non-impulsive distances calculated to 120 dB

**b.** Impulsive distances calculated to 160 dB

8. Prior to commencing pile removal operations, divers will survey the area within 20 m shutdown zone (Table 2) for sunflower sea stars. Sea stars that are found will be gently

moved into a bucket of water collected at the site and taken to a location at least 100 m outside and away from the shutdown zone and gently released onto the substrate.

9. PSOs will be positioned such that they will collectively be able to monitor the entirety of each activity's shutdown zone, and to the extent feasible, the Level B monitoring zones (Table 3). The USCG will coordinate with NMFS on the placement of PSOs prior to commencing in-water work.
10. Prior to commencing pile repair, removal, or installation, PSOs will scan waters within the relevant activity-specific shutdown zone and confirm no listed species are within the zone for at least 30 minutes immediately prior to initiation of the in-water activity (Table 2). If one or more listed species are observed within the shutdown zone, the in-water activity will not begin until the listed species exit the shutdown zone of their own accord, or the shutdown zone has remained clear of listed species for 30 minutes immediately prior to start of activities.
11. The on-duty PSOs will continuously monitor the shutdown zones (Table 2) as well as the Level B monitoring zones (Table 3) during in-water maintenance activities for the presence of listed species.
12. In-water activities will take place only:
    a. between local sunrise and sunset;
    b. during conditions with a Beaufort Sea State of 4 or less; and
    c. when the entire shutdown zone and adjacent waters are visible (e.g., monitoring effectiveness is not reduced due to rain, fog, snow, haze or other environmental/atmospheric conditions).
13. If visibility degrades such that a PSO can no longer ensure that the shutdown zones (Table 2) remain devoid of listed species during in-water maintenance activities, the crew will cease in-water work until the entire shutdown zone is visible and the PSO has indicated that the zone has remained devoid of listed species for 30 minutes.
14. To the maximum extent practicable, the Level B monitoring zones (Table 3) will be monitored during the time required to power-wash, remove, or install a pile. If the entirety of the Level B zone is not visible/or is larger than the distance at which a PSO can reliably detect and identify marine mammals, a projection of potential exposures beyond the visual detection distance will be calculated using the following equation:
    a. Species Density (or Local Occurrence) X [Total Level B Area – Observed Area]
15. If a marine mammal is observed entering a Level B zone, an exposure will be recorded and behaviors documented, but work may continue without cessation unless the animal approaches or enters one of the shutdown zones (Table 2).
16. The lead PSO will order the in-water maintenance activities to immediately cease if one or more listed species has entered, or appears likely to enter, the associated Level A shutdown zones. At Moorings Valdez, a shutdown will be ordered if one or more listed species has entered, or appears likely to enter, the associated Level B power-washing

zone (Table 2).

17. If in-water maintenance activities are shut down for less than 30 minutes due to the presence of listed-species in the shutdown zone, in-water maintenance activities may commence when the PSO provides assurance that listed species were observed exiting the shutdown zone. Otherwise, the activities may only commence after the PSO provides assurance that listed species have not been seen in the shutdown zone for 30 minutes (for cetaceans) or 15 minutes (for pinnipeds).
18. Following a lapse of in-water maintenance activities of more than 30 minutes, the PSO will authorize resumption of activities (using soft-start procedures for impact pile driving if applicable) only after the PSO provides assurance that listed species have not been present in the shutdown zone for at least 30 minutes immediately prior to resumption of operations.
19. If a listed species is observed within a shutdown zone or is otherwise harassed, harmed, injured, or disturbed, PSOs will immediately report that occurrence to NMFS using the contact information specified in Table 4.

Protected Species Observer Requirements

20. PSOs must be independent (i.e., not construction personnel) and have no other assigned tasks during monitoring periods.
21. The USCG will provide resumes or qualifications of PSO candidates to the NMFS consultation biologist and to akr.prd.section7@noaa.gov for approval at least one week prior to in-water work. NMFS will provide a brief explanation of lack of approval in instances where an individual is not approved.
22. At least one PSO will have prior experience performing the duties of a PSO during construction activity.
23. At least one PSO on the project will complete PSO training prior to deployment (e.g., see https://aisobservers.com/protected-species/new-protected-species-observer-training/ ). The training will include:
    a. field identification of marine mammals and marine mammal behavior;
    b. ecological information on marine mammals and specifics on the ecology and management concerns of those marine mammals;
    c. ESA and MMPA regulations;
    d. proper equipment use;
    e. methodologies in marine mammal observation and data recording and proper reporting protocols; and

   f. an overview of PSO roles and responsibilities.

24. Where a team of three or more PSOs (up to five) are required, a lead observer or "Command" must be designated.

25. PSOs will:
    a. have visual acuity in both eyes (correction is permissible) sufficient for discernment of moving targets at the water's surface, with the ability to estimate target size and distance; use of binoculars may be necessary to correctly identify the target;
    b. have sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations;
    c. have the ability to effectively communicate orally, by radio and in person, with project personnel;
    d. be able to collect field observations and record field data accurately and in accordance with project protocols;
    e. be able to identify to species all marine mammals that occur in the action area, including identification of behaviors;
    f. have writing skills sufficient to create understandable records of observations

26. PSOs will work in shifts lasting no longer than 4 hours with at least a 1-hour break from monitoring duties between shifts. PSOs will not perform PSO duties for more than 12 hours in a 24-hour period.

27. PSOs will have the ability to effectively communicate orally, by radio and in person, with project personnel to provide real-time information on listed species.

28. PSOs will have the ability and authority to order appropriate mitigation response, including shutdowns, to avoid takes of all listed species.

29. The PSOs will have the following equipment to address their duties:
    a. tools which enable them to accurately determine the position of a marine mammal in relationship to the shutdown zone (e.g., laser rangefinder);
    b. two-way radio communication, or equivalent, with onsite project manager;
    c. tide tables for the project area;
    d. watch or chronometer;
    e. binoculars (7x50 or higher magnification) with built-in rangefinder or reticles (rangefinder may be provided separately);
    f. instruments that allow observer to determine geographic coordinates of observed marine mammals
    g. a legible copy of this LOC and all appendices

h. legible and fillable observation record form allowing for required PSO data entry.

30. Prior to commencing in-water work or at changes in watch, the Command PSO will establish a point of contact with the construction crew. The Command PSO will brief the point of contact as to the shutdown procedures if listed species are observed likely to enter or within the shutdown zone, and will request that the point of contact instruct the crew to notify the PSO when a marine mammal is observed. If the point of contact goes "off shift" and delegates his duties, the Command PSO must be informed and brief the new point of contact.

<u>Impact Pile driving</u>

Please see the Shutdown Zones Section above for required shutdown zones (Table 2).

31. If no listed species are observed within the impact pile driving shutdown zone for 30 minutes immediately prior to pile driving, soft-start procedures will be implemented immediately prior to activities. Soft start requires contractors to provide an initial set of strikes at no more than half the operational power, followed by a 30 second waiting period, then two subsequent reduced power strike sets. A soft start must be implemented at the start of each day's impact pile driving, any time pile driving has been shutdown or delayed due the presence of a listed species, and following cessation of pile driving for a period of 30 minutes or longer.
32. Following this soft-start procedure, operational impact pile driving may commence and continue provided listed species remain absent from the shutdown zone.

<u>Vibratory Pile Driving</u>

Please see the Shutdown Zones Section above for required shutdown zones (Table 2).

32. If no listed species are observed within the vibratory pile driving shutdown zone for 30 minutes immediately prior to pile driving, vibratory pile driving may commence. This pre-pile driving observation period will take place at the start of each day's vibratory pile driving, each time pile driving has been shut down or delayed due the presence of a listed species, and following cessation of pile driving for a period of 30 minutes or longer.

<u>Down the Hole drilling (DTH)</u>

Please see the Shutdown Zones Section above for required shutdown zones (Table 2).

33. If no listed species are observed within the DTH shutdown zone for 30 minutes immediately prior to pile driving, soft-start procedures will be implemented immediately prior to activities. Soft start requires contractors to activate the drilling equipment at no

more than half the operational power for several seconds, followed by a 30 second waiting period, then two subsequent reduced power start-ups. A soft start must be implemented at the start of each day's DTH, any time pile driving has been shutdown or delayed due the presence of a listed species, and following cessation of pile driving for a period of 30 minutes or longer.

34. Following this soft-start procedure, DTH may commence and continue provided listed species remain absent from the shutdown zone.

35. Following a lapse of pile driving activities of more than 30 minutes, the PSO will authorize resumption of DTH only after the PSO provides assurance that listed species have not been present in the shutdown zone for at least 30 minutes immediately prior to resumption of operations.

<u>Vessels</u>

36. Vessel operators will:
    a. maintain a watch for marine mammals at all times while underway;
    b. stay at least 91 m (100 yds) away from listed marine mammals, except they will remain at least 460 m (500 yards) from endangered North Pacific right whales;
    c. travel at less than 5 knots (9 km/hour) when within 274 m (300 yards) of a whale;
    d. avoid changes in direction and speed when within 274 m (300 yds) of a whale, unless doing so is necessary for maritime safety;
    e. not position vessel(s) in the path of a whale, and will not cut in front of a whale in a way or at a distance that causes the whale to change direction of travel or behavior (including breathing/surfacing pattern);
    f. check the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged;
    g. reduce vessel speed to 10 knots or less when weather conditions reduce visibility to 1.6 km (1 mi) or less;
    h. follow designated speed limits to and from the project sites.

37. Vessel operators will adhere to the Alaska Humpback Whale Approach Regulations when vessels are transiting to and from the project site (see 50 CFR §§ 216.18, 223.214, and 224.103(b); note: these regulations apply to all humpback whales). Specifically, pilot and crew will not:

    i. approach, by any means, including by interception (i.e., placing a vessel in the path of an oncoming humpback whale), within 100 yards of any humpback whale;

   j. cause a vessel or other object to approach within 100 yards of a humpback whale; or
   k. disrupt the normal behavior or prior activity of a whale by any other act or omission.

38. If a whale's course and speed are such that it will likely cross in front of a vessel that is underway, or approach within 91 m (100 yds) of 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, except that vessels will remain 460 m (500 yds) from North Pacific right whales.
39. Vessels will take reasonable steps to alert other vessels in the vicinity of whale(s).
40. Vessels will not allow lines to remain in the water unless both ends are under tension and affixed to vessels or gear. No materials capable of becoming entangled around marine mammals will be discarded into marine waters.

Vessel Transit, Western DPS Steller Sea Lions, and their Critical Habitat.

41. Vessels will not approach within 5.5 km (3 nm) of rookery sites listed in 50 CFR § 224.103(d).
42. Vessels will not approach within 914 m (3,000 ft) of any Steller sea lion haulout or rookery.

General Data Collection and Reporting

*Data Collection*

43. PSOs will record observations on data forms or into electronic data sheets.
44. The USCG will ensure that PSO data will be submitted electronically in a format that can be queried such as a spreadsheet or database (i.e. digital images of data sheets are not sufficient).
45. PSOs will record the following:
    a. the date, shift start time, shift stop time, and PSO identifier;
    b. date and time of each reportable event (e.g., a marine mammal observation, operation shutdown, reason for operation shutdown, change in weather);
    c. weather parameters (e.g., percent cloud cover, percent glare, visibility) and sea state where the Beaufort Wind Force Scale will be used to determine sea-state (https://www.weather.gov/mfl/beaufort);
    d. species, numbers, and, if possible, sex and age class of observed marine mammals, and observation date, time, and location and in the case of larger

shutdown zones to be implemented for specific marine mammal hearing groups (i.e., high and low frequency cetaceans and phocid pinnipeds) during impact pile driving and down-the-hole drilling.

e. predominant anthropogenic sound-producing activities occurring during each marine mammal observation;

f. bearing and direction of travel of observed marine mammal(s);

g. observations of marine mammal behaviors and reactions to anthropogenic sounds and presence;

h. initial, closest, and last location of marine mammals, including distance from observer to the marine mammal, and minimum distance from the predominant sound-producing activity or activities to marine mammals;

i. whether the presence of marine mammals necessitated the implementation of mitigation measures to avoid acoustic impact, and the duration of time that normal operations were affected by the presence of marine mammals;

j. geographic coordinates for the observed animals, with the position recorded by using the most precise coordinates practicable (coordinates will be recorded in decimal degrees, or similar standard and defined coordinate system);

k. the number of sunflower sea stars moved, date and time of site inspection for sunflower sea stars, tidal stage at the time of scans, water clarity/visibility, number of sunflower sea stars observed and their proximity to the pile driving area within the 20 m shutdown zone.

*Data Reporting*

46. All observations of North Pacific right whales will be reported to NMFS within 24 hours. These observation reports will include the following information:

    a. date, time, and geographic coordinates of the observation(s);

    b. number of North Pacific right whales observed, including number of adults/juveniles/calves observed, if determinable;

    c. environmental conditions as they existed during each observation event, including sea conditions, weather conditions, visibility, lighting conditions, and percent ice cover.

47. Observations of humpback whales will be transmitted to AKR.section7@noaa.gov by the end of the calendar year, including:

    d. photographs (especially flukes) and video obtained;

    e. geographic coordinates for the observed animals, with the position recorded by using the most precise coordinates practicable (coordinates will be recorded in decimal degrees, or similar standard (and defined) coordinate system);

    f. number of humpback whales observed, including number of adults/juveniles/calves observed (if determinable);

g. environmental conditions as they existed during each observation event, including sea conditions, weather conditions, visibility, and lighting conditions.

*Unauthorized Take*

48. If a listed marine mammal is determined by the PSO to have been disturbed, harassed, harmed, injured, or killed (e.g., a listed marine mammal(s) is observed entering a shutdown zone before operations can be shut down, or is injured or killed as a direct or indirect result of this action), the PSO will report the incident to NMFS within one business day, with information submitted to akr.section7@noaa.gov. These PSO records will include:

    a. all information to be provided in the final report (see Mitigation Measures under the *Final Report* heading below):
    b. number of animals of each threatened and endangered species affected;
    c. the date, time, and location of each event (provide geographic coordinates);
    d. description of the event;
    e. the time the animal(s) was first observed or entered the shutdown zone, and, if known, the time the animal was last seen or exited the zone, and the fate of the animal;
    f. mitigation measures implemented prior to and after the animal was taken; and
    g. if a vessel struck a marine mammal, the contact information for the PSO on duty, or the contact information for the individual piloting the vessel if there was no PSO on duty;
    h. photographs or video footage of the animal(s) (if available).

*Stranded, Injured, Sick or Dead Listed Species (not associated with the project)*

49. If PSOs observe an injured, sick, or dead marine mammal (i.e., stranded marine mammal), they will notify the Alaska Marine Mammal Stranding Hotline at 877-925-7773. The PSOs will submit photos and available data to aid NMFS in determining how to respond to the stranded animal. If possible, data submitted to NMFS in response to stranded marine mammals will include date/time, location of stranded marine mammal, species and number of stranded marine mammals, description of the stranded marine mammal's condition, event type (e.g., entanglement, dead, floating), and behavior of live-stranded marine mammals.
50. If divers and/or PSOs observe a sunflower sea star that has sea star wasting syndrome, or if any dead sunflower sea stars are observed, pictures of the individuals will be taken and counts of how many appear to be infected will be reported. Divers and PSOs should not touch or remove these individuals.

*Illegal Activities*

51. If PSOs observe marine mammals being disturbed, harassed, harmed, injured, or killed (e.g., feeding or unauthorized harassment), these activities will be reported to NMFS Alaska Region Office of Law Enforcement (see Table 4).
52. Data submitted to NMFS will include date/time, location, description of the event, and any photos or videos taken.

*Annual Report*

53. Submit interim annual PSO monitoring reports, including data sheets, for each site where maintenance activities occurred during that year. These reports will include a summary of marine mammal species and behavioral observations, shutdowns or delays, and work completed.
54. Annual reports will be submitted to AKR.section7@noaa.gov within 90 calendar days of the completion of the project activities for the year.

*Final Report*

55. A final report will be submitted to NMFS within 90 calendar days of the completion of the project summarizing the data recorded and submitted to AKR.section7@noaa.gov. The report will summarize all in-water activities associated with the proposed action, and results of PSO monitoring conducted during the in-water project activities.
56. The final report will include:
    a. summaries of monitoring efforts, including dates and times of construction, dates and times of monitoring, dates and times and duration of shutdowns due to marine mammal presence;
    b. date and time of marine mammal observations, geographic coordinates of marine mammals at their closest approach to the project site, marine mammal species, numbers, age/size/gender categories (if determinable), and group sizes.
    c. number of marine mammals observed (by species) during periods with and without project activities (and other variables that could affect detectability);
    d. observed marine mammal behaviors and movement types versus project activity at time of observation;
    e. numbers of marine mammal observations/individuals seen versus project activity at time of observation
    f. distribution of marine mammals around the action area versus project activity at time of observation.
    g. digital, queryable documents containing PSO observations and records, and digital, queryable reports.

Summary of Agency Contact Information

**Table 4. Summary of agency contact information.**

| Reason for Contact | Contact Information |
|---|---|
| Consultation Questions & Unauthorized Take | AKR.section7@noaa.gov<br>Jenna Malek: jenna.malek@noaa.gov |
| Reports & Data Submittal | AKR.section7@noaa.gov (please include NMFS AKRO tracking number in subject line) |
| Stranded, Injured, or Dead Marine Mammal<br>*(not related to project activities)* | Stranding Hotline (24/7 coverage) 877-925-7773 |
| Oil Spill & Hazardous Materials Response | U.S. Coast Guard National Response Center: 1-800-424-8802 & AKRNMFSSpillResponse@noaa.gov |
| Illegal Activities<br>*(not related to project activities; e.g., feeding, unauthorized harassment, or disturbance to marine mammals)* | NMFS Office of Law Enforcement (AK Hotline): 1-800-853-1964 |
| In the event that this contact information becomes obsolete | NMFS Anchorage Main Office: 907-271-5006<br>Or NMFS Juneau Main Office: 907-586-7236 |

## 2.2 Action Area

“Action area” means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR § 402.02). For this reason, the action area is typically larger than the project area and extends out to a point where no measurable effects from the proposed action occur.

Each of the eight USCG facilities (Figure 1) has a different action area based on the specific repair and replacement activities that will take place (Table 2 & Table 3; Figure 2-Figure 9). The action areas include: (1) the area in which construction activities will take place, and (2) an ensonified area around the pile and dock repair and replacement activities.

The loudest sound source with the greatest propagation distance is anticipated to be associated with DTH, which will occur only at Bases Kodiak and Ketchikan. Received levels from DTH with a source level of 167 dB re 1 µPa (rms) (Table 5), may be expected on average to decline to 120 dB re 1 µPa (rms) within ~13.5 km of the pile assuming a sound speed profile with a practical spreading loss (15 Log R) (see Figure 2 & Figure 9).

The loudest sound sources at the other facilities are as follows: vibratory extraction/installation of steel piles at Moorings Seward, Valdez, Cordova, Sitka, and Petersburg, and power-washing timber and steel piles at Station Juneau. Received levels from vibratory extraction/installation of steel piles with a source level of 162 dB re 1 µPa (rms) and power-washing with a source level of 161 dB re 1 µPa (rms) (Table 5) may be expected, on average, to decline to 120 dB re 1 µPa (rms) within ~6.3 km and ~5.4 km of the source, respectively, assuming a sound speed profile with a practical spreading loss (15 Log R). The 120 dB isopleth was chosen because that is where we anticipate DTH, vibratory extraction/installation, and power-washing sound levels would approach ambient sound levels (i.e., the point where no measurable effect from the project would occur). While project sound may propagate beyond the 120 dB isopleth, we do not anticipate that marine mammals would respond in a biologically significant manner at these low levels and large distances from the sources.

**Table 5. Sound source levels and durations of in-water activities.**

| Activity Number | Non-Impact Activity | dB RMS at 10 m | $SEL_{cum}$ (dB at 10 m) | Seconds per Day | Proxy Data Source |
|---|---|---|---|---|---|
| 1 | Power washing of timber and steel piles | 161.0 | 201 | 9000 | Austin (2017) |
| 2 | Vibratory Extraction/Installation – Timber | 152 | 167 | 3000 | Greenbusch Group (2018) |
| 3 | Vibratory Extraction/Installation – Steel (based on 24-in pile) | 162 | 197 | 3000 | Laughlin (2010), WSDOT (2020b) |
| 4 | Pile Clipper – Timber | 153.8 | 182 | 710 | NAVFAC SW (2020) |
| 5 | Pile Clipper – Concrete (based on 24-inch pile) | 161.2 | 196 | 3110 | NAVFAC SW (2020) |
| 6 | Hydraulic Chainsaw | 151 | 183 | 291 | NAVFAC SW (2020) |
| 7 | Diamond Wire Saw (based on 66-inch concreate filled/steel exterior cassion) | 161.5 | 198 | 930 | NAVFAC SW (2020) |

| Activity Number | Impact Activity | dB RMS at 10 m | dB SEL at 10 m | SEL$_{cum}$ (dB at 10 m) | Strike per Day | Proxy Data Source |
|---|---|---|---|---|---|---|
| 8 | Impact Drive – Timber (based on 12-24-inch piles) | 170 | 160 | 180 | 100 | CalTrans (2020); WSDOT (2020a) |
| 9 | Impact Drive – Composite | 153 | 145 | N/A | 120 | CalTrans (2020) |
| 10 | Impact Drive – Steel (based on 24-inch pipe) | 190 | 177 | 203 | 400 | CalTrans (2015) |
| 11 | Impact Drive – Concrete (based on 24-inch pile) | 170 | 160 | 183 | 184 | WSDOT (2020a) |
| 12 | DTH Drive – Impact | 167 | 159 | - | 60 | Heyvaert and Reyff (2021) |


**Figure 2. Action Area Map USCG Base Kodiak.**


**Figure 3. Action Area Map USCG Moorings Seward.**

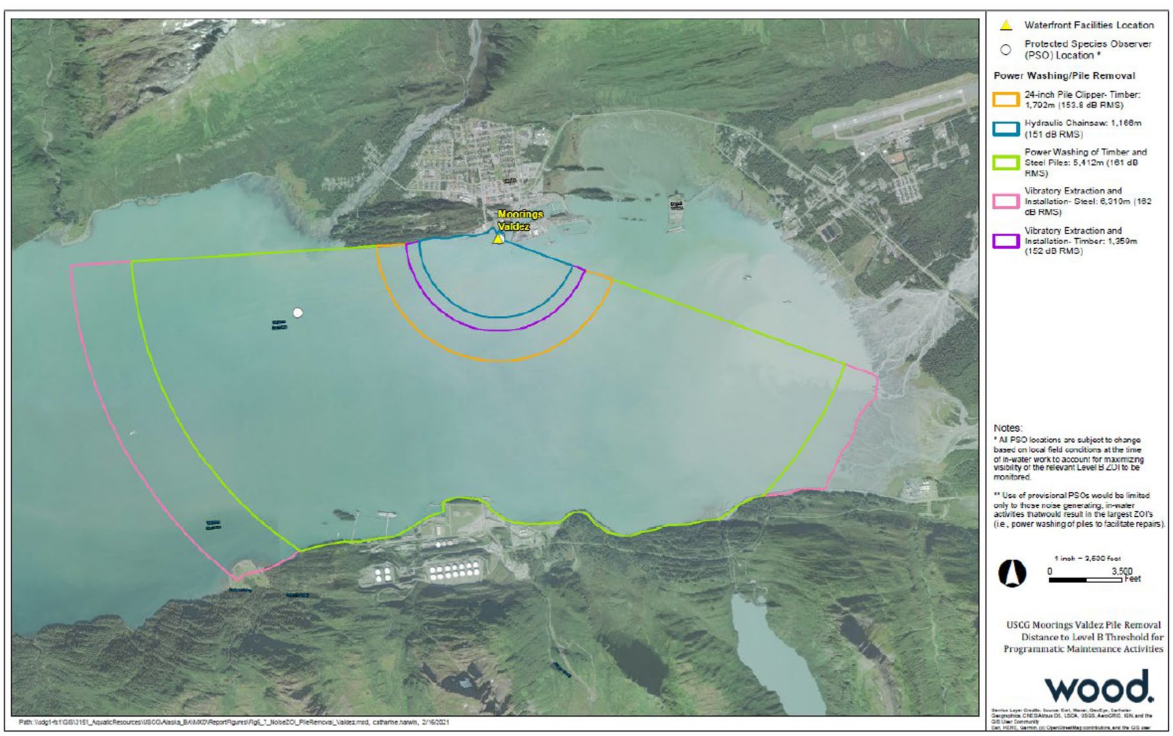


**Figure 4. Action Area Map USCG Moorings Valdez.**

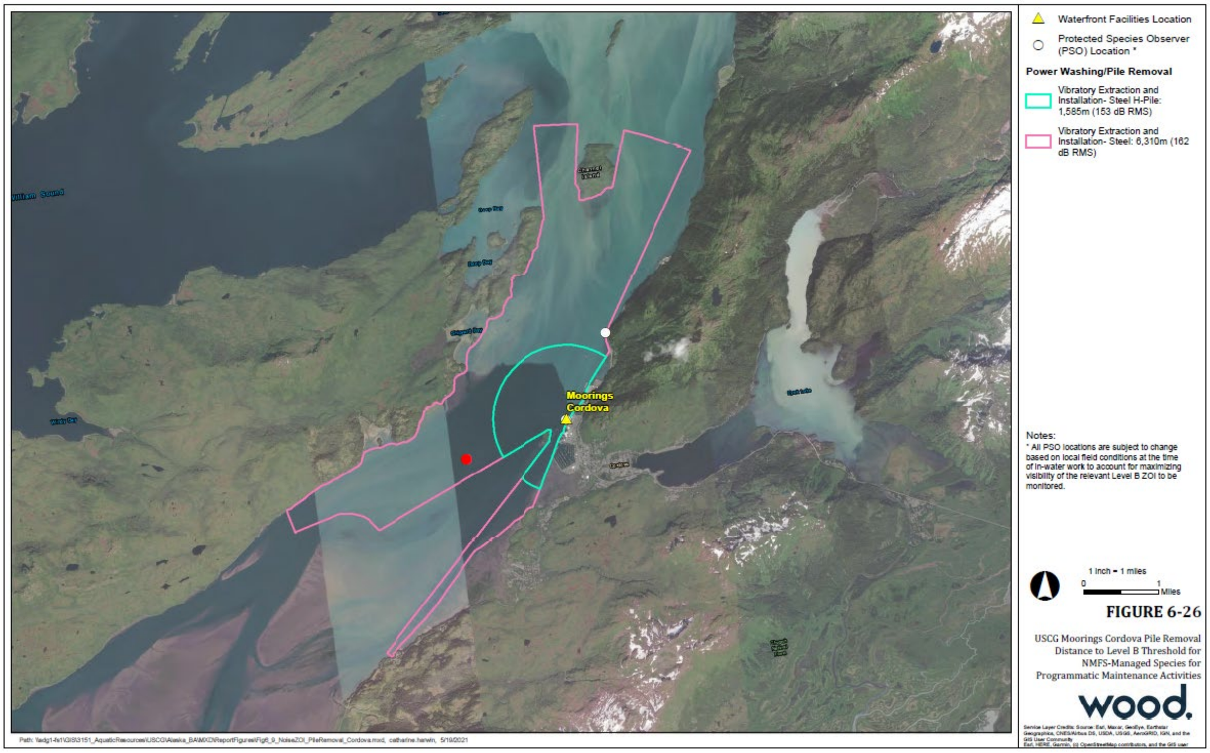


**Figure 5. Action Area Map USCG Moorings Cordova.**

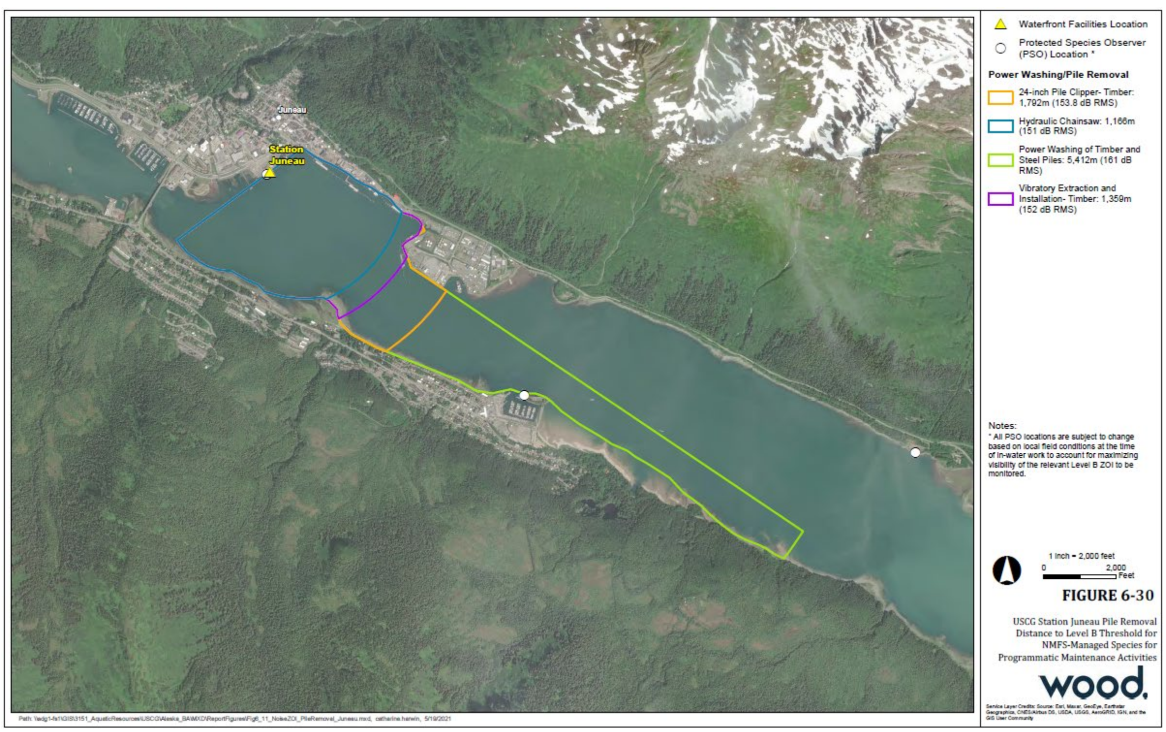


**Figure 6. Action Area Map USCG Station Juneau.**


**Figure 7. Action Area Map USCG Moorings Sitka.**


**Figure 8. Action Area Map USCG Moorings Petersburg.**


**Figure 9. Action Area Map USCG Base Ketchikan.**

## 3. APPROACH TO THE ASSESSMENT

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. The jeopardy analysis considers both survival and recovery of the species. The adverse modification analysis considers the impacts to the conservation value of the designated critical habitat.

