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

Endangered Species Act (ESA) Section 7(a)(2) Biological and Section 7(a)(4) Conference Opinion

Alaska Railroad Corporation Seward Marine Terminal Freight Dock Expansion

NMFS Consultation Number: AKRO-2024-03274

Action Agencies: National Marine Fisheries Service (NMFS), Office of Protected Resources, Permits and Conservation Division; U.S. Army Corps of Engineers (USACE); U.S. Department of Transportation Maritime Administration (MARAD)

Affected Species and Determinations:

ESA-Listed and Proposed 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?
Fin Whale (*Balaenoptera physalus*)	Endangered	Yes	NA	No	NA
Humpback Whale, Mexico DPS (*Megaptera novaeangliae*)	Threatened	Yes	No	No	NA
Humpback Whale, Western North Pacific DPS (*Megaptera novaeangliae*)	Endangered	Yes	No	No	NA
Steller Sea Lion, Western DPS (*Eumetopias jubatus*)	Endangered	Yes	No	No	NA
Sunflower Sea Star (*Pycnopodia helianthoides*)	Proposed Threatened	Yes	NA	No	NA
Blue whale (*Balaenoptera musculus*)	Endangered	No	NA	No	NA
Sei Whale (*Balaenoptera borealis*)	Endangered	No	NA	No	NA
Humpback Whale, Central America DPS (*Megaptera novaeangliae*)	Endangered	No	No	No	NA

ESA-Listed and Proposed 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?
Gray Whale, Western North Pacific DPS (*Eschrichtius robustus*)	Endangered	No	NA	No	NA
North Pacific Right Whale (*Eubalaena japonica*)	Endangered	No	No	No	NA
Sperm Whale (*Physeter macrocephalus*)	Endangered	No	NA	No	NA
Killer Whale, Southern Resident DPS *(Orcinus orca)*	Endangered	No	No	No	NA
Cook Inlet Beluga Whale (*Delphinapterus leucas)*	Endangered	No	No	No	NA

Consultation Conducted By: National Marine Fisheries Service, Alaska Region

Issued By: ________________________
Jonathan M. Kurland
Regional Administrator

Date: May 8, 2025

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TERMS AND ABBREVIATIONS

μPa	Micro Pascal
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AKR	Alaska Region
ARRC	Alaska Railroad Corporation
BA	Biological Assessment
CFR	Code of Federal Regulations
CY	Cubic Yard
dB	Decibel
dB re 1μPa	Decibel referenced 1 microPascal
DPS	Distinct Population Segment
DQA	Data Quality Act
EEZ	Exclusive Economic Zone
EPA	Environmental Protection Agency
ERT	Early Review Team
ESA	Endangered Species Act
ESCA	Endangered Species Conservation Act
°F	Fahrenheit
FR	Federal Register
FRN	Federal Register Notice
ft	Feet
HF	High Frequency Cetaceans
Hz	Hertz
IHA	Incidental Harassment Authorization
IPCC	Intergovernmental Panel on Climate Change
ITS	Incidental Take Statement
IWC	International Whaling Commission
kHz	Kilohertz
km	Kilometers
SEL_{24h}	Cumulative Sound Exposure Level
LF	Low Frequency Cetaceans
m	Meter
MARAD	United States Department of Transportation Marine Administration
Mi	Mile
Min	Minute

TERMS AND ABBREVIATIONS

MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
Nm	Nautical Mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
OCSP™	Open Cell Sheet Pile™
OHC	Ocean Heat Content
Opinion	Biological Opinion
OW	Otariid Pinnipeds
Pa	Pascals
PBF	Physical and Biological Features
PCB	Polychlorinated biphenyls
PCE	Primary Constituent Elements
PK SPL	Peak Sound Pressure Level
POP	Persistent organic pollutants
Ppm	Parts Per Million
PTS	Permanent Threshold Shift
PW	Phocid Pinnipeds
RMS	Root Mean Square
RO/RO	Roll-on/Roll-off
SEL	Sound Exposure Level
SSWS	Sea Star Wasting Syndrome
TL	Transmission Loss
TS	Threshold Shift
TTS	Temporary Threshold Shift
UME	Unusual Mortality Event
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Services
VGP	Vessel General Permit
VHF	Very High Frequency Cetaceans
Yd	Yard

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.

Section 7(a)(4) of the ESA provides a mechanism for agencies to conference on species or critical habitat proposed to be listed or designated. While consultations are required when the proposed action may affect listed species, a conference is only required when the proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. However, Federal action agencies may request a conference on any proposed action that may affect proposed species or proposed critical habitat. Conferences follow the same procedures, contents, and format as formal consultation and biological opinion. The incidental take statement provided with a conference opinion does not take effect until the Services adopt the conference opinion as a biological opinion on the proposed action, after the species is listed.

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 FR 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to NMFS' existing practice in implementing section 7(a)(2) of the Act (84 FR at 45015; 89 FR at 24268). We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

In this document, the action agencies are NMFS Office of Protected Resources, Permits and Conservation Division (hereafter referred to as Permits Division), U.S. Army Corps of Engineers (hereafter referred to as USACE), and U.S. Department of Transportation Maritime Administration (hereafter referred to as MARAD). The NMFS Permits Division plans to issue an incidental harassment authorization (IHA) pursuant to section 101(a)(5)(D) of the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.), to the Alaska Railroad Corporation (ARRC) for harassment of marine mammals incidental to the proposed action to expand and improve the existing Seward Marine Terminal Freight Dock (Freight Dock). USACE also plans to issue ARRC a Clean Water Act Section 404 permit and a Rivers and Harbors Act Section 10 permit for the proposed action (POA-2024-00197). MARAD awarded funds to ARRC under the Department of Transportation Better Utilizing Investments to Leverage Development Transportation Discretionary Grants Program for the Freight Dock. The consulting agency for this proposal is NMFS's Alaska Region (AKR). This document represents NMFS AKR's biological and conference opinion (opinion) on the effects of this proposal on endangered, threatened, and proposed species and designated critical habitat.

The opinion and Incidental Take Statement (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 incidental take statement (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 the IHA application and the proposed IHA (90 FR 14792; April 4, 2025. Other sources of information relied upon include consultation communications (emails, phone calls, and virtual meetings), recent consultations completed in the same region, and previous monitoring reports. A complete record of this consultation is on file at NMFS's Alaska, office.

The proposed action involves expansion of the existing ARRC Freight Dock in Seward, Alaska (Figure 1). The dock face will be extended by 114 meters (m; 375 feet [ft]), and the usable width of the new extension will be 91 m (300 ft). The extension will be an OPEN CELL SHEET PILE^{TM} (OCSP^{TM}) bulkhead backed by a rock revetment, consistent with the existing dock. South of the extension, a mooring dolphin and catwalk (new or salvaged) will be installed. The existing dock uplands will also be upgraded and widened to 91 m (300 ft), further expanding the fill footprint and revetment to the east. There will be improvements to the transportation corridor connecting the dock to Alaska's rail and road networks as well.

This opinion considers the effects of pile driving activities (including vibratory and impact pile driving), fill placement, rock revetment installation, and vessel transit of materials and construction barges through habitat occupied by ESA-listed marine mammals and the proposed sunflower sea star. These actions have the potential to affect the endangered blue whale (*Balaenoptera musculus),* endangered fin whale (*Balaenoptera physalus*), endangered sei whale (*Balaenoptera borealis*), threatened Mexico distinct population segment (DPS) humpback whale (*Megaptera novaeangliae*), endangered Western North Pacific DPS humpback whale, endangered Central America DPS humpback whale, endangered Western North Pacific DPS gray whale (*Eschrichtius robustus*), endangered North Pacific right whale (*Eubalaena japonica*), endangered sperm whale (*Physeter macrocephalus*), endangered Southern Resident DPS killer whale (*Orcinus orca*), endangered Cook Inlet DPS beluga whale (*Delphinapterus leucas*), endangered Western DPS Steller sea lion (*Eumetopias jubatus*), Mexico DPS humpback whale critical habitat, Western North Pacific DPS humpback whale critical habitat, Southern Resident DPS killer whale critical habitat, Cook Inlet beluga whale critical habitat, and Steller sea lion critical habitat. In addition, the action agency requested a discretionary conference on the proposed threatened listing of the sunflower sea star (*Pycnopodia helianthoides*; 88 FR 16212; March 16, 2023). The proposed action, including construction activities and vessel transit, will not occur in designated Central America DPS humpback whale critical habitat or Southern Resident DPS killer whale critical habitat, and the action agencies made no effect determinations.

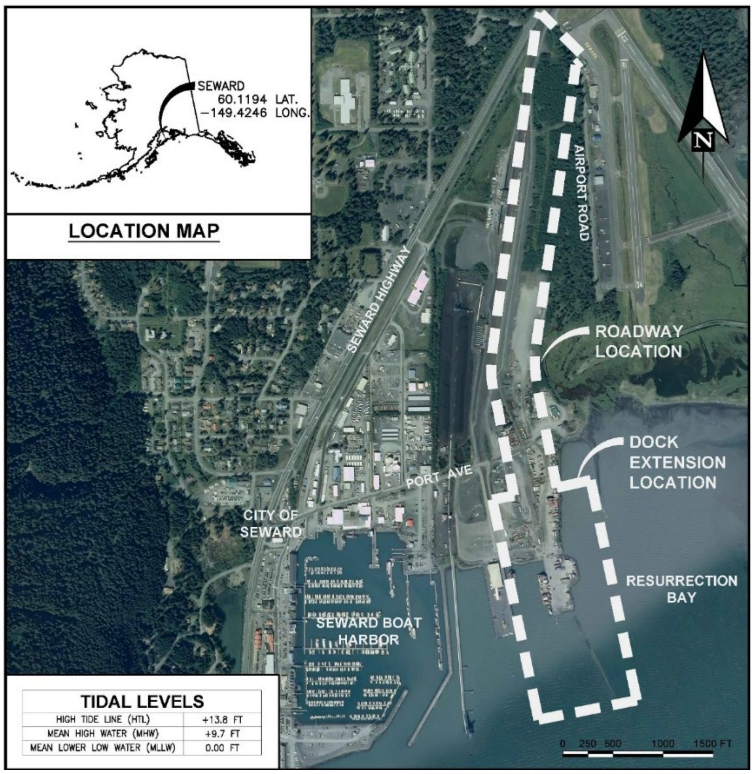

Figure 1. Geographic region of proposed activities.

1.2 Consultation History

- April 23, 2024 – ARRC submitted the Biological Assessment (BA) and request for consultation, as well as the MMPA IHA application
- May 31, 2024 – NMFS Permits Division emailed questions and comments from both NMFS Permits Division and NMFS AKR on the IHA application
- June 28, 2024 – NMFS AKR met with ARRC to discuss species determinations, and emailed questions and comments on the BA
- July 29, 2024 – NMFS AKR met with ARRC to discuss species and critical habitat

determinations along the marine transit route and the effects analysis
- September 30, 2024 – ARRC submitted the revised September IHA application and BA
- October 24, 2024 – NMFS AKR emailed questions and comments on the revised September IHA application and BA
- November 20, 2024 – ARRC submitted draft revised November IHA application and BA
- December 18, 2024 – NMFS AKR provided ARRC draft mitigation measures for review
- December 19, 2024 – Early Review Team (ERT), with participants from the NMFS Permits Division and NMFS AKR, met to discuss the project
- December 19, 2024 – NMFS AKR emailed questions and comments on the draft revised November IHA application and BA
- December 23, 2024 – NMFS Permits Division emailed questions and comments on the draft revised November IHA application
- February 4, 2025 – ARRC submitted the draft revised February IHA application and BA
- February 13, 2025 – NMFS AKR emailed questions and comments on the draft revised February IHA application
- February 14, 2025 – NMFS Permits Division emailed questions and comments on the draft revised February IHA application
- February 18, 2025 – NMFS AKR emailed questions and comments on the draft revised February BA
- March 5, 2025 – ARRC submitted the final revised IHA application
- March 6, 2025 – NMFS Permits Division determined the IHA application was adequate and complete
- March 18, 2025 – ARRC and NMFS AKR agreed upon mitigation measures
- March 25, 2025 – ARRC submitted the draft revised March BA
- March 28, 2025 – NMFS AKR emailed questions and comments on the draft revised March BA
- March 31, 2025 – NMFS AKR received the final BA and request for consultation from ARRC
- March 31, 2025 – NMFS AKR initiated consultation
- April 1, 2025 – NMFS AKR received request for consultation, draft IHA, and proposed Federal Register Notice (FRN) from NMFS Permits Division
- April 4, 2025 – Proposed IHA published in the Federal Register

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 CFR 402.02.

This opinion considers the effects of extending and expanding the ARRC Seward Marine Terminal Freight Dock, which involves pile installation and removal. The project is located in Seward, Alaska at 60.119°N and 149.425°W, and is primarily within the ARRC Seward

Terminal Reserve. The proposed action also includes vessel transit of tug and barges with project equipment and materials to the construction site; the tug and barges will likely deploy from Seattle, Washington and/or Anchorage or Dutch Harbor, Alaska.

Work is expected to commence in November 2026 and last approximately 12 months. In-water pile installation and removal will occur intermittently during the work period, for durations of minutes to hours at a time. The following description of the proposed action derives primarily from the IHA application, the proposed IHA (90 FR 14792; April 4, 2025, and the Biological Assessment.

2.1.1 Proposed Activities

ARRC proposes to expand and improve the existing Freight Dock and associated transportation corridor within the Alaska Railroad Terminal Reserve. The project will improve safety and efficiency for the movement of goods, enhance safety and efficiency of stevedoring activities, preserve the intermodal operations of commercial freight customers, accommodate larger vessels, and enhance the long-term utility of the dock.

The operational area of the existing Freight Dock is limited, with berthing capacity of up to two small-sized vessels or a single medium vessel (approximately 121 m; 400 ft). Typical barge service to Alaska utilizes larger vessels and often side-access roll-on/roll-off (RO/RO) capabilities that improve the efficiency of loading and unloading. The current Freight Dock width does not provide adequate space for side-access RO/RO ramps, nor is it long enough to fully service cargo ships delivering consumer goods and groceries to Alaska. The Freight Dock requires additional berthing capacity to accommodate current vessel operations and modern marine transport system demands. The proposed dock expansion will be able to accommodate 183 m (600 ft) barges or small feeder cargo vessels used for intra-state shipping between Alaskan ports.

ARRC has described the dock expansion in three phases: Phase I extends and armors the existing dock on the west side of the sediment groin (Figure 2) and Phases II and III widen and extend the dock on the east side of the sediment groin within the barge basin (Figure 3 and Figure 4). ARRC expects to complete all three phases of construction during the planned in-water work window considered in this consultation and the IHA. The dock face will be extended by 114 m (375 ft) and the usable width of the new extension will be 91 m (300 ft). The extension will be an OPEN CELL SHEET PILE™ (OCSP™) bulkhead structure backed by a rock revetment, consistent with the existing dock. The dock will include typical components, such as fenders, mooring bollards, sacrificial anodes, and bullrail. A mooring dolphin and catwalk (salvaged or new) will be installed south of the new dock extension. The existing dock uplands will also be upgraded and widened to 91 m (300 ft), further expanding the fill footprint and revetment to the east.

In addition to the dock expansion, the transportation corridor that connects the dock to Alaska's rail and road networks will be improved. The new two-lane gravel roadway will be approximately 1,372 m (4,500 ft) long and will replace the existing gravel rail yard access route.

2.1.1.1 In-water Construction Activities

Prior to construction of the dock extension, a temporary template will be constructed to aid in sheet pile cell installation. A total of 30 temporary template piles, either 24-inch steel pipe piles or H-piles, will be driven using vibratory pile-driving equipment (Table 1). The 30 template piles will be removed with a vibratory hammer after the sheet pile cells are constructed.

The dock extension will be an OCSP™ structure (bulkheads using flat-web sheet piles, fabricated connector wyes, and anchor piles). This type of bulkhead is a flexible wall constructed of steel sheet piles with embedded tailwall diaphragms supported by the soil. Piles will be installed with a vibratory hammer. A total of 850 PS31 (or similar) interlocking sheet piles will be installed in pairs to the required embedment using a vibratory hammer until each cell is complete. To further support the structure, a total of fourteen anchor piles fabricated from HP14 steel H-piles with welded connectors will be installed at the end of each sheet pile tailwall using a vibratory hammer.

Following the completion of each cell, fill materials will be placed behind the sheet pile wall up to an elevation of five feet above mean lower low water (MLLW) with traditional earth-moving equipment (loaders, dump trucks, bulldozers, etc.). Approximately, 114,500 cubic yards (CY) of fill will be placed below the high tide line behind the sheet pile structure. The fill will be vibrocompacted using an H-pile with "displacement angles" attached to the vibratory hammer and will consolidate and compact fill. The existing soils and added fill will be vibrocompacted down to 18 m (60 ft) below MLLW. An estimated 2,157 vibrocompaction probes are expected. Above the vibrocompacted section, fill will be placed in lifts with dump trucks and bulldozers and compacted with vibratory roller compactors. A full-length silt curtain will be used on the south end of the dock expansion between the sheet pile construction and the west side of the sediment groin to mitigate turbidity resulting from fill placement.

Rock revetments will be installed for scour protection and slope erosion protection. Materials (i.e., filter rock, rip rap) will be placed with a land- or barge-based excavator or crane. The new sheet pile walls will be driven to depths not expected to require additional rock revetment; however, the existing sheet pile wall will be reinforced with a rock revetment to prevent scouring. Approximately 2,100 CY of fill will be placed below high tide line for dock scour protection. For erosion protection, approximately 18,200 CY of fill will be placed below high tide line; gravel fill will be placed, followed by a layer of filter rock, and finally rock revetment. The current dock structure will be widened to match the new extension. The existing sediment groin and rock revetment will be removed, and materials will be salvaged for reuse in the expansion, as feasible.

The existing mooring dolphin and access catwalk at the south end of the Freight Dock will be removed in order to complete the extension. A vibratory hammer will be used to extract the mooring dolphin, which consists of four 24-inch SPIN FIN™ piles. Once the dock extension is complete, the mooring dolphin piles will be installed at their new location with a vibratory hammer and capacity-tested with an impact hammer. Attempts will be made to salvage and reuse the removed 24-inch dolphin piles; however, four 30-inch piles may be installed for the new mooring dolphin. Seven new heavy-duty fenders, each with two 30-inch piles, will be installed along the dock face with a vibratory hammer in order to protect the dock from moored vessels.

A work skiff with a 200-horsepower motor will be used to support construction activities. The skiff will operate within the project area at speeds of 10 knots (kt) or less.

2.1.1.2 Transport of Equipment and Materials

Project materials and equipment will be transported to Seward via barge, rail, and road. The crane and material barges will likely be towed from Seattle, Washington, or from Anchorage or Unalaska, Alaska. All barges will be towed at a speed of 10 kt or less.

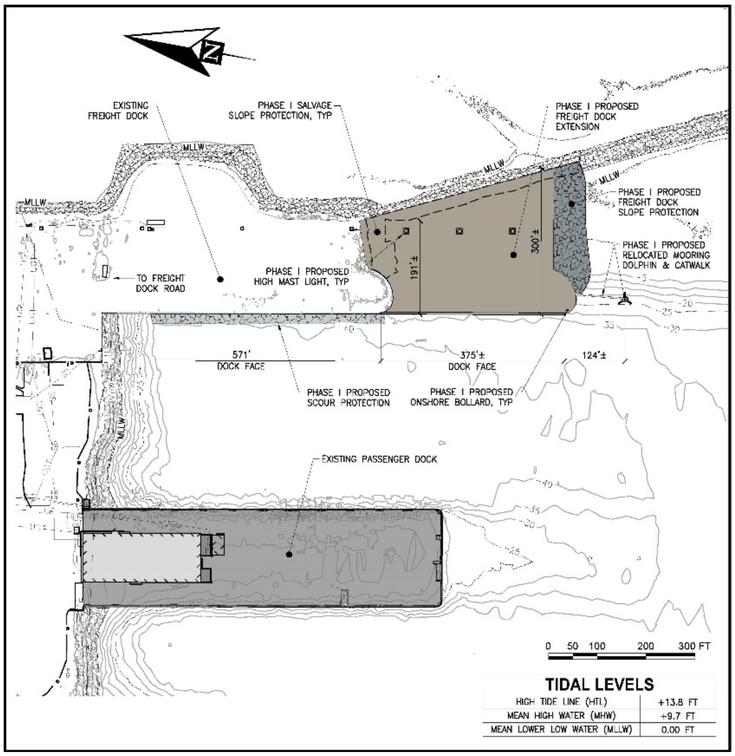

Figure 2. Phase I proposed Freight Dock site plan.