To jeopardize the continued existence of a listed species means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02). As NMFS explained when it promulgated this definition, NMFS considers the likely impacts to a species' survival as well as likely impacts to its recovery. Further, it is possible that in certain, exceptional circumstances, injury to recovery alone may result in a jeopardy biological opinion (51 FR 19926, 19934; June 3, 1986).

Under NMFS's regulations, the destruction or adverse modification of critical habitat means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species (50 CFR § 402.02).

The designation(s) of critical habitat for Steller sea lions use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (81 FR 7414; February 11, 2016) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, our use of the term PBF also applies to Primary Constituent Elements and essential features.

We use the following approach to determine whether the proposed action described in Section 2 of this opinion is likely to jeopardize listed species or destroy or adversely modify critical habitat:

Identify those aspects (or stressors) of the proposed action that are likely to have effects on listed species or critical habitat. As part of this step, we identify the action area – the spatial and temporal extent of these effects.

Identify the range-wide status of the species and critical habitat likely to be adversely affected by the proposed action. This section describes the current status of each listed species and its critical habitat relative to the conditions needed for recovery. We determine the range-wide status of critical habitat by examining the condition of its PBFs - which were identified when the critical habitat was designated. Species and critical habitat status are discussed in Section 4 of this opinion.

Describe the environmental baseline including: past and present impacts of Federal, state, or private actions and other human activities *in the action area*; anticipated impacts of proposed Federal projects that have already undergone formal or early section 7 consultation, and the impacts of state or private actions that are contemporaneous with the consultation in process. The environmental baseline is discussed in Section 5 of this opinion.

Analyze the effects of the proposed action. Identify the listed species that are likely to co-occur with these effects in space and time and the nature of that co-occurrence (these represent our *exposure analyses*). In this step of our analyses, we try to identify the number, age (or life stage), and gender of the individuals that are likely to be exposed to stressors and the populations or subpopulations those individuals represent. NMFS also evaluates the proposed action's effects on critical habitat PBFs. The effects of the action are described in Section 6 of this opinion with the exposure analysis described in Section 6.2 of this opinion.

Once we identify which listed species are likely to be exposed to an action's effects and the nature of that exposure, we examine the scientific and commercial data available to determine whether and how those listed species are likely to respond given their exposure (these represent our *response analyses*). Response analysis is considered in Section 6.3 of this opinion.

Describe any cumulative effects. Cumulative effects, as defined in NMFS's implementing regulations (50 CFR § 402.02), are the effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area. Future Federal actions that are unrelated to the proposed action are not considered because they require separate section 7 consultation. Cumulative effects are considered in Section 7 of this opinion.

Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat. In this step, NMFS adds the effects of the action (Section 6) to the environmental baseline (Section 5) and the cumulative effects (Section 7) to assess whether the action could reasonably be expected to: (1) appreciably reduce the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species and critical habitat (Section 4). Integration and synthesis with risk analyses occurs in Section 8 of this opinion.

Reach jeopardy and adverse modification conclusions. Conclusions regarding jeopardy and the destruction or adverse modification of critical habitat are presented in Section 9. These conclusions flow from the logic and rationale presented in the Integration and Synthesis Section 8.

If necessary, define a reasonable and prudent alternative to the proposed action. If, in completing the last step in the analysis, NMFS determines that the action under consultation is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat, NMFS must identify a reasonable and prudent alternative (RPA) to the action.

# 4. RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT

This opinion considers the effects of the proposed action on the species and designated critical habitats specified in Table 6.

**Table 6. Listing status and critical habitat designation for species considered in this opinion.**

| Species | Status | Listing | Critical Habitat |
|---|---|---|---|
| Humpback Whale, Mexico DPS *(Megaptera novaeangliae)* | Threatened | NMFS 2016, 81 FR 62260 | NMFS 2021 86 FR 21082 |
| Fin Whale (*Balaneoptera physalus*) | Endangered | NMFS 1970, 35 FR 18319 | Not designated |
| Steller Sea Lion, Western DPS *(Eumetopias jubatus)* | Endangered | NMFS 1997, 62 FR 24345 | NMFS 1993, 58 FR 45269 |
| Sunflower Sea Star (*Pycnopodia helianthroides*) | Threatened | Proposed, 88 FR 16212 | Not proposed at this time |

## 4.1 Status of Listed Species and Critical Habitat Not Likely to be Adversely Affected by the Action

As described in the Approach to the Assessment section of this opinion, NMFS uses two criteria to identify those endangered or threatened species or critical habitat that are likely to be adversely affected. The first criterion is exposure or some reasonable expectation of a co-occurrence between one or more potential stressors associated with USCG's maintenance activities and a listed species or designated critical habitat. The second criterion is the probability of a response given exposure. For endangered or threatened species, we consider the susceptibility of the species that may be exposed; for example, species that are exposed to sound produced by vessels, but are not likely to exhibit physical, physiological, or behavioral responses given that exposure (at the combination of sound pressure levels and distances associated with an exposure), are not likely to be adversely affected by the exposure.

We applied these criteria to the species and critical habitat listed above. Based on the complexity of having eight facilities spanning four geographic zones, we determined that while some listed species are not likely to be adversely affected by the proposed activities in all zones, each species is likely to be adversely affected in at least two zones. Therefore, all species are discussed in Section 4.3. We also determined that the critical habitat for the Mexico DPS humpback whale and for the Steller sea lion may be affected, but are not likely to be adversely affected, by the proposed action. Each is discussed in the following section and then not considered further in this opinion.

### 4.1.1 Mexico DPS humpback whale critical habitat

Critical habitat for the Mexico DPS humpback whale was designated April 20, 2021 (86 FR 21082) (Figure 10). Critical habitat for the Mexico DPS includes areas in the eastern Aleutian Islands, the Shumagin Islands, around Kodiak Island, and the Prince William Sound area.

For the Mexico DPS, the physical and biological features associated with critical habitat include prey species, primarily euphausiids (*Thysanoessa*, *Euphausia, Nyctiphanes*, and *Nematoscelis*) and small pelagic schooling fishes, such as Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasii*), capelin (*Mallotus villosus*), juvenile walleye pollock (*Gadus chalcogrammus*), and Pacific sand lance (*Ammodytes personatus*) of sufficient quality, abundance, and accessibility within feeding areas to support feeding and population growth.

Zones 2 and 4 of the proposed project are outside of the designated critical habitat areas for Mexico DPS humpback whales and thus activities at Moorings Seward on the Kenai Peninsula and the four facilities in southeast Alaska will not impact this habitat feature. Womens Bay, where Base Kodiak is located in Zone 1, is not likely to be a hotspot for humpback whale prey due to shallow conditions and frequent vessel activity. Pacific herring are known to migrate to Zone 3 (Moorings Valdez and Cordova) and humpback whale seasonal distributions are influenced by the migration of herring as they move into Prince William Sound. Impacts of sound from the proposed action are only expected to affect humpback whale prey within the immediate vicinity (e.g., tens of meters) of piles being repaired or replaced and these impacts would be short-lived, as pile removal/driving will take ~30 minutes, with one pile being worked on per day. Prey reaction to this sound is expected to be no more than a brief startle response, with normal activity resuming once the sound has ceased. Additionally, the proposed activities in Cordova are scheduled to occur within a single year over the course of 6 days and only for one to two days a year in Valdez (for a total of six piles to be replaced over the five years), further reducing the potential impacts to humpback whale prey species. Therefore, we conclude that any effects of the proposed maintenance activities at USCG facilities on Mexico DPS humpback whale critical habitat will be insignificant.

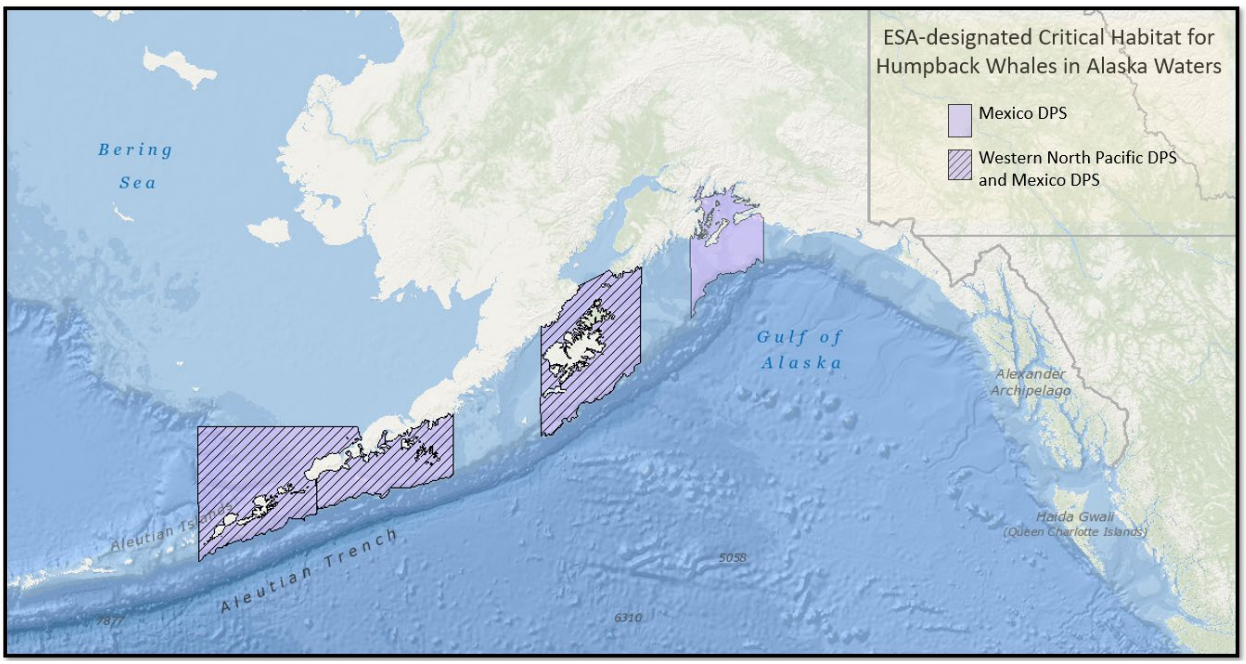


**Figure 10. Critical habitat for Mexico DPS humpback whales in waters off Alaska.**

### 4.1.2 Steller sea lion critical habitat

NMFS designated critical habitat for Steller sea lions on August 27, 1993 (58 FR 45269) (Figure 11). The following PBFs were identified at the time of listing:

1. Alaska rookeries, haulouts, and associated areas identified at 50 CFR § 226.202(a), including:
    a. Terrestrial zones that extend 914 m (3,000 ft) landward
    b. Air zones that extend 914 m (3,000 ft) above the terrestrial zone
    c. Aquatic zones that extend 914 m (3,000 ft) seaward from each major rookery and major haulout east of 144° W. longitude
    d. Aquatic zones that extend 37 km (20 nm) seaward from each major rookery and major haulout west of 144° W. longitude
2. Three special aquatic foraging areas identified at 50 CFR § 226.202(c):

a. Shelikof Strait
b. Bogoslof
c. Seguam Pass

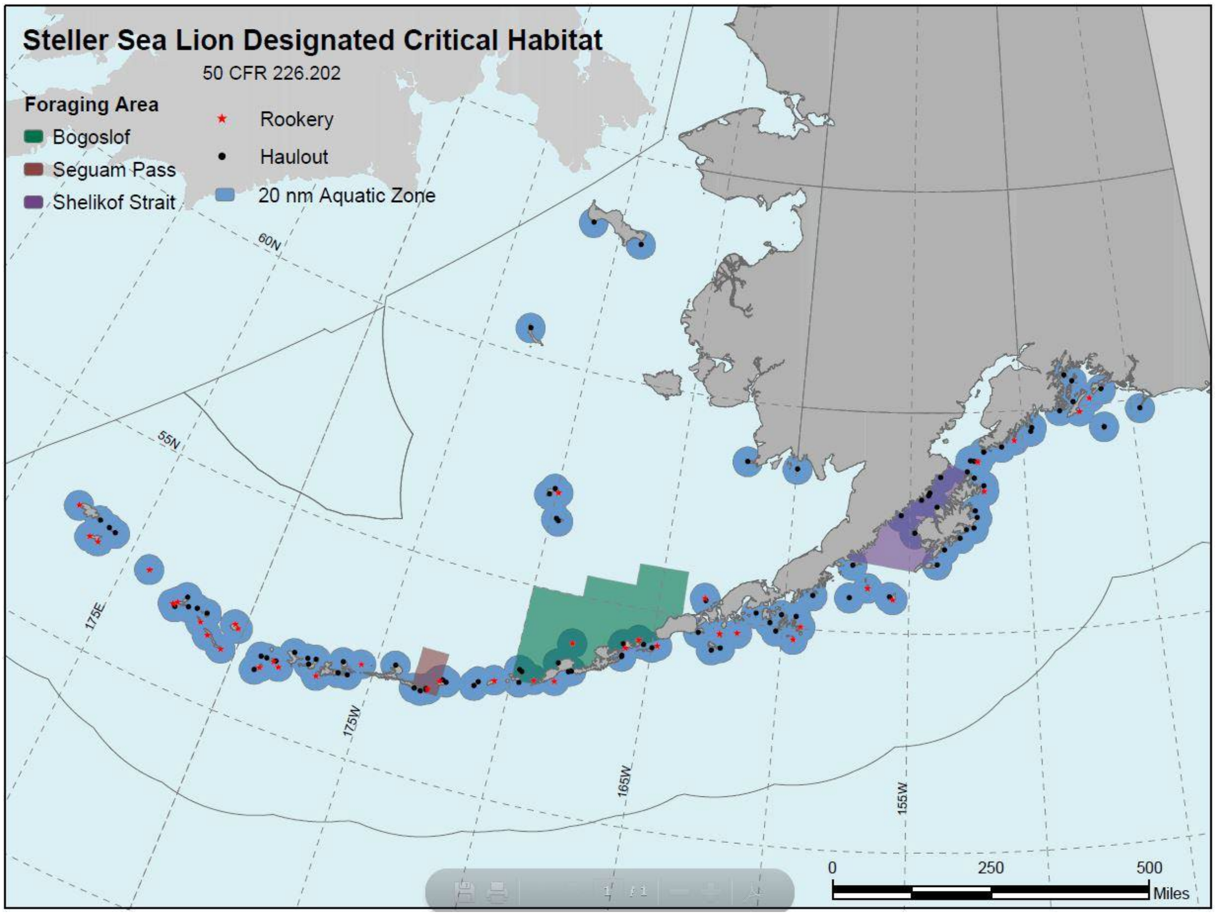


**Figure 11. Designated Steller sea lion critical habitat in Alaska.**

USCG facilities in Zones 1 and 3 overlap with Steller sea lion critical habitat. There is no overlap of Zone 2 and 4 facilities with critical habitat. Base Kodiak is located within the 20 nm aquatic zone surrounding two haulouts in Chiniak Bay and Moorings Cordova is within the 20 nm aquatic zone of one haulout on Hinchinbrook Island. Within the action areas at these two sites, project-related vessels will have limited transit and pile repair and replacement will generate sound within the 20 nm aquatic zones.

There are 3-mile no transit zones established and enforced around rookeries in the area for further protection (50 CFR § 224.103). NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yards of haulout locations further reduce disturbance by vessels and USCG has agreed that project vessel will remain 5.5 km from rookeries and 914 m from haul outs, respectively (see mitigation measures 41-42 in Section 2.1.2). Vessel sound has not been shown to affect fish distribution beyond a startle response so we do not expect project vessels to affect Steller sea lion prey at either USCG facility.

Spills or otherwise-discharged fuels may occur in Steller sea lion critical habitat during project-related vessel transit or pile repair and replacement. However, USCG will be implementing mitigation measures (#41-42) so that project vessels will avoid approaching within 3 nm (5.5 km) of known Steller sea lion rookeries and major haulouts, reducing the likelihood of released fuels from affecting critical habitat before dispersal and evaporation occurs. USCG has also included best management practices to reduce the likelihood of other discharges (e.g., concrete) from entering the water during pile repair.

Sound produced during pile repair and replacement activities in critical habitat could affect prey species, but as mentioned previously, impacts of sound on prey such as fish are expected to be minor (i.e., startle response) and short-lived. At both facilities, the construction sites are not close to the haulouts, so any sound produced at these sites will have dissipated as it travels through the 20 nm aquatic zone. Furthermore, the area of CH that will experience received sound levels in excess of 120 dB represents an extremely small proportion of critical habitat (i.e., 27.93 $km^2$ out of 1,149,155 $km^2$ designated), and occurs within critical habitat that is already industrialized.

Work at these sites will also not affect the air and terrestrial zones and does not overlap with any special aquatic foraging areas. Therefore, we conclude that any effects of the proposed maintenance activities at USCG facilities on Steller sea lion critical habitat will be insignificant.

### 4.2 Climate Change

One threat common to all the species we discuss in this opinion is global climate change. Because of this commonality, we present an overview here rather than in each of the species-specific narratives that follow. A vast amount of literature is available on climate change and for more detailed information we refer the reader to these websites which provide the latest data and links to the current state of knowledge on the topic in general, and in the Arctic specifically:

https://www.ipcc.ch/reports/

https://climate.nasa.gov/evidence/

http://nsidc.org/arcticseaicenews/

https://arctic.noaa.gov/Report-Card

*Air temperature*

Recording of global temperatures began in 1880, and the last nine years (2014–2022) have ranked as the nine warmest years on record[2]. The yearly temperature for North America has

[2] https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202213 viewed 2/17/2023.

increased at an average rate of 0.23°F since 1910; however, the average rate of increase has doubled since 1981 (0.49°F)[3].

The Arctic (latitudes between 60ºN and 90ºN) has been warming at more than two times the rate of lower latitudes since 2000. This is due to “Arctic amplification”, a characteristic of the global climate system influenced by changes in sea ice extent, albedo, atmospheric and oceanic heat transports, cloud cover, black carbon, and many other factors (Serreze and Barry 2011, Richter-Menge et al. 2017, Richter-Menge 2019). The average annual temperature is now 3-4°F warmer than during the early and mid-century (Figure 12; Thoman and Walsh 2019). The average annual temperature for Alaska in 2022 was 28.6°F, 2.6°F above the long-term average, ranking 16th warmest in the 98-year record for the state[4]. Some of the most pronounced effects of climate change in Alaska include disappearing sea ice, shrinking glaciers, thawing permafrost, and changing ocean temperatures and chemistry (Chapin et al. 2014).

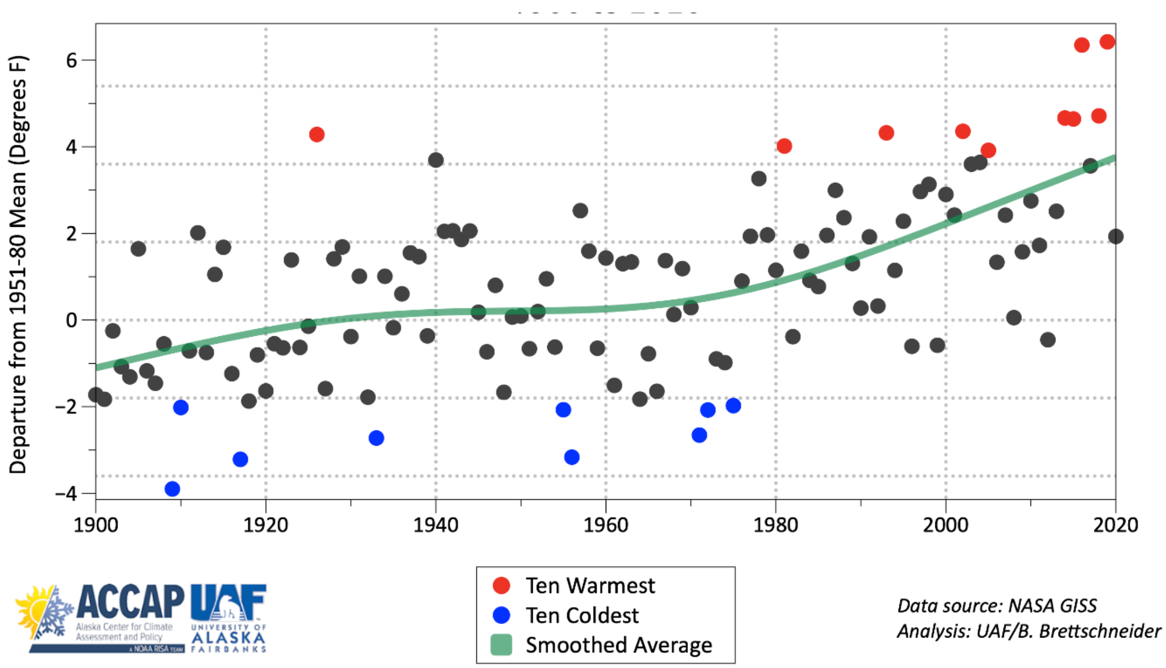


**Figure 12. Alaska Annual Temperature 1900 to 2020.**

*Marine water temperature*

Higher air temperatures have led to higher ocean temperatures. More than 90 percent of the excess heat created by global climate change is stored in the world’s oceans, causing increases in ocean temperature (IPCC 2019, Cheng et al. 2020). The upper ocean heat content, which

3 https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202213 viewed 2/17/2023.

4 https://www.ncei.noaa.gov/access/monitoring/monthly-report/national/202213 viewed 2/17/2023.

measures the amount of heat stored in the upper 2000 m (6,561 ft) of the ocean, was the highest on record in 2019 by a wide margin and is the warmest in recorded human history (Cheng et al. 2020).

The seas surrounding Alaska have been unusually warm in recent years, with unprecedented warmth in some cases (Thoman and Walsh 2019). This effect can be seen throughout the Alaska region, including the Bering, Chukchi, and Beaufort seas (Figure 13). Along the west coast, the surface waters were 4–11ºF warmer than average in the summer of 2019 (Thoman and Walsh 2019).

Warmer ocean water affects sea ice formation and melt. In the first decade of the 21$^{st}$ century, Arctic sea ice thickness and annual minimum sea ice extent (i.e., September sea ice extent) began declining at an accelerated rate and continues to decline at a rate of approximately minus 2.7 percent per decade (Stroeve et al. 2007, Stroeve and Notz 2018). None of the three species we are considering in this biological opinion are directly dependent on or greatly affected by sea ice or changes to sea ice. Humpback and fin whales have been sighted in the Bering Sea in recent years, but this is primarily during summer months when the sea ice has retreated (Clarke et al. 2020). WDPS Steller sea lions can be found on St Lawrence Island and even farther north, but are not dependent seasonal on sea ice movement.

In the Pacific Arctic, with the reduction in the cold-water pool in the northern Bering Sea, large scale northward movements of commercial stocks are underway as previously cold-dominated ecosystems warm and fish move northward to higher latitudes (Grebmeier et al. 2006, Eisner et al. 2020). Not only fish, but plankton, crabs and ultimately, sessile invertebrates like clams are affected by these changes in water temperature (Grebmeier et al. 2006, Fedewa et al. 2020).

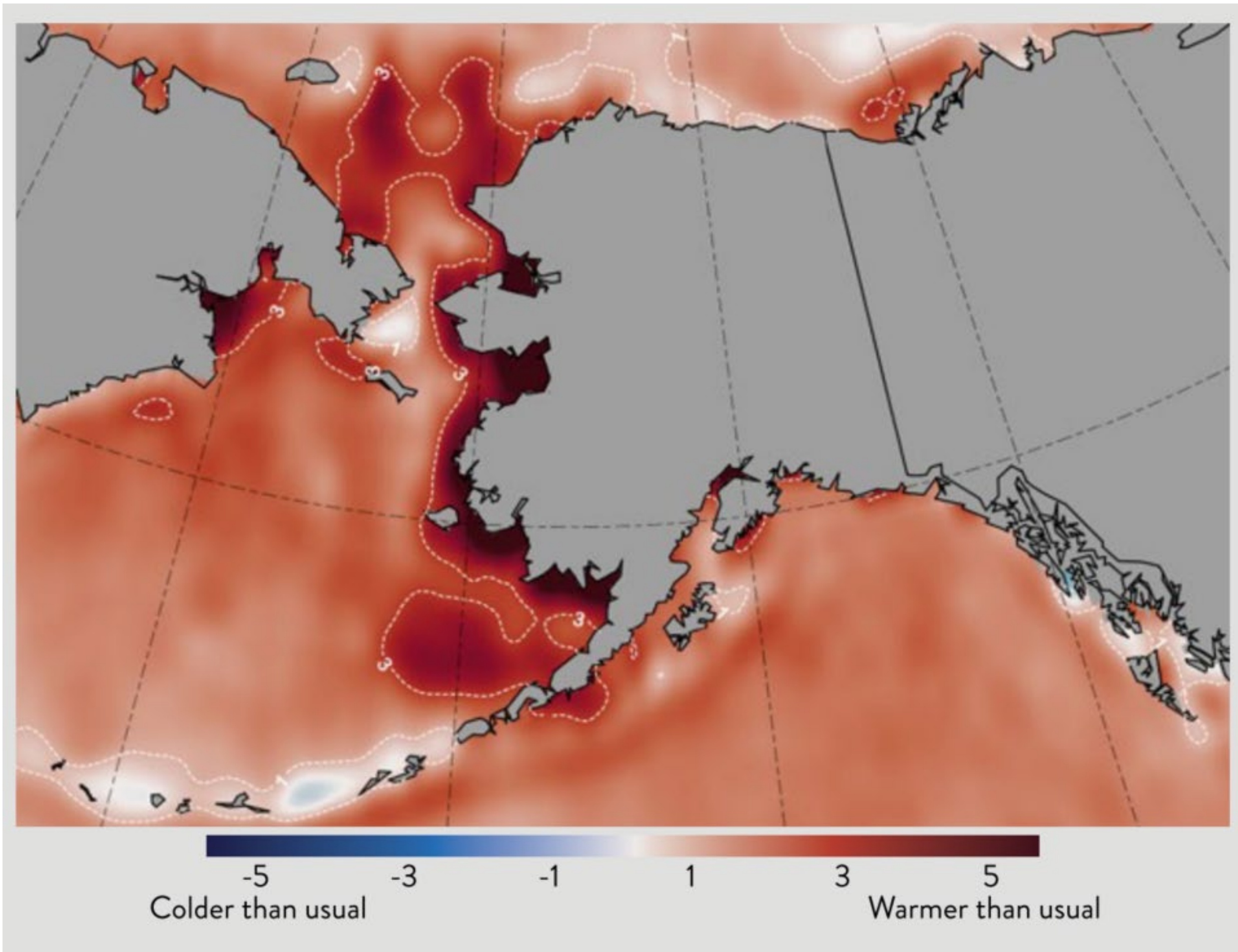


**Figure 13. Shades of red indicate summer sea surface temperatures that were warmer than average during 2014-2018, especially along the west coast.**

Another ocean water anomaly is described as a marine heat wave. Marine heat waves are described as a coherent area of extreme warm temperature at the sea surface that persists (Frölicher, Fischer and Gruber 2018). Marine heatwaves are a key ecosystem driver and there has been an increase from 30 percent in 2012 to nearly 70 percent of global oceans in 2016 experiencing strong or severe heatwaves (Suryan et al. 2021). The largest recorded marine heat wave occurred in the northeast Pacific Ocean from 2013-2015 (Frölicher, Fischer and Gruber 2018). Initially called "the blob" the northeast Pacific marine heatwave (PMH) first appeared off the coast of Alaska in the winter of 2013-2014 and by the end of 2015 it stretched from Alaska to Baja California. In mid-2016, the PMH began to dissipate, based on sea surface temperature data but warming re-intensified in late-2018 and persisted into fall 2019 (Suryan et al. 2021)(Figure 13). Consequences of this event included an unprecedented harmful algal bloom that extended from the Aleutian Islands to southern California, mass strandings of marine mammals, shifts in the distribution of invertebrates and fish, and shifts in abundance of several fish species (Cavole et al. 2016). Cetaceans, forage fish (capelin and herring), Steller sea lions, adult cod, chinook and sockeye salmon in the Gulf of Alaska were all impacted by the PMH (Bond et al. 2015, Peterson, Bond and Robert 2016, Sweeney, Towell and Gelatt 2018).

The 2018 Pacific cod stock assessment[5] estimated that the female spawning biomass of Pacific cod (an important prey species for Steller sea lions) was at its lowest point in the 41-year time series, following three years of poor recruitment and increased natural mortality as a result of the PMH. In 2020 the spawning stock biomass dropped below 20 percent of the unfished spawning biomass and the federal Pacific cod fishery in the Gulf of Alaska was closed by regulation to directed Pacific cod fishing (Barbeaux, Holsman and Zador 2020). Twenty percent is a minimum spawning stock size threshold instituted to help ensure adequate forage for the endangered western stock of Steller sea lions.

Events from warming, such as the toxic algal bloom caused by the PMH, can produce diotoxins like domoic acid and saxitoxin that may pose a risk to marine mammals in Alaska. In addition, increased temperatures can increase Brucella infections. In the Lefebvre et al. (2016) study of marine mammal tissues across Alaska, 905 individuals from 13 species were sampled including humpback whales, bowhead whales, beluga whales, harbor porpoises, northern fur seals, Steller sea lions, harbor seals, ringed seals, bearded seals, spotted seals, ribbon seals, Pacific walruses, and northern sea otters (Figure 14). Domoic acid was detected in all 13 species examined and had a 38% prevalence in humpback whales, and a 27% prevalence in Steller sea lions. Additionally, fetuses from a beluga whale, a harbor porpoise, and a Steller sea lion contained detectable concentrations of domoic acid documenting maternal toxin transfer in these species. Saxitoxin was detected in 10 of the 13 species, with the highest prevalence in humpback whales (50%) and a 10% prevalence in Steller sea lions (Lefebvre et al. 2016).

[5]NOAA Fisheries, Alaska Fisheries Science Center website. Available at https://apps-afsc.fisheries.noaa.gov/REFM/stocks/Historic_Assess.htm, accessed 2/17/23.


**Figure 14. Algal toxins detected in 13 species of marine mammals from Southeast Alaska to the Arctic from 2004 to 2013 (Lefebvre et al. 2016).**

### *Ocean Acidification*

For 650,000 years or more, the average global atmospheric carbon dioxide ($CO_2$) concentration varied between 180 and 300 parts per million (ppm), but since the beginning of the industrial revolution in the late 1700s, atmospheric $CO_2$ concentrations have been increasing rapidly, primarily due to anthropogenic inputs (Fabry et al. 2008, Lüthi et al. 2008). The world's oceans have absorbed approximately one-third of the anthropogenic $CO_2$ released, which has buffered the increase in atmospheric $CO_2$ concentrations (Feely et al. 2004, Feely, Doney and Cooley 2009). Despite the oceans' role as large carbon sinks, the $CO_2$ level continues to rise and is currently at 419 ppm[6].

As the oceans absorb $CO_2$, the buffering capacity, and ultimately the pH of seawater is reduced. This process is referred to as ocean acidification. Ocean acidification reduces the saturation states of certain biologically important calcium carbonate minerals like aragonite and calcite that many organisms use to form and maintain shells (Bates, Mathis and Cooper 2009, Reisdorph and Mathis 2014). When seawater is supersaturated with these minerals, calcification (growth) of shells is favored. Likewise, when the sea water becomes undersaturated, dissolution is favored

[6] NOAA Global Monitoring Laboratory website. Trends in Atmospheric Carbon Dioxide. Available at https://www.esrl.noaa.gov/gmd/ccgg/trends/, accessed August 22, 2022.

(Feely, Doney and Cooley 2009).

High latitude oceans have naturally lower saturation states of calcium carbonate minerals than more temperate or tropical waters, making Alaska's oceans more susceptible to the effects of ocean acidification (Fabry et al. 2009, Jiang et al. 2015). Model projections indicated that aragonite undersaturation would start to occur by about 2020 in the Arctic Ocean and by 2050, all of the Arctic will be undersaturated with respect to aragonite (Feely, Doney and Cooley 2009, Qi et al. 2017). Large inputs of low-alkalinity freshwater from glacial runoff and melting sea ice contribute to the problem by reducing the buffering capacity of seawater to changes in pH (Reisdorph and Mathis 2014). As a result, seasonal undersaturation of aragonite was already detected in the Bering Sea at sampling stations near the outflows of the Yukon and Kuskokwim Rivers, and the Chukchi Sea (Fabry et al. 2009). Models and observations indicate that rapid sea ice loss will increase the uptake of $CO_2$ and exacerbate the problem of aragonite undersaturation in the Arctic (Yamamoto et al. 2012, DeGrandpre et al. 2020).

Undersaturated waters are potentially highly corrosive to any calcifying organism, such as corals, bivalves, crustaceans, echinoderms and many forms of zooplankton such as copepods and pteropods, and consequently may affect Arctic food webs (Fabry et al. 2008, Bates, Mathis and Cooper 2009). Pteropods, which are often considered indicator species for ecosystem health, are prey for many species of carnivorous zooplankton, fishes including salmon, mackerel, herring, and cod, and baleen whales (Orr et al. 2005). Because of their thin shells and dependence on aragonite, under increasingly acidic conditions, pteropods may not be able to grow and maintain shells (Lischka and Riebesell 2012). It is uncertain if these species, which play a large role in supporting many levels of the Alaskan marine food web, will be able to adapt to changing ocean conditions (Fabry et al. 2008, Lischka and Riebesell 2012).

Climate change is projected to have substantial direct and indirect effects on individuals, populations, species, and the structure and function of marine, coastal, and terrestrial ecosystems in the foreseeable future (Hinzman et al. 2005, Burek, Gulland and O'Hara 2008, Doney et al. 2012, Huntington et al. 2020). The physical effects on the environment described above have impacted, are impacting, and will continue to impact marine species in a variety of ways (IPCC 2014), including shifting abundances, changes in distribution, changes in timing of migration, changes in periodic life cycles of species. For example, cetaceans with restricted distributions linked to water temperature may be particularly susceptible to range restriction (Learmonth et al. 2006, Isaac 2009). Conversely, for species that undergo long migrations, if either prey availability or habitat suitability is disrupted by changing ocean temperature regimes or prey availability due to ocean acidification, the timing of migration can change or negatively impact population sustainability (Simmonds and Eliott. 2009). Macleod (2009) estimated that, based on expected shifts in water temperature, 88 percent of cetaceans will be affected by climate change, 47 percent will be negatively affected, and 21 percent will be put at risk of extinction.

### 4.3 Status of Listed Species and Critical Habitat Likely to be Adversely Affected by the Action

This opinion examines the status of each species that is likely to be adversely affected by the proposed action. Species status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR § 402.02. The opinion also examines the condition of critical habitat throughout the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

For each species, we present a summary of information on the population structure and distribution of the species to provide a foundation for the exposure analyses that appear later in this opinion. Then we summarize information on the threats to the species and the species' status given those threats to provide points of reference for the jeopardy determinations we make later in this opinion. That is, we rely on a species' status and trend to determine whether an action's effects are likely to increase the species' probability of becoming extinct.

### 4.3.1 Mexico DPS humpback whale

*Population Structure and Status*

In 1970, the humpback whale was listed as endangered worldwide, under the Endangered Species Conservation Act (ESCA) of 1969 (35 FR 18319; December 2, 1970), primarily due to overharvest by commercial whalers. Congress replaced the ESCA with the ESA in 1973, and humpback whales continued to be listed as endangered, and were considered "depleted" under the MMPA.

Following the cessation of commercial whaling, humpback whale numbers increased. NMFS conducted a global status review (Bettridge et al. 2015a) and published a final rule on September 8, 2016 (81 FR 62260) recognizing 14 DPSs. Four of these were designated as endangered and one as threatened, with the remaining nine not warranting ESA listing status.

Based on an analysis of migration between winter mating/calving areas and summer feeding areas using photo-identification, Wade et al. (2016) concluded that whales feeding in Alaskan waters belong primarily to the Hawaii DPS (recovered), with small numbers from the Western North Pacific (endangered) and Mexico DPSs (threatened). The probability of encountering humpback whales from each DPS in the Gulf of Alaska (GOA) (project Zones 1-3) and southeast (Zone 4) can be found in Table 7.

**Table 7. Probability of encountering humpback whales from each DPS in the North Pacific Ocean in various feeding areas. Adapted from Wade (2021).**

| | Western North Pacific DPS (endangered) | Hawaii DPS (not listed) | Mexico DPS (threatened) |
|---|---|---|---|
| **Kamchatka** | 91% | 9% | 0% |
| **Aleutian Islands, Bering, Chukchi, Beaufort** | 2% | 91% | 7% |
| **Gulf of Alaska** | 1% | 89% | 11% |
| **Southeast Alaska/Northern BC** | 0% | 98% | 2% |
| **Southern BC/WA** | 0% | 69% | 25% |
| **OR/CA** | 0% | 0% | 58% |

Approximately 1,059 animals (CV=0.08) comprise the Western North Pacific DPS (Wade et al. 2016). The population trend for the Western North Pacific DPS is unknown. Humpback whales in the Western North Pacific remain rare in some parts of their former range, such as the coastal waters of Korea, and have shown little signs of recovery in those locations. The Mexico DPS is comprised of approximately 3,264 animals (CV=0.06) (Wade et al. 2016) with an unknown, but unlikely declining, population trend (81 FR 62260). The Hawaii DPS is comprised of 11,398 animals (CV=0.04). The annual growth rate of the Hawaii DPS is estimated to be between 5.5 and 6.0 percent.

Whales from these three DPSs overlap on feeding grounds off Alaska and are visually indistinguishable unless individuals have been photo-identified on breeding grounds and again on feeding grounds. All waters off the coast of Alaska may contain ESA-listed humpbacks. Of the three DPSs present in Alaska, we expect that only Mexico and Hawaii DPS individuals may be affected by the proposed action as the Western North Pacific DPS accounts for less than 1% of the humpback whales observed in the Gulf of Alaska (Zones 1, 2, 3) and is not found in Southeast Alaska (Zone 4).

Critical habitat was designated for the Mexico DPS on April 21, 2021 (86 FR 21082) and was discussed in section 4.1.1 above.

*Distribution*

Humpback whales generally undertake seasonal migrations from their tropical calving and breeding grounds in winter to their high-latitude feeding grounds in summer, although some individuals may remain in Alaska waters year-round. Most humpbacks that feed in Alaska winter in temperate or tropical waters near Mexico, Hawaii, or in the western Pacific near Japan. In the spring, those animals migrate back to Alaska, where food is abundant. They tend to concentrate in several areas, including Southeast Alaska, Prince William Sound, Kodiak, the mouth of Cook Inlet, and along the Aleutian Islands (Ferguson, Curtice and Harrison 2015).

Humpback whales occur throughout the central and western Gulf of Alaska from Prince William Sound to the Shumagin Islands. Seasonal concentrations are found in coastal waters of Prince William Sound, Barren Islands, Kodiak Archipelago, Shumagin Islands, and south of the Alaska Peninsula. Large numbers of humpbacks have also been reported in waters over the continental shelf, extending up to 100 nm offshore in the western Gulf of Alaska (Wade et al. 2016).

*Occurrence in the Action Area*

Zone 1 –Kodiak

Year-round opportunistic aerial surveys conducted around Kodiak Island from 1999 to 2013 (University of Alaska Fairbanks Gulf Apex Predator-Prey (UAF GAP) program) detected humpback whales in every month (Witteveen, pers. comm., 12 January 2015, as cited in Ferguson, Curtice and Harrison (2015)). The mean number of whales per month was greatest from July through September, moderate numbers were recorded from October through December, and very few whales were documented from January through June (Witteveen, pers. comm., 12 January 2015, as cited in (Ferguson, Curtice and Harrison 2015)). During summer (May-September) surveys conducted off northeast Kodiak Island in 2002-2003, humpback whales were documented in Chiniak Bay and Ferguson, Curtice and Harrison (2015) identified Biologically Important Areas (BIA) for humpback whale feeding around Kodiak Island (Figure 15). Given the documented presence of humpback whales in Chiniak Bay and vicinity, and the surrounding BIA, we assume humpback whales from the Mexico DPS could be present in the action area during the proposed activities at Base Kodiak.

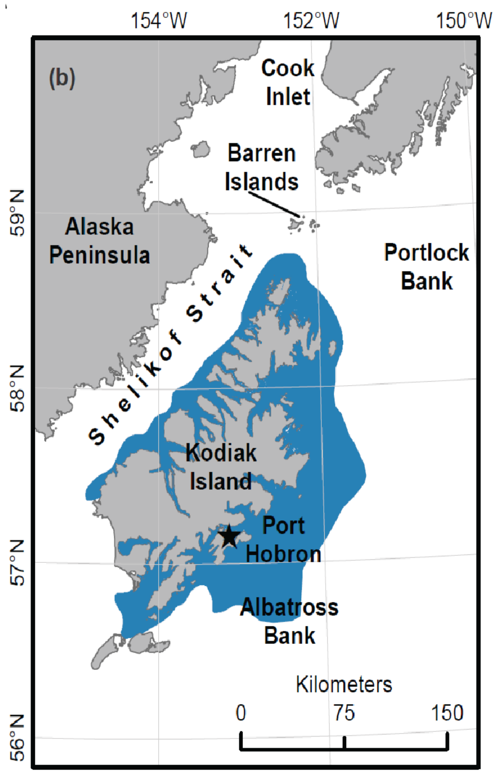


**Figure 15. Humpback whale feeding area identified by Ferguson et al. (2015a) around Kodiak Island in the Gulf of Alaska.**

Zone 2 – Kenai Peninsula

Information from the Alaska SeaLife Center in Seward, Alaska indicates that humpback whales frequent upper and outer Resurrection Bay with peak numbers during the summer months[7]. The National Park Service (NPS) manages Kenai Fjords National Park, and monitors marine mammals from sightseeing cruises, confirms that humpback whales are observed throughout Resurrection Bay and the waters surrounding Kenai Fjords National Park. Humpbacks are attracted to several spots near the Chiswell Islands (approximately 53 kilometers from the Project)[8]. Based on the widespread range and opportunistic foraging strategies of humpback whales, this species may be in the vicinity of the Moorings Seward year-round, but is unlikely to enter the action area which is mostly restricted to the boat harbor (Figure 3).

Zone 3 – Prince William Sound

Mark-recapture studies of humpback whales in Prince William Sound (Sound) related to Pacific herring (*Clupea pallasii*) predation identified 447 individual whales that were present at some

[7] Gulf Watch Alaska. Long-term monitoring. Pelagic. Accessed through: https://www.alaskasealife.org/gw_Pelagic

[8] https://www.nps.gov/kefj/learn/nature/marine_mammals.htm

time between 2006 and 2015, although it was noted that humpback whale population levels in the Sound vary widely throughout the year. Seasonal humpback whale distribution trends are heavily influenced by Pacific herring movements. Whales enter the Sound through Montague Strait in early fall in the wake of migrating herring and numbers build as the herring move into overwintering areas in bays and fjords. Whales leave the region for sub-tropical summer calving and breeding grounds during various windows between early January and mid-March, though this migration is not synchronized as some whales remain in the Sound throughout the winter. Humpback whales return to the Sound after breeding, but follow the herring out after spawning and are seen in fewer numbers in the Sound between June 1 and August 31 (Moran et al. 2018).

Humpback whales may be seen occasionally in Port Valdez year-round. They generally visit this region to feed on the abundant crustacean and small fish species present in the summer, and they typically stay in this region intermittently. Anecdotal reports from the Solomon Gulch Hatchery indicate that humpbacks may appear in nearshore areas around Valdez in late April, to intercept salmon fry leaving the hatchery. Based on the presence of their prey in the area, a Mexico DPS humpback whale could overlap with the Moorings Valdez action area. However, no in-water work will occur between March 1 and October 1, which will reduce the likelihood humpback whale presence at this site.

Humpback whale presence in Cordova is not well documented. However, this site is shallow, surrounded on most every side by mudflats that are bisected by narrow channels, making the chance of a humpback whale being in the action area less likely compared to other parts of the Sound.

Zone 4 – Southeast

Relatively high densities of humpback whales occur throughout much of southeast Alaska and northern British Columbia, particularly during the summer months (Muto et al. 2020). The abundance estimate for humpback whales in southeast Alaska is estimated to be 6,137 (CV=0.07) animals which includes whales from the Hawaii DPS (~98%) and Mexico DPS (~2%) (Wade 2021)(Table 7). Ferguson, Curtice and Harrison (2015; 2015b) identified feeding BIAs for humpback whales from March through November in Southeast (Figure 16).

Although migration timing varies among individuals, most whales depart for Hawaii or Mexico in fall or winter and begin returning to southeast Alaska in spring, with continued returns through the summer and a peak occurrence in southeast Alaska during late summer to early fall. However, there are significant overlaps in departures and returns (Baker et al. 1985; Straley 1990) and some individuals have been documented over-wintering near Sitka and Juneau (NPS Fact Sheet available at http://www.nps.gov/glba). In recent years, whales have also been reported intermittently during winter in Tongass Narrows near Ketchikan. Late fall and winter whale habitat in southeast Alaska appears to correlate with areas that have over-wintering herring, such as Sitka Sound (Baker et al. 1985, Straley 1990, Moran et al. 2018).

Between September and May from 1994 to 2000, weekly land-based surveys of marine mammals conducted from Sitka's Whale Park, located at the entrance to Silver Bay (no surveys were done in June, July, and August) indicate that the typical group size for humpback whales in the area is between 2 and 4 whales, and approximately 2.18 whales occur in the area per day. The maximum group size is unknown. When present in the area, humpback whales are foraging primarily on herring (Straley 2017).

Humpback whale presence in the waters around Station Juneau can be intermittent and irregular throughout the year. The aggregation of herring in nearby Auke Bay has the potential to provide a habitat where whales may feed on small volumes of fish and rest to conserve energy between foraging opportunities. Ferguson, Curtice and Harrison (2015) identified areas around Juneau, which overlap with the action area, as a BIA for humpback whale feeding during summer (June-August) and fall (September-November) (Figure 16). Given their widespread range and their opportunistic foraging strategies, humpback whales may be in the project vicinity during the proposed activities at Station Juneau.

Humpback whales occur frequently to feed in Tongass Narrows near Ketchikan during summer and fall months, but are less common during winter and spring. In a recent biological opinion for the Alaska Department of Transportation & Public Facilities' (ADOT&PF) Tongass Narrows Project, NMFS estimated that, on average, a group of two humpback whales may be present in Tongass Narrows every three days (NMFS 2019). Recent marine mammal monitoring for that project detected daily occurrences of a single humpback whale in Tongass Narrows for several weeks during November 2020. During fall 2018, Ketchikan Airport staff and ferry captains reported an increase in the frequency of occurrence of humpback whales in the vicinity of the Tongass Narrows Project. Anecdotal evidence suggests that humpback whales may be increasing over time in the action area for Base Ketchikan.

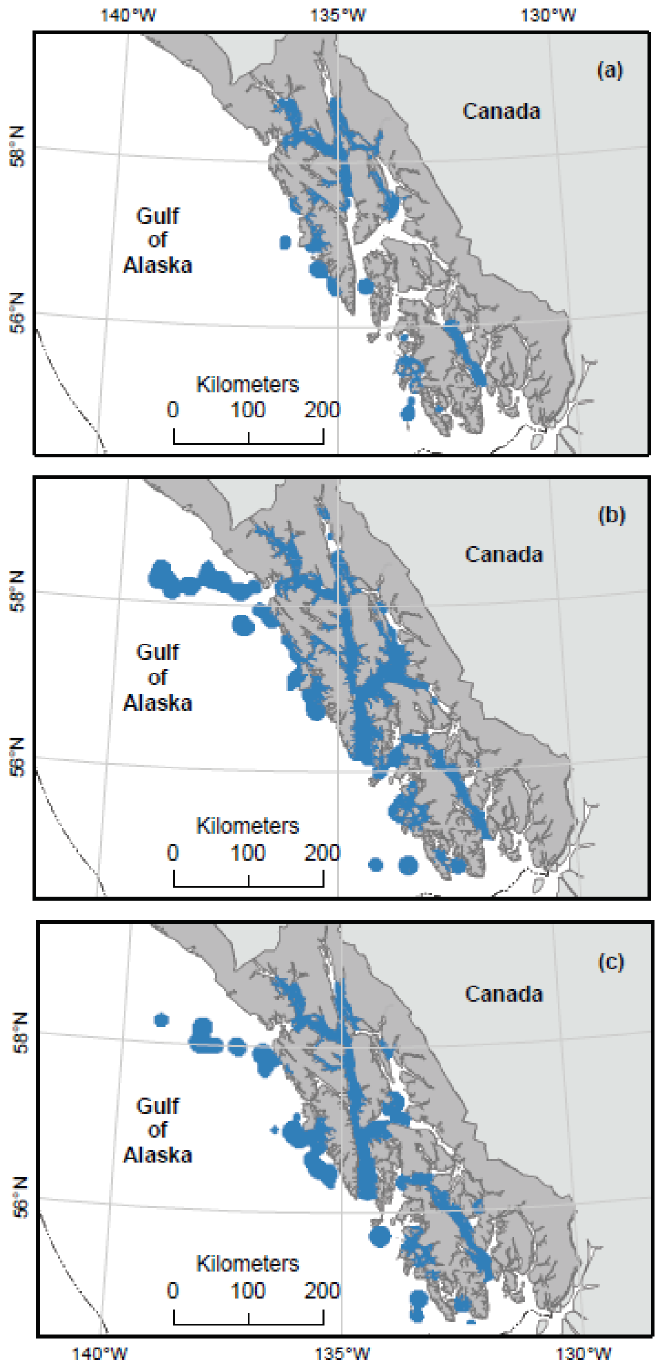


**Figure 16. Seasonal humpback whale feeding BIAs in Southeast Alaska for: a) spring, March – May; b) summer, June – August; and c) fall, September – November (Ferguson et al. 2015a, Figure 6.6).**

Humpback whale presence near Moorings Petersburg is not well documented. The humpback whale feeding BIA described by Ferguson, Curtice and Harrison (2015) for summer (June –

August, Figure 16b) suggests it is possible that individuals may be in or near the action area for this site during the summer. However, due to the limited information available on presence and the very low likelihood of a humpback whale being from the Mexico DPS, we think it is unlikely that this species present during most of the proposed work at Moorings Petersburg.

*Threats to the Species*

<u>Natural Threats</u>

Natural sources and rates of mortality of humpback whales are not well known. Based upon prevalence of tooth marks, attacks by killer whales appear to be highest among humpback whales migrating between Mexico and California, although populations throughout the Pacific Ocean appear to be targeted to some degree (Steiger et al. 2008). Juveniles appear to be the primary age group targeted. Humpback whales engage in grouping behavior, flailing tails, and rolling extensively to fight off attacks. Calves remain protected near mothers or within a group and lone calves have been known to be protected by presumably unrelated adults when confronted with attack (Ford and Reeves 2008).

Parasites and biotoxins from red-tide blooms are other potential causes of mortality (Perry, DeMaster and Silber 1999a). The occurrence of the nematode *Crassicauda boopis* appears to increase the potential for kidney failure in humpback whales and may be preventing some populations from recovering (Lambertsen 1992). Studies of 14 humpback whales that stranded along Cape Cod between November 1987 and January 1988 indicate they apparently died from a toxin produced by dinoflagellates during this period.

<u>Anthropogenic Threats</u>

Human activities are known to threaten humpback whales. Historically, whaling represented the greatest threat to every population of whales and was ultimately responsible for listing several species as endangered, but this threat has largely been curtailed. No whaling occurs within the range of Mexico DPS humpbacks, but some whaling still occurs in both Japan and South Korea (within the range of Western North Pacific DPS humpbacks)[9]. NMFS estimates that between 2002 and 2006, there were incidental serious injuries to 0.2 humpbacks annually in the Bering Sea/Aleutian Islands sablefish longline fishery. However, NMFS does not consider this estimation reliable because observers have not been assigned to a number of fisheries known to interact with the Mexico and western North Pacific DPSs of humpback whale. In addition, the Canadian observation program is also limited and uncertain (Allen and Angliss 2009).

More humpback whales are killed in collisions with ships than any other whale species except fin whales (Jensen and Silber 2004). Along the Pacific coast, a humpback whale is known to be killed about every other year by ship strikes (Barlow et al. 1997). Neilson et al. (2012) reviewed 108 whale-vessel collisions in Alaska from 1978–2011 and found that 86% involved humpback

[9] https://iwc.int/management-and-conservation/whaling/total-catches

whales. Collision hotspots occurred in southeast Alaska in popular whale watching locations. Vessel collisions are discussed more in the Environmental Baseline (Section 5.6).

Vessel collisions with humpback whales remain a significant management concern, given the increasing abundance of humpback whales foraging in Alaska, as well as the growing presence of marine traffic in Alaska's coastal waters. Based on these factors, injury and mortality of humpback whales as a result of vessel strike will continue into the future. The potential for ship strikes may increase as vessel traffic in northern latitudes increases with changes in sea-ice coverage (Muto et al. 2021).

The 2015 humpback whale status review identified underwater sound from human activity as a threat and suggested that exposure is likely chronic and at relatively high levels (Bettridge et al. 2015b). However, the authors noted that overall population-level effects of exposure to underwater sound are not well-established. Sources of underwater sound identified in the status review include commercial and recreational vessel traffic, and activities in U.S. Navy training and testing ranges.

Organochlorines, including PCB and DDT, have been identified from humpback whale blubber(Gauthier, Metcalfe and Sears 1997a). Higher PCB levels have been observed in Atlantic waters versus Pacific waters along the United States and levels tend to increase with individual age (Elfes et al. 2010). Although humpback whales off southern California tend to have the highest PCB concentrations of all North Pacific humpback whales, overall levels are on par with other baleen whales, which are generally lower than odontocete cetaceans (Elfes et al. 2010). As with blue whales, these contaminants are transferred to young through the placenta, leaving newborns with contaminant loads equal to that of mothers before bioaccumulating additional contaminants during life and passing the additional burden to the next generation (Metcalfe et al. 2004). Available information does not suggest contaminant levels in humpback whales are having a significant impact on their persistence (Elfes et al. 2010).

*Reproduction and Growth*

Humpbacks give birth and presumably mate on low-latitude wintering grounds in January to March in the Northern Hemisphere. Females attain sexual maturity at 5 years in some populations and exhibit a mean calving interval of approximately two years (Clapham 1992, Barlow and Clapham 1997). Gestation is about 12 months, and calves probably are weaned by the end of their first year (Perry, DeMaster and Silber 1999b).

*Feeding and Prey Selection*

During the feeding season, humpback whales form small groups that occasionally aggregate on concentrations of food that may be stable for long-periods of times. Humpbacks use a wide variety of behaviors to feed on various small, schooling prey including krill and fish (Jurasz and Jurasz 1979, Hain et al. 1982, Weinrich, Schilling and Belt 1992, Hain et al. 1995). There is good evidence of some territoriality on feeding and calving areas (Tyack 1981, Clapham 1994, 1996). Humpback whales are generally believed to fast while migrating and on breeding grounds, but some individuals apparently feed while in low-latitude waters normally believed to be used exclusively for reproduction and calf-rearing (Danilewicz et al. 2009). Some individuals, such as juveniles, may not undertake migrations at all (Best et al. 1995).

Humpback whales feed on pelagic schooling euphausiids and small fish including capelin, herring and mackerel. Like other large mysticetes, they are a “lunge feeder” taking advantage of dense prey patches and engulfing as much food as possible in a single gulp. They also blow nets, or curtains, of bubbles around or below prey patches to concentrate the prey in one area, then lunge with open mouths through the middle. Dives appear to be closely correlated with the depths of prey patches, which vary from location to location. In the north Pacific (southeast Alaska), most dives were of fairly short duration (<4 min) with the deepest dive to 148 m (Dolphin 1987), while whales observed feeding on Stellwagen Bank in the North Atlantic dove to <40 m (Hain et al. 1995).

Results from a study of humpback whales in the Gulf of Alaska suggest that there may be regional feeding aggregations within the Gulf of Alaska (Witteveen et al. 2011). This study confirmed that humpback whale feeding aggregations exhibit high site fidelity and indicated that, while inshore and offshore aggregations of humpbacks off Kodiak Island and southeastern Alaska represent single feeding aggregations, inshore and offshore whale aggregations off Prince William Sound may be unique (Witteveen et al. 2011).

*Diving and Social Behavior*

In Hawaiian waters, humpback whales remain almost exclusively within the 1,800 m isobath and usually within water depths less than 182 m. Maximum diving depths are approximately 170 m but usually less than 60 m (Hamilton, Stone and Martin 1997). Because most humpback prey is likely found above 300 m depths most humpback dives are probably relatively shallow. Hamilton, Stone and Martin (1997) tracked one whale near Bermuda possibly diving and feeding to 240 m depth. The deepest dives in southeast Alaska were recorded to 148 m (Dolphin 1987).

Humpback whales may remain submerged during a dive for up to 21 min (Dolphin 1987). In southeast Alaska average dive times were 2.8 min for feeding whales, 3.0 min for non-feeding whales, and 4.3 min for resting whales (Dolphin 1987).

In a review of the social behavior of humpback whales, Clapham (1996) reported that they form small, unstable social groups during the breeding season. During the feeding season they form small groups that occasionally aggregate on concentrations of food. Feeding groups are sometimes stable for long periods of time.