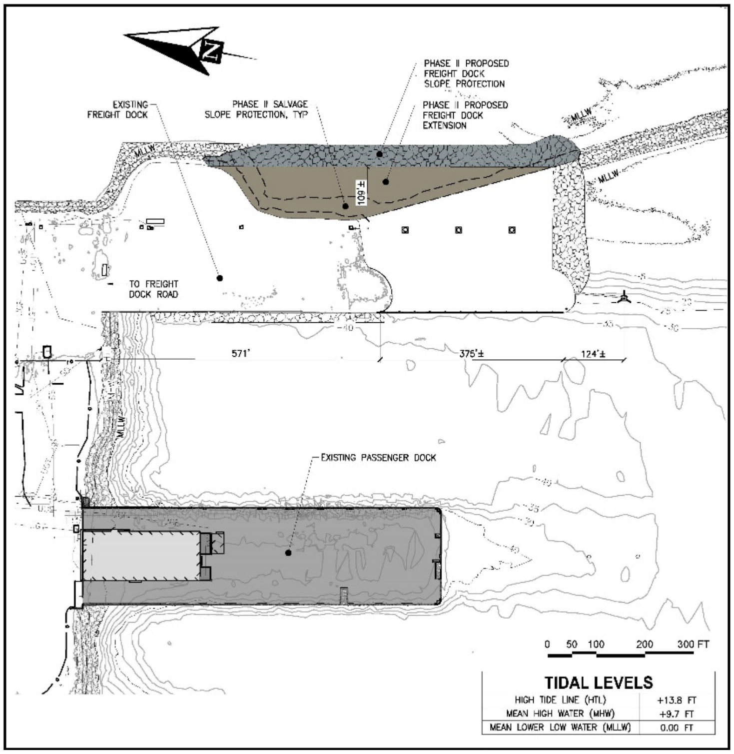

Figure 3. Phase II proposed Freight Dock site plan.

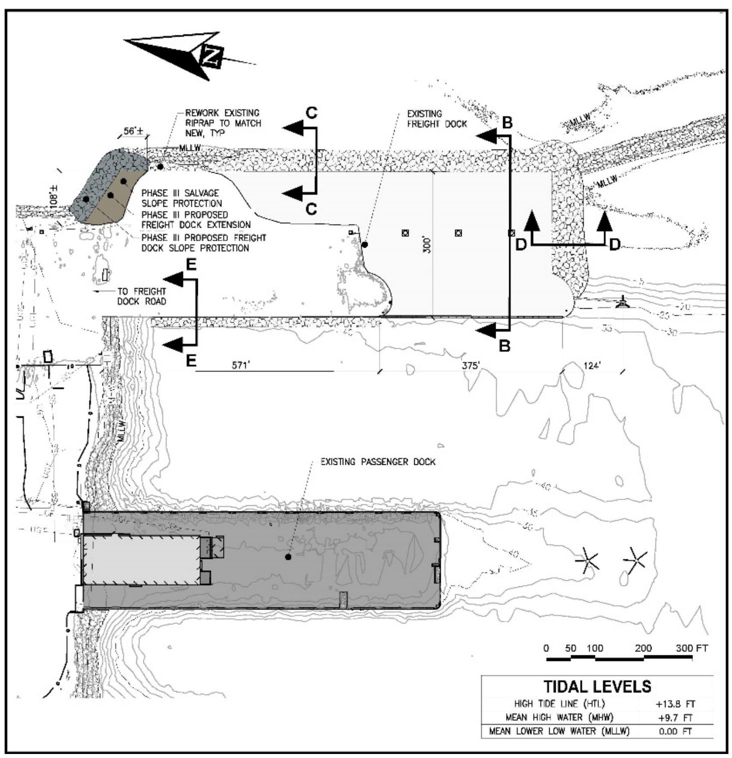

Figure 4. Phase III proposed Freight Dock site plan.

Table 1. Freight Dock pile driving summary.

Activity	Structural Feature	Method	Pile Size/Type	# of Piles	Max Piles per Day	Duration (min)/ Strikes per pile	Days of Activity
Temporary Install + Remove	Template piles	Vibratory	24-inch† steel pipe	60	6	60	50
Permanent Removal	Dolphin piles	Vibratory	24-inch steel pipe	4	4	90	4
Permanent Installation	Bulkhead	Vibratory	PS31 (or similar) sheet piles	850 (425 pairs)	20 pairs	30	75
	Anchor piles	Vibratory	HP14 steel H-piles	14	2	60	15
	Fender piles	Vibratory	30-inch steel pipe	14	4	60	6
	Dolphin piles	Vibratory	30-inch* steel pipe	4	2	60	5
		Impact				1,800	
Total Expected Days of Activity							155

†Assumes 24-inch piles will be used for the temporary template instead of H-piles.
*Assumes new dolphin piles will be installed instead of the potentially salvaged 24-inch dolphin piles removed.

2.1.2 Mitigation Measures

General Mitigation Measures

1. The project proponent will inform NMFS of impending in-water activities a minimum of one week prior to the onset of those activities (email information to akr.prd.records@noaa.gov).

2. If construction activities will occur outside of the time window specified in this letter, the applicant will notify NMFS of the situation at least 60 days prior to the end of the specified time window to allow for reinitiation of consultation.

3. In-water work will be conducted at the lowest points of the tidal cycle when feasible.

4. Consistent with AS 46.06.080, trash will be disposed of in accordance with state law. All trash bins will be properly secured with locked or secured lids that cannot blow open. The project proponent will ensure that all closed loops (e.g., packing straps, rings, bands, etc.) will be cut prior to disposal. In addition, the project proponent will secure all ropes, nets, and other marine mammal entanglement hazards so they cannot enter marine waters. Plastic monofilament netting (erosion control matting) or similar material will not be used as part of erosion control activities.

PSO Requirements

5. At least one PSO will have either prior experience as a PSO in Alaska, or will have taken

a NMFS-approved PSO or marine mammal observer training course.

6. PSO 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.

7. PSOs will be individuals independent from the project proponent and must have no other assigned tasks during monitoring periods.

8. The action agency or its designated non-federal representative will provide resumes or qualifications of PSO candidates to the consultation biologist and akr.prd.records@noaa.gov for approval at least one week prior to in-water work. NMFS will provide a brief explanation in instances where an individual is not approved.

9. PSOs will:
    a. collectively be able to effectively observe the entirety of the shutdown zone;
    b. be able to accurately record the date, time, and species of all observed marine mammals in accordance with project protocols;
    c. be able to identify listed marine mammals that may occur in the action area, at a distance equal to the outer edge of the applicable shutdown zone and determine the marine mammal's location and distance from the sound source;
    d. have the ability to effectively communicate orally, by radio or in person, with project personnel to provide real-time information on listed marine mammals;
    e. possess a copy of mitigation measures; and,
    f. possess data forms (electronic or paper).

10. PSOs will not scan for marine mammals for more than four hours without at least a one-hour break from monitoring duties between shifts. PSOs will not perform PSO duties for more than 12 hours in a 24-hour period.

<u>PSO Procedures</u>

11. PSOs will have the ability, authority, and obligation to order the appropriate mitigation response, including shutdown, to avoid takes of listed marine mammals.

12. One or more PSOs will perform PSO duties onsite throughout the authorized activity.

13. Where a team of three or more PSOs are required, a lead observer or monitoring coordinator will be designated.

14. For each in-water activity, PSOs will monitor all marine waters within the indicated shutdown zone radius for that activity (Table 2).

Table 2. Shutdown and monitoring zones.

Activity	Pile Size/Type	Sound Level at 10 m	Shutdown Zone (m)		Monitoring Zone (m)
			Low Frequency Cetaceans	Otariids	
Vibratory Installation and Removal	24-inch steel pipe	163.0 dB rms	50	20	7,360
	PS31 (or similar) sheet pile pairs	160.7 dB rms	50	20	5,170
	HP14 steel H-piles	150.0 dB rms	10	10	1,000
	30-inch steel pipe fender piles	167.0 dB rms	60*	30	13,600
	30-inch steel pipe dolphin piles	167.0 dB rms	40*	20	13,600
Impact Installation	30-inch steel pipe	177.0 dB SEL 190.0 dB rms	940	310	1,000

*The fender piles only require vibratory pile driving and a maximum of four piles will be installed in one day. The dolphin piles require both vibratory and impact methods for installation, and a maximum of two piles will be installed in one day. The smaller number of dolphin piles installed in a day results in a smaller shutdown zone.

15. PSOs will be positioned such that they will collectively be able to monitor the entirety of each activity's shutdown zone and the monitoring zone to the greatest extent feasible.

16. Prior to commencing any activity listed in Table 2, PSOs will scan waters within the appropriate shutdown zone and confirm no listed marine mammals are within the shutdown zone for at least 30 minutes immediately prior to initiation of the in-water activity. If one or more listed marine mammals are observed within the shutdown zone, the in-water activity will not begin until the listed marine mammals exit the shutdown zone of their own accord, or the shutdown zone has remained clear of listed marine mammals for 30 minutes immediately prior to the commencement of the activities listed in Table 2.

17. The on-duty PSOs will continuously monitor the shutdown zone and adjacent waters during any of the activities listed in Table 2 for the presence of listed marine mammals.

18. Activities listed in Table 2 will only take place:

    a. between 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).

19. If visibility degrades such that PSOs can no longer ensure that the shutdown zone remains devoid of listed marine mammals during any of the activities listed in Table 2, the crew will stop activities until the entire shutdown zone is visible and the PSOs has indicated that the zone remained devoid of listed marine mammals for 30 minutes.

20. The PSOs will order ongoing activities listed in Table 2 to immediately cease if one or more listed marine mammals has entered, or appears likely to enter, the shutdown zone.

21. If any of the activities listed in Table 2 are shut down for less than 30 minutes due to the presence of listed marine mammals in the shutdown zone, the activities may commence when the PSOs provides assurance that listed marine mammals were observed exiting the shutdown zone. Otherwise, the activities may only commence after the PSO provides assurance that listed marine mammals have not been seen in the shutdown zone for 30 minutes for cetaceans or 15 minutes for pinnipeds.

22. If a listed marine mammal is observed within a shutdown zone or is otherwise harassed, harmed, injured, or disturbed, the PSO will immediately report that occurrence to NMFS using the contact information specified in Table 3.

23. Prior to commencing any activity listed in Table 2, or at changes in watch, PSOs will establish a point of contact with the construction crew. The PSO will brief the point of contact as to the shutdown procedures if the PSO observes that listed marine mammals enter or are likely to enter the shutdown zone. If the point of contact goes "off shift" and delegates their duties, the point of contact must inform the PSO and brief the new point of contact.

<u>Impact Pile Installation (pipe piles or H piles)</u>

24. Impact pile driving equipment will utilize a pile cushion to mitigate underwater sound impacts from impulsive noise.

25. If no listed marine mammals are observed within the applicable shutdown zone (see Table 2) for 30 minutes immediately prior to pile installation, soft-start procedures will be implemented immediately prior to activities. Soft-start procedures require 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:

    a. at the start of each day's impact pile installation;

    b. any time pile installation has been shut down or delayed due to the presence of a listed marine mammal;

    c. whenever pile installation has temporarily stopped (≤30 minutes) and PSO observation has also stopped; or

d. whenever pile installation has temporarily stopped for more than 30 minutes and PSO observation has also stopped.

26. Following the soft-start procedure, operational impact pile installation may commence and continue, provided listed marine mammals remain absent from the shutdown zone.

27. Following a lapse of impact pile installation activities of more than 30 minutes, the PSO will authorize resumption of impact pile installation 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.

Vibratory and Sheet Pile Installation and Removal

28. If no listed marine mammals are observed within the applicable shutdown zone (see Table 2) for 30 minutes immediately prior to pile removal or installation, vibratory pile removal or installation may commence.

29. Pre-pile removal or installation observation period will take place at the start of each day's vibratory pile removal or installation, each time pile removal or installation has been shut down or delayed due to the presence of a listed species, and following a cessation of pile driving for a period of 30 minutes or longer.

30. Following a lapse of vibratory pile removal or installation activities of more than 30 minutes, the PSO will authorize resumption of vibratory pile removal or installation only after the PSO provides assurance that listed marine mammals have not been present in the shutdown zone for at least 30 minutes immediately prior to resumption of operations.

Intertidal Fill/Bank Stabilization and Maintenance

31. Fill material will consist of rock fill that is free of fine sediments to the extent practical, or will come from on-site dredged material

32. Fill material will be obtained from local sources or will be free of non-native marine and terrestrial vegetation species.

33. A PSO must be present whenever sheet piles are installed and will follow mitigation measures for impact and vibratory pile driving listed above.

Project-dedicated Vessels (vessel and crew safety should never be compromised)

34. Vessel operators will:
    a. maintain a watch for marine mammals at all times while underway;
    b. stay at least 91 m (100 yards; yd) away from listed marine mammals, except that they will remain at least 460 m (500 yd) away from endangered North Pacific

right whales;

c. travel at less than 5 kt when within 274 m (300 yd) of a whale;

d. avoid changes in direction and speed within 274 m (300 yd) 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. reduce vessel speed to 10 kt or less when weather conditions reduce visibility to 1.6 kilometers (km; 1 mile [mi]) or less;

g. 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); 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 91 m (100 yd) of any humpback whale;

   ii. cause a vessel or other object to approach within 91 m (100 yd) of any humpback whale; or,

   iii. disrupt the normal behavior or prior activity of a humpback whale by any other act or omission.

35. 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 yd) 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 yd) from North Pacific right whales.

36. Vessels will not allow lines to remain in the water unless both ends are under tension and affixed to vessels or gear.

37. Project vessels in transit to the project site will travel at 12 kt or less.

38. Project vessels in transit to the project site will travel using established navigation channels or commonly recognized vessel traffic corridors and avoid alongshore travel in shallow water (< 20 m) whenever practicable.

39. All vessels engaged in project construction activities will transit at speeds below 10 kt.

Vessel Transit, North Pacific Right Whales, and their Designated Critical Habitat

40. Vessels will:

a. remain at least 460 m (500 yd) from North Pacific right whales; and,

b. not travel through designated North Pacific right whale critical habitat if practicable (50 CFR 226.215). If traveling through North Pacific right whale critical habitat cannot be avoided, vessels will:

   i. travel through North Pacific right whale critical habitat at 5 kt or less (without a PSO on watch); or at 10 kt or less while PSOs maintain a constant watch for listed species from the bridge; and,

   ii. maintain a log indicating the time and geographic coordinates at which vessels enter and exit North Pacific right whale critical habitat.

<u>Vessel Transit, Western DPS Steller Sea Lions, and their Designated Critical Habitat</u>

41. Vessels will not approach within 5.5 km (3 nautical miles; 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.

<u>Vessel Transit, Cook Inlet Beluga Whales, and their Designated Critical Habitat</u>

43. Project vessel(s) transiting through Cook Inlet will maintain a distance of at least 1.5 miles (2.4 km) south of the mean lower low water line (MLLW) in the Susitna Delta (Beluga River to the Little Susitna River; Figure 5) between April 15 and November 15.

44. Project-specific barges will travel 12 kt or less in Cook Inlet.

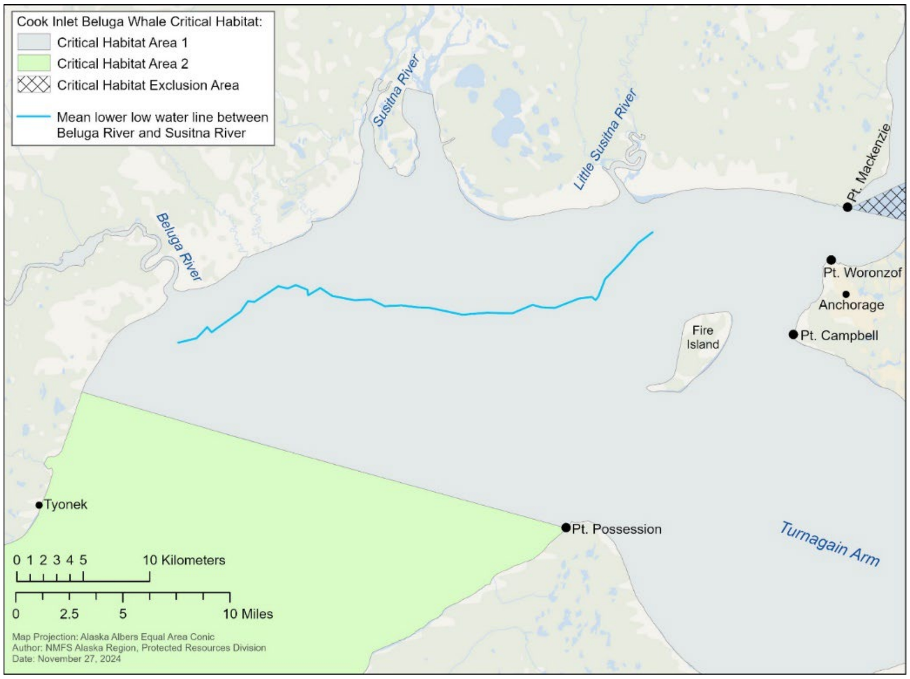

Figure 5. MLLW line between the Beluga and Little Susitna Rivers.

<u>Vessel Transit, Southern Resident killer whales, and their Designated Critical Habitat</u>

45. Vessels in transit to the project site will not approach, in any manner, within 914 m (1,000 yd) of any southern resident orca whale (RCW 77.15.740) between Seattle and Southeast Alaska.
    a. Pilot and crew will not position a vessel to be in the path of a killer whale at any point located within 914 m (1,000 yd). This includes intercepting a whale by positioning a vessel so that the prevailing wind or water current carries the vessel into the path of the whale at any point located within 914 m (1,000 yd) of the whale.
    b. Pilot and crew will not position a vessel behind a killer whale at any point located within 914 m (1,000 yd).
    c. Pilot and crew will disengage the transmission of a vessel that is within 366 m (400 yd) of a killer whale.
    d. Pilot and crew will not cause a vessel or other object to exceed a speed greater than 7 kt over ground at any point located within 914 m (1,000 yd) of a killer whale.

<u>Sunflower Sea Star</u>

46. Pre-construction surveys will not be conducted on the east side of the sediment groin. The heavy sediment load in that area will restrict visibility, and the area is not expected to be preferred habitat for sunflower sea stars.

47. Pre-construction surveys for sunflower sea stars will be conducted throughout the project footprint on the west side of the sediment groin.
    a. Survey transects will run roughly along isobaths, with two-meter separation between each transect line, until the area that will be covered by fill is surveyed.
    b. Surveys may be done on foot at low tide, or by divers or an ROV in areas where the substrate is not visible during low tide.
    c. Full-length silt curtains may be installed following surveys to deter sunflower sea stars from re-occupying the area. Follow-up surveys will not be conducted in areas where a silt curtain has been installed.
    d. In areas without completed sheet pile cells or full-length silt curtains, surveys will occur no more than 24 hours prior to the placement of fill.

48. If sunflower sea stars are detected during the pre-construction surveys, surveys will be repeated as needed prior to filling completed OCSP cells.

49. Sunflower sea stars detected in or near the construction footprint will be inspected for signs of sea star wasting syndrome (SSWS).
    a. Affected sea stars will not be handled or relocated. Any signs of SSWS will be

reported to NMFS with a count of affected individuals.

50. Sunflower sea stars unaffected by SSWS found in or near the construction footprint will be collected and relocated.
    a. Sea stars will be collected in mesh bags and housed onshore in a large container filled with fresh sea water for no more than four hours before relocation.
    b. Sea stars will be released on the east side of the small boat harbor breakwater on the western edge of the Reserve. Release will either be from the Seward Loading Facility or the shoreline immediately adjacent to the breakwater.

51. If no sunflower sea stars are detected during the pre-construction survey, no further sea star surveys will be performed.

52. A report of survey findings will be submitted to NMFS to akr.prd.records@noaa.gov.

Data Collection

PSOs have the following responsibilities for data collection:

53. PSOs will record observations on data forms or into electronic data sheets.

54. The project proponent will ensure that PSO data will be submitted electronically in a format that can be queried such as a spreadsheet or database. Digital images of data sheets are not sufficient.

55. PSOs will record the following:
    a. project name, date, shift start time, shift stop time, and PSO identifier;
    b. date and time of each reportable event (e.g., a listed marine mammal observation, operation shutdown, reason for operation shutdown, change in weather conditions);
    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 listed marine mammal;
    e. the predominant anthropogenic sound-producing activities occurring during each listed marine mammal observation;
    f. observations of listed marine mammal behaviors and reactions to anthropogenic sounds and presence;
    g. geographic coordinates of initial, closest, and last location of listed species, including distance from observer to the listed species, and minimum distance from the predominant sound-producing activity to listed species; and,

h. whether the presence of a listed species necessitated the implementation of mitigation measures to avoid acoustic impact (i.e., shutdown), and the duration of time that normal operations were affected by the presence of listed species.

Reporting

Unauthorized Take

56. 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 is observed entering a shutdown zone before operations can be shut down, or is injured or killed as a direct or indirect result of the action), the PSO will report the incident to NMFS within one business day, with information submitted to akr.prd.records@noaa.gov. These PSO records will include:

    a. digital, queryable documents containing PSO observations and records, and digital, queryable reports;
    b. the date, time, and location of each event (provide geographic coordinates);
    c. description of the event;
    d. number of individuals of each listed marine mammal species affected;
    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;
    g. if a vessel struck a listed marine mammal, the contact information for the PSO on duty on the vessel or the contact information for the individual piloting the vessel; and,
    h. photographs or video footage of the animal(s), if available.

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

57. If the PSO observes an injured, sick, or dead marine mammals (i.e., stranded), 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 individuals, description of the stranded marine mammal's condition, event type (e.g., entanglement, dead, floating), and behavior of live-stranded marine mammals.

Illegal Activities

58. If the PSO observes listed marine mammals or other 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 (Table 3; 1-800-853-1964).