*Vocalization, Hearing, and Other Sensory Capabilities*

Because of the lack of captive subjects and logistical challenges of bringing experimental subjects into the laboratory, no direct measurements of mysticete hearing are available. Consequently, hearing in mysticetes is estimated based on other means such as vocalizations (Wartzok and Ketten 1999), anatomy (Ketten 1997, Houser, Helweg and Moore 2001), behavioral responses to sound (Edds-Walton 1997), and nominal natural background sound conditions in their likely frequency ranges of hearing (Clark and Ellison 2004). The combined information from these and other sources strongly suggests that mysticetes are likely most sensitive to sound from an estimated tens of hertz to ~10 kHz (Southall et al. 2007b). However, evidence suggests that humpbacks can hear sounds as low as 7 Hz up to 24 kHz, and possibly as high as 30 kHz (Ketten 1997, Au et al. 2006). These values fall within the NMFS (NMFS 2018b) generalized low-frequency cetacean hearing range of 7 to 35 kHz.

Because of their size, no audiogram has been produced for humpback whales. However, Helweg, Houser and Moore (2000) and Houser, Helweg and Moore (2001) modeled a predicted audiogram based on the relative length of the basilar membrane (within the inner ear) of a humpback whale, integrated with known data on cats and humans. The result shows sensitivity to frequencies from about 700 Hz to 10 kHz, with maximum relative sensitivity between 2 to 7 kHz. Because ambient sound levels are higher at low frequencies than at mid frequencies, the absolute sound levels that humpback whales can detect below 1 kHz are probably limited by increasing levels of natural ambient sound at decreasing frequencies (Clark and Ellison 2004).

### 4.3.2 Fin whale

*Population Structure and Status*

The fin whale (*Balaenoptera physalus*) was listed as an endangered species under the ESCA on December 2, 1970 (35 FR 18319) and continued to be listed as endangered following passage of the ESA (39 FR 41367). Critical habitat has not been designated for fin whales. A recovery plan for the fin whale was published on July 30, 2010 (NMFS 2010). Fin whales have two recognized subspecies: *B. p. physalus* occurs in the North Atlantic Ocean (Gambell 1985), while *B. p. quoyi* occurs in the Southern Ocean (Fischer 1829). Most experts consider the North Pacific fin whales a separate unnamed subspecies.

It is difficult to assess the current status of fin whales because (1) there is no general agreement on the size of the fin whale population prior to whaling, and (2) estimates of the current size of the different fin whale populations vary widely. Prior to exploitation by commercial whalers, fin whales are thought to have numbered greater than 464,000 worldwide, and are now thought to number approximately 119,000 worldwide (Braham 1991). As used in this opinion, “populations” are isolated demographically, meaning they are driven more by internal dynamics like birth and death processes than by the geographic redistribution of individuals through immigration or emigration.

NMFS recognizes three management units or “stocks” of fin whales in U.S. Pacific waters: (1) Alaska (Northeast Pacific), (2) California/Washington/Oregon, and (3) Hawaii (Muto et al. 2019). However, Mizroch et al. (2009) suggest that this structure should be reviewed and updated, if appropriate, to reflect current data that suggests there may be at least 6 populations of fin whales in this region.

Ohsumi and Wada (1974) estimated that the Northeast Pacific fin whale population ranged from 42,000-45,000 before whaling began. Dedicated line transect cruises were conducted in coastal waters of western Alaska and the eastern and central Aleutian Islands in July and August 2001-2003 (Zerbini et al. 2006), which resulted in an estimate of 1,652 (95 percent CI: 1,142-2,389) fin whales in the area. In 2013 and 2015, dedicated line-transect surveys of the offshore waters of the Gulf of Alaska provided fin whale abundance estimates of 3,168 fin whales (CV=0.26) in 2013 and 916 (CV=0.39) in 2015. The marked differences in these estimates can be partially explained by differences in sampling coverage across the two cruises (Rone et al. 2017).

The estimates of fin whale abundance in the eastern Bering Sea and in the Gulf of Alaska are considered to be biased low because the geographic coverage of surveys was limited relative to the range of the stock. Additionally, these surveys have not been corrected for animals missed on the trackline, animals submerged when the ship passed, and responsive movement. However, data for these corrections is not currently available, and previous studies have shown that these sources of bias are small for this species (Barlow 1995).

Zerbini et al. (2006) estimated an annual rate of increase of 4.8 percent (95 percent CI: 4.1-5.4 percent) for the period of 1987-2003, however this trend should be used with caution due to the uncertainties in the initial population estimate and the population structure of fin whales in the area. Additionally, the study represented only a small fraction of the range of the Northeast Pacific stock and it may not be appropriate to extrapolate this to a broader range.

A more recent trend in abundance estimated by Friday et al. (2013) of 14 percent (95 percent CI: 1.0-26.5 percent) annual rate of increase in abundance of fin whales from 2002 to 2010 is higher than most plausible estimates for large whale populations (Zerbini, Clapham and Wade 2010). This high rate of increase may be explained, at least in part, by changes in distribution (possibly driven by changes in prey distribution) rather than population growth (Muto et al. 2019).

*Distribution*

Fin whales are distributed widely in every ocean except the Arctic Ocean (where they have recently begun to appear). In the North Pacific, fin whales are found in summer foraging areas in the Gulf of Alaska, Bering Sea/Aleutian Islands, and as far north as the northern Chukchi Sea (Muto et al. 2019).

Information on seasonal fin whale distribution has been gleaned from the reception of fin whale calls by bottom-mounted, offshore hydrophone arrays along the U.S. Pacific coast, in the central North Pacific, and in the western Aleutian Islands (Moore et al. 1998, Watkins et al. 2000, Moore et al. 2006, Stafford et al. 2007, Širović et al. 2013, Soule and Wilcock 2013). These studies documented high levels of fin whale call rates along the U.S. Pacific coast beginning in August/September and lasting through February, suggesting that these may be important feeding areas during the winter. Fin whales have been acoustically detected in the Gulf of Alaska year-round, with highest call occurrence rates from August through December and lowest call occurrence rates from February through July (Moore et al. 2006, Stafford et al. 2007).

A migratory species, fin whales generally spend the spring and early summer feeding in cold, high latitude waters as far north as the Chukchi Sea, with regular feeding grounds in the Gulf of Alaska, Prince William Sound, along the Aleutian Islands, and around Kodiak Island, primarily on the western side. Ferguson, Curtice and Harrison (2015) identified habitat around Kodiak Island, south of the mouth of Cook Inlet, as a BIA for fin whale feeding, based on boat and aerial-survey data that indicate the highest densities of fin whales occur between June and August (Figure 17). Additionally, Ferguson et al. (2015) identified a feeding BIA in the Bering Sea where the highest densities of fin whales occur from June to September, based on a combination of ship-based surveys, and acoustic and historical whaling data. In the fall, fin whales tend to return to low latitudes for the winter breeding season, though some may remain in residence in their high latitude ranges if food resources remain plentiful. In the eastern Pacific, fin whales typically spend the winter off the central California coast and into the Gulf of Alaska. Panigada et al. (2008) found water depth to be the most significant variable in describing fin whale distribution, with more than 90 percent of sightings occurring in waters deeper than 2,000 m.

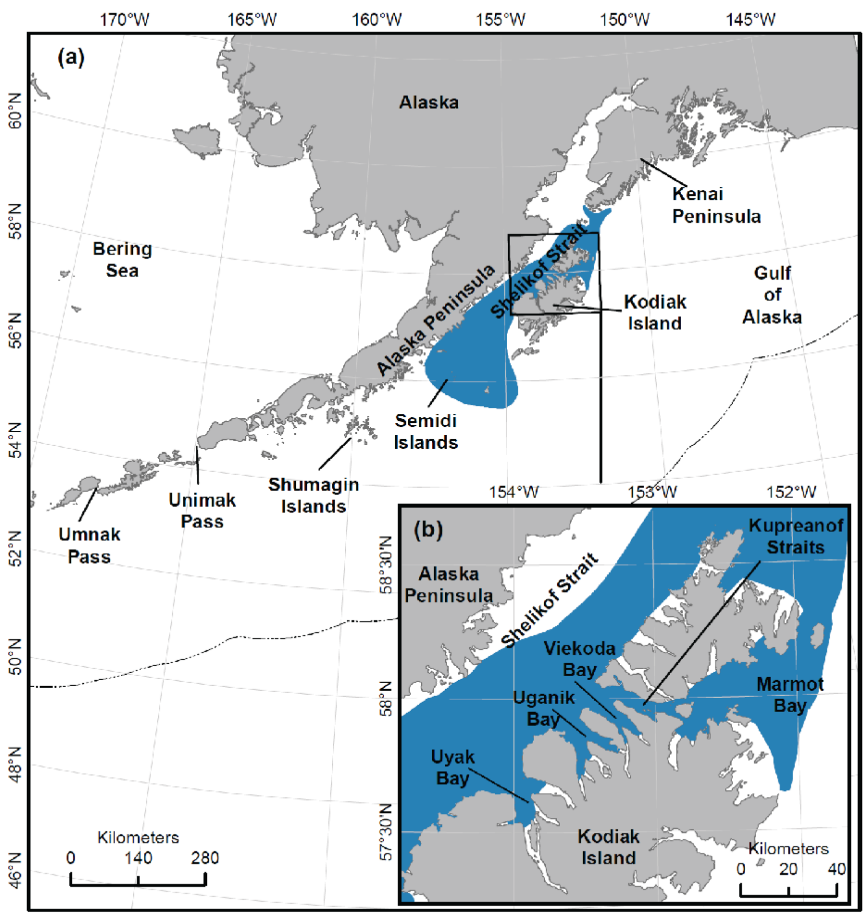


**Figure 6.1.** (a) Fin whale (*Balaenoptera physalus*) feeding Biologically Important Area (BIA), with the U.S. Exclusive Economic Zone (EEZ) shown as a dashed line; (b) BIA close-up around the northern end of Kodiak Island. The greatest densities of fin whales are found in this feeding BIA during June through August, based on boat- and aerial-based survey data.

**Figure 17. Fin whale feeding area identified by Ferguson et al. (2015a) around Kodiak Island in the Gulf of Alaska.**

*Occurrence in the Action Area*

Zone 1 – Kodiak

Fin whales may be found around Kodiak Island during the summer foraging months as the feeding BIA identified by Ferguson, Curtice and Harrison (2015) extends to areas just outside of Womens Bay (Figure 17). Additionally, in 2019 the IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER) cruise recorded 261 "schools" (groups of more than one whale) consisting of 450 individual fin whales around Kodiak, with most observations in water depths greater than 1,000 m (Matsuoka et al. 2019). Though water depths in Womens Bay may be shallow for regular fin whale activity, the high density of whales around the island suggest that they could overlap with the action area for Base Kodiak.

Zone 2 – Kenai Peninsula

Aerial Surveys conducted by the NMFS Marine Mammal Laboratory from June to July in 1998 and 2000 recorded 95 fin whale sightings in the northern Gulf of Alaska[10]. Additionally, consultation with a biologist at the Alaska SeaLife Center indicates that fin whales are frequently sighted in outer Resurrection Bay (peak sightings in summer) and are rare in upper Resurrection Bay[11]. Kenai Fjords National Park is found on land surrounding Resurrection Bay, and NPS staff monitor marine mammals from sightseeing cruises. The NPS states that fjords, like those near Seward, provide the right environment for spotting fin whales. In Kenai Fjords, NPS tends to see fin whales two or three times a season, usually in May and again in August. The area between the end of the Resurrection Peninsula and Cheval Island and Agnes Cove (over 40 km from the Mooring Seward site) is the best place in the park to spot a fin whale[12].

Though fin whales may be present in outer Resurrection Bay, we do not expect this species to get close to the Moorings Seward action area due to their preference of deeper waters farther from shore and the shallow, crowded nature of the action area in the Seward harbor.

Zone 3 – Prince William Sound

Fin whales regularly feed in the Gulf of Alaska and in Prince William Sound and may occur within Port Valdez during summer and sometimes as early in the year as April. Sightings data for fin whales around Cordova are not available and due to the shallow nature of the waters around this site, we expect that this species is less likely to be present in this area compared to Moorings Valdez.

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[10] Information from the Alaska Fisheries Science Center/National Marine Mammal Laboratory: Platforms of Opportunity Program (POP): 1950-present. https://www.fisheries.noaa.gov/inport/item/17407

[11] Gulf Watch Alaska. Long-term monitoring. Pelagic. Accessed through: https://www.alaskasealife.org/gw_Pelagic

[12] https://www.nps.gov/kefj/learn/nature/marine_mammals.htm

Zone 4 – Southeast

Fin whales are not commonly found in the waters around southeast Alaska as they tend to feed in the GOA and further north during the summer months and prefer deeper water. Seasonal vessel-based surveys from 1991-2007 conducted in southeast only sighted fin whales during 2004 and 2005, and only during the summer months (surveys also conducted in spring and fall)(Dahlheim, White and Waite 2009). All fin whales reported were found near the southern tip of the southeast study area, near Prince of Wales Island and in the southern end of Clarence Strait. In 2013, multiple fin whales were sighted well offshore of Sitka during vessel-based surveys in the GOA (Rone et al. 2017). These surveys suggest that it is highly unlikely that fin whales will overlap with the action areas for the USCG facilities in this zone.

*Threats to the Species*

Natural Threats

Natural sources and rates of mortality are largely unknown, but Aguilar and Lockyer (1987) suggested annual natural mortality rates might range from 0.04 to 0.06 for northeast Atlantic fin whales. The occurrence of the nematode *Crassicauda boopis* appears to increase the potential for kidney failure and may be preventing some fin whale populations from recovering (Lambertsen 1983). Adult fin whales engage in flight responses (up to 40 km/h) to evade killer whales, which involves high energetic output, but show little resistance if overtaken (Ford and Reeves 2008). Killer whale or shark attacks may also result in serious injury or death in very young and sick individuals (Perry, DeMaster and Silber 1999a).

Anthropogenic Threats

Fin whales have undergone significant exploitation during commercial whaling, and though they are currently protected under the International Convention for the Regulation of Whaling through the International Whaling Commission (IWC), they are still lawfully hunted in aboriginal subsistence fisheries off West Greenland. In 2003, two males and four females were landed and two others were struck and lost (IWC 2005). In 2004, five males and six females were killed, and two other fin whales were struck and lost. Between 2003 and 2007, the IWC set a catch limit of up to 19 fin whales in this aboriginal subsistence fishery. However, the scientific recommendation was to limit the number killed to four individuals until accurate populations estimates could be produced(IWC 2005).

Fin whales experience significant injury and mortality from fishing gear and ship strikes (Perkins and Beamish 1979, Carretta et al. 2007, Waring et al. 2007, Douglas et al. 2008). Between 1969 and 1990, 14 fin whales were captured in coastal fisheries off Newfoundland and Labrador; of these seven are known to have died because of capture (Perkins and Beamish 1979). In 1999, one fin whale was reported killed in the Gulf of Alaska pollock trawl fishery and one was killed the same year in the offshore drift gillnet fishery (Angliss and Outlaw 2005). According to Waring et al. (2007), four fin whales in the western North Atlantic died or were seriously injured in fishing gear, while another five were killed or injured as a result of ship strikes between January 2000 and December 2004.

Jensen and Silber (2004) review of the NMFS's ship strike database revealed fin whales as the most frequently confirmed victims of ship strikes (26 percent of the recorded ship strikes [n = 75/292 records]), with most collisions occurring off the east coast, followed by the west coast of the U.S. and Alaska/Hawai'i. From 1999 to 2005, there were 15 reports of fin whales strikes by vessels along the U.S. and Canadian Atlantic coasts (Cole, Hartley and Merrick 2005, Nelson et al. 2007). Of these, 13 were confirmed, with deaths occurring in 11 of the interactions. Five of seven fin whales stranded along Washington State and Oregon showed evidence of ship strike with incidence increasing since 2002 (Douglas et al. 2008). Neilson et al. (2012) documented three fin whale-vessel collisions in Alaska between 1978 and 2011 – two around Kodiak Island and one in Resurrection Bay. Since 2011, NMFS AKR has received reports of five fin whale-vessel collisions – one in the Port of Alaska (arrived on the bow of a freighter from Seattle, so location of the actual collision is unknown), two in the Gulf of Alaska, and two in the Bering Sea near Unalaska (NMFS Stranding Database, Accessed January 12, 2022). Due to fin whales' utilization of deeper, offshore waters, it is likely that the number of collisions with vessels may be higher but occur in areas where a dead whale is much less likely to be noticed.

The organochlorines DDE, DDT, and PCBs have been identified from fin whale blubber, but levels are lower than in toothed whales due to fin whales feeding at a lower level in the food chain (Borrell and Aguilar 1987, Aguilar and Borrell 1988). Females contained lower burdens than males, likely due to mobilization of contaminants during pregnancy and lactation (Aguilar 1987, Gauthier, Metcalfe and Sears 1997b). Contaminant levels increase steadily with age until sexual maturity, at which time levels begin to drop in females and continue to increase in males (Aguilar and Borrell 1988).

*Reproduction and Growth*

The reproduction and growth of fin whales is not as well documented as for other baleen species. Fin whales in the North Pacific are thought to mate around December to February. Male fin whales reach sexual maturity between 6 and 10 years of age, while females mature between 7 and 12 years. Females gestate for approximately 11 months and produce calves that can weigh between 4,000 to 6,000 pounds. Birthing occurs in tropical and subtropical areas during midwinter. Females nurse their calves for 6-7 months and may produce a calf every 2 to 3 years.

Despite reaching sexual maturity between 6 and 12 years of age, adult fin whales reach physical maturity around 25 years of age. They can weigh 40-80 tons and grow to 75-85 ft long. Fin whales may also live as long as 90 years.

*Feeding and Prey Selection*

In the North Pacific, fin whales prefer euphausiids (mainly *Euphausia pacifica*, *Thysanoessa longipes*, *T. spinifera*, and *T. inermis*) and large copepods (mainly *Calanus cristatus*), followed by schooling fish such as herring, walleye pollock (*Theragra chalcogramma*), and capelin (Nemoto

1970, Kawamura 1980). Feeding may occur in shallow waters on prey such as sand lance (Overholtz and Nicolas 1979) and herring (Nøttestad et al. 2002), but most foraging is observed in high-productivity, upwelling, or thermal front marine waters (Panigada et al. 2008). Fin whales, like humpback and blue whales, exhibit lunge-feeding behavior, where large amounts of water and prey are taken into the mouth and filtered through the baleen (Brodie 1993, Goldbogen et al. 2006, Goldbogen et al. 2008).

*Diving and Social Behavior*

The amount of time fin whales spend at the surface varies. Some authors have reported that fin whales make 5 to 20 shallow dives, each of 13 to 20 s duration, followed by a deep dive of 1.5 to 15 min (Gambell 1985, Stone et al. 1992, Lafortuna et al. 2003). Other authors have reported that the fin whale's most common dives last 2 to 6 min (Watkins et al. 1981, Hain et al. 1992). The most recent data support average dives of 4.2 min at 59 m for non-foraging fin whales and dives of 6.3 min at 98 m for foraging fin whales (Croll et al. 2001b), while foraging dives at excess of 150 m have been observed (Panigada et al. 1999). Lafortuna et al. (2003) found that foraging fin whales have a higher blow rate than when traveling.

Fin whales tend to be to be solitary or found in small groups. In waters off the U.S. Atlantic Coast, individuals or duos represented about 75 percent of sightings during the Cetacean and Turtle Assessment Program (Hain et al. 1992). Individuals or groups of less than five individuals represented about 90 percent of the observations. During the 2017 IWC-POWER cruise in the eastern Bering Sea, Matsuoka et al. (2018) observed a total of 143 "schools" (groups of more than one individual) consisting of 195 individual fin whales, including three calves. These observations indicate that fin whales also form pairs or small groups in Alaskan waters.

*Vocalization, Hearing, and Other Sensory Capabilities*

Fin whales produce a variety of low-frequency sounds in the 10 to 200 Hz band (Watkins 1981, Watkins et al. 1987, Edds 1988, Thompson, Findley and Vidal 1992). The low-frequency sounds produced by fin whales have the potential to travel over long distances, and it is possible that long-distance communication occurs in fin whales (Payne and Webb 1971, Edds-Walton 1997). Also, there is speculation that the sounds may function for long-range echolocation of large-scale geographic targets such as seamounts, which might be used for orientation and navigation (Tyack 1999). While there is no direct data on hearing in low-frequency cetaceans, based on their vocalizations the applied frequency range is anticipated to be between 7 Hz and 35 kHz (NMFS 2018b). Synthetic audiograms produced by applying models to X-ray computed tomography scans of a fin whale calf skull indicate the range of best hearing for fin whale calves is from approximately 0.02 to 10 kHz, with maximum sensitivities between 1 to 2 kHz (Cranford and Krysl 2015).

### 4.3.3 Western DPS Steller sea lions

*Population Structure and Status*

The Steller sea lion was listed as a threatened species under the ESA on November 26, 1990 (55

FR 49204). In 1997, NMFS reclassified Steller sea lions as two DPSs based on genetic studies and other information (62 FR 24345; May 5, 1997). At that time, the Eastern DPS (which includes animals from east of Cape Suckling, Alaska, at 144°W longitude) was listed as threatened and the Western DPS (which includes animals from west of Cape Suckling, at 144°W longitude) was listed as endangered. On November 4, 2013, the Eastern DPS was removed from the endangered species list (78 FR 66140). Information on Steller sea lion biology, threats, and habitat (including critical habitat) is available in the revised Steller Sea Lion Recovery Plan (NMFS 2008b) and 5-year Status Review (NMFS 2020).

As summarized most recently by Muto et al. (2020), the WDPS of Steller sea lions decreased from an estimated 220,000 to 265,000 animals in the late 1970s to less than 50,000 in 2000. Factors that may have contributed to this decline include incidental take in fisheries, competition with fisheries for sea lion prey, legal and illegal shooting, predation, exposure to contaminants, disease, and ocean regime shift climate change (NMFS 2008b). The most recent comprehensive aerial photographic and land-based surveys of WDPS Steller sea lions in Alaska (Fritz et al. 2016, Sweeney, Towell and Gelatt 2018) estimated a total Alaska population (both pups and non-pups) of 52,932 (Muto et al. 2020). There are strong regional differences in trends in abundance of WDPS Steller sea lions, with mostly positive trends in the Gulf of Alaska and eastern Bering Sea east of Samalga Pass (~170°W longitude) and generally negative trends to the west in the Aleutian Islands.

The population trends in the Gulf of Alaska were observed to be increasing until 2015 (Sweeney, Towell and Gelatt 2018); however, in 2017, NMFS surveys observed anomalously low pup counts in these areas (Sweeney, Towell and Gelatt 2018), which may be related to low availability of prey associated with warm ocean temperatures in the Gulf of Alaska during 2014-2016. The 2020 Pacific cod stock assessment indicated a continued low biomass level, and NMFS closed the Gulf of Alaska Pacific cod directed fishery for the 2020 season (pursuant to 50 CFR § 679.20(d)(4)).

*Distribution*

Steller sea lions range along the North Pacific rim from northern Japan to California, with centers of abundance in the Gulf of Alaska and Aleutian Islands (Figure 18) (Loughlin, Rugh and Fiscus 1984). Although Steller sea lions seasonally inhabit coastal waters of Japan in the winter, breeding rookeries outside of the U.S. are located only in Russia (Burkanov and Loughlin 2005). Steller sea lions are not known to migrate annually, but round trip migrations of greater than 6,500 km by individual Steller sea lions have been documented and individuals may widely disperse outside of the breeding season (late-May to early-July) (Jemison et al. 2013, Muto et al. 2020). Additionally, sea lions may make semi-permanent or permanent one-way movements from one site to another (Chumbley et al. 1997, Burkanov and Loughlin 2005). Animals from the Eastern DPS occur primarily east of Cape Suckling, Alaska (144° W) and animals from the endangered western DPS occur primarily west of Cape Suckling.

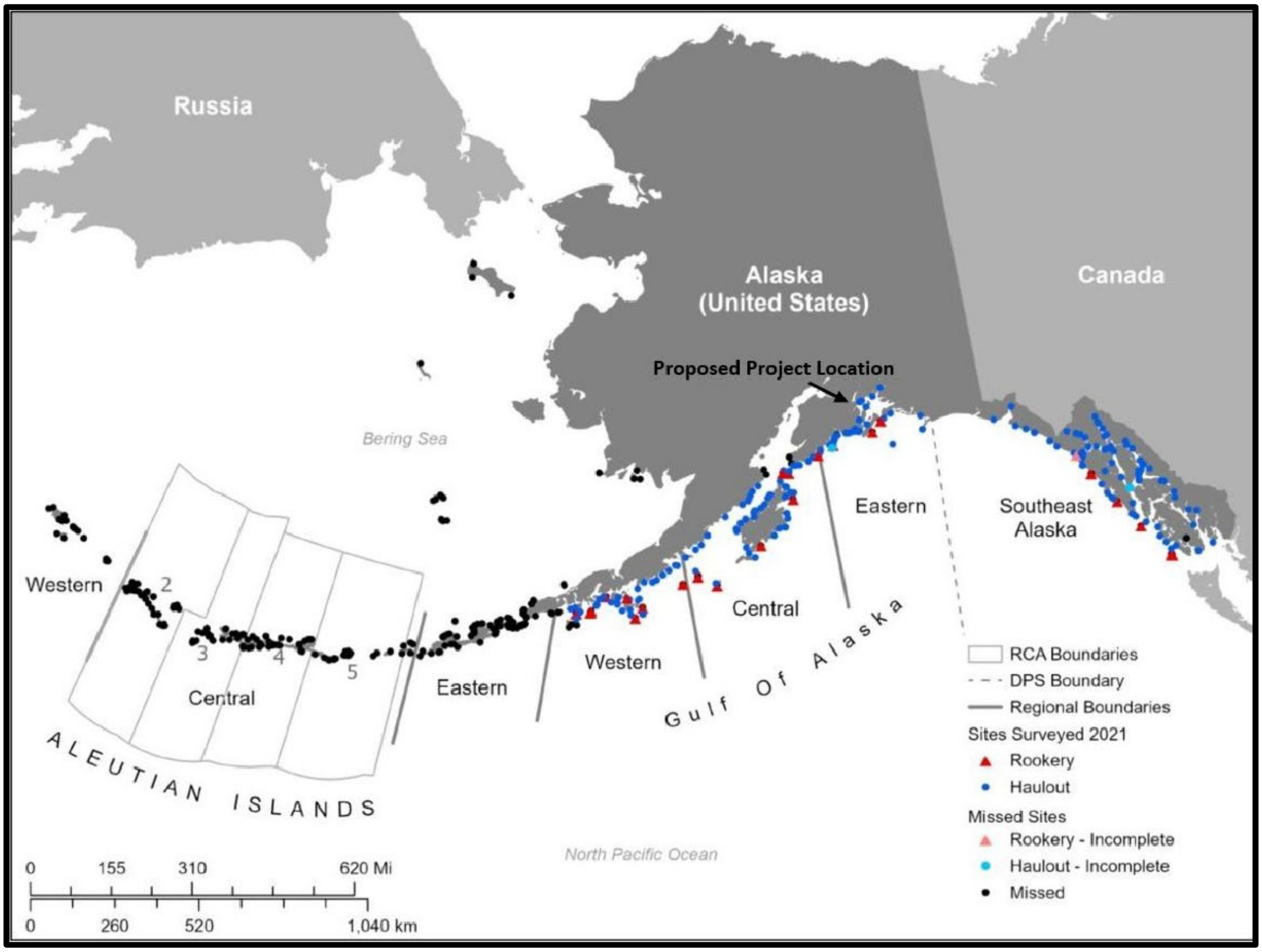


**Figure 18. Generalized distribution (crosshatched area) of Steller sea lions in the North Pacific and major U.S. haulouts and rookeries (50 CFR § 226.202, 27 August 1993), as well as active Asian and Canadian (British Columbia) haulouts and rookeries (points: (Burkanov and Loughlin 2005), S. Majewski, Fisheries and Oceans Canada, pers. comm.). Black dashed line (144°W) indicates stock boundary (Loughlin 1997) and solid black line delineates U.S. Exclusive Economic Zone.**

Land sites used by Steller sea lions are referred to as rookeries and haulouts. Most adult Steller sea lions occupy rookeries during the pupping and breeding season, which extends from late May to early July (Pitcher 1981, Gisiner 1985), and adult females especially exhibit high site fidelity (Hastings 2017). Haulouts are used by all age classes of both genders but are generally not where sea lions reproduce. During the breeding season some juveniles and non-breeding adults occur at or near the rookeries, but most are on haulouts (Rice 1998, Ban 2005, Call and Loughlin 2005).

Large numbers of Steller sea lions disperse widely outside of the breeding season, probably to access seasonally important prey resources. A variety of studies, including assessment of mitochondrial DNA, indicate that there is an exchange of sea lions across the stock boundary (Raum-Suryan et al. 2002, Baker et al. 2005, Fritz and Brown 2005, Pitcher et al. 2007, Fritz et al. 2013, Jemison et al. 2013). Despite the tendency to return to natal rookeries, movement of individuals, including breeding females, from Prince William Sound to southeast Alaska began in the 1990s and two new, mixed-stock rookeries, White Sisters and Graves, were established east of 144° W (Gelatt et al. 2007, Jemison et al. 2013, O'Corry-Crowe et al. 2014). Some WDPS females have likely emigrated permanently and given birth at White Sisters and Graves rookeries.