59. Data submitted to NMFS will include date/time, location, description of the event, and any photos or videos taken.

North Pacific Right Whales

60. All observations of North Pacific right whales will be reported to NMFS within 24 hours. Photographs and/or video should be taken, if possible, to aid in photo identification of individual animals. Reports will include all applicable information that will be included in a final report.

Extralimital Sightings

61. All observations of ESA-listed marine mammal species not considered in this consultation will be reported to NMFS within 24 hours. Photographs and/or video should be taken, if possible, to aid in photo identification. Reports will include all applicable information that will be included in a final report.

Monthly Reports

62. Submit interim monthly PSO monitoring reports, including digital, queryable documents. These reports will include a summary of marine mammal species and behavioral observations, shutdowns or delays, and work completed.

63. Monthly reports will be submitted to akr.prd.section7@noaa.gov by the 15th day of the month following the reporting period. For example, the report for activities conducted in November 2026 will be submitted by December 15, 2026.

Final Report

64. A final report will be submitted to NMFS within 90 calendar days of the completion of the project summarizing the data recorded by emailing it to akr.prd.records@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 activities.

65. The final report for projects 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 listed species presence;
    b. dates and times of listed species observations, geographic coordinates of listed species at their closest approach to the project site, including date, water depth, species, age/size/sex (if determinable), and group sizes;
    c. number of listed species observed, broken out by species, during periods with and

without project activities (and other variables that could affect detectability);

d. observed listed marine mammal behaviors and movement types versus project activity at the time of observation;

e. numbers of listed species observations/individuals seen versus project activity at time of observation;

f. any photos or videos taken of listed species;

g. details of all sunflower sea star surveys and findings, including:

  i. dates, times, and transect lines of each survey conducted;

  ii. number of sunflower sea stars observed in each sighting; and,

  iii. number of sunflower sea stars observed to have sea star wasting syndrome in each sighting, or number of dead sunflower sea stars observed.

h. digital, queryable documents containing PSO observations and records, and digital, queryable reports.

Table 3. Summary of agency contact information.

Reason for Contact	**Contact Information**
Consultation Questions & Unauthorized Take	akr.prd.section7@noaa.gov
Reports & Data Submittal	akr.prd.records@noaa.gov
Stranded, Injured, or Dead Marine Mammals	Stranding Hotline (24/7 coverage) 1-877-925-7773
Oil Spill & Hazardous Materials Response	U.S. Coast Guard National Response Center: 1-800-424-8802 and AKRNMFSSpillResponse@noaa.gov
Illegal Activities *(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 or NMFS Juneau Main Office: 901-206-4342

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.

NMFS defines the action area for this consultation to include the area within which project-related noise levels exceed 120 dB re 1 μPa root mean square (rms), and are expected to approach ambient noise levels (i.e., the point where no measurable effect from the project would occur). To define the action area, we considered the maximum diameter and type of piles, the pile-driving methods, and empirical measurements of noise. Received sound levels associated with pile driving activities are expected to decline to 120 dB re 1μPa rms within 13,594 m of the source (Figure 6). See the Acoustic Threshold section for more information on the factors included in this calculation.

The proposed action also includes vessel transit of tug and barges with project equipment and materials to the construction site, and the transit routes are considered part of the action area. The tug and barges will likely deploy from Seattle, Washington and/or Anchorage or Dutch Harbor, Alaska (Figure 7).

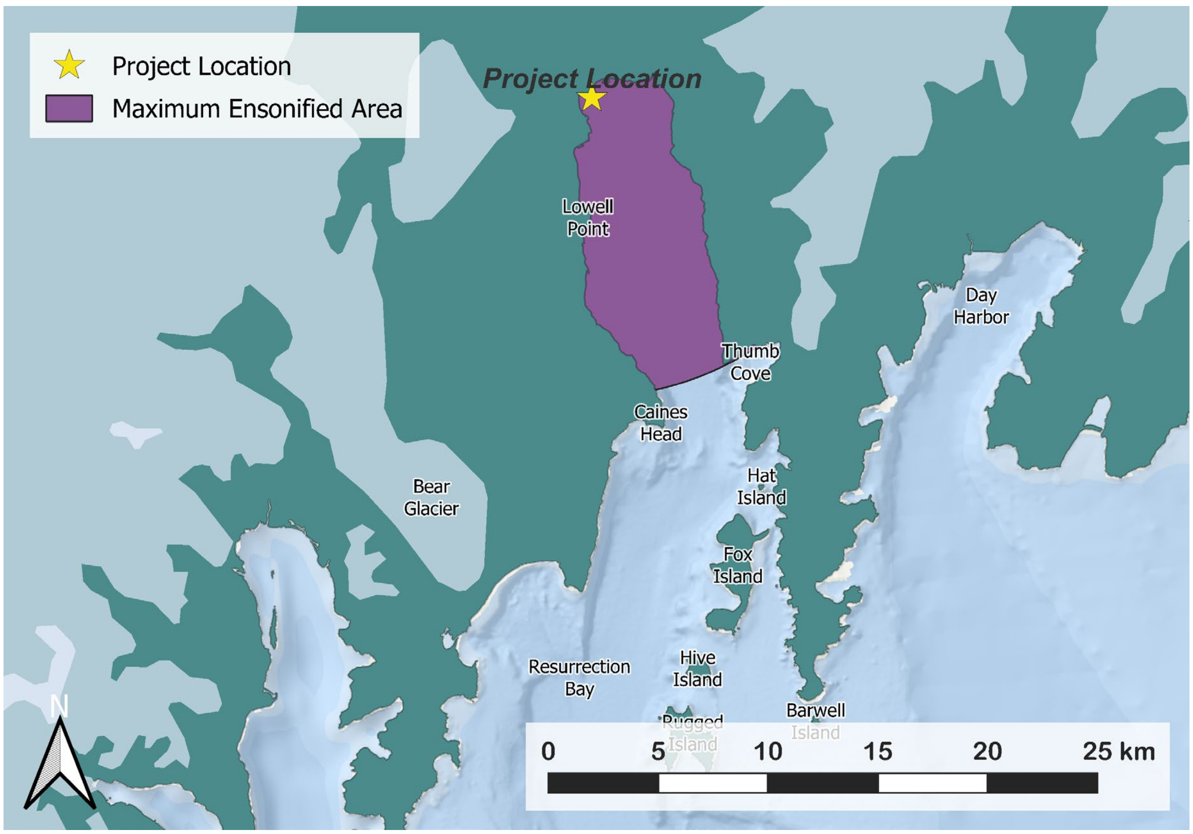

Figure 6. Construction action area (provided by the Applicant).

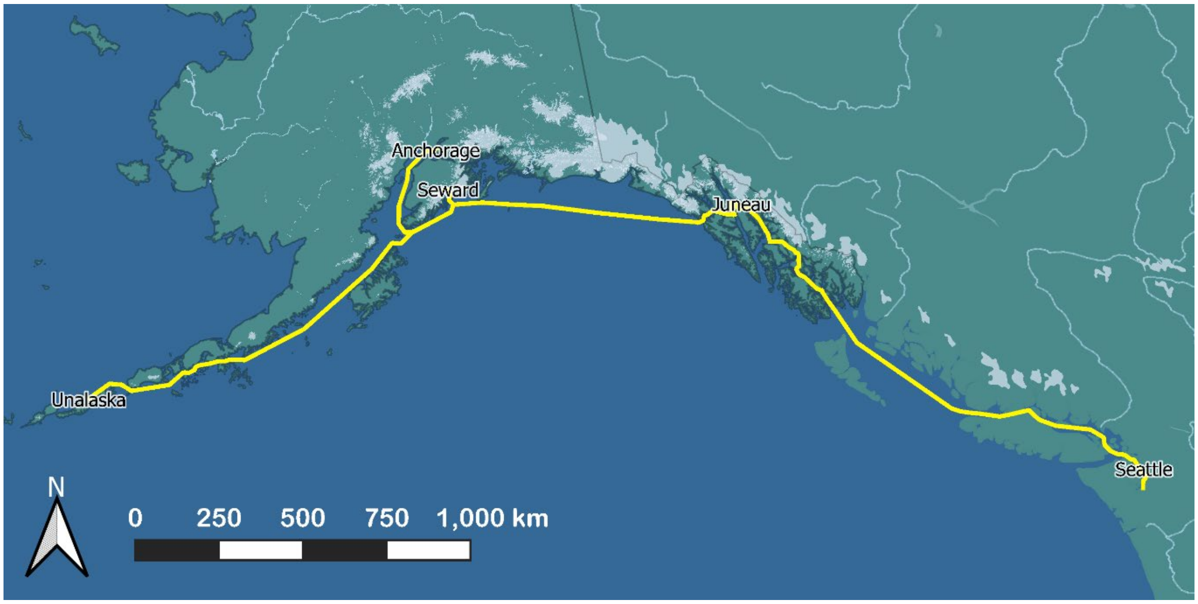

Figure 7. Approximate transit routes for project vessels (provided by the Applicant).

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 designations of critical habitat for Southern Resident killer whales, Cook Inlet beluga whales, and Steller sea lions, use 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 PCEs 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 or proposed species or critical habitat. As part of this step, we identify the action area – the spatial and temporal extent of these effects.

- Identify the rangewide 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 and proposed 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 and proposed 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 sex 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 and proposed 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 and proposed 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 or proposed species or destroy or adversely modify designated critical habitat, NMFS must identify a reasonable and prudent alternative 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 4. Project-specific barges will be towed from Seattle, WA and/or Anchorage or Dutch Harbor, Alaska to the project site. The proposed vessel route from Seattle is expected to transit through designated critical habitat for Mexico DPS humpback whales, Southern Resident DPS killer whales, and Steller sea lions. The proposed vessel route from Anchorage is expected to transit through designated critical habitat for Mexico DPS and Western North Pacific DPS humpback whales, Cook Inlet beluga whales, and Steller sea lions. The proposed vessel route from Dutch Harbor is expected to transit through designated critical habitat for Mexico DPS and Western North Pacific DPS humpback whales and Steller sea lions. The nearest designated critical habitat to the construction site is the Steller sea lion rookeries located approximately 55 km southwest on the Chiswell Islands. Designated Central America DPS humpback whale critical habitat and Southern Resident DPS killer whale critical habitat does not occur in the action area.

Table 4. Listing status and critical habitat designation for species considered in this opinion.

Species	Status	Listing	Critical Habitat
Blue whale (*Balaenoptera musculus*)	Endangered	NMFS 1970, 35 FR 18319	Not designated
Sei whale (*Balaenoptera borealis*)	Endangered	NMFS 1970, 35 FR 18319	Not designated
Humpback Whale, Central America DPS *(Megaptera novaeangliae)*	Endangered	NMFS 2016, 81 FR 62260	NMFS 2021 86 FR 21082
Gray whale, Western North Pacific DPS (*Eschrichtius robustus*)	Endangered	NMFS 1970, 35 FR 18319	Not designated
North Pacific Right Whale *(Eubalaena japonica)*	Endangered	NMFS 2008, 73 FR 12024	NMFS 2008, 73 FR 19000
Sperm Whale (*Physeter macrocephalus*)	Endangered	NMFS 1970, 35 FR 18319	Not designated
Killer whale, Southern Resident DPS (*Orcinus orca*)	Endangered	NMFS 2015 80 FR 7380	NMFS 2021, 71 FR 69054
Cook Inlet beluga whale (*Delphinapterus leucas*)	Endangered	NMFS 2008, 73 FR 62919	NMFS 2011, 76 FR 20180
Fin Whale (*Balaneoptera physalus*)	Endangered	NMFS 1970, 35 FR 18319	Not designated
Humpback Whale, Mexico DPS *(Megaptera novaeangliae)*	Threatened	NMFS 2016, 81 FR 62260	NMFS 2021 86 FR 21082
Humpback Whale, Western North Pacific DPS *(Megaptera novaeangliae)*	Endangered	NMFS 2016, 81 FR 62260	NMFS 2021 86 FR 21082
Steller Sea Lion, Western DPS *(Eumetopias jubatus)*	Endangered	NMFS 1997, 62 FR 24345	NMFS 1993, 58 FR 45269
Sunflower Sea Star (*Pycnopodia helianthoides*)	Proposed Threatened	NMFS 2023, 88 FR 16212	Not designated

4.1 Species and Critical Habitat Not Likely to be Adversely Affected by the Action

NMFS uses two criteria to identify those endangered, threatened, or proposed species or critical habitat that are likely to be adversely affected by the proposed action. The first criterion is exposure or some reasonable expectation of a co-occurrence between one or more potential stressors associated with the proposed action and a listed or proposed species or designated critical habitat. The second criterion is an assessment of the potential response given exposure.

We applied these criteria to the species and critical habitats listed above. The following species and critical habitats may be exposed to stressors from the vessel transit associated with the proposed action, but we have concurred that they are not likely to be adversely affected: blue whale, sei whale, Central America DPS humpback whale, Western North Pacific gray whale, North Pacific right whale, sperm whale, Southern Resident DPS killer whale, Cook Inlet beluga whale, Mexico DPS humpback whale critical habitat, Western North Pacific DPS humpback whale critical habitat, Southern Resident DPS killer whale critical habitat, Cook Inlet beluga whale critical habitat, and Steller sea lion critical habitat. Below we discuss our rationale for those determinations.

4.1.1 Blue Whale, Sei Whale, Central America DPS Humpback Whale, Western North Pacific Gray Whale, North Pacific Right Whale, Sperm Whale, Southern Resident DPS Killer Whale, Cook Inlet Beluga Whale

4.1.1.1 Vessel Traffic

The tug and barges will deploy from Seattle, Anchorage, and/or Dutch Harbor and will have a short-term presence in the North Pacific and Gulf of Alaska. All barges will be towed at a speed of 10 kt or less; the typical transit speed is between 6 and 9 kt. The proposed routes overlap with the ranges of the blue whale, sei whale, Central America DPS humpback whale, Western North Pacific DPS gray whale, North Pacific right whale, sperm whale, Southern Resident DPS killer whale, and Cook Inlet beluga whale, and these species may be encountered during vessel transit. Potential effects from project vessel traffic on these ESA-listed species includes auditory and visual disturbance and vessel strike.

Mitigation measures (Section 2.1.2) will be implemented to minimize or avoid auditory and visual disturbance and potential vessel collisions with marine mammals during project activities. These mitigation measures include, but are not limited to, maintaining a vigilant watch aboard vessels for listed marine mammals and avoiding potential interactions with whales by implementing a 5 kt speed restriction when within 274 m (300 yd) of observed whales. Project vessels will also be maneuvered to keep at least 914 m (1,000 yd) away from killer whales observed between Seattle and Southeast Alaska, 460 m (500 yd) away from any observed North Pacific right whales, 91 m (100 yd) from other marine mammals, and avoid approaching whales in a manner that causes them to change direction or separate from other whales in their group.

Although some marine mammals could receive sound levels in exceedance of the acoustic threshold of 120 dB from the project vessels or be disturbed by the visual presence of tug and barges, disturbances rising to the level of harassment are extremely unlikely to occur. NMFS has interpreted 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). While listed marine mammals will likely be exposed to acoustic stressors from barging activities, the nature of the exposure (primarily vessel noise) will be low-frequency, with much of the acoustic energy emitted by project vessels at frequencies below the best hearing ranges of many large baleen whales. In addition, the duration of the exposure to ship noise will be brief as the vessels will be in transit. The project vessels will emit continuous sound while in transit, which may alert marine mammals before the received sound level exceeds 120 dB. Slight deflection and avoidance are expected to be common responses, in those instances where there is any response at all. The implementation of mitigation measures is expected to further reduce the amount of potential disturbance to marine mammals from transiting vessels.

The factors discussed above, when considered as a whole, make it extremely unlikely that transiting vessels will elicit behavioral responses from, or have adverse effects on, blue whales, sei whales, Central America DPS humpback whales, Western North Pacific gray whales, North Pacific right whales, sperm whales, Southern Resident DPS killer whales, and Cook Inlet beluga whales that rise to the level of harassment under the ESA (Wieting 2016). We expect any effects to listed species to have little consequence and not to significantly disrupt normal behavioral patterns, and conclude that auditory and visual disturbance from project-related vessel traffic will be insignificant.

Vessel strike is an ongoing source of mortality for large cetaceans (Vanderlaan and Taggart 2007; Schoeman, Patterson-Abrolat and Plon 2020) and vessel speed is a principal factor in whether a strike results in death (Laist et al. 2001; Vanderlaan and Taggart 2007). From 1978 to 2022, there were 151 vessel strikes reported involving humpback whales, 3 strikes involving sperm whales, and one strike each of a gray whale, killer whale, and beluga whale in Alaska waters (Neilson et al. 2012; Helker et al. 2019; Freed et al. 2023; Brower et al. 2024). There were also 15 reported ship strikes of unidentified whales (Neilson et al. 2012; Helker et al. 2019; Freed et al. 2023; Brower et al. 2024). The vast majority of reported strikes occurred in Southeast Alaska between May and September, where and when commercial vessel traffic coincides with large aggregations of humpback whales in narrow straits and passageways.

Central America DPS humpback whales feed almost exclusively offshore of California and Oregon in the eastern Pacific, with only a few individuals identified at the northern Washington-southern British Columbia feeding grounds (81 FR 62260). The probability of encountering a humpback whale from the Central America DPS in Alaska waters is zero percent (Wade 2021). The majority of gray whales in Alaska waters belong to the Eastern North Pacific population, and only approximately 1.2 percent of the gray whales found in the eastern North Pacific migratory corridor (United States West Coast [Alaska, Washington, Oregon, and California], Canada, and Mexico) during the spring and fall months are from the Western North Pacific DPS (Damon-Randall 2023). Cook Inlet beluga whales may be susceptible to vessel strike injury or mortality. In an examination of 106 individuals, 14 percent had signs of confirmed or possible vessel strike (McGuire et al. 2020). This suggests that strikes are not rare, but such strikes are survivable. Southern Resident DPS killer whale L98 was killed during a vessel interaction in 2006 and J34 was found dead in 2016 with injuries consistent with those incurred during a vessel strike (Carretta et al. 2024). There have been no reported strikes of blue whales, sei whales, or North Pacific right whales in Alaska since 1978; however, the reported unidentified whale strikes could potentially include these species (Neilson et al. 2012; Helker et al. 2019; Freed et al. 2023; Brower et al. 2024).

The probability of strike events depends on the frequency, speed, and route of the marine vessels, and the distribution and density of marine mammals in the area, as well as other factors. With the low number of vessel trips, transitory nature of project-related vessel traffic, slow transit speeds, implementation of the mitigation measures, and the low occurrence of these whale species over the majority of the route, we conclude the probability of a project vessel striking a blue whale, sei whale, Central America DPS humpback whale, Western North Pacific DPS gray whale, North Pacific right whale, sperm whale, Southern Resident DPS killer whale, or Cook Inlet beluga whale is extremely low and any adverse effects due to vessel strikes are extremely unlikely to occur, and thus discountable.

In summary, we conclude that vessel traffic associated with the proposed action is not likely to adversely affect blue whales, sei whales, Central America DPS humpback whales, Western North Pacific DPS gray whales, North Pacific right whales, sperm whales, Southern Resident DPS killer whales, or Cook Inlet beluga whales.

4.1.1.2 Pile Driving Activities

The project is located in Seward, Alaska, at the head of Resurrection Bay. The action area for pile driving activities extends 13,594 m south to Thumb Cove and Caines Head in inner Resurrection Bay (Figure 6). Humpback whales, gray whales, and killer whales regularly occur in inner Resurrection Bay. However, humpbacks feeding in Alaska waters primarily belong to the Hawaii DPS, with small numbers from the Mexico DPS and Western North Pacific DPS (Wade 2021). The Central America DPS of humpback whales breed in waters off Central America and feed along the west coast of the United States and southern British Columbia (81 FR 62260). The probability of encountering a humpback whale from the Central America DPS in Resurrection Bay is zero percent, and pile driving activities will have no effect on humpback whales from this DPS (Wade 2021).

The majority of gray whales in Alaska waters belong to the Eastern North Pacific population. Western North Pacific DPS gray whales primarily occur in the western North Pacific Ocean with feeding areas in Sakhalin and Kamchatka and wintering areas in Japan and China. Approximately 1.2 percent of the gray whales found in the eastern North Pacific migratory corridor (United States West Coast [Alaska, Washington, Oregon, and California], Canada, and Mexico) during the spring and fall months are from the Western North Pacific DPS (Damon-Randall 2023). Given the small percentage, limited seasonal presence, migratory behavior, and location well south of Resurrection Bay, we do not expect Western North Pacific DPS gray whales in the action area. Therefore, adverse effects to Western North Pacific DPS gray whales from pile driving activities are extremely unlikely, and thus discountable.

There are three stocks of killer whales that could occur in the construction action area: Eastern North Pacific Alaska Resident; Gulf of Alaska, Aleutian Islands and Bering Sea Transient; and, AT1 Transient. The range of Southern Resident killer whales during the spring, summer, and fall includes the coastal and inland waterways of Washington State and the transboundary waters between the United States and Canada. Southern Residents have been observed as far south as central California during the winter months and as far north as Southeast Alaska (Carretta et al. 2024). The construction action area is far outside of the known range of Southern Resident killer whales and pile driving activities will have no effect on whales from this DPS.

There are five stocks of beluga whales in Alaska: Beaufort Sea, Bristol Bay, Cook Inlet, Eastern Bering Sea, and Eastern Chukchi Sea. A review of all marine mammal surveys and anecdotal sightings in the northern Gulf of Alaska between 1936 and 2000 found only 28 beluga whale sightings, indicating that very few beluga whale sightings occurred outside Cook Inlet in the

Gulf of Alaska (Laidre et al. 2000). There have been two sightings of belugas in the action area, one in September 1997 and one in September 2023. While the Cook Inlet DPS beluga whale population is the closest to the action area, it is unknown which population these whales belonged to. Given the infrequent beluga sightings in the Gulf of Alaska, the small population size, and limited range of the Cook Inlet DPS beluga whale, we do not expect whales from this population in the construction action area. Therefore, adverse effects to Cook Inlet DPS beluga whales from pile driving activities are extremely unlikely, and thus discountable.

We are unaware of any records of blue whales, sei whales, North Pacific right whales, and sperm whales in inner Resurrection Bay. These species may occur farther south in the offshore waters of the Gulf of Alaska, but they are not expected to occur in the construction action area. Therefore, adverse effects to those species from pile driving activities are extremely unlikely, and thus discountable.

In summary, NMFS concludes that pile driving activities associated with the proposed action are not likely to adversely affect the blue whale, sei whale, Central America DPS humpback whale, Western North Pacific gray whale, North Pacific right whale, sperm whale, Southern Resident DPS killer whale, and Cook Inlet beluga whale. These species will not be discussed further.

4.1.2 Effects to Critical Habitat

The proposed action is not likely to adversely affect designated critical habitat for Mexico DPS and Western North Pacific DPS humpback whales, Southern Resident DPS killer whales, Cook Inlet beluga whales, or Steller sea lions. The action area for pile driving activities extends 13,594 m into Resurrection Bay and the nearest designated critical habitat to the construction site is the Steller sea lion rookeries located approximately 55 km southwest on the Chiswell Islands. Project-specific barges will be towed from Seattle, Anchorage, and/or Dutch Harbor to the project site, and will pass through designated critical habitat for Mexico DPS and Western North Pacific DPS humpback whales, Southern Resident DPS killer whales, Cook Inlet beluga whales, and Steller sea lions.

Critical habitat was designated for the Mexico DPS and Western North Pacific DPS humpback whale on April 21, 2021 (86 FR 21082). Only one PBF was identified: adequate prey resources. Humpback whales are generalist predators and prey availability can vary seasonally and spatially; however, data indicate that their diet is consistently dominated by euphausiid species and small pelagic fishes such as northern anchovy, Pacific herring, Pacific sardine, and capelin (84 FR 54354). We do not expect that the passage of project vessels on the surface of the water will have a measurable effect on aggregations of these prey species. The eddies or wake of the vessels across the surface of the water may cause temporary mixing or displacement of a relatively small number of zooplankton, but we do not expect that this disturbance would affect the prey distribution or abundance in a meaningful or measurable way. For these reasons we conclude that disturbance to Mexico DPS and Western North Pacific DPS humpback whale critical habitat from project-related vessel traffic will be insignificant.

NMFS published a final rule to designate critical habitat for Southern Resident DPS killer whales on November 29, 2006 (71 FR 69054). On August 2, 2021, NMFS published a revision to that rule designating six additional coastal areas along the U.S. West Coast (86 FR 41668). The newly designated critical habitat areas are outside of the vessel transit action area. The following physical or biological features were identified as essential to the conservation of the Southern Resident DPS killer whale:

1. Water quality to support growth and development
2. Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction and development, as well as overall population growth
3. Passage conditions to allow for migration, resting, and foraging

Project vessels have the potential for unauthorized spills that could affect PBF 1. However, we do not expect the release of toxins in a quantity that could impact water quality. A small spill would likely disperse quickly due to tide-induced turbulence and mixing, and a large spill is extremely unlikely to occur. Therefore, adverse effects to PBF 1 from project vessel spills are expected to be insignificant. The primary impacts from the proposed action to PBF 2 are from acoustic and non-acoustic disturbance. Project-related sound is not expected to cause direct injury to fish, and will behaviorally affect fish only at close range. Non-acoustic disturbance from the passage of project vessels on the surface of the water (boat wakes, spinning propellers) will be temporary and have a relatively small geographic extent. With the low number of vessel trips and transitory nature of project-related vessel traffic, any adverse effects to PBF 2 from project vessels are expected to be insignificant. The sound and presence of project vessels could impact PBF 3 by causing killer whales to avoid or abandon certain areas; however, the duration of exposure to the vessels and associated noise will be brief and temporary, lasting on the order of minutes. Project-specific vessel transit is unlikely to affect Southern Resident DPS killer whale passage conditions, and potential impacts to PBF 3 are expected to be insignificant. The limited transit of project vessels through this highly industrialized waterway will not negatively affect the essential features of designated critical habitat.

NMFS designated critical habitat for the Cook Inlet beluga whale on April 11, 2011 (76 FR 20180). Cook Inlet beluga whale critical habitat includes five PCEs (or PBFs) deemed essential to the conservation of the Cook Inlet beluga whale (50 CFR 226.220(c)):

1. Intertidal and subtidal waters of Cook Inlet with depths <30 ft (MLLW) and within 5 mi of high and medium flow anadromous fish streams
2. Primary prey species consisting of four species of Pacific salmon (Chinook, sockeye, chum, and coho), Pacific eulachon, Pacific cod, walleye pollock, saffron cod, and yellowfin sole
3. Waters free of toxins or other agents of a type and amount harmful to Cook Inlet beluga whales
4. Unrestricted passage within or between the critical habitat areas
5. Waters with in-water noise below levels resulting in the abandonment of critical habitat areas by Cook Inlet beluga whales

Project vessels are expected to travel in normal shipping lanes in Cook Inlet, which are located outside of PBF 1; therefore, the proposed action will have no effect on PBF 1. Acoustic and non-acoustic disturbance from project vessels could impact PBF 2. Project-related sound is not expected to cause direct injury to fish, and will behaviorally affect fish only at close range. Non-acoustic disturbance from the passage of project vessels on the surface of the water (boat wakes, spinning propellers) will be temporary and have a relatively small geographic extent. With the low number of vessel trips and transitory nature of project-related vessel traffic, any adverse effects to PBF 2 from project vessels are expected to be insignificant. Unauthorized spills could occur; however, we do not expect toxins to be released into the environment in amounts that would be harmful to PBF 3. A small spill would likely disperse quickly due to tide-induced turbulence and mixing, and a large spill is extremely unlikely to occur. Therefore, adverse effects to PBF 1 from project vessel spills are expected to be insignificant. The sound and presence of project vessels could impact PBF 4 and PBF 5 by causing belugas to avoid or abandon certain areas; however, the duration of exposure to the vessel and associated noise will be brief and temporary, lasting on the order of minutes. Project-specific vessel transit is unlikely to affect beluga passage and occurrence, and adverse effects to PBF 4 and PBF 5 are expected to be insignificant. For these reasons, we conclude that there is no aspect of the vessel transit through critical habitat that will negatively impact the essential features of Cook Inlet beluga critical habitat.

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

1. Alaska rookeries, haulouts, and associated areas identified in 50 CFR 226.202(a), including:
   a. Terrestrial zones that extend 3,000 ft (0.9 km) landward
   b. Air zones that extend 3,000 ft (0.9 km) above the terrestrial zone
   c. Aquatic zones that extend 3,000 ft (0.9 km) seaward from each major rookery and major haulout east of 144° W longitude
   d. Aquatic zones that extend 20 nm (37 km) seaward from each major rookery and major haulout west of 144° W longitude
2. Three special aquatic foraging areas identified in 50 CFR 226.202(c):
   a. Shelikof Strait
   b. Bogoslof
   c. Seguam Pass

There will be no effect to the terrestrial or air zones of PBF 1, as project activities will not occur on land or in the air near rookeries or haulouts. Project activities will also not occur in Seguam Pass, and there will be no effect to this special aquatic foraging area of PBF 2. Project vessels may enter the aquatic zones near rookeries and haulouts of PBF 1 and the Shelikof Strait and Bogoslof special aquatic foraging areas of PBF 2. However, project vessels are expected to travel in normal shipping lanes when in Steller sea lion range, and Steller sea lions at haulouts or rookeries near those shipping lanes are likely habituated to vessel traffic. Additionally, mitigation measures will be implemented to protect Steller sea lion critical habitat from vessel disturbance. For these reasons, we conclude that the effects of project vessel transit on the two aquatic zones of PBF 1 and the Shelikof Strait and Bogoslof special aquatic foraging areas of PBF 2 are expected to be insignificant. There is no aspect of the passage of the project-specific vessels over or near critical habitat that will negatively impact the essential features of Steller sea lion critical habitat.

In summary, we find that the temporary passage of the project tug and barges over the water surface of critical habitat for Mexico and Western North Pacific DPS humpback whales, Southern Resident DPS killer whales, Cook Inlet beluga whales, and Steller sea lions will have an immeasurably small effect on the features determined to be essential for these species.

The ensonfied area for pile driving activities does not overlap with any designated critical habitat. The nearest critical habitat is the Steller sea lion rookeries located on the Chiswell Islands, approximately 55 km southwest of the construction site. Based on the distance of the construction site from major haulouts and rookeries, we expect any adverse effects to designated critical habitat for Steller sea lions would be immeasurably small, and thus insignificant.

Therefore, we conclude that the proposed action is not likely to adversely affect critical habitat for Mexico DPS and Western North Pacific DPS humpback whales, Southern Resident DPS killer whales, Cook Inlet beluga whales, and Steller sea lions. As such, critical habitat will not be discussed further in this opinion.

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. 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.

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

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

http://nsidc.org/arcticseaicenews/

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

Increased air temperatures, increased ocean temperatures, and ocean acidification are the three facets of climate change presented here as they have the most direct impact on marine mammals and their prey.

Air temperature

Recording of global temperatures began in 1850, and the last 10 years (2015–2024) have ranked as the 10 warmest years in the 175-year record. The yearly temperature for North America has increased at an average rate of 0.27°F per decade since 1910; however, the average rate of increase since 1975 is more than double the century-scale rate (0.59°F).[1]

The Arctic (latitudes between 60ºN and 90ºN) has been warming at more than two times the rate

[1] https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202413 accessed March 2025.

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 8). The average annual temperature for Alaska in 2024 was 28.9°F, 2.9°F above the long-term average, ranking in the warmest third of the historical record for the state.[2] 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).

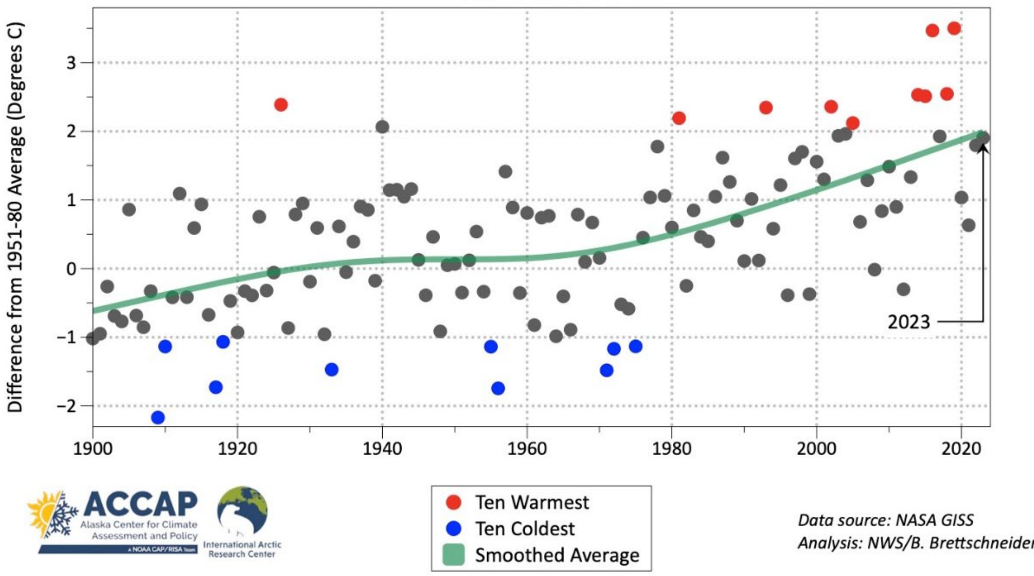

Figure 8. Alaska annual average temperature 1900 to 2023.[3]

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 2024 global ocean heat content (OHC), which is the amount of heat stored in the ocean, in the upper 700 meters and upper 2000 meters was a record high. The five highest 2000-meter OHC measurements have all occurred in the past five years and five highest 700-meter OHC have all occurred since 2019. The Atlantic and Indian Oceans had their highest OHC in the upper 700 meters since the 1950s, while the Pacific had its third highest.[4]

The seas surrounding Alaska have been unusually warm in recent years, with unprecedented warmth in some cases (Thoman and Walsh 2019). This effect is observed throughout the Alaska region, including the Bering, Chukchi, and Beaufort seas (Figure 9). Warmer ocean water affects

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[2]https://www.ncei.noaa.gov/access/monitoring/monthly-report/national/202413 accessed March 2025.
[3]https://www.flickr.com/photos/alaskaclimategraphics/albums/72177720310047711/with/53724340701 accessed November 2024.
[4]https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202413 accessed March 2025.

sea ice formation and melt. In the first decade of the 21st century, Arctic sea ice thickness and annual minimum sea ice extent began declining at an accelerated rate and continues to decline at a rate of approximately 2.7 percent per decade (Stroeve et al. 2007; Stroeve and Notz 2018).

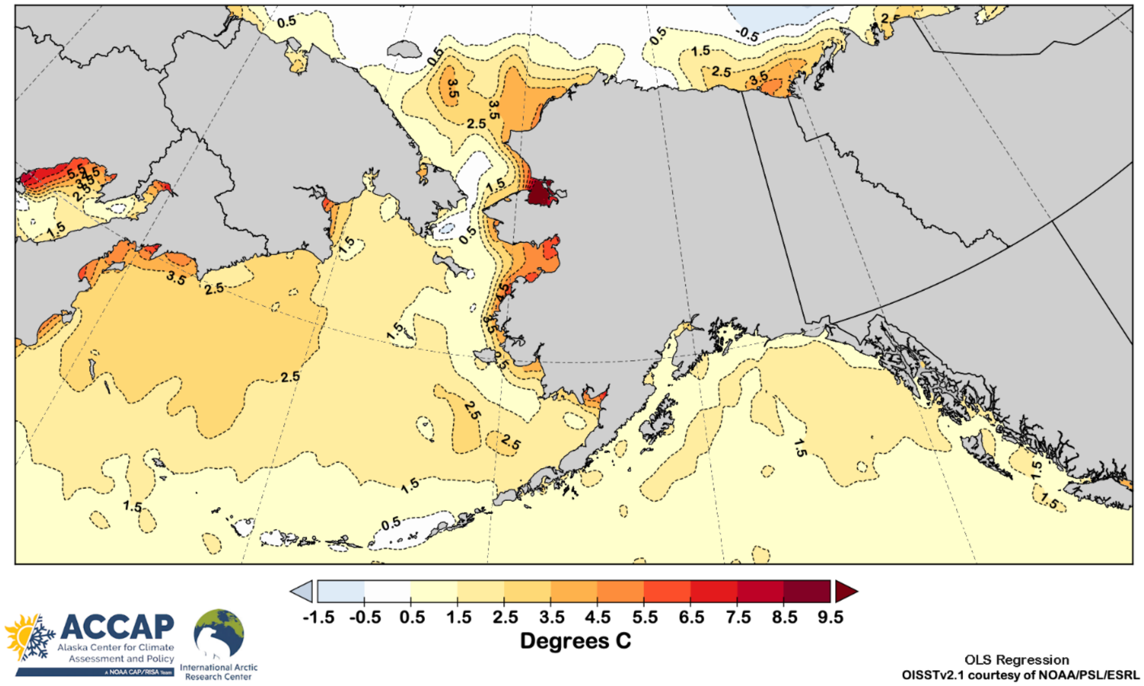

Figure 9. Change in average sea surface temperature, July 1982-2023.[5]

With the reduction in the cold-water pool in the northern Bering Sea, large scale northward movements of commercial fish 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 sessile invertebrates like clams are affected by these changes in water temperature (Grebmeier et al. 2006; Fedewa et al. 2020).

The marine heat wave, a coherent area of extreme warm temperature at the sea surface that persists, is another ocean water anomaly (Frölicher, Fischer and Gruber 2018). Marine heatwaves are a key ecosystem driver and nearly 70 percent of global oceans experienced strong or severe heatwaves in 2016, compared to 30 percent in 2012 (Suryan et al. 2021). The largest recorded marine heat wave occurred in the northeast Pacific Ocean, appearing off the coast of Alaska in the winter of 2013-2014 and extending south to Baja California by the end of 2015 (Frölicher, Fischer and Gruber 2018). The Pacific marine heatwave began to dissipate in mid-2016, but warming re-intensified in late-2018 and persisted through 2021 (Suryan et al. 2021; Hastings et al. 2023). 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 such as capelin and herring, Steller sea

[5]https://www.flickr.com/photos/alaskaclimategraphics/albums/72177720310434651/with/53535707176 accessed November 2024.

lions, adult cod, and Chinook and sockeye salmon in the Gulf of Alaska were all impacted by the Pacific marine heatwave (Bond et al. 2015; Peterson, Bond and Robert 2016; Sweeney, Towell and Gelatt 2018).

The 2018 Gulf of Alaska Pacific cod stock assessment 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 2014-2016 Pacific marine heatwave.[6] The spawning stock biomass dropped below 20 percent of the unfished spawning biomass in 2020; 20 percent is a minimum spawning stock size threshold instituted to help ensure adequate prey availability for the endangered Western DPS of Steller sea lions. The federal Pacific cod fishery in the Gulf of Alaska was closed by regulation to directed Pacific cod fishing in 2020 as a result (Barbeaux, Holsman and Zador 2020). Pacific cod abundance remains at reduced levels; however, the spawning stock biomass is above the 20 percent minimum spawning stock size threshold (Hulson et al. 2024).

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). 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 ocean's role as a large carbon sink, the CO_2 level continues to rise and the global monthly mean for November 2024 was 423.64 ppm.[7]

As the oceans absorb CO_2, the buffering capacity and 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 seawater becomes undersaturated, dissolution is favored (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 indicate that aragonite undersaturation was expected to start to occur by about 2020 in the Arctic Ocean, and by 2050 all of the Arctic will be undersaturated with this mineral (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

[6]https://apps-afsc.fisheries.noaa.gov/REFM/Docs/2018/GOA/GOApcod.pdf accessed November 2024.
[7]https://gml.noaa.gov/ccgg/trends/global.html accessed November 2024.

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, and, consequently, may affect Arctic food webs (Fabry et al. 2008; Bates, Mathis and Cooper 2009). Pteropods, which are often considered an 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). With their thin shells and dependence on aragonite, pteropods may not be able to grow and maintain shells under increasingly acidic conditions (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 marine species in a variety of ways, including shifting abundances, changes in distribution, changes in timing of migration, and changes in periodic life cycles of species (IPCC 2019). For example, cetaceans with restricted distributions linked to water temperature may be particularly susceptible to range restriction (Learmonth et al. 2006; Isaac 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. Of greatest concern are cetaceans with ranges limited to non-tropical waters and preferences for shelf habitats (Macleod 2009).

4.3 Status of Listed Species 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 or proposed 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.

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 Fin Whale

4.3.1.1 Population Structure and Status

NMFS recognizes three stocks of fin whale in U.S. Pacific waters: Northeast Pacific (Alaska), California/Washington/Oregon, and Hawaii (Young et al. 2024). There are no reliable estimates of current or historical abundances for the entire Northeast Pacific fin whale stock. Many of the studies that provide information on the distribution, occurrence, and/or abundance estimates for areas within the range of the Northeast Pacific stock are over a decade or more old. A dedicated line-transect survey of the offshore waters of the Gulf of Alaska in 2013 provided an abundance estimate of 3,168 fin whales (Rone et al. 2017), and a minimum population estimate of 2,554 whales was derived from this provisional estimate (Young et al. 2024). This is an underestimate for the entire stock as it is based on surveys that only covered a small portion of their range. Additional information on fin whale biology and natural history is available at: https://www.fisheries.noaa.gov/species/fin-whale.

The fin whale was listed as an endangered species under the Endangered Species Conservation Act (ESCA) on December 2, 1970 (35 FR 18319). Congress replaced the ESCA with the ESA in 1973 and fin whales continued to be listed as endangered (39 FR 41367; November 27, 1974). A recovery plan for the fin whale was published on July 30, 2010 (NMFS 2010).

4.3.1.2 Distribution

Fin whales are typically found in deep, offshore waters of all major oceans, primarily in temperate to polar latitudes. Most migrate from tropical breeding and calving areas in the winter to colder feeding areas in the summer. In the North Pacific, 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, Bering Sea/Aleutian Islands, and around Kodiak Island (Young et al. 2024).

Fin whale feeding biologically important areas have been identified around Kodiak Island, including the mouth of Cook Inlet (Ferguson, Curtice and Harrison 2015; Wild et al. 2023), and in the Bering Sea (Ferguson et al. 2015). The highest densities of fin whales in Alaska occur between June and August around Kodiak Island and from June to September in the Bering Sea (NMFS 2012; Ferguson, Curtice and Harrison 2015; Ferguson et al. 2015). Fin whales tend to return to low latitudes for the winter breeding season, though some may remain in their high latitude ranges if food resources remain plentiful. During winter months, fin whales have been seen over a wide geographic area from 23°N to 60°N, but winter distribution and the location of primary wintering areas (if any) are poorly known (Young et al. 2024).