*Occurrence in the Action Area*

Zone 1 - Kodiak

WDPS Steller sea lions frequent the marine waters in the vicinity of Kodiak Island. Sea lions have become accustomed to human activity, use the area for feeding, and utilize artificial floats as haulouts. The species has been observed in the vicinity of the action area in Womens Bay at all times of the year feeding and overwintering.

Zone 2 – Kenai Peninsula

Steller sea lions have been observed frequently along the eastern shoreline of Resurrection Bay, transiting between the small boat harbor and Lowell Point, within the small boat harbor, and around fish cleaning stations[13]. Communication with the Alaska SeaLife Center[14] also indicated that WDPS of Steller sea lions are commonly sighted year-round throughout the bay and that there may be some overlap between Western and Eastern DPS Steller sea lions at this location.

Zone 3 – Prince William Sound

Local information from the Solomon Gulch Hatchery (across the port from Moorings Valdez) and from NMFS representatives indicates that Steller sea lions may be drawn into Port Valdez in the summer through the fall, following the spawning salmon back to the hatchery. The hatchery is located within the action area for both power-washing and vibratory extraction/installation of steel piles at this site. Steller sea lions attracted to the concentrated food supply during spawning periods could be exposed to sound from the proposed activities. Additionally, monitoring following an oil spill drill in Port Valdez reported 84 Steller sea lion sightings over twenty days in April and May 2020 for an occurrence of 4.2 Steller sea lions/day.

Density data is not available for Steller sea lions in Cordova. However, Steller sea lions are present in the Cordova area year-round and are most frequently observed in the fall and winter. Sea lions were frequently seen hauled out on navigational buoys or foraging near Humpback

[13] https://www.nps.gov/kefj/learn/nature/marine_mammals.htm

[14] Gulf Watch Alaska. Long-term monitoring. Pelagic. Accessed through: https://www.alaskasealife.org/gw_Pelagic

Creek, particularly in fall and winter months (URS Group Inc. 2006).

Zone 4 – Southeast

The majority of Steller sea lions that may be observed in southeast Alaska are expected to be predominantly from the Eastern DPS that was delisted in 2013 (78 FR 66140). However, WDPS individuals may be found in the area as well. Using mark-recapture models, 18 years of resighting data from over 3500 branded Steller sea lions in the western and eastern regions, and mitochondrial DNA haplotypes from western and eastern populations, Hastings et al. (2020) estimated the minimum proportions of Steller sea lions with western genetic material in 5 regions of southeast Alaska. Based on Hastings et al. (2020), we estimate that the WDPS will account for 1.4% of Steller sea lions in Lynn Canal (Station Juneau) and 2.2% of Steller sea lions on the central outer coast (Moorings Sitka).

Although there are no known Steller sea lion haulouts or rookeries in the action area for Station Juneau, the Benjamin Island haulout (30 kilometers northwest of the action area) and Little Island (28 kilometers northwest of the action area) in the Lynn Canal are likely the predominant haulouts used by the Steller sea lions that are found transiting into and out of the area. The abundance and behavioral patterns of Steller sea lions in Petersburg is unknown, though they are expected to be present near the action area for Moorings Petersburg. Steller sea lions occur year-round in Sitka. From September to May between 1994 and 2000, weekly land-based surveys of marine mammals occurred from Sitka's Whale Park, located at the entrance to Silver Bay (these land based surveys were not performed in June, July, and August). From 2000 to 2016, marine mammal data was collected from small vessels or Allen Marine's 100 foot tour catamarans throughout the year. Steller sea lion numbers were highest near the project area, in Silver Bay and Eastern Channel of Sitka Sound, in January and February. The sea lions observed in this area were likely attracted by overwintering herring (Womble, Sigler and Willson 2009). Sea lions were often seen in groups of 4 or more; however, a group of more than 100 was sighted on at least 1 occasion (Straley 2017).

*Threats to the Species*

Natural Threats

Killer whale predation, particularly on the WDPS under reduced population size, may cause significant reductions in the stock (NMFS 2008a). Sleeper sharks are also significant predators of Steller sea lions. Frid et al. (2009) suggested that risk of predation in nearshore waters by killer whales and offshore predation risk by sleeper sharks limited the use of Pacific herring in deep water and walleye Pollock in shallow water.

Steller sea lions have tested positive for several pathogens, but disease levels are unknown. Similarly, parasites in this species are common, but mortality resulting from infestation is unknown. However, significant negative effects of these factors may occur in combination with stress, which reduces immune capability to resist infections and infestations. If other factors, such as disturbance, injury, or difficulty feeding occur, it is more likely that disease and parasitism can play a greater role in population reduction.

Anthropogenic Threats

Steller sea lions were historically and recently subjected to substantial mortality by humans, primarily due to commercial exploitation and both sanctioned and unsanctioned predator control (Scheffer 1950, Atkinson et al. 2008, NMFS 2008a). Several dozen individuals may become entangled and drown in commercial fishing gear annually (Atkinson et al. 2008, NMFS 2008a). Removal of several hundred individuals occurs by subsistence hunting each year in controlled and authorized harvests. Occasional harvest also occurs in Canada(Fisheries and Oceans Canada 2010). Additional mortality (362 individuals from 1990 to 2003) has occurred from shooting of sea lions interfering in aquaculture operations along British Columbia[15](Fisheries and Oceans Canada 2010).

Significant concern also exists regarding competition between commercial fisheries and Steller sea lions for the same resource: stocks of pollock, Pacific cod, and Atka mackerel. Significant evidence exists that supports the WDPS declining as a result of change in diet and resulting declines in growth, birth rates, and survival (Calkins and Goodwin 1988a, Calkins, Becker and Pitcher 1998, Pitcher, Calkins and Pendleton 1998, Trites and Donnelly 2003, Atkinson et al. 2008). As a result, limitations on fishing grounds, duration of fishing season, and monitoring have been established to prevent Steller sea lion nutritional deficiencies as a result of inadequate prey availability.

Contaminants are a considerable issue for Steller sea lions. Roughly 30 individuals died as a result of the Exxon Valdez oil spill and contained particularly high levels of PAH contaminants, presumably as a result of the spill. Blood testing confirmed hydrocarbon exposure. Subsequently, premature birth rates increased and pup survival decreased (Calkins et al. 1994, Loughlin, Ballachey and Wright 1996). Organochlorines, including PCBs and DDT (and their metabolites), were identified in Steller sea lions in greater concentrations than any other pinniped during the 1980s, although levels appear to be declining (Barron, Heintz and Krahn 2003, Hoshino et al. 2006). The levels of PCBs have been found to have twice the burden in individuals from Russia than from western Alaska (4.3 ng/g wet weight versus 2.1 ng/g wet weight; (Myers et al. 2008). Levels of DDT in Russian pups were also on average twice that in western Alaska pups (3.3 ng/g wet weight blood versus 1.6 ng/g wet weight). PCB levels in the kidneys of some adult males are high enough that reproductive and immune function may have been compromised (Wang et al. 2011). The source of contamination is likely from pollock, which have been found to contain organochlorines throughout the Gulf of Alaska, but higher in regions occupied by the Eastern DPS of Steller sea lions (NMFS 2008a).

Heavy metals, including mercury, zinc, copper, metallothionien, and butyltin have been identified in Steller sea lion tissues, but are in concentrations lower than other pinnipeds (Noda et al. 1995, Kim et al. 1996, Beckmen et al. 2002, NMFS 2008a). Mercury may be of higher

[15] https://www.justice.gov/usao-ak/pr/two-alaska-men-sentenced-harassing-killing-steller-sea-lions-and-obstructing

significance, with liver levels being measured above those necessary to impact fish (Holmes et al. 2008). However, contaminants leading to mortality in Steller sea lions have not been identified (NMFS 2008a). Contaminant burdens are lower in females than males, because contaminants are transferred to the fetus in utero as well as through lactation (Lee et al. 1996, Myers et al. 2008). However, this means that new generations tend to start with higher levels of contaminants than their parents originally had. Contaminants in Steller sea lion are of additional concern because contaminants in the body tend to be mobilized as fat reserves are used, such as when prey availability is low, a situation that is likely occurring for Steller sea lions today.

*Reproduction and Growth*

Female Steller sea lions reach sexual maturity and first breed between three and eight years of age and the average age of reproducing females (generation time) is about 10 years (Pitcher and Calkins 1981, Calkins and Pitcher 1982, York 1994). They give birth to a single pup from May through July (though twinning has been reported (Maniscalco and Parker 2009)), and then breed about 11 days after giving birth. Females normally ovulate and breed annually after maturity although there is a high rate of reproductive failures. The gestation period is believed to be about 50 to 51 weeks (Pitcher and Calkins 1981). The available literature indicates an overall reproductive (birth) rate on the order of 55 percent to 70 percent or greater (Gentry 1970, Pitcher and Calkins 1981). However, natality was reported to be low in the WDPS in recent years (2003-2009; 69%) versus earlier years (43%); (Maniscalco, Springer and Parker 2010). Survival through the first three weeks can be less than 50 percent at some sites, while others can be over 90 percent (Kaplan, White and Noon 2008).

Mothers with newborn pups will make their first foraging trip about a week after giving birth, but trips are short in duration and distance at first, then increase as the pup gets older (Merrick and Loughlin 1997, Milette 1998, Pitcher et al. 2001, Milette and Trites 2003, Maniscalco, Parker and Atkinson 2006). Females attending pups tend to stay within 37 km of the rookery (Calkins 1996, Merrick and Loughlin 1997). Newborn pups are wholly dependent upon their mother for milk during at least their first three months of life, and observations suggest they continue to be highly dependent upon their mother through their first winter (Porter 1997, Trites et al. 2006),). Generally, female Steller sea lion will nurse their offspring until they are one to two years old (Gentry 1970, Sandegren 1970, Pitcher and Calkins 1981, Calkins and Pitcher 1982, Trites et al. 2006). Pups may enter the water after 2 to 4 weeks (Sandegren 1970).

Males reach sexual maturity at about the same time as females, but generally do not reach physical maturity and participate in breeding until about eight to ten years of age (Pitcher and Calkins 1981). The sex ratio of pups at birth is assumed to be about 1:1 or biased toward slightly greater production of males, but non-pups are biased towards females (Calkins and Pitcher 1982, NMFS 1992, Trites and Larkin 1992, York 1994).

*Feeding, Prey Selection, Diving, and Social Behavior*

The foraging strategy of Steller sea lions is strongly influenced by seasonality of reproductive activities on rookeries, and the seasonal presence of many prey species. Steller sea lions are generalist predators that eat a variety of fishes and cephalopods (Pitcher and Calkins 1981, Calkins and Goodwin 1988b, NMFS 2008b) and occasionally other marine mammals and birds (Pitcher and Fay 1982, NMFS 2008b). During summer Steller sea lions feed mostly over the continental shelf and shelf edge. Females attending pups forage within 20 nm of breeding rookeries (Merrick and Loughlin 1997), which is the basis for designated critical habitat around rookeries and major haulout sites.

Steller sea lions tend to make shallow dives of less than 250 m (820 ft) but are capable of deeper dives (NMFS 2008b). Female foraging trips during winter tend to be longer in duration and farther from shore (130 km), during which foraging dives are deeper (frequently greater than 250 m). Summer foraging dives, on the other hand, tend to be closer to shore (about 16 km) and shallower (100 to 250 m) (Merrick and Loughlin 1997). Adult females stay with their pups for a few days after birth before beginning a regular routine of alternating foraging trips at sea with nursing their pups on land. Female Steller sea lions use smell and distinct vocalizations to recognize and create strong social bonds with their newborn pups so they can find them upon returning from foraging.

Because of their polygynous breeding behavior, in which individual, adult male sea lions will breed with a large number of adult females, Steller sea lions have clearly defined social interactions. Steller sea lions are gregarious animals that often travel in large groups of up to 45 individuals (Keple 2002), and rafts of several hundred Steller sea lions are often seen adjacent to haulouts. Individual rookeries and haulouts may be comprised of hundreds of animals. At sea, groups usually consist of females and sub adult males as adult males are usually solitary (Loughlin 2002).

*Vocalization, Hearing, and Other Sensory Capabilities*

The ability to detect sound and communicate underwater is important for a variety of Steller sea lion life functions, including reproduction and predator avoidance. NMFS categorizes Steller sea lions in the otariid pinniped functional hearing group, with an applied frequency range between 60 Hz and 39 kHz in water (NMFS 2018b). Studies of Steller sea lion auditory sensitivities have found that this species detects sounds underwater between 1 and 25 kHz (Kastelein et al. 2005), and in air between 250 Hz and 30 kHz (Mulsow and Reichmuth 2010). Sound signals from vessels are typically within the hearing range of Steller sea lions, whether the animals are in the water or hauled out.

### 4.3.4 Sunflower Sea Star

*Population Structure and Status*

On August 18, 2021, the Center for Biological Diversity petitioned NMFS to list the sunflower sea star (*Pycnopodia helianthoides*) under the ESA. NMFS determined that the proposed action may be warranted (86 FR 73230, December 27, 2021) and began a full status review to evaluate overall extinction risk for the species. NMFS issued a proposed rule to list the species as threatened on March 16, 2023, (88 FR 16212). NMFS has not proposed to designate critical habitat at this time.

*Distribution*

The sunflower sea star is a large (up to 1 m in diameter), fast-moving (up to 160 cm/minute), many-armed (up to 24) echinoderm native to the west coast of North America (Lowry et al. 2022). It occupies waters from the intertidal zone to at least 435 m deep, but is most common at depths less than 25 m and rare in waters deeper than 120 m (Lambert 2000, Hemery et al. 2016, Gravem et al. 2021). Sunflower sea stars occur over a broad array of soft-, mixed-, and hard-bottom habitats from the Aleutian Islands to Baja California, Mexico, but are most abundant in waters off eastern Alaska and British Columbia (Gravem et al. 2021).

*Occurrence in the Action Area*

Currently we assume that the sunflower sea star occupies inter-and sub-tidal habitats throughout southeast Alaska, the Gulf of Alaska, marine waters in lower Cook Inlet (south of the mouth of Kachemak Bay), and around Kodiak Island. Although surveys and data are very sparse, we assume that they could be in coastal areas surrounding the Aleutian Islands; they have been found in test fisheries in nearshore Bering Sea waters. All eight USCG facilities fall within the range of the sunflower sea star and the species may be found in any of the action areas.

Data from recent counts of sunflower sea stars from western Prince William Sound area (Zone 3 for the current project) showed a big increase in 2022 (Coletti et al. 2023). The density of sunflower sea stars in western Prince William Sound in 2022 are similar to what was observed prior to the recent SSWS pandemic (S. Traiger, pers. comm.).

*Threats to the Species*

Prior to 2013, the global abundance of sunflower sea star was estimated at several billion animals, but from 2013–2017 sea star wasting syndrome (SSWS) reached pandemic levels, killing an estimated 90 percent or more of the population (Lowry et al. 2022). Declines in the northern portion of its range were less pronounced than in the southern portion, but still exceeded 60 percent. Species-level impacts from SSWS, both during the pandemic and on an ongoing basis, have been identified as the major threat affecting the long-term persistence of the sunflower sea star (Lowry et al. 2022).

*Reproduction and Growth*

The species has separate sexes and is a broadcast spawner with a planktonic larval stage (Lundquist and Botsford 2011). Females can release a million eggs or more (Strathmann 1987, Chia and Walker 1991, Byrne 2013). Reproduction also occurs via larval cloning, enhancing potential reproductive output beyond female fecundity (Bosch, Rivkin and Alexander 1989, Balser 2004). Sea stars also have the ability to regenerate lost rays/arms and parts of the central disc (Chia and Walker 1991). Rays may detach when a sea star is injured or as a defense reaction when attacked by a predator. The longevity of *P. helianthoides* in the wild is unknown, as is the age at first reproduction and the period over which a mature individual is capable of reproducing (Lowry et al. 2022).

*Feeding and Prey Selection*

The sunflower sea star hunts a range of bivalves, gastropods, crustaceans, and other invertebrates using chemosensory stimuli and will dig for preferred prey in soft sediment (Mauzey, Birkeland and Dayton 1968, Paul and Feder 1975, Herrlinger 1983). It preys on sea urchins and plays an important role in controlling sea urchin numbers in kelp forests (Lowry et al. 2022). While generally solitary, they are also known to seasonally aggregate, perhaps for spawning purposes.

# 5. ENVIRONMENTAL BASELINE

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action areas that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR § 402.02).

Due to the complexity of having eight action areas considered in this Opinion, the Environmental Baseline subsections may provide a broad overview encompassing all sites or may include site-specific information as available. Recent projects requiring ESA sec 7 consultations that have taken place in the same area as the currently considered sites are as follows (note, no recent formal consultations have taken place in Zones 1 and 2 in the last five years):

<u>Zone 3</u>

- Cordova Harbor Rebuild Project (pile extraction and driving); AKRO-2023-01396

<u>Zone 4</u>

- Auke Bay, Erickson Residence Marine Access Project (demolition and pile driving); AKRO-2019-01827
- Auke Bay Ferry Terminal modification and improvement (pile extraction and driving); AKRO-2019-02254
- Statter Harbor Improvements Project, Juneau, AK (demolition, dredging, excavation, and wall construction); AKRO-2018-9770

- O'Connell Bridge Lightering Float Pile Project, Sitka, AK (pile extraction and driving); AKRO-2018-00245
- Halibut Point Dock Project, Sitka, AK (pile extraction and driving); AKRO-2019-02310
- Tongass Narrows Gravina Island Access Project (pile extraction and driving, excavation); AKRO-2019-03432
- City of Ketchikan Rock Pinnacle Removal Project (blasting and dredging); AKRO-2019-00553
- City of Ketchikan Berth III Project (pile extraction and driving); AKRO-2020-02183
- Ketchikan Port Facility Recapitalization Project (demolition and pile driving); AKRO-2021-02754

## 5.1 Climate Change

Since the 1950s the atmosphere and oceans have warmed, snow and sea ice have diminished, sea levels have risen, and concentrations of greenhouse gases have increased (IPCC 2014). There is little doubt that human influence has been the dominant cause of the observed warming since the mid-20th century (IPCC 2014). The impacts of climate change are especially pronounced at high latitudes and in polar regions. Average temperatures have increased across Alaska at more than twice the rate of the rest of the United States.

In the past 60 years, average air temperatures across Alaska have increased by approximately 3°F, and winter temperatures have increased by 6°F (Chapin et al. 2014). Some of the most pronounced effects of climate change in Alaska include disappearing sea ice, shrinking glaciers, thawing permafrost, and changing ocean temperatures and chemistry (Chapin et al. 2014). Climate change is projected to have substantial direct and indirect effects on individuals, populations, species, and the structure and function of marine, coastal, and terrestrial ecosystems in the foreseeable future (Houghton 2001, McCarthy et al. 2001). The impacts of these changes and their interactions on listed species in Alaska are hard to predict.

Indirect threats associated with climate change include increased human activity as a result of regional warming. Less ice could mean increased vessel activity or construction activities with an associated increase in sound, pollution, and risk of ship strike. Human fishing pressure could change the abundance, seasonality, or composition of prey species. Fisheries in Alaska are managed with the goal of sustainability; however, not all fish stocks are assessed, and it is unknown whether management of fisheries for optimal returns provides sufficient densities in feeding areas for efficient foraging by ESA-listed marine mammal species.

An Unusual Mortality Event (UME) of large cetaceans occurred in Alaskan waters in 2015-2016. Reports of dead whales included 22 dead humpback, 12 fin, 2 gray, 1 sperm, and 6 unidentified whales. The fin whales were observed stranded within a 27-day period around Kodiak Island.

This was concurrent with an unusually large number of dead whales found in British Columbia. The strandings were concurrent with the arrival of the Pacific marine heatwave, one of the strongest El Nino weather patterns on record, decreasing ice extent in the Bering Sea, and one of the warmest years on record in Alaska in terms of air temperature.

Recent studies and observations have shown changes in distribution (Brower, Clarke and Ferguson 2018), body condition (Neilson and Gabriele 2020), and migratory patterns of humpback whales, likely in response to climate change. The indirect effects of climate change on Mexico DPS humpback whales and fin whales over time would likely include changes in the distribution of ocean temperatures suitable for many stages of their life history, the distribution and abundance of prey, and the distribution and abundance of competitors or predators.

The Pacific marine heatwave is also likely responsible for poor growth and survival of Pacific cod, an important prey species for Steller sea lions. The 2018 Pacific cod stock assessment estimated that the female spawning biomass of Pacific cod was at its lowest point in the 41-year time series considered. This assessment was conducted following three years of poor recruitment and increased natural mortality during the Gulf of Alaska marine heat wave from 2014 to 2016 (NMFS 2018a).

The Steller Sea Lion Recovery Plan ranks environmental variability as a potentially high threat to recovery of the Western DPS (NMFS 2008a). The Bering Sea and Gulf of Alaska are subjected to large-scale forcing mechanisms that can lead to basin-wide shifts in the marine ecosystem resulting in significant changes to physical and biological characteristics, including sea surface temperature, salinity, and sea ice extent and amount.

Physical forcing affects food availability and can change the structure of trophic relationships by impacting climate conditions that influence reproduction, survival, distribution, and predator-prey relationships at all trophic levels. Warmer waters could favor productivity of some species of forage fish, but the impact on recruitment of important prey fish of Steller sea lions is unpredictable. Recruitment of large year-classes of gadids (e.g., pollock) and herring has occurred more often in warm than cool years, but the distribution and recruitment of other fish (e.g., osmerids) could be negatively affected (NMFS 2008). Populations of Steller sea lions in the Gulf of Alaska and Bering Sea have experienced large fluctuations due to environmental and anthropogenic forcing (Mueter et al. 2009).

### 5.2 Sound

ESA-listed species in the different action areas are exposed to several sources of ambient (natural) and anthropogenic (human-caused) sound. The combination of anthropogenic and ambient sounds contributes to the total sound at any one place and time. Ambient sources of underwater sound include sea ice, wind, waves, precipitation, and biological sounds from marine mammals, fishes, and crustaceans. Other anthropogenic sources of underwater sound of concern to listed species in Alaska include in-water construction activities such as drilling, dredging, and pile driving; oil, gas, and mineral exploration and extraction; Navy sonar and other military activities; geophysical seismic surveys; and ocean research activities. Levels of anthropogenic sound can vary dramatically depending on the season, type of activity, and local conditions. Sound impacts to listed marine mammal species from many of these activities are mitigated through ESA Section 7 consultations state-wide.

Sound is of particular concern to marine mammals because many species use sound as a primary sense for navigating, finding prey, avoiding predators, and communicating with other individuals. As described in greater detail later in this opinion, sound may cause marine mammals to leave a habitat, impair their ability to communicate, or cause stress. Sound can cause behavioral disturbances, mask other sounds including their own vocalizations, may result in injury, and, in some cases, may result in behaviors that ultimately lead to death. The severity of these impacts can vary greatly between minor impacts that have no real cost to the animal, to more severe impacts that may have lasting consequences.

Because responses to anthropogenic sound vary among species and individuals within species, it is difficult to determine long-term effects. Habitat abandonment due to anthropogenic sound exposure has been found in terrestrial species (Francis and Barber 2013). The presence and movements of ships in the vicinity of seals can affect their normal behavior (Jansen et al. 2010) and may cause them to abandon their preferred breeding habitats in areas with high traffic (Allen 1984, Henry and Hammill 2001, Edrén et al. 2010). Clark et al. (2009) identified increasing levels of anthropogenic sound as a habitat concern for whales because of its potential effect on their ability to communicate (i.e., masking). Some research (Parks 2003, McDonald et al. 2006, Parks 2009) suggests marine mammals compensate for masking by changing the frequency, source level, redundancy, and timing of their calls. However, the long-term implications of these adjustments, if any, are currently unknown.

The action area at each USCG facility has its own unique suite of ambient and anthropogenic sound based on local fauna and human activity. While some site-specific information is available, common sources of anthropogenic sound that may occur at some or all locations include: marine vessels, shoreline and in-water construction, aircraft, and trains and other land-based vehicles.

In the Port of Kodiak, ambient underwater sound levels of 125 dB re 1mPa or greater have been measured during normal port construction activities (PND 2015). Base Kodiak is located ~12.5 km from the Port of Kodiak and could be expected to have similar underwater sound levels during construction. Background underwater sound levels in Tongass Narrows, which is in the action area for Base Ketchikan can range from 120 to 130 dB re 1 mPa, with levels peaking during the summer (HDR 2018). The background underwater sound levels at or near the other USCG facilities is unknown. Based on this site-specific information available, USCG has estimated that the background sound levels at all eight sites are likely to range between 120 to 130 dB re 1 mPa.

### 5.3 Fisheries Interactions

Commercial, recreational, and subsistence fishing occurs in and around all of the action areas considered in this Opinion. Commercial fisheries pose a threat to recovering marine mammal stocks in the Gulf of Alaska and the waters of southeast Alaska. Entanglement may result in minor injury or may potentially significantly affect individual health, reproduction, or survival. Additionally, reductions in seasonal availability and distribution of fish can cause cumulative effects on many species that depend on reliable sources of prey for survival.

Bettridge et al. (2015b) report that fishing gear entanglements may moderately reduce the population size or the growth rate of ESA-listed whales. Humpback whales have been killed and injured during interactions with commercial fishing gear; however, the frequency of these interactions does not appear to have a significant adverse consequence for humpback whale populations. Most entanglements occur between early June and early September, when humpbacks are foraging in nearshore Alaska waters. A photographic study of humpback whales in southeastern Alaska found at least 53 percent of individuals showed some kind of scarring from fishing gear entanglement (Neilson et al. 2005).

Fishing gear involved in humpback entanglements between 1990 and 2016 included gillnet gear (37 percent), pot gear (29 percent), and longline gear (1-2 percent). The minimum mean annual mortality and serious injury rate due to interactions with all fisheries between 2014 and 2018 is 19 humpbacks for the Central North Pacific stock and 1.7 whales for the Western North Pacific stock (Muto et al. 2021). Between 2016 and 2020, entanglement of humpback whales (n = 47) was the most frequent human-caused source of mortality and injury of large whales (Freed et al. 2022). In 2019, a fin whale was caught in and killed in a pollock trawl net in the Bering Sea (Freed et al. 2022).

Among Steller sea lions, the minimum estimated mean annual mortality and serious injury rate in U.S. commercial fisheries between 2014 and 2018 was 38 individuals (Muto et al. 2021). This is likely an underestimate as it is an actual count of verified human-caused deaths and serious injuries, and not all entangled animals strand nor are all stranded animals found, reported, or have the cause of death determined. Between 2016 and 2020, entanglement in fishing gear accounted for mortality and injury of 148 Western DPS Steller sea lions, with commercial trawl gear being the most common cause of entanglement (n=113; Freed et al. 2022).

Commercial fisheries may additionally indirectly affect whales and sea lions by reducing the amount of available prey or affecting prey species composition. In Alaska, commercial fisheries target known marine mammal prey species, such as pollock and cod, and bottom-trawl fisheries may disturb habitat for bottom-dwelling prey species of marine mammals. The Mexico DPS humpback whales and fin whales considered in this biological opinion also feed on a variety of other species, some of which are not commercially or recreationally viable fisheries. As it is unknown how much of the humpback and fin whale diets consists of species exploited by commercial fisheries between Kodiak and Ketchikan, we cannot assess the degree to which competition for prey with fisheries affects these large whale species. However, we have no indication that this is a serious concern. Whether fisheries reduce Steller sea lion prey biomass and quality at local and/or regional spatial scales, leading to a reduction in Steller sea lion survival and reproduction, has been a matter of considerable debate among the scientific community (NMFS 2008b).

Due to their highly migratory nature, most species considered in this Opinion have the potential to interact with fisheries both within and outside of the action areas. Assessing the impact of fisheries on such species is difficult due to the large number of fisheries that may interact with the animals and the inherent complexity of evaluating ecosystem-scale effects.

### 5.4 Pollutants and Contaminants

A number of contaminant discharges pollute the marine waters of Alaska annually. Marine water quality in any of the action areas can be affected by discharges from shipyard and other industrial activities, treated sewer system outflows, seafood processing plants, vessels operating in marine waters, and sediment runoff from paved surfaces and developed areas (HDR 2017). Intentional sources of pollution, including domestic, municipal, and industrial wastewater discharges, are managed and permitted by the Alaska Department of Environmental Conservation (ADEC). Using ADEC's databases for contaminated sites and impaired waterbodies, we identified possible sources of pollution and contaminants for the marine waters, or impaired waters, close to the action area at each USCG facility. We only included sites that were close to the shoreline and had evidence of contaminants spreading into local water bodies. The sites described below are still being addressed by ADEC. In addition to activities managed by ADEC, pollution may also occur from accidental discharges and spills.

Zone 1 – Kodiak

The USCG facility on Kodiak has two active contaminated sites that could affect Womens Bay. According to ADEC, the following sites border or are located slightly upland from the bay: several upland underground storage tanks that have not received appropriate remediation (Hazard ID: 1049) and an old power plant emitting petroleum hydrocarbons that are migrating into the bay through the storm sewer system (Hazard ID: 1048).

Zone 2 – Kenai Peninsula

ADEC's database of contaminated sites has one active location near the Seward boat harbor that could affect the action area: Icicle Seafoods on the north side of the harbor experienced a used oil/diesel mix spill in 2019 (Hazard ID: 27085).