4.3.1.3 Presence in the Action Area

Marine Transit Routes

Fin whales are ubiquitous in the Gulf of Alaska, from the outer waters of Southeast Alaska and pelagic waters of the Gulf of Alaska, to the coastal waters of the Kodiak Archipelago and Alaska

Peninsula, to inland waters of Southeast Alaska (Ferguson, Curtice and Harrison 2015). There have been year-round acoustic detections of fin whales in the Gulf of Alaska, with the highest call occurrence rates from August through December (Moore et al. 2006; Stafford et al. 2007).

Inner Resurrection Bay

Fin whales are rare in inner Resurrection Bay; however, there have been several sightings in recent years. There were two sightings of a single fin whale within three hours of each other (and likely of the same whale) on June 23, 2019, a sighting of three to four fin whales on July 1, 2024, and a sighting of two fin whales on July 20, 2024.[8] A freshly dead fin whale carcass was discovered on the bulbous bow of a cruise ship in Seward harbor in May 2016, and it was confirmed that the whale was killed by ship strike (Helker et al. 2019).

4.3.1.4 Feeding and Prey Selection

Fin 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). 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, 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).

Average dives for foraging fin whales are 98 m deep and 6.3 minutes long, compared to non-foraging dives that are 59 m deep and 4.2 minutes long (Croll et al. 2001). Foraging dives deeper than 150 m have been documented (Panigada et al. 1999).

4.3.1.5 Reproduction

Male fin whales reach sexual maturity between 6 and 10 years of age, while females mature between 7 and 12 years old. Fin whales in the North Pacific are thought to mate around December to February. The gestation period is approximately 11 to 12 months, and females give birth in tropical and subtropical areas during midwinter. Calves weigh from 4,000 to 6,000 pounds and are nursed for 6 to 7 months. Reproductive females may produce a calf every two to three years. Despite reaching sexual maturity between 6 and 12 years of age, adult fin whales reach physical maturity around 25 years of age.

4.3.1.6 Vocalization, Hearing, and Other Sensory Capabilities

Fin whales produce a variety of low-frequency sounds in the 10 Hz to 0.2 kHz range (Thompson, Findley and Vidal 1992; Rice et al. 2021). The most typical signals are long, patterned sequences of short duration (0.5 to 2 seconds) infrasonic pulses in the 18 to 35 Hz range (Patterson and Hamilton 1964). The seasonality and stereotype of the bouts of patterned sounds suggest that

[8] https://happywhale.com/browse accessed December 2024.

these sounds are male reproductive displays (Watkins et al. 1987), while the individual counter calling data of McDonald et al. (1995) suggest that the more variable calls are contact calls. Some authors suggest there are geographic differences in the frequency, duration, and repetition of the pulses (Thompson, Findley and Vidal 1992).

Their low-frequency sounds have the potential to travel over long distances, and it is possible that fin whales participate in long-distance communication (Payne and Webb 1971, Edds-Walton 1997). The sounds may also function for long-range echolocation of large-scale geographic targets such as seamounts, which may be used for orientation and navigation (Tyack 1999).

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 20 Hz to 10 kHz, with maximum sensitivities between 1 to 2 kHz (Cranford and Krysl 2015). Houser et al. (2024) developed a catch-and-release program for low-frequency cetaceans, specifically adolescent minke whales, in order to perform hearing tests in the wild. Results from two whales indicate that minke whales are sensitive to sound frequencies as high as 45 to 90 kilohertz, which is higher than previously believed. The NMFS 2024 Technical Guidance update was published before Houser et al. (2024), and additional minke whale hearing data were collected during the 2024 field season, which have not yet been published. The generalized hearing range for low-frequency cetaceans is currently reported between 7 Hz and 36 kHz; however, NMFS anticipates reevaluating and updating the acoustic criteria once the 2024 data have been analyzed and published (NMFS 2024a).

4.3.1.7 Threats

Natural Threats

There is limited information on natural sources of injury or mortality to fin whales. Predation of fin whales by killer whales has been observed (Vidal and Pechter 1989); adults engage in flight responses (up to 40 km/hour) to evade the predators, 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 1999).

An unusual mortality event (UME) included thirteen fin whales that stranded in the Gulf of Alaska, with a peak occurrence from May 1 to November 30, 2015 (Savage 2017). A definitive cause of the UME was not determined, although the primary cause likely involved one or more consequences of shifting environmental conditions such as exposure to algal toxins or lack of prey.

Anthropogenic Threats

Ship strikes are a known threat for fin whales, and this species may be more vulnerable to strikes due to their large body size and the amount of time they spend at the surface (Sèbe et al. 2022). Between 1978 and 2022, seven ship strikes of fin whales were reported in Alaskan waters (Neilson et al. 2012; Helker et al. 2019; Freed et al. 2023; Brower et al. 2024). Vessel strikes of fin whales in Alaska are likely underreported, which may be due to their preference for offshore waters, the animal sinking before it is visible (Rockwood, Calambokidis and Jahncke 2017), and/or the carcass washing ashore in a remote location inaccessible to humans.

Fin whales may also experience significant injury and mortality from fishing gear and entanglements. Between 2009 and 2022, two fin whales were reported as entangled or entrapped in gear in Alaskan waters (Helker, Allen and Jemison 2015; Delean et al. 2020; Freed et al. 2023; Brower et al. 2024).

4.3.2 Mexico and Western North Pacific DPS Humpback Whales

4.3.2.1 Population Structure and Status

In 1970, the humpback whale was listed under the ESCA as endangered worldwide (35 FR 18319; December 2, 1970) primarily due to overharvest by commercial whaling. Humpback whales continued to be listed as endangered following passage of the ESA (39 FR 41367; November 27, 1974), and are also considered "depleted" under the MMPA.

NMFS conducted a global status review of humpback whales (Bettridge et al. 2015) and published a final rule recognizing 14 DPSs on September 8, 2016 (81 FR 62260). Four of these DPSs 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 (2021) concluded that humpbacks feeding in Alaska waters belong primarily to the Hawaii DPS (recovered), with small numbers from the Mexico DPS (threatened) and Western North Pacific DPS (endangered). 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.

There are approximately 2,913 animals in the Mexico DPS and 1,084 animals in the Western North Pacific DPS (Wade 2021); the population trend for both is unknown. The Hawaii DPS is estimated at 11,540 animals, and the annual growth rate is between 5.5 and 6.0 percent (Wade 2021). Humpbacks in the Gulf of Alaska summer feeding area are comprised of approximately 89 percent Hawaii DPS individuals, 11 percent Mexico DPS individuals, and less than 1 percent Western North Pacific DPS individuals. Additional information on humpback whale biology and natural history is available at: https://www.fisheries.noaa.gov/species/humpback-whale.

4.3.2.2 Distribution

Humpback whales are found in all oceans of the world, with a broad geographical range from tropical to temperate waters in the Northern Hemisphere and from tropical to near-ice-edge waters in the Southern Hemisphere. Seasonal migrations occur from their tropical calving and breeding grounds in winter to their high-latitude feeding grounds in summer.

Most humpbacks that summer in Alaska winter in temperate or tropical waters near Mexico, Hawaii, or in the western Pacific near Japan. In the spring, these animals migrate back to Alaska, where food is abundant. They tend to concentrate in several areas, including Southeast Alaska, Prince William Sound, Kodiak, the Bering Sea, and along the Aleutian Islands (Wild et al. 2023). Large numbers of humpbacks have also been reported in waters over the continental shelf, extending up to 185 km offshore in the western Gulf of Alaska (Wade 2021). Some individuals remain in Alaska waters year-round.

4.3.2.3 Presence in the Action Area

Marine Transit Routes

Relatively high densities of humpback whales occur throughout much of Southeast Alaska and northern British Columbia, particularly during the summer months. Most whales in this area are from the Hawaii DPS (98 percent) with a small number from the Mexico DPS (2 percent; Wade 2021). 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 during late summer to early fall. However, there are significant overlaps in departures and returns (Baker et al. 1985; Straley 1990).

In the Gulf of Alaska, humpback whales are from the Hawaii DPS (89 percent), Mexico DPS (11 percent), and Western North Pacific DPS (1 percent; Wade 2021). Humpbacks occur throughout the central and western Gulf of Alaska from Prince William Sound to the Shumagin Islands. Seasonal concentrations are found in the 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 185 km offshore in the western Gulf of Alaska (Rone et al. 2017; Wade 2021).

Inner Resurrection Bay

Humpback whales frequent inner Resurrection Bay with peak numbers during the summer months. Over 100 opportunistic sightings were reported in inner Resurrection Bay between 2003 and 2024 (Figure 10).[9]

[9]https://seamap.env.duke.edu/species/180530 accessed December 2024.

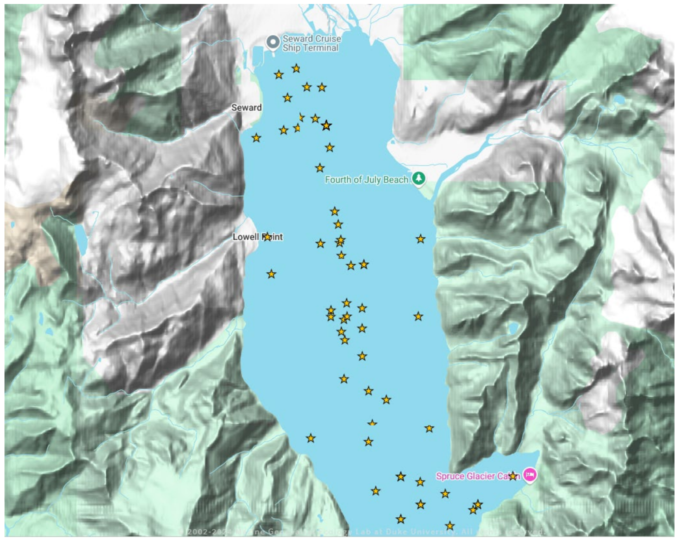

Figure 10. Humpback whale sightings in inner Resurrection Bay from 2003 to 2024.

4.3.2.4 Feeding and Prey Selection

Humpback whales exhibit flexible feeding strategies, sometimes foraging alone and sometimes cooperatively (Clapham 1993). Humpback whales are 'gulp' or 'lunge' feeders, capturing large mouthfuls of prey during feeding rather than continuously filtering food, as may be observed in some other large baleen whales (Goldbogen et al. 2008; Simon, Johnson and Madsen 2012). When lunge feeding, whales advance on prey with their mouths wide open, then close their mouths around the prey and trap them by forcing engulfed water out past the baleen plates. Compared to some other baleen whales, humpbacks are relatively generalized in their prey selection. In the Northern Hemisphere, known prey includes euphausiids (krill), copepods, juvenile salmonids, herring, Arctic cod, walleye pollock, pteropods, and cephalopods (Johnson and Wolman 1984; Perry, DeMaster and Silber 1999; Straley et al. 2018).

In the North Pacific, humpback whales forage in the coastal and inland waters along California, north to the Gulf of Alaska and the Bering Sea, and west along the Aleutian Islands to the Kamchatka Peninsula and into the Sea of Okhotsk (Tomilin 1957; Johnson and Wolman 1984). Biologically important areas for seasonal feeding have been identified in Southeast Alaska, Prince William Sound, waters surrounding Kodiak Island, and the waters surrounding the Shumagin Islands (Ferguson, Curtice and Harrison 2015; Wild et al. 2023).

4.3.2.5 Reproduction

Humpbacks in the Northern Hemisphere give birth and presumably mate on low-latitude wintering grounds from January to March. Females attain sexual maturity at five years old 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 are probably weaned by the end of their first year (Perry, DeMaster and Silber 1999).

4.3.2.6 Vocalization, Hearing, and Other Sensory Capabilities

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). NMFS categorizes humpback whales in the low-frequency cetacean functional hearing group, with a generalized hearing range between 7 Hz and 36 kHz (NMFS 2024a). Baleen whales have inner ears that appear to be specialized for low-frequency hearing.

Humpback whales produce a wide variety of sounds (especially animals in mating groups) ranging from 20 Hz to 10 kHz (Tyack 1981; Silber 1986). During the breeding season males sing long, complex songs, with frequencies in the 20 to 5,000 Hz range and intensities as high as 181 dB (Payne 1970; Winn, Perkins and Poulter 1970; Thompson, Cummings and Ha 1986). Source levels average 155 dB and range from 144 to 174 dB (Thompson, Winn and Perkins 1979). The songs appear to have an effective range of approximately 10 to 20 km. Social sounds associated with male aggressive behavior in breeding areas are very different than songs and extend from 50 Hz to 10 kHz (or higher), with most energy in components below 3 kHz (Tyack and Whitehead 1983; Silber 1986). These sounds appear to have an effective range of up to nine kilometers (Tyack and Whitehead 1983).

Feeding groups produce distinctive sounds ranging from 20 Hz to 2 kHz, with median durations of 0.2 to 0.8 seconds and source levels of 175-192 dB (Thompson, Cummings and Ha 1986). These sounds are thought to be attractive and appear to rally animals to the feeding activity (D'Vincent, Nilson and Hanna 1985; Sharpe and Dill 1997). Humpback whales produce sounds less frequently in their summer feeding areas.

4.3.2.7 Threats

Natural Threats

There is limited information on natural sources of injury or mortality to humpback whales. Based upon the 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 pursued. Humpback whales examined for biotoxins indicated a 38 percent prevalence for domoic acid and a 50 percent prevalence for saxitoxin (Lefebvre et al. 2016).

Anthropogenic Threats

Historically, commercial whaling represented the greatest threat to every population of humpback whale. In 1963, the International Whaling Commission (IWC) banned commercial hunting of humpback whales, and, as a result, this threat has largely been curtailed. No commercial whaling occurs within the range of Mexico DPS humpbacks. Japan resumed commercial whaling in its territorial sea and exclusive economic zone (EEZ) in 2019, which is within the Western North Pacific DPS humpback range. Previously, “commercial bycatch whaling” was documented within the Western North Pacific DPS humpback range in Japan and

South Korea (Bettridge et al. 2015). Alaska Native subsistence hunters are not granted aboriginal subsistence whaling quotas to take humpback whales under the International Whaling Commission.

Vessel strike is one of the main threats and sources of anthropogenic impacts to humpback whales in Alaska. Neilson et al. (2012) summarized 108 ship strike events in Alaska from 1978 to 2011; 86 percent (93 strikes) involved humpback whales. Fifty-eight humpbacks were struck by vessels between 2012 and 2022 (Helker et al. 2019; Freed et al. 2023; Brower et al. 2024). Most ship strikes of humpback whales are reported in Southeast Alaska, where high vessel traffic overlaps with whale presence.

Fishing gear entanglement is another major threat. Entanglement may result in only minor injury or may significantly affect individual health, reproduction, or survival. Every year humpback whales are reported entangled in fishing gear in Alaska, particularly pot gear and gill net gear. Between 2016 and 2020, entanglement of humpback whales (n=47) was the most frequent human-caused source of mortality and injury of large whales in Alaska (Freed et al. 2022).

4.3.3 Western DPS Steller Sea Lion

4.3.3.1 Population Structure and Status

On November 26, 1990, NMFS published a final rule to list Steller sea lions as threatened (55 FR 49204). In 1997, NMFS reclassified Steller sea lions as two DPSs (62 FR 24345; May 5, 1997); the Eastern DPS was listed as threatened and the Western DPS was listed as endangered. On November 4, 2013, NMFS published a final rule to delist the Eastern DPS (78 FR 66140). Information on Steller sea lion biology and habitat (including critical habitat) is available in the revised Steller Sea Lion Recovery Plan (NMFS 2008) and five-year Status Review (NMFS 2020).

The Western DPS of Steller sea lions decreased from an estimated 220,000 to 265,000 animals in the late 1970s to fewer than 50,000 in 2000 (Young et al. 2024). Factors that may have contributed to this decline include incidental take in fisheries, competition with fisheries for prey, legal and illegal shooting, predation, exposure to contaminants, disease, and ocean regime shift-driven climate change (NMFS 2008). The most recent comprehensive surveys of Western DPS Steller sea lions estimated a total Alaska population (both pups and non-pups) of 52,727 (Sweeney et al. 2025). Between 2009 and 2024, Western DPS Steller sea lion pups increased by 0.90 percent per year and non-pups increased by 0.96 percent per year (Sweeney et al. 2025). While the data show the overall population trend is positive, abundance and trends are highly variable across regions and age classes.

Pup counts declined in the eastern and central Gulf of Alaska between 2015 and 2017, counter to the increases observed in both regions since 2002 (Sweeney et al. 2017). These declines may have been due to changes in prey availability from the marine heatwave that occurred in the northern Gulf of Alaska from 2014 to 2016 (Bond et al. 2015; Petersen et al. 2016; Young et al. 2024). Pup counts rebounded to 2015 levels in 2019; however, non-pup counts in the eastern, central, and western Gulf of Alaska regions declined (Sweeney et al. 2019). The eastern Gulf of

Alaska region non-pups count remained low in 2021, the central Gulf of Alaska increased to 2010 levels, and the western Gulf of Alaska showed the first signs of decline in 2021 after increasing since the early 2000s (Sweeney et al. 2022). As of 2024, the eastern Gulf of Alaska region non-pup count significantly decreased, the central Gulf of Alaska region continued to increase, and the western Gulf of Alaska remained stable (Sweeney et al. 2025).

4.3.3.2 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 11; 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 only located in Russia (Burkanov and Loughlin 2005). Steller sea lions are not known to migrate annually, but individuals may widely disperse outside of the breeding season (late May to early July; Jemison et al. 2013; Young et al. 2024).

Land sites used by Steller sea lions are referred to as rookeries and haulouts (Figure 11). Rookeries are used by adult sea lions for pupping, nursing, and mating; most adults occupy rookeries during the reproductive season (Pitcher and Calkins 1981; Gisiner 1985), and exhibit high site fidelity (Sandegren 1970). Some juveniles and non-breeding adults occur at or near the rookeries during the breeding season, but most are on haulouts (Rice 1998; Ban 2005; Call and Loughlin 2005). Haulouts are used by all age classes of both sexes but are generally not where sea lions reproduce. At the end of the reproductive season, some females may move with their pups to other haulout sites and males may migrate to distant foraging locations (Spalding 1964; Pitcher and Calkins 1981). Sea lions may make semi-permanent or permanent one-way movements from one site to another (Chumbley et al. 1997; Burkanov and Loughlin 2005). Round trip migrations of greater than 6,500 km have been documented for individual Steller sea lions (Jemison et al. 2013).

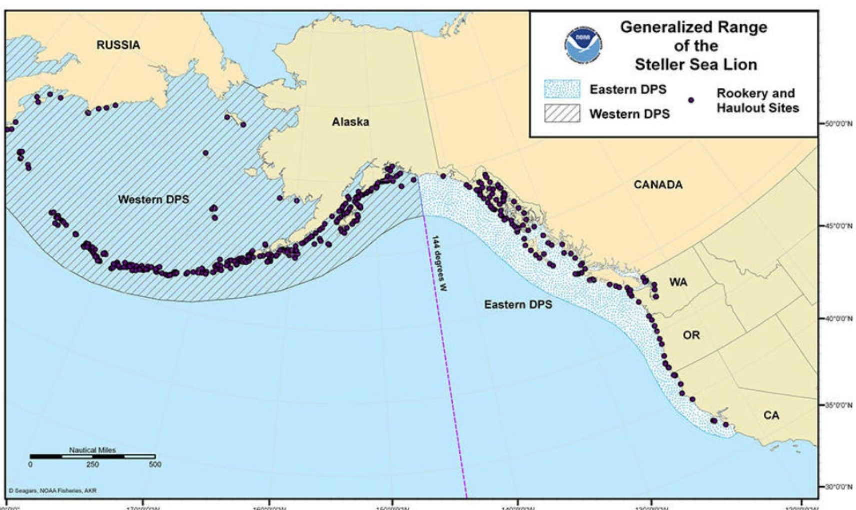

Figure 11. Ranges, rookeries, and haulout sites of Western and Eastern DPS Steller sea lions.

4.3.3.3 Presence in the Action Area

Marine Transit Routes

Given the wide dispersal of individuals, the Western DPS of Steller sea lions will likely be encountered along the transit routes. An area of high occurrence extends from the shore to water depths of 500 m. In the Gulf of Alaska, foraging habitat is primarily shallow, nearshore, and continental shelf waters 8 to 24 km offshore with a secondary occurrence inshore of the 1,000 m isobath, and a rare occurrence seaward of the 1,000 m isobath.

Inner Resurrection Bay

Professional tour boat captains in Seward reported that at least five to ten Steller sea lions can be found foraging daily throughout inner Resurrection Bay, often near Seward Harbor. Steller sea lions are also commonly observed near Lowell Point, Tonsina Point, Fourth of July Beach, North Fox Island, and Hat Island within Resurrection Bay.

4.3.3.4 Feeding, Diving, Hauling Out, and Social Behavior

The foraging strategy of Steller sea lions is strongly influenced by seasonality of sea lion 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 1988; NMFS 2008), and occasionally other marine mammals and birds (Pitcher and Fay 1982; NMFS 2008).

During summer, Steller sea lions feed mostly over the continental shelf and shelf edge. Females attending pups forage within 37 km of breeding rookeries (Merrick and Loughlin 1997), and begin a regular routine of alternating foraging trips at sea with nursing their pups on land a few days after birth. Steller sea lions tend to make shallow dives of less than 250 m but are capable of deeper dives (NMFS 2018). Female foraging dives during summer tend to be closer to shore and are shallower (Merrick and Loughlin 1997). Winter foraging trips tend to be longer in duration, farther from shore, and with deeper dives.

Steller sea lions are gregarious animals that often travel in large groups of up to 45 individuals (Keple 2002), and rafts of several hundred animals are often observed adjacent to haulouts. Individual rookeries and haulouts may be comprised of hundreds of animals. At sea, groups usually consist of females and subadult males, as adult males are usually solitary (Loughlin 2002).

4.3.3.5 Reproduction

Male Steller sea lions reach sexual maturity between ages three and seven, but do not reach physical maturity and participate in breeding until about 8 to 10 years of age (Pitcher and Calkins 1981). Female Steller sea lions reach sexual maturity and first breed between 3 and 8 years of age, and the average age of reproductive females is about 10 (Pitcher and Calkins 1981; Calkins and Pitcher 1982; York 1994).

After reaching maturity, females normally ovulate and breed annually. There is a high rate of reproductive failure but, when successful, females give birth to a single pup between May and July. The sex ratio of pups at birth is assumed to be about 1:1, or slightly biased toward males. Newborn pups are dependent upon their mother for milk during at least the first three months, and observations suggest they continue to be highly dependent through their first winter (Trites et al. 2006).

4.3.3.6 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 68 kHz in water (NMFS 2024a). Studies of Steller sea lion auditory sensitivities have found that this species detects sounds underwater between one and 25 kHz (Kastelein et al. 2005), and in air between 250 Hz and 30 kHz (Mulsow and Reichmuth 2010).

4.3.3.7 Threats

Natural Threats

Killer whale predation on the Western DPS, under reduced population size, may cause significant reductions in the stock (NMFS 2008). Steller sea lions are also vulnerable to predation from sleeper sharks. Juvenile Steller sea lions were found to underutilize foraging habitats and prey resources based on predation risk by killer whales and sleeper sharks (Frid et al. 2009).

Steller sea lions have tested positive for several pathogens, and parasites are common; however, disease levels and mortality resulting from infestation are unknown. Significant negative effects of these factors may occur in combination with stress, which may compromise the immune system. 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

The female spawning biomass of Pacific cod, an important prey species for Steller sea lions, was at its lowest point in 2018.[10] The federal Pacific cod fishery in the Gulf of Alaska was closed by regulation to directed Pacific cod fishing in 2020 (Barbeaux, Holsman and Zador 2020). Abundance has remained at reduced levels since the 2014-2016 marine heatwave; however, the spawning stock biomass is above the 20 percent minimum spawning stock size threshold (Hulson et al. 2024).

Anthropogenic Threats

Subsistence hunters removed 218 Western DPS Steller sea lions between 2017 and 2021 in controlled and authorized harvests (Young et al. 2024). Between 2018 and 2022, human-caused mortality and injury of Western DPS Steller sea lions (n=159) was primarily caused by

[10] https://apps-afsc.fisheries.noaa.gov/REFM/Docs/2018/GOA/GOApcod.pdf accessed December 2024.

entanglement in fishing gear, in particular, commercial trawl gear (n=109; Brower et al. 2024). Illegal shooting continues to be a threat to Steller sea lions in certain areas of Alaska.

Concern also exists regarding competition between commercial fisheries and Steller sea lions for the same resource: stocks of pollock, Pacific cod, and Atka mackerel. 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.

Metal and contaminant exposure remains a focus of ongoing investigation. Total mercury concentrations measured in hair samples collected from pups in the western-central Aleutian Islands were detected at levels that cause neurological and reproductive effects in other species (Rea et al. 2013).

4.3.4 Sunflower Sea Star

4.3.4.1 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 completed 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.

The global abundance of sunflower sea stars was estimated at several billion animals prior to 2013, but sea star wasting syndrome (SSWS) reached pandemic levels from 2013–2017, killing an estimated 90 percent or more of the population (Lowry et al. 2022). Sunflower sea stars are currently estimated to number approximately 600 million (Lowry et al. 2022). No specific populations of sunflower sea stars have been delineated and they are assumed to be genetically homogenous throughout their range (Lowry et al. 2022).

4.3.4.2 Distribution

The sunflower sea star is a fast-moving (up to 160 centimeters/minute) echinoderm native to the west coast of North America (Lowry et al. 2022). The species 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 in Alaska to Baja California, Mexico (Figure 12), but are most abundant in waters off eastern Alaska and British Columbia (Gravem et al. 2021). They are found along the outer coasts and inside waters, which have complex geophysical features including glacial fjords, sounds, embayments, and tidewater glaciers. Preferring temperate waters, they inhabit kelp forests and rocky intertidal shoals (Shivji et al. 1983; Lowry et al. 2022), and are regularly found in eelgrass meadows (Gravem et al. 2021).

Figure 12. Sunflower sea star distribution in habitats shallower than 435 m.

4.3.4.3 Presence in the Action Area

Marine Transit Routes

Surveys and data for sunflower sea stars in most Alaska waters are very sparse. Currently we assume that the sunflower sea star occupies inter-and sub-tidal habitats throughout the Gulf of Alaska and Southeast Alaska, including the project action area. Sunflower sea star abundance varied geographically in Alaska prior to the SSWS pandemic.

Inner Resurrection Bay

Densities in nearby western Prince William Sound were considered high with an average of 0.233 sunflower sea stars/m^2 (Konar et al. 2019); however, post-pandemic densities in the area are now much lower at 0.04 sunflower sea stars/m^2 (Traiger et al. 2022). Gulf Watch Alaska conducted nearshore marine ecosystem monitoring in the Kenai Fjords National Park region (in close proximity to the construction site) and estimated a density of 0.0125 sunflower sea stars/m^2 in 2024. Sunflower sea stars have been observed and reported opportunistically near the Seward Harbor,[11] but there have been no recent surveys conducted in inner Resurrection Bay.

4.3.4.4 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).

[11]https://www.inaturalist.org/observations?nelat=60.1916769839303&nelng=-149.16515596512517&subview=map&swlat=59.819583039735434&swlng=-149.51122530106267&taxon_id=47673 accessed December 2024.

4.3.4.5 Reproduction and Growth

While generally solitary, sunflower sea stars are known to seasonally aggregate, perhaps for spawning purposes. 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. Sunflower sea star longevity 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).

4.3.4.6 Threats

SSWS is the primary threat and stressor to sunflower sea stars across their range. Declines in the northern portion of its range (i.e., Alaska and British Columbia) 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).

Additional threats to the sunflower sea star include fisheries bycatch, especially in fisheries that use bottom contact gear; habitat degradation and destruction, especially in nearshore, urbanized areas of the species' range; inadequate regulatory mechanisms in some jurisdictions that allow for harvest of the species, even under limited circumstances; and, both direct and indirect (i.e., ecological) consequences of anthropogenic climate change (Lowry et al. 2022). SSWS is thought to be exacerbated by warming ocean temperatures and other climate-change-related characteristics.

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).

This section focuses on existing anthropogenic and natural activities within the action area and their influences on the listed and proposed species that may be adversely affected by the action. Focusing on the impacts of activities specifically within the action area allows us to assess the prior experience and condition of the animals that will be exposed to effects from the actions under consultation. This focus is important because individual animals may exhibit, or be more susceptible to, adverse responses to stressors in some life history stages or in certain areas within their distribution. These localized stress responses or baseline stress conditions may increase the severity of the adverse effects expected from the action. Although some of the activities discussed below may occur outside of the action area, they may still impact listed or proposed species and/or habitat in the action area. Listed and proposed species may be affected by multiple threats concurrently, compounding the impacts of individual threats. The factors that have likely had the greatest impact are discussed below.

5.1 Recent Biological Opinions in the Action Area

NMFS AKR has issued several biological opinions (as well as letters of concurrence) for construction projects in Resurrection Bay in recent years, including:

- USCG Dock Construction Seward and Sitka (AKRO-2024-00243), 2024
- Alaska Railroad Company Seward Dock Repair (AKRO-2023-03224), 2024
- USCG Minor Waterfront Maintenance, Repair, and Replacement Projects in Southcentral and Southeast Alaska (AKRO-2021-01864), 2023

The above biological opinions are available on the NMFS Alaska Region website at: https://www.fisheries.noaa.gov/alaska/consultations/section-7-biological-opinions-issued-alaska-region

5.2 Climate and Environmental 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 2023). While both natural and anthropogenic factors have influenced this warming, human influence has been the dominant cause of the observed warming since the mid-20th century (IPCC 2023). In marine ecosystems, shifts in temperature, ocean circulation, stratification, nutrient input, oxygen content, and ocean acidification are associated with climate change and increased atmospheric carbon dioxide (Doney et al. 2012), and these shifts have potentially far-reaching biological effects. The impacts of climate change are especially pronounced at high latitudes and in polar regions.

In the past 70 years, the average air temperatures across Alaska have increased by approximately 4.3°F and winter temperatures have increased by 7°F.[12] 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

[12] https://akclimate.org/climate-change-in-alaska/ accessed December 2024.

(Houghton 2001; McCarthy et al. 2001). The impacts of these changes and their interactions on listed and proposed 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 and risk of ship strike or construction activities with an associated increase in sound and pollution. 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.

The Gulf of Alaska is 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 is unpredictable.

Temperature is the most important abiotic factor influencing the physiology of fishes and the pathogenicity of their disease organisms (Brett 1971; Marcogliese 2001). Fish are particularly vulnerable to mortality during periods of increased water temperatures, and mortality may occur through several mechanisms, including increased virulence of pathogens, increases in metabolic rate that outstrip energy resources, and an oxygen demand that exceeds the heart's capacity to deliver oxygen (von Biela et al. 2020).

The Pacific marine heatwave, one of the strongest El Niño weather patterns on record, is likely responsible for poor growth and survival of Pacific cod, an important prey species for marine mammals. The spawning stock biomass dropped below 20 percent of the unfished spawning biomass in 2020 and the Federal Pacific cod fishery in the Gulf of Alaska was closed to directed Pacific cod fishing by regulation (Barbeaux, Holsman and Zador 2020). Pacific cod abundance remains at reduced levels; however, the spawning stock biomass is above the 20 percent minimum spawning stock size threshold (Hulson et al. 2024).

Effects to the North Pacific ecosystem are very pronounced, widespread, and well documented. While a changing climate may create opportunities for range expansion for some species, the life cycles and physiological requirements of many specialized polar species are closely linked to the annual cycles of sea ice and photoperiod and they may be less adaptable (Doney et al. 2009; Wassmann et al. 2011). Species in the North Pacific successfully adapted to changes in the climate in the past; however, some species may not be able to adapt at the current accelerated rate of change.

5.2.1 Biotoxins

As temperatures in Alaska waters warm and sea ice diminishes, marine mammal health may be compromised through nutritional and physiological stress, toxins from harmful algal blooms, and exposure to new pathogens. An unprecedented harmful algal bloom extended from the Aleutian Islands to southern California as a result of the Pacific marine heatwave and was linked to mass strandings of marine mammals (Cavole et al. 2016). The neurotoxins domoic acid and saxitoxin are two of the most common biotoxins found along the west coast of North America (Lefebvre et al. 2016). These toxins can have sublethal effects, including reproductive failure and chronic neurological disease, and can also cause death (Broadwater, Van Dolah and Fire 2018).

Domoic acid and saxitoxin have been documented in zooplankton, clams, worms, planktivorous fish, marine mammals, and seabirds in Alaska. Lefebvre et al. (2016) detected domoic acid in all 13 Alaskan marine mammal species examined, saxitoxin in 10 of the 13 species, and both toxins were present in five percent of the animals tested. It is unknown if exposure to multiple toxins suppresses immunity or results in additive or synergistic effects (Broadwater, Van Dolah and Fire 2018). With declining sea ice, warmer water temperatures, and changes in ocean circulation patterns, more frequent and intense harmful algal blooms are likely.

5.2.2 Disease

In addition to influencing animal nutrition and physiological stress, environmental shifts caused by climate change may foster exposure to new pathogens in Alaskan marine mammals. Through altered animal behavior and the absence of physical barriers, loss of sea ice may create new pathways for animal movement and introduction of infectious diseases.

New open water routes through the Arctic suggest that opportunities for pathogens, such as phocine distemper virus, to cross between North Atlantic and North Pacific marine mammal populations may become more common (VanWormer et al. 2019). Phocine distemper virus is a pathogen responsible for extensive mortality in European harbor seals in the North Atlantic. The virus was first detected in the North Pacific Ocean in 2004 in sampled northern sea otters (VanWormer et al. 2019). Brucella and Phocid herpesvirus-1 have also been found in Alaskan marine mammals (Zarnke et al. 2006); herpesviruses have been implicated in fatal and nonfatal infections of harbor seals in the North Pacific (Zarnke et al. 2006).

5.3 Unusual Mortality Events

Several UMEs have occurred within Alaskan waters, and these are likely linked to climate change and the associated changes in prey. Increased gray whale strandings along the west coast of North America ranging from Mexico to Alaska resulted in two UMEs. The first gray whale UME occurred in 1999–2000. The cause of the UME was not determined; however, the carcasses were in poor body condition, suggesting starvation following the 1997–1998 El Niño event (Le Boeuf et al. 2000; Gulland et al. 2005; Moore et al. 2022). Several likely contributors were identified during the second gray whale UME, which occurred from 2019 to 2023. Ecological changes affected the benthic and water-column-inhabiting invertebrates; prey availability for gray whales in the Arctic and sub-Arctic shifted, and resulted in malnutrition in some whales (Moore et al. 2022). The changes in the structure and function of the Arctic ecosystem may help explain the ‘boom and bust’ cycles in gray whale populations and how climate change may impact gray whales in the future (Stewart et al. 2023).

An unusual mortality event of large cetaceans occurred in Alaska waters in 2015–2016 (Savage 2017). Reports of dead whales included 22 humpback, 12 fin, two gray, one sperm, and six unidentified whales. There was an unusually large number of dead whales found in British Columbia during this time as well. Sonar/seismic testing, radiation, and predation likely did not contribute to the UME (Savage 2017). A definitive cause could not be determined, but ecological factors were a contributory cause (i.e., 2015 El Niño and Pacific Coast domoic acid bloom). The strandings were concurrent with the Pacific marine heatwave, decreasing ice extent in the Bering Sea, and, one of the warmest years on record in Alaska in terms of air temperature.

5.4 Vessel Activity

Ferries, cruise ships, tankers, ore carriers, commercial fishing vessels, and recreational vessels transit or operate within Alaska state and EEZ waters. Much of the vessel traffic is concentrated in coastal areas of southeastern and southcentral Alaska where recreational vessels, charter vessels, commercial whale watch vessels, tour boats, and cruise ships are prevalent during the summer months. Large vessel traffic is more likely to occur year-round statewide, in both nearshore and offshore waters, and includes commercial fishing vessels, freighters/tankers, and passenger ferries.

Seward receives moderate vessel traffic year-round, with a peak from April to October. Vessel types include cruise ships, freight vessels, barges, recreational vessels (whale watching, kayaks, sailboats), and charter and commercial fishing vessels. An annual average of approximately 5,800 large vessel transits were recorded in Resurrection Bay (AOOS 2020).

5.4.1 Vessel Noise

Anthropogenic sources of noise have increased ambient noise levels in the ocean over the last 50 years (Richardson et al. 1995; NRC 2003; Horowitz and Jasny 2007). Much of this increase is due to increased shipping as ships become more numerous and of larger tonnage world-wide (NRC 2003). 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 sound pressure level) in the world's ocean from pre-industrial periods, and that most of these increases are from distant shipping (Hildebrand 2009). The primary underwater sound associated with vessel operations is the continuous cavitation sound produced by the propeller arrangement. Other vessel sound sources include onboard diesel generators and the main engine; however, both are subordinate to the thruster and main propeller blade rate harmonics (Gray and Greeley 1980).

Shipping sounds are often at source levels of 150 to 190 dB re 1 μPa rms (Greene and Moore 1995). Kipple and Gabriele (2007) measured sounds emitted from 38 vessels ranging in size from four to 293 m traveling at speeds of 10 kt in Glacier Bay, Southeast Alaska. Sound levels ranged from a minimum of 157 to a maximum of 182 dB re 1 μPa rms, with sound levels showing an increasing trend with both increasing vessel size and vessel speed. Vessel sound levels also showed dependence on propulsion type and horsepower.

Some baleen whales have adjusted their communication frequencies, intensity, and call rate to limit masking effects from anthropogenic sounds such as shipping traffic. Baleen whales may also exhibit behavioral changes in response to vessel noise. Marine mammals that have been disturbed by anthropogenic noise and vessel approaches are commonly reported to shift from resting behavioral states to active behavioral states, suggesting an energetic cost to the affected animal. Humpback cow-calf pairs significantly reduced the amount of time spent resting and milling when vessels approached, as compared to undisturbed whales (Morete et al. 2007). Fin whales were observed to respond to vessels at a distance of about one kilometer (Edds and Macfarlane 1987) and when closely approached by vessels, fin whales stopped feeding, swam away, spent less time at the surface, and increased respiration rates (Jahoda et al. 2003). Responding to vessels is likely stressful, but the biological significance of that stress is unknown (Bauer and Herman 1986).

Potential impacts of vessel disturbance on Steller sea lions have not been well studied, and the responses likely depend on the season and stage in the reproductive cycle (NMFS 2008). Steller sea lions are more likely to be disturbed at haulouts and near rookeries, where in-air vessel noise or visual presence could cause behavioral responses such as avoidance of the sound source, spatial displacement from the immediate surrounding area, trampling, and abandonment of pups (Calkins and Pitcher 1982; Kucey 2005). Repeated disturbances that result in abandonment or reduced use of rookeries by lactating females could negatively affect body condition and survival of pups through interruption of normal nursing cycles (NMFS 2008). Increases in ambient noise from vessel traffic, however temporary, also have the potential to mask communication between sea lions and affect their ability to detect predators (Richardson and Malme 1993; Weilgart 2007).

5.4.2 Vessel Strike

Ship strikes can cause major wounds or death to marine mammals, and are of greatest risk for large whales. The probability of a strike depends on the frequency, speed, and route of the marine vessels, and the distribution and density of marine mammals in the area, as well as other factors.

From 1978 to 2011, 108 whale-vessel collisions were reported in Alaska, with the majority occurring in Southeast between May and September (Neilson et al. 2012). Small recreational vessels traveling at speeds over 13 kt 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 (93 whales; 86 percent) and the number of humpback strikes increased annually by 5.8 percent from 1978 to 2011 (Neilson et al. 2012). During the same time period, three fin whales, one gray whale, one sperm whale, and six unidentified whales were reported (Neilson et al. 2012). In more recent years (2012–2022), reported strikes in Alaska include 58 humpback whales, four fin whales, and two sperm whales (Helker et al. 2019; Freed et al. 2023; Brower et al. 2024). There were also nine reported ship strikes of unidentified whales (Helker et al. 2019; Freed et al. 2023; Brower et al. 2024).

5.5 Tourism

Tourism is a large industry in Seward and Resurrection Bay. Cruise ships are scheduled to stop in Seward between one and five times per week April through September in 2025. Alaska’s summer 2019 cruise ship visitor volume was 44 percent higher than in 2010, and 18 percent of cruise ship passengers in 2019 stopped in Seward (McDowell Group 2020a). Seward experienced a 15 percent increase in cruise passenger volume between 2023 and 2024, from 191,500 to 220,200 passengers. Approximately 1.9 million cruise ship passengers are expected to visit Alaska in 2025 and there are 63 cruise ships scheduled to visit Seward in 2025.[13] The influx of visitors suggests an increasing demand for tourism in the area, including vessel-based activities like whale-watching and sport-fishing. There were 28 vessels engaged in whale watching tours in Seward in 2019, some of which operated multiple tours daily (McDowell Group 2020b). The city was the number two whale watch destination in Alaska with 93,400 passengers. Larger cruise ships, longer tourist seasons, and increased port calls are expected to bring many more visitors to Seward in the future.

Seward is also home to the Alaska SeaLife Center, which is a public aquarium and marine mammal rehabilitation center. The facility has housed a number of ESA-listed species including Steller sea lions and ringed seals, as well as sunflower sea stars.

5.6 Coastal Development

Construction projects in the Gulf of Alaska are primarily in state waters and usually occur within one mile of shore. Projects that interact with listed and proposed species include construction, enhancement or removal of mooring floats, docks, marine access points, shipping terminals, and ferry terminals. The stressors most commonly associated with these projects include underwater noise caused by pile driving, injury due to vessel traffic, pollution, and disturbance to the seafloor, marine habitat, or prey resources.

Coastal development results in the loss and alteration of nearshore marine mammal and sunflower sea star habitat and changes in habitat quality. Increased development may prevent listed and proposed species from reaching or using important feeding, breeding, and resting areas. While some habitat for sunflower sea stars may be lost to development, installation of in-water infrastructure (e.g., dock pilings) may create additional feeding areas for this species.