Zone 3 – Prince William Sound

Port Valdez has several active contaminated sites onshore including: The Crowley Valdez North Dock underground storage tank released 150 gal of diesel fuel, some of which reached the Small Boat Harbor on the border of the action area (Hazard ID: 27144); the Petro Star Valdez Refinery had a tanker truck explode, leading to a combination of diesel fuel and aqueous film forming foam potentially entering the outer edges of the southeastern action area (Hazard ID: 27196); and several Alyeska crude tank spills located on the south side of the action area that have unknown ground water impacts that may affect the marine environment (Hazard IDs: 1434, 1722, 25918).

The only active contaminated site in Cordova is not close to the action area.

Zone 4 – Southeast

There are several active contaminated sites in the action area for Station Juneau: petroleum contamination into an unnamed stream from the Cordova Heights Apartments on Douglas Island (Hazard ID: 26062); petroleum contamination in Bear Creek from a partially buried fuel tank at Bear Creek Apartments on Douglas Island (Hazard ID: 4294); and arsenic contamination at the Treadwell Mines site on Douglas Island (Hazard ID: 25594).

The NPS Indian River Asphalt Plant in Sitka has led to contamination of the shoreline on the Indian River with tar-like substance, exceeding groundwater levels of numerous contaminants (Hazard ID: 26891). There are several impaired water bodies in the area, but they are outside the action area and are not expected to impact contaminants at Moorings Sitka.

The Petersburg AFS Tank Farm near the Petersburg harbor has concentrations of numerous contaminants in soil and groundwater at the sites that are above acceptable cleanup levels (Hazard ID: 1988).

Base Ketchikan has local petroleum hydrocarbon contamination due to overfilling of an aboveground storage tank (Hazard ID: 1184).

## 5.5 Vessel Interactions

Ferries, cruise ships, tankers, ore carriers, commercial fishing vessels, recreational vessels, and barges and tugs transit or operate within Alaska state and U.S. exclusive economic zone (EEZ) waters. Much of the vessel traffic in Alaskan waters is concentrated in coastal areas of southeastern and southcentral Alaska during the summer months, where recreational vessels, charter vessels, commercial whale watch vessels, tour boats, and cruise ships are prevalent. Traffic from large vessels is more likely to occur year-round statewide, in both near shore and offshore waters, and includes commercial fishing vessels, freighters/tankers, passenger ferries, etc. In general, there is less vessel traffic off western and northern Alaska compared to other parts of the state, although considerable traffic passes through the Aleutian Islands via the Great Circle Route. These trends are changing with climate change-driven decreases in sea ice in the Bering, Chukchi, and Beaufort seas (Neilson et al. 2012).

Statewide, marine vessels are a known source of injury and mortality to marine mammals in Alaska, including some of the species considered in this Opinion (Laist et al. 2001, Neilson et al. 2012). In addition to the potential for entanglement discussed in section 5.4 above, vessel traffic may affect listed species through collisions (strikes) and increased ocean sound. Vessel traffic also has the potential to impact species via pollution from discharges and spills, and behavioral disruption (e.g., interference with foraging or migration, disturbance while resting or hauled-out). Information on large vessel transits at each USCG facility are described below.

Vessel sound and presence can impact whales by causing behavioral disturbances, auditory interference, or non-auditory physical and physiological effects (e.g., vessel strike). From 1978-2011, there were at least 108 recorded whale-vessel collisions in Alaska, with the majority occurring in Southeast Alaska between May and September (Neilson et al. 2012). Small recreational vessels traveling at speeds over 13 knots were most commonly involved in ship strike encounters; however, all types and sizes of vessels were reported (Neilson et al. 2012). The majority of vessel strikes involved humpback whales (86 percent) and the number of humpback strikes increased annually by 5.8 percent from 1978 to 2011. Seventeen humpback whales were reported struck by vessels between 2013 and 2015 (Delean et al. 2020) and 18 humpbacks were reported struck by vessels between 2016 and 2020 (Freed et al. 2022). There have been nine reported ship strikes in Prince William Sound between 2000 and 2021(NMFS Alaska Regional Office Stranding Database accessed February 2023). NMFS implemented regulations to minimize harmful interactions between ships and humpback whales in Alaska (see 50 CFR §§ 216.18, 223.214, and 224.103(b)).

Steller sea lions may be more susceptible to ship strike mortality or injury in harbors or in areas where animals are concentrated, e.g., near rookeries or haulouts (NMFS 2008a). There are four records of stranded Steller sea lions with injuries indicative of vessel strike in Alaska, three occurred in Sitka and one in Kachemak Bay (NMFS Alaska Regional Office Stranding Database accessed February 2023). The risk of vessel strike, however, has not been identified as a significant concern for Steller sea lions.

Zone 1 – Kodiak

There is substantial vessel activity around parts of Kodiak Island, with vessel traffic density data from 2008 to 2015 indicating that Womens Bay records ~400 large vessel transits on average annually (AOOS 2020). The action area for Base Kodiak in Womens Bay contains vessels associated with the USCG, commercial container operations, and recreational fisheries(Shannon and Wilson 2021).

Neilson et al. (2012) reported vessel strikes of humpback (1+), fin (1), and Cuvier's beaked (2) whales off the northeast side of Kodiak near Womens Bay between 1978 and 2011. There have also been two additional vessel strikes of humpback whales in the same area between 2012 and 2020 (NMFS Alaska Regional Office Stranding Database accessed February 2023).

Zone 2 – Kenai Peninsula

Seward receives moderate vessel traffic year-round, with a peak from April to October. Vessel types include cruise ships, freight vessels, passenger ferries, barges, recreational vessels (whale watching, kayaks, sailboats), and charter and commercial fishing vessels. Vessel transit data from 2008 to 2015 suggested that Resurrection Bay records ~5,800 large vessel transits on average each year (AOOS 2020). Due to the action area being mostly contained within the boat harbor, the majority of the vessels present will be smaller fishing or recreational (tour) vessels.

Of the 108 vessel strikes of cetaceans reported from 1978-2011, 2 occurred in Resurrection Bay (Neilson et al. 2012). Since 2012, an additional two strikes have been reported, for a total of 2 humpback whales and two fin whales since 1978.

Zone 3 – Prince William Sound

Prince William Sound receives considerable vessel traffic. The Port of Valdez regularly receives crude oil tankers, oil/chemical tankers, passenger ships, and houses commercial and recreational fishing and tourist vessels. Data collected by AOOS (2020) and the Marine Exchange (Marine Traffic 2020) indicates that the Port of Valdez records ~4,500 large vessel transits on average annually.

Cordova vessel traffic is mostly restricted to fishing and passenger vessels. Though not as busy as Valdez, the Port of Cordova records ~ 2,475 large vessel transits annually (AOOS 2020, Marine Traffic 2020). Additionally, both ports are part of the Alaska Marine Highway System, with daily cruises to Whittier.

Neilson et al. (2012) reported six whale strikes in Prince William Sound between 1978-2011, and another three strikes were reported between 2012-2020 (NMFS Alaska Regional Office Stranding Database accessed February 2023) for a total of six humpback whales and three unidentified cetaceans. Of these, one unidentified cetacean was reported as struck in Valdez and no strikes were reported near Cordova.

Zone 4 – Southeast

The action areas in Southeast normally experience high levels of marine vessel traffic with highest volumes occurring May through September. Juneau, Sitka, and Ketchikan all harbor large cruise ships during the summer months while Petersburg is limited to smaller passenger cruise ships (250 people) partially due to the navigational challenges presented by Wrangell Narrows.

Juneau is one of the busiest cruise ship ports in the country. It is also home to commercial fishing activity, fueling terminals, floatplane facilities, receives ferry service from the Alaska Marine Highway System, and other recreational activities. Between 2008 and 2015, Juneau recorded ~6,300 large vessel transits on average annually(AOOS 2020, Marine Traffic 2020).

Sitka is the top commercial fishery port in southeast and receives ferry service from the Alaska Marine Highway System, as well as large cruise ships. From 2008 to 2015, Sitka annually averaged 15,000 large vessel transits (AOOS 2020, Marine Traffic 2020).

Similar to Sitka, Petersburg is an active fishing port, with one of the top fishing fleets in the world. Between fishing, small cruise ships, and other vessel traffic, Petersburg averaged over 10,000 large vessel transits annually from 2008 to 2015 (AOOS 2020, Marine Traffic 2020)).

Base Ketchikan is located in Tongass Narrows, a very active vessel traffic area, hosting vessels from small personal use watercraft to large cruise ships. There are currently USCG regulations in place for all vessels over 23 ft to not exceed a maximum speed of seven knots (70 FR 20471; April 20, 2005). Data collected from 2008 to 2015 indicate that Ketchikan records ~6,000 large vessel transits on average annually (AOOS 2020, Marine Traffic 2020)).

The following summary statements were provided by Neilson et al. (2012) about humpback whale vessel strikes in southeast Alaska:

- Most vessels that strike whales are less than 49 ft (15 m) long
- Most fatal vessel collisions occur at speeds over 13 knots
- Most collisions occur between May and September
- Calves and juveniles appear to be at higher risk of collisions than adult whales

Since 2011, cruise lines, pilots, NMFS, and National Park Service (NPS) biologists have worked together to produce weekly whale sightings maps to improve situational awareness for cruise ships and state ferries in southeast Alaska. In 2016, NMFS and NPS launched Whale Alert, another voluntary program that receives and shares real-time whale sightings with controlled access to reduce the risk of ship strike and contribute to whale avoidance. More information is available at https://www.fisheries.noaa.gov/resource/tool-app/whale-alert.

In addition, many of the marine mammal viewing tour boats participate in the Whale SENSE program. NMFS implemented Whale SENSE Alaska in 2015, which is a voluntary program developed in collaboration with the whale-watching industry that recognizes companies who commit to responsible practices. More information is available at https://whalesense.org/.

**5.6 Coastal Development**

Coastal zone development results in the loss and alteration of nearshore marine mammal habitat and changes in habitat quality. Increased development may prevent marine mammals from reaching or using important feeding, breeding, and resting areas.

Zone 1 – Kodiak

The primary development in Womens Bay is USCG Base Kodiak on the head of the bay, with other minor developments on both shorelines. On the southwest side of the bay, there is little development other than a road that parallels the shoreline. There have been recent improvement projects at Base Kodiak and at some of the fishing facilities co-located in the bay.

Zone 2 – Kenai Peninsula

The shoreline in the proposed action area is heavily developed as most of the area is contained within the boat harbor. The portion of the action area outside of the harbor consists of mainly natural beach that has development (camp group, paved trails) just upland from the shore. Much of the shoreline surrounding the action area has been modified or is currently being modified, such as the construction at the adjacent Alaska Railroad Company terminal that is expected in the coming years.

Zone 3 – Prince William Sound

There is considerable coastal development in Port Valdez, with the town and harbors closest to the construction site and industrial development on the opposite shoreline.

The majority of the coastline bordered by the Moorings Cordova action area is undeveloped, with the exception of the area surrounding the construction site, which sits outside of the harbor.

Zone 4 – Southeast

Station Juneau is surrounded by a combination of industrial, residential, and recreational coastal development. The southern end of the action area (Level B zone for pile clipping) borders an undeveloped area.

Although much of Baranof Island is undeveloped, the shoreline surrounding the action area for Moorings Sitka is highly altered by man-made structures and impervious surfaces.

At Moorings Petersburg, the shoreline on either side of the construction site is heavily developed, but the far side of the action area across the channel has sparse development, with mostly natural shorelines.

There is moderate shoreline development on nearby Pennock and Gravina islands by Base Ketchikan. The majority of the City of Ketchikan is located on Revillagigedo Island. Marine facilities include fish processing plants, small boat harbors, cruise ship and ferry terminals, float plane docks, a dry dock, shipyard, and other infrastructure. Ketchikan International Airport is located on Gravina Island.

## 5.7 Subsistence Harvest

The ESA and MMPA allow for the harvest of marine mammals by Alaska Natives for subsistence purposes and for creating and selling authentic native articles of handicrafts. Except for 11 Arctic village members of the Alaska Eskimo Whaling Commission that have IWC-issued quota for aboriginal subsistence harvest of bowhead whales, subsistence hunters in Alaska are not authorized to take large whales (Muto et al. 2018a). However, one humpback whale was illegally harvested in Kotlik in October, 2006, and another was illegally harvested in Toksook Bay in May, 2016, while a gray whale was illegally harvested in the Kuskokwim River in July, 2017.

Steller sea lions are hunted for subsistence purposes throughout southcentral and southeast Alaska. As of 2009, data on community subsistence harvest are no longer being consistently collected; therefore, the most recent estimate of annual statewide harvest (excluding St. Paul Island, Atka, and Akutan, which actively collect harvest data)[16] is 172 individuals from the 5-year period from 2004 to 2008. Data were collected on Alaska Native harvest of Steller sea lions

[16] These numbers included both harvested and struck and lost sea lions.

for 7 communities on Kodiak Island for 2011 and 15 communities in southcentral Alaska in 2014; the Alaska Native Harbor Seal Commission and ADF&G estimated a total of 20 adult sea lions were harvested on Kodiak Island in 2011, and 7.9 sea lions (CI = 6-15.3) were harvested in Southcentral Alaska in 2014, with adults comprising 84% of the harvest (Muto et al. 2017, 2018b).

## 6. EFFECTS OF THE ACTION

"Effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR § 402.02).

This biological opinion relies on the best scientific and commercial information available. We try to note areas of uncertainty, or situations where data is not available. In analyzing the effects of the action, NMFS gives the benefit of the doubt to the listed species by minimizing the likelihood of false negative conclusions (concluding that adverse effects are not likely when such effects are, in fact, likely to occur).

We organize our effects analysis using a stressor identification – exposure – response – risk assessment framework for the proposed activities.

We conclude this section with an *Integration and Synthesis of Effects* that integrates information presented in the *Status of the Species* and *Environmental Baseline* sections of this opinion with the results of our exposure and response analyses to estimate the probable risks the proposed action poses to endangered and threatened species.

NMFS identified and addressed all potential stressors; and considered all consequences of the proposed action, individually and cumulatively, in developing the analysis and conclusions in this opinion regarding the effects of the proposed action on ESA-listed species and designated critical habitat.

### 6.1 Project Stressors

Stressors are any physical, chemical or biological phenomena that can induce an adverse response. The effects section starts with identification of the stressors produced by the constituent parts of the proposed action. Based on our review of the data available, the maintenance activities at the eight USCG facilities project may result in the following stressors to ESA-listed marine mammals:

- Underwater sound produced by impulsive and non-impulsive sound sources related to pile repair and replacement activities, including vibratory pile driving, impact pile driving, and down-the-hole drilling

- Vessel strike, sound, and disturbance
- Seafloor, habitat, and prey resource disturbance
- Pollutants and contaminants
- Direct pile contact
- Direct human contact

### 6.1.1 Minor Stressors on ESA-Listed Species

Based on a review of available information, we determined the following stressors are either unlikely to occur or likely to have minimal impacts on Mexico DPS humpback whales, fin whales, WDPS Steller sea lions, and sunflower sea stars.

#### 6.1.1.1 *Vessel Sound*

Vessel sound transmitted through water is a continuous (non-impulsive) sound source. Broadband source levels for tugs and barges have been measured at 145 to 170 dB re 1 µPa, and 151 to 152 dB re 1µPa for small vessels with outboard motors (Richardson et al. 1995). Sound from vessels within this size range would reach the 120 dB threshold at distances between 86 and 233 m (282 and 764 feet) from the source (Richardson et al. 1995).

Vessel activity associated with the proposed pile repair and replacement at each USCG facility will be minimal, with approximately five vessels per site (two tugs, two barges, and one skiff). Tugs and barges are expected to have roughly two trips each day (i.e., back and forth from the action area) and a skiff will have short movements to conduct maintenance activities. The vessels will be travelling at speeds slower than 13 knots, which will result in lower levels of vessel sound compared to vessels moving at faster speeds. Because maintenance activities are not expected to last for more than 20 days at any site in a given year and the project vessels will only be traveling short distances twice per day (start and end of the working period), the sound produced by the limited number of project vessels is not expected to add to the baseline sound conditions at the eight USCG facilities.

NMFS expects minimal low-level exposure of short-term duration to listed humpback and fin whales, and Steller sea lions from vessel sound related to this action. If animals are exposed and do respond, they may exhibit slight deflection from the sound source and engage in low-level avoidance behavior, short-term vigilance behavior, or short-term masking behavior, but these behaviors are not likely to result in adverse consequences for the animals. The nature and duration of response is not expected to be a significant disruption of important behavioral patterns such as feeding or resting. Further, marine mammals that frequent the action areas of most, if not all, of the USCG facilities are likely to have developed a tolerance to vessel sound and disturbance due to the common presence of vessels such as ferries, fishing vessels, tenders, barges, tugboats, and other commercial and recreational vessels. The impact of vessel sound on Mexico DPS humpback whales, fin whales, and WDPS Steller sea lions is therefore determined to be insignificant.

6.1.1.2 *Vessel Strike*

The possibility of a vessel strike associated with the proposed action is extremely unlikely. As described in section 6.1.1.1, there will only be up to five project-related vessels operating at each USCG facility at speeds slower than 13 knots, with a limited number of transits each day for a maximum of 20 days per year (Table 1). Vessel operators will also reduce speed further to 5 knots if within 274 m (300 yards) of a whale (see Section 2.1.2). Due to the common presence of commercial and recreational vessels in the action areas and presumable tolerance of marine mammals to regular vessel traffic, the use of slow-moving tugboats and barges and small skiffs associated with construction is not eagerly anticipated to result in vessel strikes of ESA-listed species at the eight USCG facilities.

In addition to the small number of vessels and slower transit speeds, the local bathymetry or other surrounding environmental conditions (e.g., sediment loads, lack of prey species) may greatly reduce the likelihood of humpback or fin whales from entering the action area at some sites. For example, the action area for Moorings Seward is almost completely within the confined boat harbor, making it highly unlikely that a large whale would enter the action area. The mitigation measures in Section 2.1.2. also state that vessels will stay at least 91 m (100 yards) from listed marine mammals, as well as adhere to the Alaska Humpback Whale Approach Regulations (see 50 CFR §§ 216.18, 223.214 and 224.103(b)). All of these factors limit the risk of a vessel interacting with marine mammals in the project action areas, leading us to conclude that a vessel strike is extremely unlikely to occur.

6.1.1.3 *Seafloor, Habitat, and Prey Resource Disturbance*

Repair and replacement of piles at the eight USCG facilities may temporarily increase local turbidity. Both activities may require removing and replacing rock armor surrounding piles, which would disturb sediments temporarily. Pile driving and DTH also causes localized increases in turbidity around piles being removed and installed. But in general, turbidity associated with pile installation is localized to about a 7.6 m (25 ft) radius around a pile (Everitt, Fiscus and DeLong 1980) and local tidal activity can reduce turbidity quickly. As the shutdown zone around construction is 20 m (Table 2), listed animals are not expected to be close enough to be affected by project-generated turbidity. Sunflower sea stars may be in close enough proximity to experience localized turbidity, but being highly mobile, they can move from the area if negatively impacted, if they haven't already been removed from the area during pre-construction surveys. Therefore, we conclude that effects of seafloor disturbance and increased turbidity on humpback whales, fin whales, Steller sea lions, or sunflower sea stars would be immeasurably small.

Construction activities associated with pile repair and replacement would produce non-impulsive (i.e., vibratory pile removal) and impulsive (i.e., impact driving and DTH) sounds. Fish react to sounds that are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving on fish, although several are based on studies related to large, multiyear bridge construction projects (e.g., Scholik and Yan 2001, 2002, Popper and Hastings 2009). Impulsive sounds at received levels of 160 dB may cause subtle changes in fish behavior. SPLs of 180 dB may cause noticeable changes in behavior (Pearson, Skalski and Malme 1992, Skalski, Pearson and Malme 1992) and SPLs of sufficient strength have been known to cause injury to fish and fish mortality.

The most likely impact to fish from pile driving and DTH activities at the project areas would be temporary behavioral avoidance of the area. The duration of fish avoidance of construction areas after pile driving ceases is unknown, but a rapid return to normal distribution and behavior is anticipated. In general, impacts to marine mammal prey species are expected to be minor and temporary given the small area of pile driving within the action areas relative to known feeding areas for humpback and fin whales, and Steller sea lions. In general, we expect fish will be capable of moving away from project activities to avoid exposure to sound and that areas in which stress, injury, temporary threshold shifts (TTS), or changes in balance of prey species may occur will be limited to a few meters directly around the pile driving and drilling operations. We consider potential adverse impacts to prey resources from pile-driving and drilling in the action area to be insignificant.

Studies on euphausiids and copepods, two of the more abundant and biologically important groups of zooplankton, have documented some sensitivity of zooplankton to sound (Chu, Sze and Wong 1996, Wiese 1996); however, any effects of pile driving and drilling activities on zooplankton would be expected to be restricted to the area within a few meters of pile replacement and would likely be sub-lethal. While previous studies concluded that crustaceans (such as zooplankton) are not particularly sensitive to sound produced by even louder impulsive sounds such as seismic operations (Wiese 1996), a recent study provides evidence that seismic surveys may cause significant mortality (McCauley et al. 2017). However, seismic surveys are significantly louder and lower frequency than the sound sources associated with pile repair and replacement activities and are not directly comparable.

No appreciable adverse impact on zooplankton populations will occur due in part to large reproductive capacities and naturally high levels of predation and mortality of these populations. Any mortality or impacts on zooplankton as a result of pile replacement activities is immaterial as compared to the naturally occurring reproductive and mortality rates of these species.

Construction activities will temporarily increase turbidity and in-water sound and may adversely affect habitat and prey in the action area. Adverse effects on prey species populations during project activities will be short-term, based on the limited duration of the project (maximum 20 days in a given year at any site). After pile driving activities are completed, habitat use and function are expected to return to similar pre-construction levels and fish, zooplankton, and other prey are expected to repopulate the area. Therefore, we conclude that impacts to seafloor, habitat disturbance, and prey species is insignificant.

#### 6.1.1.4 *Pollutants and Contaminants*

Marine mammals could be exposed to accidental discharges through project vessels and pile repair and replacement. Accidental spills could occur from a vessel leak or onboard spill during construction activities. The size of the spill influences the number of individuals that will be exposed to spilled material and the duration of that exposure. Contact through the skin, eyes, or through inhalation and ingestion could result in temporary irritation or long-term endocrine or reproductive impacts, depending on the duration of exposure. The greatest threat to cetaceans is likely from the inhalation of the volatile toxic hydrocarbon fractions of fresh oil, which can damage the respiratory system (Hansen 1985, Neff 1990), cause neurological disorders or liver damage (Geraci and St. Aubin 1990), have anesthetic effects (Neff 1990), and cause death (Geraci and St. Aubin 1990). However, for small spills there is expected to be a rapid dissipation of toxic fumes into the atmosphere from rapid aging of fresh refined oil, which limits potential exposure of whales and Steller sea lions to prolonged inhalation of toxic fumes. We do not expect that sunflower sea stars would be affected by pollutants that are released and remain at the surface, or higher in the water column.

In addition to discharges from project vessels and pile driving equipment, concrete waste may be released into the action area during the cutting of concrete piles. Concrete can be highly alkaline, with the potential to increase the pH of affected waters and harm marine life, as well as release pollutants such as silica and cadmium. Cutting of concrete piles will only take place at Base Ketchikan and USCG has included best management practices (BMPs) to ensure that concrete washings will not enter the water, and that uncured concrete poured for replacement piles will be contained within water-tight forms and closely monitored so that no concrete is spilled into the environment. Due to these BMPs, we expect that concrete pile cutting and replacement will have a negligible effect on local water quality.

The USCG has best management practices in place to address potential releases of pollutants. These include using clean construction materials that are suitable for use in the marine environment, use of secondary containment beneath all active work areas, and use of water-tight forms to ensure no over-topping of concrete occurs during pouring for repair activities (described in detail in USCG 2022a). Based on the localized nature of small spills or pollutant releases, the relatively rapid weathering and dispersion, and the safeguards in place to prevent spills from occurring (see Section 4.1.3.1 in USCG 2022a for more details), NMFS concludes that exposure of listed species to a small oil spill or pollutant release is highly unlikely to occur, and should such exposure occur, its effects upon listed species will be so small as to be insignificant.

#### 6.1.1.5 *Direct Pile Contact*

Direct pile contact is expected only to affect the sunflower sea star. All USCG facilities included in the proposed project fall within the range of the sunflower sea star as they are south of the Aleutian Islands and in coastal areas.

The sunflower sea star is commonly found in water less than 25 m deep and could be in areas proposed for pile replacement and repair activities. Prior to the SSWS pandemic, abundance of sunflower sea stars varied geographically in Alaska: infrequent in Kachemak Bay (<0.005 $m^2$); fairly common in the Kenai Fjords National Park (~0.075/$m^2$); and quite common in western Prince William Sound (average 0.233/$m^2$) (Konar et al. 2019). Post-pandemic densities are much less and range from 0 to 0.04/$m^2$ at the sites that once had the highest density (western Prince William Sound)(Traiger et al. 2022). Typically, sunflower sea stars are solitary and do not aggregate.

Although up to 245 piles will be removed and replaced on a 1-1 basis across all sites and years of the project, no more than 20 piles per year will be replaced at any given site, with a range from 1 (Moorings Seward) to 20 (Base Kodiak) piles per year. For this analysis, we look at the number of sunflower sea stars that could be crushed using 20 pipe piles and current sunflower sea star density numbers. The maximum size of any pile type that will be used at any of the sites is 24-inch. A 24-inch (60.9 cm) pipe pile has a foot print of 0.292 $m^2$. Consequently, if 20 piles were installed, a total area of 5.8 $m^2$ of substrate would be covered by pipe piles (20 x 0.292 $m^2$). Assuming a density of 0.04 sea stars/$m^2$ at all project sites post-SSWS, less than one sea star (0.23 sea stars; 5.8 $m^2$ x 0.04 sea stars/ $m^2$) might be impacted at the site with the largest number of piles being replaced (Base Kodiak) and 0.012 sea stars might be struck by a pipe at the site replacing only a single pile (Moorings Seward). Because sunflower sea stars are typically solitary and don't aggregate, it is even more unlikely that one pile would strike two or more individuals. As noted in section 4.3.4, sunflower sea star arms may detach when they are injured and the sea star can regenerate lost arms and parts of the central disc (Chia and Walker 1991). Consequently, it is likely that a pile would need to land squarely on a whole individual for it to be killed.

Because sunflower sea stars are present at low densities and any individuals in the shutdown zone will be removed prior to the start of activity the chances of a pile landing on a sunflower sea star are unlikely. Therefore, we consider the probability of a pile striking a sunflower sea star to be discountable.

6.1.1.6 *Direct Human Contact*

USCG will be conducting scans for the presence of sunflower sea stars in the 20 m shutdown zone around piles to be repaired or replaced. If a sea star is found, it will be carefully removed and reported as outlined in mitigation measures #8, 45, and 50. If we again assume a sea star density of 0.04 /$m^2$ at each site, we can use the area of the Level A shutdown zones to calculate how many sea stars may be handled. The maximum area that would be impacted in a shutdown zone is 1257 $m^2$, which only occurs if there is no obstruction to the dissipation of sound from the pile area. Moorings Valdez is the only site considered to have the maximum area that would need to be surveyed and cleared of sea stars (see Figure 6-Figure 10 in USCG 2022b). Estimates of area to be surveyed by site are in Table 8.

To calculate the number of sunflower sea stars that may be affected by direct contact, we multiplied the sea star density (0.04/$m^2$) by the estimated area of the 20 m-radius sea star shutdown zone around each pile to get the number of sea stars that may be present on a given day. That number was multiplied by the proposed number of working days at a site per year to get a yearly total, and then yearly totals were multiplied by the number years that work would be occurring at each site. The five year totals were summed across sites for a grand total of 13,182 sea stars that could be affected by direct human contact as they are removed from the sea star shutdown zone prior to pile repair and replacement.

**Table 8. Estimated maximum take of sunflower sea stars due to direct human contact.**

| | Kodiak | Seward | Valdez | Cordova | Juneau | Sitka | Petersburg | Ketchikan |
|---|---|---|---|---|---|---|---|---|
| Estimated area to be surveyed ($m^2$) | 942 | 419 | 1,257 | 1,100 | 628 | 942 | 1,100 | 838 |
| Maximum # of sea stars affected/yr | 754 | 67 | 151 | 264 | 503 | 377 | 176 | 670 |
| Maximum # of sea stars affected across 5 yrs | 3,770 | 67 | 452 | 264 | 2,513 | 1,885 | 880 | 3,351 |
| Grand Total | 13,182 | | | | | | | |

The maximum number of sea stars that could be affected by relocation efforts is a conservative estimate, as the area to be surveyed at each site is likely smaller than the estimates used as tidal fluctuations will impact how much habitat is available for sea stars at a given time and the project activities are likely to occur during lower water levels. In addition, survey areas for piles may overlap, resulting in less total area that needs to be surveyed, and fewer sea stars that subsequently need to be relocated. Sunflower sea stars are habitat generalists that tend occupy low intertidal and subtidal zones, and are common at depths less than 25 m. The maximum area to be surveyed for sea star removal across all eight USCG facilities is 7,225 $m^2$ (1.79 acres), which accounts for an incredibly small amount of the total habitat available for the species in southeast and south central Alaska waters. Additionally, removal of sea stars from the shutdown zone is expected to be minor harassment and not cause fatality to the individuals while helping to conserve the species present at each facility. Based on the amount of area from which sea stars will be removed compared to their total available habitat and the limited impacts expected on individuals, we conclude that effects of direct human contact on sunflower sea stars with be insignificant.