The shoreline near the construction site is moderately developed, with man-made structures and impervious surfaces along parts of the shoreline while other coastline areas have not been impacted by human development. Marine facilities in the city of Seward include a small boat harbor, cruise ship terminal, the current freight terminal, and other infrastructure. Beyond Seward's immediate surroundings, the project action area extends through Resurrection Bay and into the Gulf of Alaska and the North Pacific Ocean via the transit routes. Some areas are highly developed (e.g., Seattle), while other areas are completely undeveloped.

5.7 Pollutants and Discharges

Marine ecosystems receive pollutants from local, regional, and international sources, and their levels and sources are often difficult to identify and monitor. Sources of pollutants in the action area include atmospheric loading of pollutants (e.g., polychlorinated biphenyls [PCBs]); storm

[13] https://claalaska.com/wp-content/uploads/2025/01/SEW-Seward-2025.pdf accessed February 2025.

water runoff from coastal towns, cities, and villages; runoff into rivers emptying into bays; groundwater discharges; discharges from vessels such as cruise ships; sewage treatment plant effluents; air pollution; and, oil spills.

The Clean Water Act of 1972 has several sections or programs applicable to activities in offshore waters. Section 402 of the Clean Water Act authorizes the U.S. Environmental Protection Agency (EPA) to administer the National Pollutant Discharge Elimination System (NPDES) permit program to regulate point source discharges into waters of the United States. Section 403 of the Clean Water Act requires that the EPA conduct an ocean discharge criteria evaluation for discharges of pollutants from point sources into the territorial seas, contiguous zones, and the oceans. The Ocean Discharge Criteria (40 CFR Part 125, Subpart M) sets forth specific determinations of unreasonable degradation that must be made before permits may be issued.

The EPA issued a NPDES vessel general permit authorizing several types of discharges incidental to the normal operation of vessels, such as grey water, black water, coolant, bilge water, ballast, and deck wash (EPA 2013). The permit applies to owners and operators of non-recreational vessels that are at least 24 m in length, as well as to owners and operators of commercial vessels less than 24 m that discharge ballast water.

The U.S. Coast Guard (USCG) has regulations related to pollution prevention and discharges from vessels carrying oil, noxious liquid substances, garbage, municipal or commercial waste, and ballast water (33 CFR Part 151). The Vessel Incidental Discharge Act, which requires the EPA to develop new national standards of performance for commercial vessel incidental discharges and the USCG to develop corresponding implementing regulations, was signed into law in 2018.

Until these new national standards and regulations are published (anticipated in 2026), the following interim requirements apply:

- For large, non-fishing commercial vessels: The existing vessel discharge requirements established through the EPA 2013 Vessel General Permit and the USCG ballast water regulations, and any applicable state and local government requirements.
- For small vessels and fishing vessels of any size: The existing ballast water discharge requirements established through the EPA 2013 Vessel General Permit and the USCG ballast water regulations, and any applicable state and local government requirements.[14]

As visitors to Seward and the use of Resurrection Bay continues to grow, an increase in pollutants entering Resurrection Bay is likely to occur. The Alaska Department of Environmental Conservation (ADEC) monitors wastewater discharges and has documented increasing water-quality violations with increasing cruise ship visitation. There were generally about 20 to 25 exceedances a year found in samples from both large and small ships from 2015 to 2018.[15]

[14]https://www.epa.gov/vessels-marinas-and-ports/vessels-vgp accessed December 2024.
[15]https://www.adn.com/alaska-news/2025/02/25/more-cruise-traffic-in-alaska-is-followed-by-more-wastewater-violations-officials-say/ accessed February 2025.

Detected exceedances have ranged from about 60 to about 75 a year in the past few years.

NMFS completed an ESA Section 7 consultation on the effects of activities associated with the Alaska Federal/State Preparedness Plan for Response to Oil & Hazardous Substance Discharge/Releases (NMFS 2015). The biological opinion reviewed oil and other hazardous materials spills in Alaska marine waters from 1995–2012; spills occurred throughout the marine waters of Alaska, but primarily in coastal, nearshore areas. The State of Alaska regulates water quality standards within three miles of the shore.

The ADEC Statewide Oil Spills Database provides public access to data on all reported spills, including those as little as one gallon. The types of spills recorded include jet fuel, crude oil, ethylene glycol, and produced water. From January 2014 through December 2024, a total of 23,954 spills were reported in Alaska; 210 of which were reported in Seward.[16]

5.8 Contaminants

Persistent organic pollutants (POPs), which have been used in industrial applications and as flame retardants, have a long lifetime in the environment, are transported over long distances, enter food-webs, and often biomagnify in wildlife and humans (Burkow and Kallenborn 2000; Rigét et al. 2019). Although far from the pollution sources, the Arctic is a receptor of POPs transported from temperate regions via air and water currents (Mossner and Ballschmiter 1997; Burkow and Kallenborn 2000). Studies have found significant levels of these contaminants in the tissues of marine mammals across Alaska. The use of POPs such as DDT, PCBs, and polybrominated diphenyl ethers have been banned or regulated, greatly reducing inputs into the environment (Rigét et al. 2019; Bolton et al. 2020). As a result, there are declining trends of the major classes of POPs in Arctic animals, with reductions of about two to 10 percent per year since reaching a peak in the early 1980s (Bolton et al. 2020).

Heavy metals, in particular mercury, are of concern to marine mammals. Heavy metals can enter marine mammals through uptake from the atmosphere through the lungs, absorption through the skin, across the placenta before birth, via milk during lactation, ingestion of sea water, and ingestion of food (Vos et al. 2003). The major route of heavy metal contamination for marine mammals seems to be via feeding. Mercury biomagnifies and being a top predator in the food web can influence heavy metal levels, especially in marine mammals relying on fish (Vos et al. 2003). Mercury concentrations were found to be elevated in Steller sea lion pups sampled in the western and central Aleutian Islands (Castellini et al. 2012; Rea et al. 2013; Rea and O'Hara 2018). Fetal exposure to mercury during late gestation, a particularly vulnerable stage of neurological development, was also detected in sea lions (Rea et al. 2013). Tissues from Eastern and Western DPS Steller sea lion pups were tested, and mercury occurred in nearly all of the tissues sampled (Holmes et al. 2008). Other heavy metals, such as lead, nickel, copper, and arsenic have also been detected in Steller sea lion samples (Holmes et al. 2008; Ferdinando 2019).

[16]https://dec.alaska.gov/Applications/SPAR/PublicMVC/PERP/SpillSearch accessed December 2024.

5.9 Marine Debris

Marine debris is any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned in the marine environment. Marine debris degrades marine habitat quality, poses ingestion and entanglement risks to marine life, and may introduce invasive species. Marine debris may also leach or absorb hazardous materials which are harmful to marine life.

The most commonly observed interaction between marine mammals and marine debris is through entanglement, often from packing bands or in remnants of fishing gear that has been discarded or lost. Marine debris may also affect marine mammals through ingestion, such as from fishery gear ingestion (i.e., flashers) or from plastics. About 80 percent of marine debris is made up of plastic items, and plastic waste inputs into the ocean and marine mammal interactions with debris are increasing globally (Baulch and Simmonds 2015). Plastics are especially concerning because the large pieces degrade and break apart slowly, releasing harmful chemicals into the ocean and making them easier for fauna to consume. Plastics can be found throughout the water column, but are highest in sediment where it can settle and remain undisturbed (Tekman et al. 2020). Plastic ingestion has been observed throughout food chains, including in zooplankton, fish species, and marine mammals (Botterell et al. 2022; Tirelli, Suaria and Lusher 2022). Ingested plastic can cause choking and blockage of the gastrointestinal tract, along with punctures that can expose the animal to infections. Microplastics in the stomach can also cause dietary dilution, where animals feel like they have a full stomach and will not continue to eat, which can lead to malnourishment, lethargy, and ultimately mortality. Ingested plastics can also expose animals to chemical pollution and contaminants that can aggregate in adipose tissue and cause a cascade of health concerns (Senko et al. 2020).

5.10 Fisheries Interactions

Commercial, recreational, and subsistence fishing occurs in the action area, and may harm or kill listed or proposed species through direct bycatch, gear interactions (entrapments and entanglements), vessel strikes, contaminant spills, habitat modification, competition for prey, and behavioral disturbance or harassment. Commercial fisheries pose a threat to recovering marine mammal stocks in the Gulf of 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.

Reports of fin whale entanglements in Alaska waters are sparse, with only two records between 2012 and 2022. One was entangled and killed in the commercial Pacific cod mechanical jig fishery in the Gulf of Alaska in 2012 and the other in the commercial pollock trawl fishery in the Bering Sea in 2019 (Helker et al. 2019; Brower et al. 2024).

Bettridge et al. (2015) 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. Between 2018 and 2022, entanglement of humpback whales (n=50) was the most frequent human-caused source of mortality and injury of large whales in Alaska (Brower et al. 2024). 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). The frequency of these interactions, however, does not appear to have a significant adverse consequence for humpback whale populations.

The Alaska Department of Fish and Game (ADFG) analyzed data from 1,439 individually marked Steller sea lions re-sighted between 2001 and 2015, and found that animals that ingested salmon hook and line fishing gear had lower survival than comparable animals that had not ingested fishing gear (Freed et al. 2022). Between 2018 and 2022, human-caused mortality and injury of Western DPS Steller sea lions (n=159) was primarily caused by entanglement in fishing gear, in particular, commercial trawl gear (n=109; Brower et al. 2024). This mortality and serious injury estimate results from an actual count of verified human-caused deaths and serious injuries, and is a minimum because not all entangled animals strand nor are all stranded animals found, reported, or have the cause of death determined. Overall, the relative impact on the recovery of the Western DPS of Steller sea lion due to entanglement is ranked as low (NMFS 2008).

Sunflower sea stars are caught as bycatch in commercial fisheries, but the exact number of individuals caught is currently unknown. The mortality rate of sunflower sea stars bycaught in commercial fisheries gear and returned to sea is also unknown, but likely varies by gear type. Sea stars bycaught in hook-and-line and pot gear are generally returned to sea shortly after being brought aboard, whereas sea stars bycaught in trawl gear generally stay with the catch of that haul all the way to processing. Some unknown amount of undetected injury and mortality to sunflower sea stars also likely occurs from bottom contact gear and anchors that crush but do not capture sea stars.

Commercial fisheries may indirectly affect marine mammals by reducing the amount of available prey or affecting prey species composition. Competition for prey species could exist between listed species and commercial fishing, as certain fisheries target key Steller sea lion and humpback whale prey, including Pacific cod, salmon, and herring. Fishery management measures have reduced this potential competition in some regions (e.g., no trawl zones and gear restrictions on various fisheries in southeast Alaska). The broad distribution of prey and seasonal fisheries may minimize competition as well.

Due to their highly migratory nature, many species considered in this opinion have the potential to interact with fisheries both in and outside of the action area. 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.

5.10.1 Aquaculture

Aquaculture in Alaska has the potential to impact ESA-listed species through habitat exclusion, entanglement, entrapment, behavioral modifications, vessel collisions, and increased vessel traffic and noise (Price et al. 2017; Bath et al. 2023). There are currently 98 issued permits for aquatic farm operations in Alaska: 14 hatcheries and 84 aquatic farms.[17] These operations occur within state waters, with the main regions of development in Southeast and Southcentral (Prince William Sound, Kenai Peninsula, and Kodiak). Forty-two seaweed and invertebrate species have been permitted for aquaculture in Alaska; the primary species include Pacific oysters, blue mussels, and sugar, ribbon, and bull kelp. Between 2014 and 2018, the state received an average of six applications for aquatic farms per year and this number has increased to an average of 14 applications per year between 2019 and 2023 (NMFS 2024b). Farmed seaweed production has significantly increased from no production in 2016 to approximately 871,911 pounds in 2022.

5.11 Subsistence Harvest

The ESA and MMPA allow for the harvest of marine mammal species by Alaska Natives for subsistence purposes and for creating and selling authentic native articles of handicrafts and clothing. Subsistence harvest of Western DPS Steller sea lions is regulated by co-management agreements with NMFS, and occurs at or well below sustainable levels of harvest. Annual statewide data on community subsistence harvest of Steller sea lions are no longer collected as of 2009. The minimum estimated mean annual subsistence take (harvested plus struck-and-lost) from the Western DPS between 2017–2021 was 218 sea lions (Young et al. 2024).

With the exception of the harvest of bowhead whales by subsistence hunters in the Alaska Eskimo Whaling Commission's 11 member villages, subsistence hunters in Alaska are not authorized to take any species of great whales (i.e., fin, sperm, and humpback whales) under the Whaling Convention Act (16 U.S.C. 916 *et seq.*), which implements the International Convention for the Regulation of Whaling, Dec. 2, 1946, 161 U.N.T.S. 72.

5.12 Poaching and Illegal Harassment

Steller sea lions have been poached and illegally harvested throughout their range. The NMFS Alaska Marine Mammal Stranding Program documented 60 Steller sea lions with suspected or confirmed firearm injuries in Southeast and Southcentral Alaska from 2000–2019 (Wright 2016; Wright 2021).

Western DPS Steller sea lions with gunshot wounds have been found stranded on shore along the outer Copper River Delta in recent years (Wright 2016; Wright 2021), and seven of nine pinnipeds stranded in the surveyed area in 2019 were shot (Wright 2021). Multiple Steller sea lion carcasses were again found with evidence of human interactions in the same area in the summer of 2023; some had evidence of gunshot wounds. The number of carcasses observed during the 2023 NMFS surveys on the Copper River Delta was greater than previous years.[18] Two Alaska men were sentenced in 2018 for harassing and killing Steller sea lions with shotguns and obstructing the investigation. On various occasions during the 2015 Copper River salmon

[17]https://www.adfg.alaska.gov/index.cfm?adfg=fishingaquaticfarming.aquaticfarminfo_op_permits_species_region accessed March 2025.
[18]https://www.fisheries.noaa.gov/feature-story/help-stop-illegal-shootings-sea-lions-and-seals-near-copper-river-delta accessed December 2024.

season, the captain and crew used two shotguns to shoot at Steller sea lions while fishing.[19]

There are two known cases of unlawful harvests of humpback whales in Alaska; one humpback whale was unlawfully harvested in Kotlik in October 2006, and another in Toksook Bay in May 2016. Subsistence hunters in western Alaska incorrectly believed they could legally harvest large whales other than bowheads. In May 2024, a fisherman pled guilty to a Federal misdemeanor after admitting that he directed a member of his crew to shoot a sperm whale and tried to ram the whale with his fishing boat.[20]

5.13 Sea Star Wasting Syndrome

Sea star wasting syndrome is the primary threat and stressor to sunflower sea stars across their range. A sea star wasting syndrome pandemic occurred across the range of the sunflower sea star from 2013 to 2017. Sea star wasting syndrome is known to occur in sunflower sea stars and other species at smaller geographic and temporal scales. Outbreaks are expected to occur in the future, but the magnitude is unknown. The pathogen that caused the 2013-2017 pandemic is unknown; however, sea star wasting syndrome is thought to be exacerbated by warming ocean temperatures and other climate change related characteristics. The 2022 sunflower sea star status review report identified sea star wasting syndrome as the factor of greatest concern for the species throughout its range (Lowry et al. 2022).

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). We apply this same "effects" definition to our analysis of proposed species.

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 aims to minimize the likelihood of false negative conclusions (i.e., 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

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[19] https://www.justice.gov/usao-ak/pr/two-alaska-men-sentenced-harassing-killing-steller-sea-lions-and-obstructing accessed November 2024.
[20] https://www.juneauempire.com/news/alaska-fisherman-pleads-guilty-to-federal-charges-after-ordering-crew-to-shoot-whale/ accessed December 2024.

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 and proposed 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 IHA application, the biological assessment, personal communications, and available literature, the proposed activities may cause the following stressors to ESA-listed and proposed species:

- Vessel presence, noise, and strike
- Seafloor disturbance, turbidity, and loss of habitat
- Effects on prey
- Trash and debris
- Pollutants and contaminants
- Acoustic disturbance from pile driving activities
- Direct contact with sunflower sea stars

6.1.1 Minor Stressors on ESA-Listed and Proposed 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 fin whales, Mexico and Western North Pacific DPS humpback whales, Western DPS Steller sea lions, and sunflower sea stars.

6.1.1.1 Vessel Presence, Noise, and Strike

As described above in the proposed activities section, the project will use tug and barges. These vessels will transport project equipment and materials to the construction site in Resurrection Bay and will likely deploy from Seattle, Washington, and/or Anchorage, or Dutch Harbor, Alaska. Upon arrival to the construction site, movement of project vessels will be localized within the vicinity of the Freight Dock. A work skiff will also be used in the project area to support construction activities. Vessel traffic in Resurrection Bay will slightly increase during project construction; however, the proposed action is not expected to increase the number of vessels that transit to and from the Freight Dock.

Auditory or visual disturbance to listed species could occur during vessel activities associated with the project. Marine mammals could react by either investigating or being startled by vessels.

Disturbance from vessels could temporarily increase stress levels or displace an animal from its habitat. Underwater noise from vessels may temporarily disturb or mask communication of marine mammals. Behavioral reactions to vessels can vary depending on the type and speed of the vessel, the spatial relationship between the vessel and the animal, the species, and the behavior of the animal prior to the disturbance from the vessel. Response also varies between individuals of the same species exposed to the same sound.

If animals are exposed to vessel noise and presence, they may exhibit deflection from the noise source, engage in low level avoidance behavior, exhibit short-term vigilance behavior, or experience and respond to short-term acoustic masking behavior, but these behaviors are not likely to result in significant disruption of normal behavioral patterns. Vessels moving at slow speeds and avoiding rapid changes in direction may be tolerated by some species. Other individuals may deflect around vessels and continue on their path of travel.

Slight deflection and avoidance are expected to be common responses, in those instances where there is a response. Free-ranging marine mammals may engage in avoidance behavior when surface vessels move toward them, similar to their behavioral responses to predators. Animals have been observed reducing their visibility at the water surface and moving horizontally away from the source of disturbance or adopting erratic swimming strategies (Williams et al. 2002; Lusseau 2003; Lusseau 2006). Studies indicate that dive times and swimming speeds increase, vocalizations and surface active behaviors usually decrease, and individuals in groups move closer together (Kruse 1991; Evans et al. 1994). Most animals in confined spaces, such as shallow bays, moved towards more open, deeper waters when vessels approached (Kruse 1991).

Some baleen whales have adjusted their communication frequencies, intensity, and call rate to limit masking effects from anthropogenic sounds such as shipping traffic. Baleen whales may also exhibit behavioral changes in response to vessel noise. Marine mammals that have been disturbed by anthropogenic noise and vessel approaches are commonly reported to shift from resting behavioral states to active behavioral states, suggesting an energetic cost to the affected animal. Humpback cow-calf pairs significantly reduced the amount of time spent resting and milling when vessels approached (Morete, Bisi and Rosso 2007). Fin whales were observed to respond to vessels at a distance of about one kilometer (Edds and Macfarlane 1987) and when closely approached by vessels, fin whales stopped feeding, swam away, spent less time at the surface, and increased respiration rates (Jahoda et al. 2003). Responding to vessels is likely stressful to humpback whales, but the biological significance of that stress is unknown (Bauer and Herman 1986).

Potential impacts of vessel disturbance on Steller sea lions have not been well studied, and the responses will likely depend on the season and stage in the reproductive cycle (NMFS 2008). Steller sea lions are more likely to be disturbed at haulouts and near rookeries, where in-air vessel noise or visual presence could cause behavioral responses such as avoidance of the sound source, spatial displacement from the immediate surrounding area, trampling, and abandonment of pups (Calkins and Pitcher 1982; Kucey 2005). Repeated disturbances that result in abandonment or reduced use of rookeries by lactating females could negatively affect body condition and survival of pups through interruption of normal nursing cycles (NMFS 2008). Increases in ambient noise from vessel traffic, however temporary, also have the potential to mask communication between sea lions and affect their ability to detect predators (Richardson and Malme 1993; Weilgart 2007). Vessel operations during pile driving activities will not occur near any major pinniped haulouts or rookeries and the effects of vessel presence along the transit routes on Steller sea lions is likely to be temporary as the vessel approaches and passes.

Project vessels will increase sound in the action area during the proposed action and some marine mammals may be exposed to vessel noise as a result. Marine mammal responses to vessel noise may include changes in behavioral states (Richardson et al. 1995), changes in vocalizations (Lesage et al. 1999; Scheifele et al. 2005; Gervaise et al. 2012), and temporary displacement (Blane and Jaakson 1994; Erbe and Farmer 2000). However, project-related vessel noise is not expected to cause a disruption in marine mammal behavioral patterns, which include, but are not limited to, breeding, feeding, sheltering, resting, or migrating. Impacts to fin whales, Mexico and Western North Pacific DPS humpback whales, and Western DPS Steller sea lions from vessel noise are expected to be undetectable and minor due to the relatively low density of these species in the action area, short duration of spatial overlap, low likelihood of exposure to sound that could significantly disrupt behavioral patterns, and implementation of mitigation measures.