### 6.1.2 Major Stressors on ESA-Listed Species and Critical Habitat

The following sections analyze the stressors likely to adversely affect ESA-listed species due to underwater anthropogenic sound. First, we provide a brief explanation of the sound measurements and acoustic thresholds used in the discussions of acoustic effects in this opinion.

#### 6.1.2.1 *Acoustic Thresholds*

Since 1997, NMFS has used generic sound exposure thresholds to determine whether an activity produces underwater and in-air sounds that might result in impacts to marine mammals (70 FR 1871, 1872; January 11, 2005). NMFS has developed comprehensive guidance on sound levels likely to cause injury to marine mammals through onset of permanent and temporary thresholds shifts (PTS and TTS) (83 FR 28824; June 21, 2018; 81 FR 51693; August 4, 2016). NMFS is in the process of developing guidance for behavioral disruption (Level B harassment). However, until such guidance is available, NMFS uses the following conservative thresholds of underwater sound pressure levels,[17] expressed in root mean square[18] (rms), from broadband sounds that cause behavioral disturbance, and referred to as Level B harassment under section 3(18)(A)(ii) of the Marine Mammal Protection Act (MMPA) (16 U.S.C § 1362(18)(A)(ii)):

- impulsive sound: 160 $dB_{rms}$ re 1 μPa
- non-impulsive sound: 120 $dB_{rms}$ re 1μPa

Different thresholds and auditory weighting functions are provided for different marine mammal hearing groups, which are defined in the Technical Guidance (NMFS 2018b). The generalized hearing range for each hearing group is in Table 9.

**Table 9. Underwater marine mammal hearing groups (NMFS 2018b).**

| Hearing Group | ESA-listed Marine Mammals In the Project Area | Generalized Hearing Range[1] |
|---|---|---|
| Low-frequency (LF) cetaceans *(Baleen whales)* | Humpback and fin whales | 7 Hz to 35 kHz |
| Mid-frequency (MF) cetaceans *(dolphins, toothed whales, beaked whales)* | None | 150 Hz to 160 kHz |
| High-frequency (HF) cetaceans *(true porpoises)* | None | 275 Hz to 160 kHz |
| Phocid pinnipeds (PW) *(true seals)* | None | 50 Hz to 86 kHz |
| Otariid pinnipeds (OW) *(sea lions and fur seals)* | Steller sea lions | 60 Hz to 39 kHz |

[17] Sound pressure is the sound force per unit micropascals (μPa), where 1 pascal (Pa) is the pressure resulting from a force of one newton exerted over an area of one square meter. Sound pressure level is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in acoustics is 1 μPa, and the units for underwater sound pressure levels are decibels (dB) re 1 μPa.

[18] Root mean square (rms) is the square root of the arithmetic average of the squared instantaneous pressure values.

| Hearing Group | ESA-listed Marine Mammals In the Project Area | Generalized Hearing Range[1] |
|---|---|---|
| [1]Respresents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 db threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall et al. 2007a) and PW pinniped (approximation). | | |

These acoustic thresholds are presented using dual metrics of cumulative sound exposure level ($L_E$) and peak sound level (PK) for impulsive sounds and $L_E$ for non-impulsive sounds.

The MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]" (16 U.S.C. § 1362(18)(A)).

While the ESA does not define "harass," NMFS issued guidance interpreting the term "harass" under the ESA as to: "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016). Exposure to sound capable of causing level A or Level B harassment under the MMPA often, but not always constitutes take under the ESA. For the purposes of this consultation, we have determined < indicate which stressors have take associated with them> have sound source levels capable of causing take under the MMPA and ESA.

While the ESA does not define "harass," NMFS issued guidance interpreting the term "harass" under the ESA as to: "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016). For purposes of this consultation, any exposure to Level A or Level B disturbance sound thresholds under the MMPA constitutes an incidental "take" under the ESA and must be authorized by the ITS (Section 10 of this opinion) (except that take is not prohibited for threatened species that do not have ESA section 4(d) regulations).

As described below, we anticipate that exposures to listed marine mammals from sound associated with the proposed action may result in disturbance (Level B harassment) and potential injury. However, with the addition of mitigation measures, no mortalities or permanent impairment to hearing are anticipated.

## 6.2 Exposure Analysis

As discussed in the *Approach to the Assessment* section of this opinion, exposure analyses are designed to identify the listed species that are likely to co-occur with these effects in space and time and the nature of that co-occurrence. In this step of our analysis, we try to identify the number, age (or life stage), and gender of the individuals that are likely to be exposed to an action's effects and the populations or subpopulations those individuals represent.

As discussed in Section 2.1.2 above, the USCG proposed mitigation measures that should avoid or minimize exposure of Mexico DPS humpback whales, fin whales, WDPS Steller sea lions, and sunflower sea stars to one or more stressors from the proposed action.

NMFS expects that humpback and fin whales, and WDPS Steller sea lions will be exposed to underwater sound from pile repair and replacement activities (including power-washing, vibratory pile removal/installation, impact pile driving, and DTH).

### 6.2.1 Ensonified Area

This section describes the operational and environmental parameters of each construction activity that allow NMFS to estimate the area ensonified above the acoustic thresholds, based on only a single construction activity occurring at a time, as proposed by USCG.

The sound field in the eight action areas is the existing background sound plus additional construction sound from the proposed project. Marine mammals may be affected via sound generated by the primary components of the project (i.e., power-washing, vibratory pile removal/installation, impact pile driving, and DTH pile installation). NMFS used acoustic monitoring data from other locations to develop the source levels used to calculate distances to the Level B thresholds for different sizes of piles and installation/removal methods. The values used and the source from which they were derived are summarized in Table 5 and described in detail below.

Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic sound exposure is also informed to varying degrees by other factors related to the source (e.g., frequency, predictability, duty cycle), the environment (e.g., bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall et al. 2007b, Ellison et al. 2012). Based on the available science and the practical need to use a threshold that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic sound above received levels of 120 dB re 1 μPa rms for continuous or non-impulsive sources (e.g., vibratory pile-driving and DTH) and above 160 dB re 1 μPa rms for non-explosive impulsive (e.g., impact pile-driving) or intermittent sources.

The USCG's proposed maintenance activities for the eight facilities includes the use of continuous and impulsive sources, and therefore the 120 and 160 dB re 1 μPa rms thresholds for Level B behavioral harassment are applicable.

Transmission loss (TL) is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater TL is:

TL = B * Log10 (R1/R2), where

TL = transmission loss in dB

B = transmission loss coefficient; for practical spreading equals 15

R1 = the distance of the modeled SPL from the driven pile, and

R2 = the distance from the driven pile of the initial measurement

When site-specific transmission loss measurements are not available, the recommended TL coefficient for most nearshore environments is the default practical spreading value of 15. This value results in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions, which is the most appropriate assumption for USCG's proposed maintenance activities.

Due to the variation in maintenance activities that will take place at each USCG facility, the maximum Level B thresholds for 120 dB rms and 160 dB rms for marine mammals will differ between sites (Table 10). Using the practical spreading model, USCG determined that at Bases Kodiak and Ketchikan, DTH will result in the underwater sound falling below 120 dB rms at a calculated maximum distance of 13,594 m. At Moorings Seward, Valdez, Cordova, Sitka, and Petersburg, vibratory pile extraction and installation of steel piles will result in underwater sound falling below 120 dB rms at a maximum distance of 6,310 m. At Station Juneau, power-washing timber and steel piles will result in underwater sound falling below 120 dB rms at a distance of 5,412 m. There are restrictions to the spread of underwater sound to the full distance of the Level B harassment isopleths at all sites based on the local geography of the surrounding areas (see Figure 2-Figure 9). For example, sound in Womens Bay at Base Kodiak will not propagate farther than ~4700 m from the source in any direction.

Sound levels for power-washing steel piles were estimated with measurements from a CaviBlaster used by Hilcorp Alaska in April 2017. Received levels were measured at 143 dB at 170 m (Austin 2017). Using this data to back calculate to a sound source level of 176 dB re 1 μPa at 1 m, we estimated that the sound level at 10 m would be 161 dB re 1 μPa, resulting in a Level B isopleth of 5,412 m (Table 10). The piles that will be power-washed in the current project are timber, not steel, so this is likely a conservative estimate. Use of the power-washer is expected to be limited to 30 minutes at a time.

DTH pile installation includes drilling (non-impulsive sound) and hammering (impulsive sound) to penetrate rocky substrates (Denes et al. 2016, Denes, Vallarta and Zeddies 2019, Reyff and Heyvaert 2019). DTH pile installation was initially thought be a non-impulsive sound source. However, Denes, Vallarta and Zeddies (2019) concluded from their study at Thimble Shoal, VA, that DTH should be characterized as impulsive based on a >3 dB difference in sound pressure level in a 0.035-second window (Southall et al. 2007b) compared to a 1-second window. Thus, impulsive thresholds are used to evaluate Level A harassment, and continuous thresholds are used to evaluate Level B harassment.

**Table 10. Calculated Level A and Level B isopleths for underwater sound from maintenance activities.**

| Activity | Level A (m)* | | Level B (m) |
|---|---|---|---|
| | Low Frequency | Otariid | |
| **Non-Impulsive[a]** | | | |
| Power-washing Timber and Steel | 1.3 | 0.1 | 5,412 |
| Vibratory Extraction/Installation – Timber (based on 14-inch piles) | 1.5 | 0.1 | 1,359 |
| Vibratory Extraction/Installation – Steel (based on 24-inch piles) | 7.1 | 0.3 | 6,310 |
| Clipper – Timber | NA | NA | 1,792 |
| Clipper – Concrete | NA | NA | 5,580 |
| Hydraulic Chainsaw | NA | NA | 1,166 |
| Diamond Wire Saw | NA | NA | 5,843 |
| **Impulsive[b]** | | | |
| Impact Drive – Timber/Composite | 18.4/2.1 | 0.7/0.1 | 46 |
| Impact Drive – Steel | 215.8 | 8.4 | 1,000 |
| Impact Drive – Concrete | 27.7 | 1.1 | 46 |
| DTH Drive | 434.1 | 16.9 | 13,594 |

*Only low frequency cetaceans (humpback and fin whales) and otariids (Steller sea lions) are expected in the project action areas
**a.** Non-impulsive distances calculated to 120 dB
**b.** Impulsive distances calculated to 160 dB

### 6.2.2 Marine Mammal Occurrence and Exposure Estimates

In this section we provide the information about the presence, density, or group dynamics of humpback and fin whales, and Steller sea lions that informed the exposure estimate calculations.

For our calculations, we used either density data or occurrence data (only available for some sites and species). Occurrence data were based mostly on marine mammal monitoring reports from previous projects or studies that had been conducted in the same area. The metrics used and their sources are described in Table 11.

**Table 11. Density and occurrence data used for exposure estimates. Density data (species/km2) were reported from U.S. Navy (2020, 2021) surveys. Sources for occurrence data (# of individuals/day) are indicated by footnotes.**

| Site | Humpback whale | Fin whale | Western DPS Steller sea lion |
|---|---|---|---|
| **Base Kodiak** | 0.093 HB/km$^2$ | 0.068 FW/km$^2$ | 0.068 SSL/km$^2$ |
| **Moorings Seward** | 1 HB/day[1] | 0.068 FW/km$^2$ | 2 SSL/day[1] |
| **Moorings Valdez** | 0.093 HB/km$^2$ | 0.068 FW/km$^2$ | 4.2 SSL/day[5] |
| **Moorings Cordova** | 0.093 HB/km$^2$ | 0.068 FW/km$^2$ | 0.0678 SSL/km$^2$ |
| **Station Juneau** | 4 HB/day[2] | 0.0001 FW/km$^2$ | 0.316 SSL/km$^2$ |
| **Moorings Sitka** | 5 HB/day[3] | 0.0001 FW/km$^2$ | 2 grps of 8 SSL/day (or 16 SSL/day) [6] |
| **Moorings Petersburg** | 0.0017 HB/km$^2$ | 0.0001 FW/km$^2$ | NA |
| **Base Ketchikan** | 0.571 HB/day [4] | 0.0001 FW/km$^2$ | NA |

[1] Occurrence based on information collected by the Alaska SeaLife Center, the Kenai Fjords National Park Service, local whale watching companies, and other scientific literature.

[2] Occurrence based on marine mammal monitoring data from PND Engineers (2019) for the Erickson Dock Marine Access Project in Auke Bay.

[3] Occurrence based on marine mammal monitoring data from Solstice AK Consulting (2018) for the Garry Paxton Industrial Park project.

[4] Occurrence based on AKRO Tongass Narrows, Gravina Access Project Biological Opinion (NMFS 2019)

[5] Occurrence based on marine mammal monitoring reports from multiple stations in Valdez during an oil spill response in 2020.

[6] Occurrence based on marine mammal monitoring reports from Turnagain (2017) and Windward (2017), as used in the AKRO Halibut Point Dock Biological Opinion (NMFS 2020).

For species and sites for which density data was the best available information, the following equation was used for exposure estimates:

Exposure estimate = Density * ensonified area * number of days of activity

The ensonified area for each activity at each site can be found in Table 12. For species and sites for which occurrence data was available, the following equation was used for exposure estimates:

Exposure estimate = Occurrence/day * number of days of activity

**Table 12. Ensonified area (km2) for each activity at each USCG facility.**

| Site | Power-washing | Vibratory Timber | Vibratory Steel | Impact Timber | Impact Steel | DTH |
|---|---|---|---|---|---|---|
| **Kodiak** | NA | 1.3 | 4.51 | NA | NA | 4.51 |
| **Seward** | NA | NA | 0.24 | NA | 0.24 | NA |
| **Valdez** | 34.3 | 2.62 | 40.21 | 0.007 | 1.45 | NA |
| **Cordova** | NA | NA | 23.42 | NA | 1.57 | NA |
| **Juneau** | 3.31 | 1.62 | 0.003 | NA | NA | NA |
| **Sitka** | 4.5 | 0.87 | 5.67 | 0.007 | 0.56 | NA |
| **Petersburg** | 2.59 | 1.63 | 2.88 | 0.006 | 1.33 | NA |
| **Ketchikan** | 6.51 | 1.45 | 7.3 | NA | NA | 10.06 |

As described in Section 4.3.1., an estimated 11 percent of humpback whales in the Gulf of Alaska and 2 percent of humpback whales in Southeast Alaska are from the Mexico DPS (Wade 2021). Exposure estimates of humpback whales at sites in Zones 1, 2, and 3 were multiplied by 11 percent to determine the number of Mexico DPS humpback whales that would be exposed to Level B harassment. Exposure estimates of humpback whales at sites in Zone 4 were multiplied by 2 percent to determine the number of Mexico DPS humpback whales that would be exposed to Level B harassment (Table 12).

Similarly, for Steller sea lions, the percentage of individuals expected to be from the WDPS differs across sites in Zone 4 (Hastings et al. 2021). The percentages are as follows: 1.4 percent at Station Juneau and 2.2 percent at Moorings Sitka. The percent of WDPS Steller sea lions near Moorings Petersburg and Base Ketchikan are expected to be negligible. Exposure estimates for

WDPS Steller sea lions at Station Juneau and Moorings Sitka were multiplied by 1.4 and 2.2 percent, respectively (Table 12). For all sites in Zones 1-3, all Steller sea lions are presumed to be from the WDPS.

**Table 13. Exposure estimates for ESA-listed marine mammal species from USCG pile repair and replacement activities over five years. Exposure estimates are rounded to the nearest whole number for the five year period.**

| Site | Mexico DPS humpback whale | Fin whale | WDPS Steller sea lion |
|---|---|---|---|
| **Base Kodiak** | 5 | 35 | 35 |
| **Moorings Seward** | 0 | 0 | 8 |
| **Moorings Valdez** | 4 | 30 | 63[1] |
| **Moorings Cordova** | 2 | 10 | 10 |
| **Station Juneau** | 8 | 0 | 1 |
| **Moorings Sitka** | 5 | 0 | 18[1] |
| **Moorings Petersburg** | 0 | 0 | 0 |
| **Base Ketchikan** | 2 | 0 | 0 |
| **Total** | 26[2] | 75 | 135 |

[1] The exposure estimates calculated by AKR are for the entirety of the project (five years), with fractional estimates summed and rounded up at the five year mark. Exposure estimates for NMFS Permits Division are calculated on a per-year basis, which accounts for some slight discrepancies between the final exposure estimates in this Opinion and the permit issued by NMFS Permits Division.

[2] The total exposures estimates calculated for humpback whales across all facilities and years was 814. This was then adjusted using the estimated percentages of Mexico DPS humpback whales in each zone.

No take by Level A harassment of humpback whales or fin whales is proposed for authorization or expected to occur due to their large size and ability to be visibly detected in the project area if an animal should approach the Level A harassment zone. Should a Steller sea lion go undetected, initially, by a protected species observer and later be observed within the Level A harassment zone, the mitigation measures (including shutdowns), make it unlikely that an animal would accumulate enough exposure for PTS to occur. Therefore, no take by Level A harassment is proposed or expected to occur.

### 6.3 Response Analysis

As discussed in the *Approach to the Assessment* section of this opinion, response analyses determine how listed species/critical habitats are likely to respond after being exposed to an action's effects on the environment or directly on listed species themselves. Our assessments try to detect the probability of lethal responses, physical damage, physiological responses (particular stress responses), behavioral responses, and social responses that might result in reducing the fitness of listed individuals.

Loud underwater sound can result in physical effects on the marine environment that can affect marine organisms. Possible responses by Mexico DPS humpback whales, fin whales, and WDPS Steller sea lions to the impulsive and continuous sound produced by pile installation and removal activities are:

- Physical Response
  - Auditory threshold shifts (or hearing loss)
  - Non-auditory physiological effects
- Behavioral responses
  - Auditory interference (masking)
  - Tolerance, habituation, or sensitization
  - Change in dive, respiration, or feeding behavior
  - Change in vocalizations
  - Avoidance or displacement
  - Vigilance
  - Startle response

#### 6.3.1 Responses to major sound sources (Pile Driving/Removal Activities)

As described in the *Exposure Analysis*, Mexico DPS humpback whales, fin whales, and WDPS Steller sea lions are anticipated to occur in the action areas at some or all of the USCG facilities and are anticipated to overlap with sound associated with in-water maintenance activities including pile repair and replacement. We assume that some individuals are likely to be exposed and respond to these impulsive and continuous sound sources.

With proper implementation of the mitigation measures and shutdown procedures described in Section 2.1.2, we do not expect that any listed marine mammals will be exposed to sound levels loud enough, long enough, or at distances close enough for the proposed action to cause Level A harassment. Across all eight USCG facilities, we expect no more than 26 exposures of Mexico DPS humpback whales, 75 exposures of fin whales, and 135 exposures of Western DPS Steller sea lions to sound levels sufficient to cause Level B harassment, as described in Section 6.2.2. All Level B instances of take are expected to occur at received levels greater than 120 dB and 160 dB for non-impulsive and impulsive sound sources, respectively.

The introduction of anthropogenic sound into the aquatic environment from pile driving and DTH activities are the primary means by which marine mammals may be harassed from project activities covered in this opinion. In general, animals exposed to natural or anthropogenic sound may experience physical and physiological effects, ranging in magnitude from none to severe (Southall et al. 2007a). Exposure to anthropogenic sound can also lead to non-observable physiological responses such as an increase in stress hormones. Additional sound in a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions such as communication and predator and prey detection.

Exposure to pile driving/removal and DTH sound has the potential to result in auditory threshold shifts and behavioral reactions (e.g., avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior). The effects of pile driving/removal and DTH sound on marine mammals are dependent on several factors, including, but not limited to, sound type (e.g., impulsive vs. non-impulsive), the species, age and sex class (e.g., adult male vs. cow with calf), duration of exposure, the distance between the pile and the animal, received levels, behavior at time of exposure, and previous history with exposure (Wartzok et al. 2003, Southall et al. 2007a). Here we discuss physical auditory effects (threshold shifts) followed by behavioral effects.

#### 6.3.1.1 *Threshold Shifts*

NMFS defines a sound -induced threshold shift (TS) as a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS 2018b). In other words, a threshold shift is a hearing impairment, and may be temporary (such as ringing in your ears after a loud rock concert) or permanent (such as the loss of the ability to hear certain frequencies or partial or complete deafness). There are numerous factors to consider when examining the consequence of TS, including: the signal’s temporal pattern (e.g., impulsive or non-impulsive); likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS; the magnitude of the TS; time to recovery; the frequency range of the exposure (i.e., spectral content); the hearing and vocalization frequency range of the exposed species relative to the signal's frequency spectrum (i.e., how an animal uses sound within the frequency band of the signal; (Kastelein et al. 2014); and the overlap between the animal and the sound (e.g., spatial, temporal, and spectral; (NMFS 2018b)). The amount of threshold shift is customarily expressed in dB.

*Temporary Threshold Shift*

Temporary threshold shift (TTS) is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter 1970). While experiencing TTS, the hearing threshold rises, and a sound must be stronger in order to be heard. In terrestrial mammals, TTS can last from minutes to days (in cases of strong TTS). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the sound ends. Few data exist on the sound levels and durations necessary to elicit mild TTS in marine mammals, and none of the published data describe TTS elicited by exposure to multiple pulses of sound. Available data on TTS in marine mammals are summarized in Southall et al. (2007a).

Although some Level B exposures may occur during the course of the proposed action, not all instances of Level B take will result in TTS because the estimated sound thresholds for the onset of TTS are conservative. If TTS does occur, it is expected to be mild and temporary and not likely to affect the long-term fitness of the affected individuals.

*Permanent Threshold Shift*

When permanent threshold shift (PTS) occurs, there is physical damage to the sound receptors in the ear. The animal will have an impaired ability to hear sounds in specific frequency ranges, and there can be total or partial deafness in severe cases (Kryter 1985). There is no specific evidence that exposure to pulses of sound can cause PTS in any marine mammal. However, given the possibility that mammals close to a sound source can incur TTS, it is possible that some individuals will incur PTS. Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage, but repeated or (in some cases) single exposures to a level well above that causing the onset of TTS might elicit PTS.

Relationships between TTS and PTS thresholds have not been studied in marine mammals but are assumed to be similar to those in humans and other terrestrial mammals, based on anatomical similarities. PTS might occur at a received sound level at least several decibels above that which induces mild TTS, if the animal were exposed to strong sound pulses with rapid rise time. For non-impulsive exposures (i.e., vibratory pile driving), a variety of terrestrial and marine mammal data sources indicate that threshold shift up to 40 to 50 dB may be induced without PTS, and that 40 dB is a conservative upper limit for threshold shift to prevent PTS. An exposure causing 40 dB of TTS is, therefore, considered equivalent to PTS onset (NMFS 2018b).

For the proposed actions, no exposures are expected at levels resulting in PTS due to estimates of Level A isopleths and mitigation measures to shut down pile driving activities if a humpback or fin whale or Steller sea lion approaches a Level A zone.

#### 6.3.1.2 *Non-auditory Physiological effects*

Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, internal bubble formation, resonance effects, and other types of organ or tissue damage (Cox et al. 2006, Southall et al. 2007a). Studies examining such effects are limited. In general, little is known about the potential for pile driving activities to cause auditory impairment or other physical effects in marine mammals. Available data suggest that such effects, if they occur at all, would presumably be limited to short distances from the sound source and to activities that extend over a prolonged period of time. The available data do not allow identification of a specific exposure level above which non-auditory effects can be expected (Southall et al. 2007a) or any meaningful quantitative predictions of the numbers (if any) of marine mammals that might be affected in those ways. Marine mammals that show behavioral avoidance of pile driving are especially unlikely to incur auditory impairment or non-auditory physical effects.

An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (Moberg 2000). In many cases, an animal's first, and sometimes most economical (in terms of energetic costs), response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and "distress" is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments and for both laboratory and free-ranging animals (Jessop et al. 2003, Lankford et al. 2005, Crespi et al. 2013). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker 2000, Romano et al. 2002) and, more rarely, studied in wild populations (Romano et al. 2002). For example, sound reduction from reduced ship traffic in the Bay of Fundy following September 11, 2001 was linked to a significant decline in fecal stress hormones in North Atlantic right whales, suggesting that chronic exposure to increased sound levels, although not acutely injurious, can produce stress (Rolland et al. 2012). These stress hormones returned to their previous level within 24 hours after the resumption of shipping traffic. Exposure to loud sound can also adversely affect reproductive and metabolic physiology (Kight and Swaddle 2011). In a variety of factors, including behavioral and physiological responses, females appear to be more sensitive or respond more strongly than males (Kight and Swaddle 2011).

These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as "distress". In addition, any animal experiencing TTS would likely also experience stress responses (NRC 2003).

The estimated 395 days of in-water activities across all eight USCG facilities will be staggered over five years and occur for a limited amount of time each year (Table 1), thus limiting the potential for chronic stress. Humpback or fin whales or Steller sea lions that show behavioral avoidance of pile driving and DTH are especially unlikely to incur auditory impairment or non-auditory physical effects because they will be limiting the duration of their exposure.

#### 6.3.1.3 *Behavioral Responses*

Behavioral responses are influenced by an animal's assessment of whether a potential stressor poses a threat or risk. Behavioral responses may include: changing durations of surfacing and dives, number of blows per surfacing, or changing direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where sound sources are located; and/or, flight responses.

Disturbance includes a variety of effects, including subtle changes in behavior, more conspicuous changes in activities, and displacement. Behavioral responses to sound are highly variable and context-specific, and reactions, if any, depend on species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day, and many other factors (Southall et al. 2007a).

Tolerance of a stressor can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok et al. 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. Behavioral state may affect the type of response as well. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson et al. 1995, NRC 2003, Wartzok et al. 2003).

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway et al. 1997, Finneran, Carder and Ridgway 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices, but also including pile driving) have been varied but often consist of avoidance behavior or other behavioral changes, suggesting discomfort (Morton and Symonds 2002, Wartzok et al. 2003, Thorson and Reyff 2006, Nowacek et al. 2007). Responses to non-impulsive sound, such as vibratory pile installation, have not been documented as fully as responses to pulsed sounds.

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification could be biologically significant if the change affects growth, survival, or fitness. Significant behavioral modifications that could potentially lead to effects on growth, survival, or fitness include:

- Drastic changes in diving/surfacing patterns;

- Longer-term habitat abandonment due to loss of desirable acoustic environment;
- Longer-term cessation of feeding or social interaction; and,
- Cow/calf separation.

The onset of behavioral disturbance from anthropogenic sound depends on both external factors (characteristics of sound sources and their paths) and the specific characteristics of the receiving animals (hearing, motivation, experience, demography), and is difficult to predict (Southall et al. 2007a). Humpback and fin whales and Steller sea lions are expected to exhibit some of these behavioral responses to the proposed action.

6.3.1.4 *Auditory Masking*

Natural and artificial sounds can disrupt behavior by masking, or interfering with, a marine mammal's ability to hear other sounds. Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher levels. Chronic exposure to excessive, though not high-intensity, sound could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions. Masking can interfere with detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired from maximizing their performance or fitness in survival and reproduction. If the coincident (masking) sound were anthropogenic, it could be potentially harassing if it disrupted hearing-related behavior. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs only during the sound exposure. Because masking (without resulting in threshold shift) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

Masking occurs at the frequency band the animals utilize, so the frequency range of the potentially masking sound is important in determining any potential behavioral impacts. Lower frequency man-made sounds are more likely to affect detection of communication calls and other potentially important natural sounds such as surf and prey sound. Anthropogenic sounds may also affect communication signals when both occur in the same sound band and thus reduce the communication space of animals (Clark et al. 2009), and cause increased stress levels (Foote, Osborne and Hoelzel 2004, Holt et al. 2009).

Masking has the potential to affect species at the population or community levels as well as at individual levels. Masking affects both senders and receivers of the signals and can potentially have long-term chronic effects on marine mammal species and populations. Recent research suggests that low frequency ambient sound levels have increased by as much as 20 dB (more than a three-fold increase in terms of SPL) in the world's ocean from pre-industrial periods, and that most of these increases are from distant shipping (Hildebrand 2009). All anthropogenic sound sources, such as those from vessel traffic, pile driving, and dredging activities, contribute to the elevated ambient sound levels, thus intensifying masking.

Sound from pile driving and DTH activities is relatively short-term. It is possible that pile driving and DTH sound resulting from this proposed action may mask acoustic signals important to Mexico DPS humpback and fin whales, and WDPS Steller sea lions. However, the limited affected area and infrequent occurrence of humpback and fin whales in many of the USCG facilities action areas would result in insignificant impacts from masking.

Masking is likely less of a concern for Steller sea lions, which vocalize both in air and water and do not echolocate or communicate with complex underwater "songs". Any masking event that could possibly rise to MMPA Level B harassment of sea lions would occur concurrently within the zones of behavioral harassment already estimated for pile driving activities, which have already been taken into account in the Exposure Analysis.

#### 6.3.1.5 *Change in dive, respiration, vocalizations, or feeding behavior*

Available studies show wide variation in response to underwater sound; therefore, it is difficult to predict specifically how any given sound in a particular instance might affect marine mammals perceiving the signal. If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (Lusseau and Bejder 2007). This highlights the importance of assessing the context of the acoustic effects alongside the estimated received levels. Severity of effects from a response to acoustic stimuli can likely vary based on the context in which the stimuli were received, particularly if it occurred during a biologically sensitive temporal or spatial point in the life history of the animal. There are broad categories of potential responses, which we describe in greater detail here, that include alteration of dive behavior, alteration of foraging behavior, effects to breathing, interference with or alteration of vocalization, avoidance, and flight.

Changes in dive behavior can vary widely, and may consist of increased or decreased dive times and surface intervals, as well as changes in the rates of ascent and descent during a dive (Frankel and Clark 2000). Variations in dive behavior may reflect interruptions in biologically significant activities (e.g., foraging) or they may be of little biological significance. The impact of an alteration to dive behavior resulting from an acoustic exposure depends on what the animal is doing at the time of the exposure and the type and magnitude of the response.

Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (e.g., bubble nets or sediment plumes), or changes in dive behavior. As for other types of behavioral responses, the frequency, duration, and temporal pattern of signal presentation, as well as differences in species sensitivity, are likely contributing factors to differences in response in any given circumstance (Croll et al. 2001a). A determination of whether foraging disruptions incur fitness consequences would require information or estimates of the energetic requirements of the affected individuals and the relationship between prey availability, foraging effort and success, and the life history stage of the animal.

Rates of respiration naturally vary with different behaviors, and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may indicate annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater sound when determining the potential for impacts resulting from anthropogenic sound exposure (Kastelein et al. 2001).

Based on this analysis, we expect Mexico DPS humpback whales, fin whales, and WDPS Steller sea lions to continue foraging in the face of moderate levels of disturbance. For example, humpback whales, which only feed during part of the year and must satisfy their annual energetic needs during the foraging season, may continue foraging in the face of disturbance in the action areas. Similarly, a humpback cow accompanied by her calf is less likely to flee or abandon an area at the cost of her calf's survival. We also expect that these animals could resume foraging close by if the in-water sound associated with the proposed action causes them to avoid the action area. The proposed action is not expected to result in WDPS Steller sea lions moving to a different haulout, but could cause them to temporarily move to different foraging areas near the action area. It is likely some change in dive, respiration, or feeding behavior of Mexico DPS humpback whales, fin whales, and WDPS Steller sea lions may occur in the eight action areas, but we do not expect much change in these behaviors. Any change in behavior that could rise to Level B harassment under the MMPA is included within the zones of behavioral harassment estimated in Table 2, and have been taken into account in the exposure analysis.Effects of Sound on Sunflower Sea Stars

#### 6.1.3.6 *Effects of Sound on Sunflower Sea Stars*

While there is a paucity of literature on the effects of loud underwater sounds on sunflower sea stars, there are a few studies that look at the effects of loud sounds on other echinoderms. We don't know whether sunflower sea stars possess underwater vibration receptors that could be affected by loud sounds. However, we do know that they possess no gas bladder, as most fish do. With no gas bladder, the number of ways a sunflower sea star could be affected by pile driving and DTH sound is limited. The consensus of the available studies is that continuous loud sound exposure (>140 dB) can cause echinoderms such as sea urchins to have increased levels of stress related hormones (Vazzana et al. 2020, Solé et al. 2023). However, there is no information about whether the increase in these hormones have any impact on the behavior or survival of echinoderms. Furthermore, there are currently no studies that suggest sea stars, or more specifically sunflower sea stars, have this response. Therefore, we conclude that, based on the best available information that we have, adverse effects of acoustic disturbance from pile repair and replacement activities on sunflower sea stars will be insignificant, if thre are any effects at all.

### 6.3.2 Response Analysis Summary

Probable responses of humpback and fin whales, and Steller sea lions to repair and replacement of piles through pile removal, installation, and DTH include TTS, increased stress, and/or short-term behavioral disturbance reactions such as changes in activity and vocalizations, masking, avoidance or displacement, or tolerance. These reactions and behavioral changes are expected to be temporary and subside quickly when the exposure ceases. The primary mechanism by which these behavioral changes may affect the fitness of individual animals is through the animals' energy budget, time budget, or both (the two are related because foraging requires time). We expect most animals would leave the area during pile driving activities if they were disturbed. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to increase the energy budgets of humpback and fin whales and Steller sea lions, and their probable exposure to sound sources are not likely to reduce their fitness.

## 7. CUMULATIVE EFFECTS

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

We searched for information on non-Federal actions reasonably certain to occur in the action area. We did not find any information about non-Federal actions other than what has already been described in the Environmental Baseline (Section 5 of this Opinion). All of the environmental factors we considered – sound, fisheries interactions, pollutants and contaminants, vessel interactions, coastal development and subsistence harvest – are expected to continue in the future. As discussed in Section 5, all of the USCG facilities included in this Opinion are important hubs for fishing and vessel traffic. These factors in turn contribute to local soundscapes, pollutants and contaminants entering the environment, and continued coastal development as new areas are utilized by an every-growing human population. Additionally, subsistence harvest of marine mammals by Alaska Natives has been taking place since time immemorial and is expected to continue for many generations to come.

Some continuing non-Federal activities are reasonably certain to contribute to climate change within the action area. However, it is difficult if not impossible to distinguish between the action areas' future environmental conditions caused by global climate change that are properly part of the environmental baseline versus cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action areas are described in the Status of the Species and Environmental Baseline (Sections 4 and 5).

Reasonably foreseeable future state, local, or private actions include activities that relate to different scenarios of disturbance from vessel traffic: tourism, transportation, and commercial fishing.

### 7.1 Vessel Traffic and Tourism

The action areas at all eight USCG facilities experience moderate to heavy levels of marine vessel traffic year-round with anywhere from 400 (Base Kodiak) to 15,000 (Moorings Sitka) large vessel transits per year(AOOS 2020). Marine vessels that use the action areas include cruise ships, passenger ferries, whale watching tour boats, charter and commercial fishing vessels, barges, freight vessels, recreational vessels, and kayaks. In 2019, Juneau and Ketchikan ranked as the two ports with the highest volume of cruise passengers at 1.3 and 1.2 million, respectively (McDowell Group 2020). Seward, Sitka, and Valdez all also made the list of ports with more than 10 thousand cruise passengers in 2019. From 2018 to 2019, there was an 18% increase in the total number of cruise passengers to Alaskan ports (McDowell Group 2020). Though cruises practically ceased in 2020 and into 2021 due to the pandemic, preliminary numbers for 2022 suggest that ~1.15 million cruise passengers came to Alaska. Larger vessels and longer seasons have the potential to bring many more passengers close to USCG facilities in Seward, Valdez, Juneau, Sitka, and Ketchikan each year, which could have effects on listed species.

It is unknown whether overall vessel traffic or shipping will increase in the future, as this depends largely on economics, tourism, and other factors, but it is unlikely to decrease significantly. As a result, there will be continued risk to marine mammals of ship strikes, exposure to vessel sound and presence, and small spills.

### 7.2 Fishing

Fishing, a major industry in Alaska, is expected to continue near many of the USCG facilities considered in this project, especially near Base Kodiak, Moorings Seward, Valdez, Cordova, Sitka, and Petersburg. As a result, there will be continued risk to marine mammals of prey competition, ship strikes, harassment, and entanglement in fishing gear. NMFS assumes that ADFG will continue to manage fish stocks and monitor and regulate fishing under their jurisdiction to maintain sustainable stocks. It remains unknown whether, and to what extent, marine mammal prey may be less available due to commercial, subsistence, personal use, and sport fishing. In addition, we do not know the full extent of the effects of fishing vessel traffic on availability of prey to listed species.

There are currently no other known state or private activities reasonably certain to occur in the action areas that may affect listed species and are not subject to section 7 consultation. We expect tourism, fisheries harvest, sound, pollutants and discharges, and vessel traffic will continue into the future at similar or higher levels than present.

## 8. INTEGRATION AND SYNTHESIS

The Integration and Synthesis section is the final step of NMFS's assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 6) to the environmental baseline (Section 5) and the cumulative effects (Section 7) to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) result in appreciable reductions in the likelihood of both the survival or recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) result in the adverse modification or destruction of critical habitat as measured through direct or indirect alterations that appreciably diminish the value of designated critical habitat as a whole for the conservation of the species. These assessments are made in full consideration of the status of the species (Section 4).

As we discussed in the *Approach to the Assessment* section of this opinion, we begin our risk analyses by asking whether the probable physical, physiological, behavioral, or social responses of endangered or threatened species are likely to reduce the fitness of endangered or threatened individuals or the growth, annual survival or reproductive success, or lifetime reproductive success of those individuals.

As part of our risk analyses, we identified and addressed all potential stressors and considered all consequences of exposing listed species to all the stressors associated with the proposed action, individually and cumulatively, given that the individuals in the action area for this consultation are also exposed to other stressors in the action area and elsewhere in their geographic range.

### 8.1 Humpback and Fin Whale Risk Analysis

Based on the results of the exposure analysis, we expect a maximum of 814 humpback whales may be exposed to sound from pile repair and replacement activities across all eight USCG facilities. Depending on the specific location of the facility, either 11 percent or 2 percent of these whales are expected to be from the Mexico DPS, for a maximum of 26 whales from this DPS expected to be exposed across all facilities and years. Our exposure analysis also indicates that we expect a maximum of 75 fin whales to be exposed to sound from pile repair and replacement across all eight USCG facilities.

Exposure to adverse effects from vessel disturbance and vessel sound are likely to be insignificant due to the limited amount and duration of vessel traffic expected to occur and the baseline amount of vessel sound present at each of the USCG facilities. Adverse effects from vessel strikes are considered extremely unlikely to occur because there will be very few project-specific vessels at each facility, these vessels will be traveling very short distances at very slow speeds, and there are existing regulations and mitigation measures regarding approaching whales that will be followed by vessel operators.

Disturbance to seafloor, habitat, and prey resources are not expected to adversely affect humpback whales because these disturbances are temporary, and the action area is not important habitat to humpback whales for foraging, migrating, breeding, or other essential life functions. Adherence to mitigation measures, Clean Water Act regulations, and other BMPs described in 4.1.3.1 in USCG (2022a) is expected to minimize the risk of exposure of humpback whales to the potential introduction of pollutants into the action area.

Sound from pile driving activities may cause responses from humpback and fin whales such as brief startle reactions or short-term behavioral modification. These reactions are expected to subside quickly when the exposure to pile driving sound ceases. The primary mechanism by which the behavioral changes we have discussed affect the fitness of individual animals is through the animals' energy and time budget. Large whales such as humpback and fin whales have an ability to survive for months on stored energy during migration and while in their wintering areas, and their feeding patterns allow them to acquire energy at high rates. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to reduce the energy budgets of humpback or fin whales, and their probable exposure to project-related sound is not likely to reduce their fitness.

The areas of each of the eight USCG facilities are not known to be highly utilized by humpback and fin whales in general, and especially during the proposed construction seasons, which is the strongest evidence supporting the conclusion that the proposed action will likely have minimal impact on humpback whale populations. Sound from the proposed action could discourage Mexico DPS humpback whales and fin whales from feeding in the action areas during some proposed activities, but any such effects would be brief and the affected whales would likely find other comparable foraging opportunities in the vicinity. Although climate change has the potential to impact humpback and fin whales through reduced prey abundance or availability, the rapidly increasing numbers of humpback whales especially in Southeast and other parts of Alaska suggest that climate change is not negating population growth.

Therefore, the exposures from this action are not likely to reduce the abundance, reproduction rates, or growth rates (or significantly increase variance in one or more of these rates) of the humpback and fin whale populations those individuals represent. The implementation of mitigation measures (including shutdown zones) to reduce exposure to high levels of sound decrease the likelihood of a behavioral response that may affect vital functions, or cause TTS or PTS of humpback and fin whales. Based on the best information currently available, the proposed action is not expected to appreciably reduce the likelihood of survival and recovery of Mexico DPS humpback whales or fin whales.

### 8.2 WDPS Steller Sea Lion Risk Analysis

Based on the results of the exposure analysis, we expect that 135 WDPS Steller sea lions may be exposed to sound from pile repair and replacement across all USCG facilities. These estimates represent the maximum number of takes that may be expected to occur, but not necessarily the number of individuals taken, as a single individual may be taken multiple times over the course of the proposed action. Sound from pile repair and replacement activities is likely to cause some individual Steller sea lions to experience changes in their behavioral states that might have adverse consequences (Frid and Dill 2002). However, these responses are not likely to alter the physiology, behavioral ecology, or social dynamics of individual Steller sea lions in ways or to a degree that would reduce their fitness.

Commercial fishing likely affects prey availability throughout much of the Western DPS's range, and causes a small number of direct mortalities each year. Predation has been considered a threat to this DPS, and may remain so in the future. Subsistence hunting occurs at fairly low levels for this DPS. Illegal shooting is also a continuing threat, but the number of illegally shot sea lions found in the region to date is relatively low and has not precluded or measurably delayed recovery of the species.

Exposure to non-biodegradable marine debris, specifically to debris that can cause entanglement, remains an unquantifiable risk, but associated effects from this project will be immeasurably small. Best practices regarding waste management (cutting loops prior to disposal) will further reduce the impact of debris on Steller sea lions. Any increases in turbidity or seafloor disturbance will be temporary and localized, and have an immeasurably small effect, if any, upon Steller sea lions. Based on the localized nature of small oil spills, the relatively rapid weathering expected, and the safeguards in place to avoid and minimize oil spills, we conclude that the probability of the proposed action causing a small oil spill and exposing Western DPS Steller sea lions is extremely small, and thus the effects are considered highly unlikely to occur.

Exposure to vessel noise and presence, marine debris, seafloor disturbance and turbidity, and small oil spills may occur, but such exposure will have a very small impact, and we conclude that these stressors will not result in take of Steller sea lions. The temporary increase in ship traffic due to the proposed action is unlikely to result in a vessel strike. Project vessels will be traveling at slow speeds, the increase in vessel traffic will be small, and vessel strike is not considered a significant concern for Steller sea lions (only four reports of potential vessel strikes involving Steller sea lions have been reported in Alaska).

It is difficult to estimate the behavioral responses, if any, that WDPS Steller sea lions may exhibit to underwater sounds generated by project activities at the sites where they are expected to occur (i.e., all sites except Moorings Petersburg and Base Ketchikan). Though the sounds produced during project activities may not greatly exceed levels that Steller sea lions already experience at any of the given USCG facilities, the sources proposed for use in this project are not among sounds to which they are commonly exposed. In response to project-related sounds, some Steller sea lions may move out of the area or change from one behavioral state to another, while other Steller sea lions may exhibit no apparent behavioral changes at all.

The primary mechanism by which the behavioral changes may affect the fitness of individual animals is through the animal’s energy budget, time budget, or both. Most adult Steller sea lions occupy rookeries during the pupping and breeding season, which extends from late May to early July (NMFS 2008a). There are no rookeries within the 20nm aquatic zone of any USCG site and though there are two haulouts near Base Kodiak and one haulout near Moorings Seward within the 20 nm aquatic zone, the natural surrounding geography will make it highly unlikely that project-related sound will reach these areas. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to measurably reduce the energy budgets of Steller sea lions in the eight action areas.

The probable responses (i.e., tolerance, avoidance, short-term masking, and short-term vigilance behavior) to close approaches by vessel operations and their probable exposure to sound from pile repair and replacement activities are not likely to reduce the current or expected future reproductive success or reduce the rates at which Steller sea lions grow, mature, or become reproductively active. Therefore, these exposures are not likely to reduce the abundance, reproduction rates, or survival and growth rates of the population those individuals represent.

The implementation of mitigation measures (including shutdown zones) to reduce exposure to high levels of sound decrease the likelihood of a behavioral response that may affect vital functions, or cause TTS or PTS of Steller sea lions. Based on the best information currently available, the proposed action is not expected to appreciably reduce the likelihood of survival or recovery of WDPS Steller sea lions.

### 8.3 Sunflower Sea Star Risk Analysis

Little is known about how sunflower sea stars respond to underwater sound. As concluded in section 6.3.1.5, we expect any effects of sound on sea stars from the proposed action to be insignificant, if there are any effects at all. The primary risks to sea stars from this action are direct pile contact and direct human contact, if sea stars are present in the 20 m shutdown zones. We calculated that less than one sea star might be struck by direct pile contact at the site with the largest number of piles to be replaced (Base Kodiak), which suggests that across all sites, we would expect less than eight sea stars to be directly impacted by pile contact.

Sea stars may also be impacted by direct human contact during pre-construction site inspections. If a sea star is found in the 20 m shutdown zone of a pile that will be repaired or replaced, it will be moved to 100 m outside of the shutdown zone. Based on the size of the Level A shutdown zones estimated for each site (see Table 8 and section 6.1.1.6), and assuming a density of 0.04 sea stars/$m^2$, we estimate that a maximum of 13,182 sea stars could be impacted by direct human contact across all eight USCG facilities.

Across all sites included in this action, it is anticipated that sea stars may be impacted by either direct pile or human contact in 7,225 $m^2$ (1.79 acres). Compared to the amount of habitat the species can occupy throughout Alaska and other parts of its range (e.g., low intertidal and subtidal zones down to 435 m, but most common above 25 m), and the expected non-lethal impacts of direct human contact, the proposed action is not expected to decrease the likelihood of survival or recovery of the sunflower sea star.

## 9. CONCLUSION

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS's biological opinion that the proposed action is not likely to jeopardize the continued existence of Mexico DPS humpback whales, fin whales, WDPS Steller sea lions, or sunflower sea stars and is not likely to adversely affect designated Mexico DPS humpback whale or Steller sea lion critical habitat.

## 10. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA prohibits the take of endangered species unless there is a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 U.S.C. § 1532(19)). "Incidental take" is defined as take that results from, but is not the purpose of, the carrying out of an otherwise lawful activity conducted by the action agency or applicant (50 CFR § 402.02). Based on NMFS guidance, the term "harass" under the ESA means to: "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016). The MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment] (16 U.S.C. § 1362(18)(A)(i) and (ii)). For this consultation, the USCG and NMFS Permits Division anticipates that any take of Mexico DPS humpback whales, fin whales, WDPS Steller sea lions, and sunflower sea stars will be by Level B harassment only. No Level A takes are contemplated or authorized.

The ESA does not prohibit the take of threatened species unless special regulations have been promulgated, pursuant to ESA section 4(d), to promote the conservation of the species. Federal regulations promulgated pursuant to section 4(d) of the ESA extend the section 9 prohibitions to the take of Mexico DPS humpback whales (50 C.F.R. § 223.213). ESA section 4(d) rules are not being proposed for the sunflower sea star at this time; therefore, ESA section 9 take prohibitions might not apply to this species. This ITS includes numeric limits on the take of sunflower sea stars because specific amounts of take were analyzed in our jeopardy analysis. These numeric limits provide guidance to the action agency on its requirement to re-initiate consultation if the amount of take estimated in the jeopardy analysis of this biological opinion is exceeded. This ITS includes reasonable and prudent measures and terms and conditions designed to minimize and monitor take of this proposed-threatened species.

Under the terms of section 7(b)(4) and section 7(o)(2) of the ESA, taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement (ITS).

Section 7(b)(4)(C) of the ESA provides that if an endangered or threatened marine mammal is involved, the taking must first be authorized by section 101(a)(5) of the MMPA. Accordingly, **the terms of this incidental take statement and the exemption from section 9 of the ESA become effective only upon the issuance of MMPA authorization to take the marine mammals identified here**. Absent such authorization, this incidental take statement is inoperative.

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. USCG and NMFS Permits Division have a continuing duty to regulate the activities covered by this ITS. In order to monitor the impact of incidental take, USCG and NMFS Permits Division must monitor and report on the progress of the action and its impact on the species as specified in the ITS (50 CFR § 402.14(i)(3)). If USCG and NMFS Permits Division (1) fail to require the permit holder to adhere to the terms and conditions of the ITS through enforceable terms that are added to the authorization, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

## 10.1 Amount or Extent of Take

Section 7 regulations require NMFS to estimate the number of individuals that may be taken by proposed actions or utilize a surrogate (e.g., other species, habitat, or ecological conditions) if we cannot assign numerical limits for animals that could be incidentally taken during the course of an action (50 CFR § 402.14(i)(1); see also 80 FR 26832; May 11, 2015).

The taking of Mexico DPS humpback and fin whales, and WDPS Steller sea lions will be by incidental harassment only. The taking by serious injury or death is prohibited and will result in the modification, suspension, or revocation of the ITS. Table 11 lists the amount and timing of authorized take (incidental take by harassment) for this action. The method for estimating the number of listed species exposed to sound levels expected to result in Level B harassment is described in Section 6.2. NMFS expects that 814 instances of Level B harassment of humpback whales may occur across all eight USCG facilities. While we are only authorizing take of 26 Mexico DPS humpback whale under the ESA, we will consider the ESA-authorized take limit to be exceeded when the MMPA-authorized limit on Level B take of humpback whales is exceeded, as it is impossible to distinguish between DPSs in the field. NMFS expects that 75 instances and 135 instances of Level B harassment of fin whales and WDPS Steller sea lions, respectively, may occur.

Pile driving activities will be halted as soon as possible when it appears a humpback or fin whale, or Steller sea lion is approaching the Level A shutdown zone and before it reaches the Level A isopleth. No Level A take of marine mammals is authorized in this biological opinion (Table 13).

**Table 14. Incidental take of ESA-listed species authorized across the eight USCG facilities over five years.**

| Species | Proposed Authorized Level A Takes | Proposed Authorized Level B Takes | Proposed Takes (non-mammals) |
|---|---|---|---|
| Mexico DPS Humpback whale (*Megaptera novaeangliae*) | 0 | 26 | 0 |
| Fin whale (*Balaenoptera physalus*) | 0 | 75 | 0 |
| Western DPS Steller sea lion (*Eumetopias jubatus*) | 0 | 135 | 0 |
| Sunflower sea star (*Pycnopodia helianthroides*) | 0 | 0 | 13,182 |

## 10.2 Effect of the Take

In Section 9 of this opinion, NMFS determined that the level of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the ESA-listed species or destruction or adverse modification of critical habitat.

The takes from the proposed action are associated with behavioral harassment from pile driving and DTH activities. Although the biological significance of behavioral responses remains unknown, this consultation has assumed that exposure to these activities might disrupt one or more behavioral patterns that are essential to an individual animal's life history. However, any behavioral responses of these whales and pinnipeds to sound sources and any associated disruptions are not expected to affect the fitness of any individuals of these species, the viability of the population, or the species' survival or recovery.

We estimate that the proposed activities could affect 13,182 sunflower sea stars as they are removed from the shutdown zone prior to in-water work. The current range-wide (i.e., global) population estimate for the sunflower sea star is nearly 600 million individuals, based on a compilation of the best available science and information (Gravem et al. 2021). This is 0.000022% of the population. Take prohibitions have not been proposed for this species at this point.

## 10.3 Reasonable and Prudent Measures

Reasonable and prudent measures (RPMs) are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take." (50 CFR 402.02). Failure to comply with RPMs (and the terms and conditions that implement them) may invalidate the take exemption and result in unauthorized take.

RPMs are distinct from the mitigation measures that are included in the proposed action (described in Section 2.1.2). We presume that the mitigation measures will be implemented as described in this opinion. The failure to do so will constitute a change to the action that may require reinitiation of consultation pursuant to 50 CFR § 402.16.

The RPMs included below, along with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. NMFS concludes that the following RPMs are necessary and appropriate to minimize or to monitor the incidental take of Mexico DPS humpback whales, fin whales, and WDPS Steller sea lions resulting from the proposed action.

1. The USCG and NMFS Permits Division will conduct operations in a manner that will minimize impacts to Mexico DPS humpback whales, fin whales, and WDPS Steller sea lions that occur within or in the vicinity of the action areas at each USCG facility.
2. The USCG and NMFS Permits Division will implement a comprehensive monitoring program to ensure that Mexico DPS humpback whales, fin whales, and WDPS Steller sea lions are not taken in numbers or in a manner or in amounts not anticipated by this opinion, and to submit a final report to NMFS AKR evaluating the mitigation measures and the results of the monitoring program.

## 10.4 Terms and Conditions

"Terms and conditions" implement the reasonable and prudent measures (50 CFR § 402.14(i)(2)).

In order to be exempt from the prohibitions of section 9 of the ESA, the action agencies must comply (or must ensure that any applicant complies) with the following terms and conditions. These terms and conditions are in addition to the mitigation measures included in the proposed action, as set forth in Section 2.1.2 of this opinion. The USCG and NMFS Permits Division or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR § 402.14(i)(3))).

Any taking that is in compliance with these terms and conditions is not prohibited under the ESA (50 CFR § 402.14(i)(5)). As such, partial compliance with these terms and conditions may invalidate this take exemption and result in unauthorized, prohibited take under the ESA. If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the action may lapse.

These terms and conditions constitute no more than a minor change to the proposed action because they are consistent with the basic design of the proposed action.

To carry out RPM #1, the USCG and NMFS Permits Division, or its authorization holder, must:

1.1 Implement all mitigation measures, including observation and shut down zones and other requirements, as described in the final IHA and the marine mammal monitoring and mitigation plan.

To carry out RPM #2, the USCG and NMFS Permits Division, or its authorization holder, must:

2.1 Through the use of PSOs, ensure that marine mammals are not present within the relevant activity-specific Level B monitoring zones for pile repair, removal, and installation for at least 30 minutes immediately prior to initiation of the in-water activity (Table 3). If one or more listed species are observed within the Level B monitoring zone, the in-water activity will not begin until the listed species exit the monitoring zone of their own accord, or the monitoring zone has remained clear of listed species for 30 minutes immediately prior to start of activities.

2.2 Report immediately to NMFS AKR (see Table 3 for *Contact Information*) the taking of any ESA-listed marine mammal in a manner other than that described in this ITS.

2.3 Reinitiate consultation following a prohibited take. Any subsequent activities causing incidental take will not be exempt from the take prohibitions of ESA section 9 until consultation is reinitiated. NMFS AKR will work with USCG and NMFS Permits Division to determine what additional actions are necessary to minimize additional prohibited take and ensure ESA compliance.

2.4 Adhere to all monitoring and reporting requirements as detailed in the IHA issued by NMFS under section 101(a)(5) of the MMPA as reflected in the marine mammal monitoring and mitigation plan.

2.5 Submit a project specific report within 90 days of the conclusion of in-water work associated with this project. The report must analyze and summarize marine mammal interactions during this project. The report should be emailed to NMFS AKR at AKR.section7@noaa.gov. This report must also contain information described in the mitigation measures of this opinion.

## 11. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR § 402.02).

For this proposed action, NMFS suggests the following conservation recommendations:

1. Project vessel crews should participate in the WhaleAlert program to report real-time sightings of whales while transiting in the waters of Southeast Alaska and to minimize the risk of vessel strikes. More information is available at https://www.fisheries.noaa.gov/resource/tool-app/whale-alert.
2. Without approaching whales, project vessel crews should attempt to photograph humpback whale flukes and record GPS coordinates of the sightings during transit. These data should be included in the final report submitted to NMFS AKR.
3. Without approaching whales, project vessel crews should attempt to photograph and/or video North Pacific right whales and record GPS coordinates of the sightings during transit. These data should be submitted to NMFS AKR as soon as possible.
4. Without approaching sea lions, project vessel crews should attempt to photograph Steller sea lions when brand numbers are visible and record GPS coordinates of the sightings during transit. These data should be included in the final report submitted to NMFS AKR.
5. USCG should ensure that the entities responsible for conducting the sunflower sea star surveys have practice and expertise with the methodology they use to conduct the survey, prior to conducting the actual surveys. In addition, USCG should invite PRD biologists to the site when a sunflower sea star survey is being conducted or the equipment to do the survey is being tested to enable PRD to better understand the efficacy of the selected methods and equipment.
6. USCG should publish, or make widely available, a report detailing the methodology used and results of the sunflower sea star surveys conducted as part of this proposed action. Those findings will aid other action agencies and future projects in developing protocols for future surveys, and will increase general understanding of sunflower sea star movements and densities across southcentral and southeast Alaska.

In order to keep NMFS's Protected Resources Division informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, USCG and NMFS Permits Division should notify NMFS of any conservation recommendations they implement in their final action.

## 12. REINITIATION OF CONSULTATION

As provided in 50 CFR § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in this opinion, or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount of incidental take is exceeded, section 7 consultation must be reinitiated immediately (50 CFR § 402.14(i)(4)).

# 13. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) (Data Quality Act (DQA)) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

## 13.1 Utility

This document records the results of an interagency consultation. The information presented in this document is useful to USCG and NMFS Permits Division, and the general public. These consultations help to fulfill multiple legal obligations of the named agencies. The information is also useful and of interest to the general public as it describes the manner in which public trust resources are being managed and conserved. The information presented in these documents and used in the underlying consultations represents the best available scientific and commercial information and has been improved through interaction with the consulting agency.

This consultation will be posted on the NMFS Alaska Region website http://alaskafisheries.noaa.gov/pr/biological-opinions/. The format and name adhere to conventional standards for style.

## 13.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

## 13.3 Objectivity

***Standards:*** This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the ESA Consultation Handbook, ESA Regulations, 50 CFR § 402.01 et seq.

***Best Available Information:*** This consultation and supporting documents use the best available information, as referenced in the literature cited section. The analyses in this opinion contain more background on information sources and quality.

***Referencing:*** All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

***Review Process:*** This consultation was drafted by NMFS staff with training in ESA implementation, and reviewed in accordance with Alaska Region ESA quality control and assurance processes.

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