Project vessel noise is not expected to cause disruption in sunflower sea star behavioral patterns, which include, but are not limited to, breeding, feeding, sheltering, resting or migrating. There are no existing criteria to assess adverse impacts of anthropogenic sound on sunflower sea stars (Hawkins, Pembroke and Popper 2015); however, vessel noise is not expected to impact sunflower sea stars in any measurable way because their physiological and behavioral processes are mediated by chemical stimuli. Additionally, there will only be a short and/or transitory duration of spatial overlap and a low likelihood of exposure to sound that could significantly disrupt behavioral patterns; impacts to sunflower sea stars are expected to be undetectable and minor.

Ship strikes can cause major wounds or death to marine mammals. An animal at the surface could be struck directly by a vessel, a surfacing animal could hit the bottom of a vessel, or a vessel propeller could injure or kill an animal below the water surface. Vessel speed is a principal factor in whether a strike results in serious injury or death of a whale. Laist et al. (2001) determined that most lethal or severe injuries involved ships traveling 14 kt or faster. Serious injuries were found to occur infrequently at vessel speeds below 14 kt, and rarely at speeds below 10 kt. Vanderlaan and Taggart (2007) found the greatest rate of change in the probability of a lethal injury to a large whale occurs between vessel speeds of 8.6 and 15 kt, and the probability of a lethal injury drops below 50 percent at 11.8 kt.

From 1978 to 2022, there were 151 vessel strikes involving humpback whales and seven strikes involving fin whales in Alaska waters (Neilson et al. 2012; Helker et al. 2019; Freed et al. 2023; Brower et al. 2024). The vast majority of reported strikes occurred in Southeast Alaska between May and September, where and when commercial vessel traffic coincides with large aggregations of humpback whales in narrow straits and passageways. Small recreational vessels traveling at speeds over 13 kt were most commonly involved in ship strike encounters; however, all types and sizes of vessels were reported (Neilson et al. 2012). When the vessel type and/or size was known, larger vessels (container ship, cruise ship, state ferry, and USCG cutter) were involved in the strikes of fin whales (Neilson et al. 2012; Helker et al. 2019; Freed et al. 2023).

There are no ship strike reports for Steller sea lions in Alaska between 2012 and 2022 (Helker et al. 2019; Freed et al. 2023; Brower et al. 2024), and the risk of vessel strike has not been identified as a significant concern for Steller sea lions. 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 2008).

There may be an increased risk of vessel strike due to the increased traffic associated with the Freight Dock project. However, the low number of vessel trips, transitory nature of project-related vessel traffic, slow operational speeds, existing regulations regarding approaching humpback whales, and implementation of mitigation measures (e.g., staying 91 m away from listed marine mammals, avoiding changes in direction and reducing speed when within 274 m of whales, and reducing speed when visibility is reduced) limit the risk of strike from the proposed action. The relatively low density of fin whales, humpback whales, and Steller sea lions in the action area also greatly reduces the probability of a vessel strike occurring. NMFS concludes that the likelihood of vessel strike of fin whales, Mexico DPS humpback whales, Western North Pacific DPS humpback whales, or Western DPS Steller sea lions is improbable. Sunflower sea stars are not susceptible to vessel strike.

6.1.1.2 Seafloor Disturbance, Turbidity, and Loss of Habitat

The proposed activities would not result in permanent impacts to habitats used directly by listed or proposed species, except for the actual footprint of the expanded Freight Dock. The total seafloor area likely impacted by the project is relatively small compared to the available habitat in inner Resurrection Bay and does not include any biologically important areas or other habitat of known importance. The area is highly influenced by anthropogenic activities and is not heavily used by listed or proposed species. Additionally, the total seafloor area affected by pile installation and removal is a small area compared to the vast foraging habitat available to marine mammals and sunflower sea stars. At best, the construction area provides marginal foraging habitat. Furthermore, pile driving at the project site would not obstruct movements or migration of marine mammals and sunflower sea stars.

Pile driving activities may cause temporary and localized turbidity through sediment disturbance, and increases in turbidity levels will have temporary impacts on water quality. Turbidity plumes during pile installation and removal will be localized around the pile; turbidity associated with pile installation is localized to an approximate 7.6 m radius around the pile (Everitt, Fiscus and DeLong 1980). A full-length silt curtain will be used on the south end of the dock expansion between the sheet pile wall and the west side of the sediment groin to mitigate short-term localized turbidity resulting from fill placement behind the revetment. Turbidity and sedimentation are naturally increased on the east side of the sediment groin, which receives regular deposition from the Resurrection River. Shutdown mitigation measures are likely to prevent listed cetaceans from being close enough to experience effects of turbidity from pile driving, and pinnipeds could easily avoid localized areas of turbidity.

Increases in turbidity will be temporary, localized, and difficult to detect in waters that have a high concentration of suspended solids and local tidal activity. Impacts on marine mammals are expected to be brief, intermittent, and minor, if impacts occur at all. Any effects to fin whales, Mexico DPS humpback whales, Western North Pacific DPS humpback whales, or Western DPS Steller sea lions from seafloor disturbance and increased turbidity levels would be immeasurably small.

Sunflower sea stars have been observed in the action area and may overlap with construction activities. Sunflower sea stars may be in close enough proximity to experience habitat degradation from seafloor disturbance, localized turbidity, or loss of habitat from the Freight Dock expansion. Surveys will be conducted for sunflower sea stars prior to project activities and silt curtains may deter sea stars from re-occupying the area. Sunflower sea stars are also highly mobile and will be able to move from disturbed areas, if negatively impacted, to nearby areas of more favorable habitat. The new in-water project footprint will be slightly less than five acres, which is very small in comparison to the preferred habitat available in Resurrection Bay and the surrounding waters. Additionally, the construction area abuts the outflow of the Resurrection River and there is a high output of freshwater and sediment, resulting in less-than-ideal sunflower sea star habitat. Because of the low density of sunflower sea stars in the action area, their mobile nature, the relatively small area of non-preferred habitat impacted compared to the available widespread suitable habitat, and the implementation of mitigation measures, we conclude that the effects of seafloor disturbance, increased turbidity, and loss of habitat on sunflower sea stars would be minimal.

6.1.1.3 Effects on Prey

Construction activities will produce non-impulsive (i.e., vibratory pile installation and removal) and impulsive (i.e., impact pile driving) sounds. Fish react to intermittent low-frequency sounds and sounds that are especially strong. 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 areas with certain types of sound energy.

Impulsive sounds at received levels of 160 dB may cause subtle changes in fish behavior and SPLs of 180 dB may cause noticeable changes in behavior (Pearson, Skalski and Malme 1992; Skalski, Pearson and Malme 1992). SPLs of sufficient strength have been known to cause injury to fish and fish mortality (Popper et al. 2014a; Popper et al. 2014b). Pile driving associated barotrauma (i.e., damage to internal tissues) of fish has been found to occur at sound pressure levels of 205-215 dB re: 1 μPa_{peak} in experimental studies (Casper et al. 2012; Halvorsen et al. 2012). However, there are very few experimental examples of sound being sufficiently loud to result in death or mortal injury to fishes (Popper and Hawkins 2019).

Injury to fish depends more on the magnitude of particle motion than on sound levels as mammals perceive it (Popper and Hawkins 2019). It is likely that fish will avoid sound sources within ranges that may be harmful (McCauley, Fewtrell and Popper 2003). The most likely impact to fish from pile driving activities would be temporary behavioral avoidance of the project area. The duration of fish avoidance of this area after pile driving ceases is unknown, but a rapid return to normal recruitment, distribution, and behavior is expected.

In general, impacts to marine mammal prey species are expected to be minor and temporary, given the small area of pile driving relative to known feeding areas of listed marine mammals.

We expect fish will be capable of moving away from project activities to avoid exposure to noise. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. We expect the area 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 operations.

Studies on euphausiids and copepods, two of the more abundant and biologically important groups of zooplankton, have documented some sensitivity to sound (Chu, Sze and Wong 1996; Wiese 1996); however, any effects of pile driving activities on zooplankton would be expected to be restricted to the area within a few meters of the project and would likely be sub-lethal. 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 construction operations is immaterial as compared to the naturally occurring reproductive and mortality rates of these species.

Given the short daily duration of sound associated with individual pile driving events, the relatively small areas being affected, the localized response of prey species, and the rapid return of any temporarily displaced species, pile driving activities are unlikely to have a permanent adverse effect on any prey habitat or prey species. Any impacts to marine mammal habitat are not expected to result in significant or long-term consequences for individual marine mammals, or to contribute to adverse impacts on their populations. NMFS considers potential adverse impacts to prey resources from construction activities in the action area to be immeasurably small.

Sound pressure levels generated by other activities of the proposed action (i.e., vessel traffic) may cause temporary behavioral changes of prey species at close range, such as a startle or stress response. Project-related vessel sounds are not expected to cause direct injury to fish, and will behaviorally affect fish only at close range, for a short period of time. A very small proportion of primary prey species for listed marine mammals may also be temporarily disturbed by non-acoustic sources, including boat wakes and spinning propellers. Prey species may exhibit a startle or flight response, but these forms of disturbance would be temporary, with a geographic extent much smaller than the project action area.

Sunflower sea stars are carnivorous invertebrates that eat a variety of invertebrates, including clams, mussels, oysters, snails, crabs, and sea urchins. Marine invertebrates such as mussels and barnacles may be in the project footprint, and attached to piles that will be removed. However, Resurrection Bay is relatively unproductive in its subtidal benthic habitats. Previous dive surveys in the area indicated the benthic environment within the harbor was sparsely populated by small sea snails, nudibranchs, and other sea slugs. Given the relatively small project footprint and low amount of sunflower sea star prey expected within the footprint, impacts to their prey species are expected to be insignificant.

Based on the above information, prey species may be impacted by the proposed action; however, the expected impact on prey is very minor. Adverse effects to fin whales, Mexico DPS humpback whales, Western North Pacific DPS humpback whales, Western DPS Steller sea lions, or sunflower sea stars due to project-caused prey effects will be immeasurably small.

6.1.1.4 Trash and Debris

The project may generate trash and debris from construction activities, which could be released into the marine environment and pose risks to listed and proposed species. ARRC intends to comply with all applicable regulations, and will implement best management practices to minimize, retrieve, and appropriately dispose of project-generated trash and debris. The impact of trash and debris is expected to be very minor, and thus adverse effects to ESA-listed and proposed species will be immeasurably small.

6.1.1.5 Pollutants and Contaminants

Listed and proposed species could be exposed to authorized discharges through project vessels. Discharges associated with some marine commercial vessels are covered under a national NPDES Vessel General Permit (VGP) for Discharges Incidental to the Normal Operation of Vessels. Commercial vessels are covered under the VGP when discharging within the territorial sea extending three nautical miles from shore. When vessels are operating and discharging in Federal waters, the discharges are regulated under MARPOL 73/78, the International Convention for the Prevention of Pollution from Ships. The EPA completes consultation on the issuance of the VGP with the Services and receives separate biological opinions. Previously, these opinions have concluded that EPA's issuance of the VGP was not likely to jeopardize listed species or adversely modify designated or proposed critical habitat. An ESA consultation was completed for this general permit, impacts associated with marine vessel discharges were considered, and incidental take has been accounted for.

Accidental spills could occur from a vessel leak or onboard spill. The size of the spill influences the number of individuals that will be exposed and the duration of that exposure. Contact through the skin, eyes, or 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 inhalation of 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, toxic fumes from small spills are expected to rapidly dissipate into the atmosphere as fresh refined oil ages quickly, limiting the potential exposure of marine mammals. We do not expect sunflower sea stars to be affected by pollutants that are released and remain at the surface or higher in the water column.

ARRC has best management practices for hazardous materials and waste management in place to address oil and other contaminant spill prevention. These include oil booms on-site, regular checks of equipment, hoses, and fuel storage for leaks, and proper storage of potentially harmful chemicals and contaminants. Based on the localized nature of small spills or pollutant releases, the relatively rapid weathering and dispersion, and the safeguards in place to avoid and minimize spills, NMFS concludes that exposure of fin whales, Mexico DPS humpback whales, Western North Pacific DPS humpback whales, Western DPS Steller sea lions, or sunflower sea stars to an oil spill or pollutant release from the project is highly unlikely to occur. If exposure were to occur, NMFS does not expect detectable responses from listed or proposed species due to the ephemeral nature of small spills.

6.1.1.6 Acoustic Disturbance to Sunflower Sea Stars from Pile Driving Activities

Overall, there are significant data gaps regarding the effects of loud underwater sounds on sunflower sea stars. Sunflower sea stars do not possess a gas bladder, but we do not know if they possess underwater vibration receptors that could be affected by loud sounds. Exposure to continuous loud sound (>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), but there is no data that the increase in these hormones affects their behavior or survival. There are currently no studies that suggest sea stars, or more specifically sunflower sea stars, have this response.

There are no existing criteria to assess adverse impacts of anthropogenic sound on sunflower sea stars (Hawkins, Pembroke and Popper 2015); however, the number of ways a sunflower sea star could be affected by pile driving activity sound is limited. Their physiological and behavioral processes are mediated by chemical stimuli and noise is not expected to impact sunflower sea stars in any measurable way. Therefore, we conclude the effects of acoustic disturbance from pile driving activities will be very minor, if there are any effects at all.

6.1.2 Major Stressors on Fin Whales, Mexico and Western North Pacific DPS Humpback Whales, and Western DPS Steller Sea Lions

Construction activities will produce non-impulsive (i.e., vibratory pile driving) and impulsive (i.e., impact pile driving) sounds. Acoustic disturbance from pile driving activities is the major stressor likely to adversely affect fin whales, Mexico DPS humpback whales, Western North Pacific DPS humpback whales, and Western DPS Steller sea lions. A brief explanation of the sound measurements and acoustic thresholds used in the discussions of acoustic effects in this opinion is provided below, and the following sections will analyze the exposure to and response of ESA-listed marine mammal species to underwater anthropogenic sound from project construction activities.

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) (89 FR 84872; October 24, 2024; 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,[21] expressed in root mean square (rms),[22] from broadband sounds that cause behavioral disturbance, and referred to as

[21]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.
[22]Root mean square (rms) is the square root of the arithmetic average of the squared instantaneous pressure values.

Level B harassment under section 3(18)(A)(ii) of the 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

NMFS uses the thresholds in Table 5 for underwater sounds that cause injury, referred to as Level A harassment under section 3(18)(A)(i) of the MMPA (16 U.S.C 1362(18)(A)(i)) (NMFS 2024a). Different thresholds and auditory weighting functions are provided for different marine mammal hearing groups, which are defined in the Technical Guidance (NMFS 2024a). These acoustic thresholds are presented using dual metrics of weighted cumulative sound exposure level (SEL_{24h}) and peak sound pressure level (PK SPL) for impulsive sounds and weighted SEL_{24h} for non-impulsive sounds. Level A harassment radii can be calculated using the optional user spreadsheet tool[23] associated with the updated 2024 NMFS Acoustic Guidance, or through modeling. The generalized hearing range for each hearing group is in Table 6.

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 construction activities that produce non-impulsive (i.e., vibratory pile driving) and impulsive (i.e., impact pile driving) underwater sounds have sound source levels capable of causing take under the MMPA and ESA.

As described below, we anticipate that exposures to listed marine mammals from noise associated with the proposed action may result in disturbance. However, no mortalities or permanent impairment to hearing are anticipated.

[23]The Optional User Spreadsheet Tool can be downloaded from the following website: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance-other-acoustic-tools accessed March 2025.

Table 5. Summary of marine mammal auditory injury onset criteria underwater (NMFS 2024a).

Hearing Group	Auditory Injury Onset Criteria* (Received Level)	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	$L_{p,0\text{-pk,flat}}$: 222 dB $L_{E,p,\text{ LF,24h}}$: 183 dB	$L_{E,p,\text{ LF,24h}}$: 197 dB
High-Frequency (HF) Cetaceans	$L_{p,0\text{-pk,flat}}$: 230 dB $L_{E,p,\text{ HF,24h}}$: 193 dB	$L_{E,p,\text{ HF,24h}}$: 201 dB
Very High-Frequency (VHF) Cetaceans	$L_{p,0\text{-pk,flat}}$: 202 dB $L_{E,p,\text{VHF,24h}}$: 159 dB	$L_{E,p,\text{ VHF,24h}}$: 181 dB
Phocid Pinnipeds (PW)	$L_{p,0\text{-pk.flat}}$: 223 dB $L_{E,p,\text{PW,24h}}$: 183 dB	$L_{E,p,\text{PW,24h}}$: 195 dB
Otariid Pinnipeds (OW)	$L_{p,0\text{-pk,flat}}$: 230 dB $L_{E,p,\text{OW,24h}}$: 185 dB	$L_{E,p,\text{OW,24h}}$: 199 dB

*Dual metric criteria for impulsive sounds: Use whichever criteria results in the larger isopleth for calculating auditory injury onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level criteria associated with impulsive sounds, the PK SPL criteria are recommended for consideration for non-impulsive sources.

Note: Peak sound pressure level ($L_{p,0\text{-pk}}$) has a reference value of 1 µPa (underwater), and weighted cumulative sound exposure level ($L_{E,p}$) has a reference value of 1 $\mu Pa^2 s$ (underwater). In this Table, criteria are abbreviated to be more reflective of International Organization for Standardization standards (ISO 2017; ISO 2020). The subscript "flat" is being included to indicate peak sound pressure are flat weighted or unweighted within the generalized hearing range of marine mammals underwater (i.e., 7 Hz to 165 kHz). The subscript associated with cumulative sound exposure level criteria indicates the designated marine mammal auditory weighting function (LF, HF, and VHF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The weighted cumulative sound exposure level criteria could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle).

Table 6. Marine mammal hearing groups (NMFS 2024a).

Hearing Group	ESA-listed Marine Mammals In the Project Area	Generalized Hearing Range*
Low-frequency cetaceans (baleen whales)	Fin whales Mexico and Western North Pacific humpback whales	7 Hz to 36 kHz
High-frequency cetaceans (dolphins; toothed, beaked, and bottlenose whales)	None	150 Hz to 160 kHz
Very High-frequency cetaceans (true porpoise porpoises, *Kogia*, river dolphins, cephalorhynchid, *Lagenorhynchus cruciger*)	None	200 Hz to 165 kHz
Phocid pinnipeds (true seals)	None	40 Hz to 90 kHz
Otariid pinnipeds (sea lions and fur seals)	Western DPS Steller Sea Lions	60 Hz to 68 kHz

*Represents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges may not be as broad. Generalized hearing range chosen based on ~65 dB threshold from composite audiogram, previous analysis in NMFS 2018, and/or data from Southall et al. 2007; Southall et al. 2019. Additionally, animals are able to detect very loud sounds above and below that "generalized" hearing range.

6.1.3 Major Stressors on Sunflower Stars

The primary stressor for sunflower sea stars will be direct physical contact, either during pile driving activities or pre-construction surveys. Pilings could come in contact with sunflower sea stars during installation, or sea stars could be brought to the surface on pilings during removal. Sunflower sea stars could also be buried by fill materials, which will be placed behind completed sheet pile cells and then vibrocompacted. Pile driving activities have the potential to directly impact (e.g., harm, wound, kill) sunflower sea stars.

Surveys for sunflower sea stars will be conducted prior to pile driving activities. Sunflower sea stars found during surveys or attached to a pile being removed from the water will be gently collected and released as outlined in the mitigation measures. Sunflower sea stars are fairly tolerant to handling; however, the collection and relocation process will likely introduce some stress. Handling/moving them can be a major stressor if done incorrectly, and immediate responses include reduced appetite and high movement/activity. Sunflower sea stars could be injured during the collection or relocation process. Relocation may also expose them to a greater predation risk as they move to find shelter and attach to the substrate.

6.2 Exposure Analysis

As discussed in the *Approach to the Assessment* section of this opinion, exposure analyses are designed to identify the listed and proposed 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 sex 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, ARRC proposed mitigation measures that should avoid or minimize exposure of fin whales, Mexico and Western North Pacific DPS humpback whales, Western DPS Steller sea lions, and sunflower sea stars to one or more stressors from the proposed action.

NMFS expects that fin whales, humpback whales, and Steller sea lions will be exposed to underwater noise from pile driving activities (including vibratory pile driving and impact pile driving) and that sunflower sea stars will be exposed to direct physical contact from pile driving activities or pre-construction surveys.

6.2.1 ESA-Listed Marine Mammals

6.2.1.1 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 behavioral thresholds, based on only a single construction activity occurring at a time, as proposed by ARRC.

The sound field in the action area is the existing background noise plus additional construction noise from the proposed project. Marine mammals may be affected via sound generated by the primary components of the project (i.e., impact pile driving and vibratory pile installation and removal). NMFS used acoustic monitoring data from other locations to develop the source levels used to calculate distances to the Level A and Level B thresholds for different sizes and types of piles and installation/removal methods. The values used are presented in Table 7.

NMFS developed a spreadsheet tool[24] to help implement the 2024 updated Technical Guidance (NMFS 2024a), which, like the 2018 Technical Guidance (NMFS 2018), incorporates the duration of an activity into the estimation of a distance to the Level A isopleth. This estimation can then be used in conjunction with marine mammal density or occurrence to help predict exposures. NMFS notes that because of some of the assumptions included in the methods used for these tools, the isopleths estimated may be overestimates, and the resulting estimate of Level A harassment likely overestimates the number of marine mammals that actually experience auditory injury if they should cross the Level A isopleth for fairly brief amounts of time. However, these tools currently offer the best available way to conservatively predict appropriate isopleths. NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate.

Inputs used in the NMFS User Spreadsheet are shown in Table 7, and the resulting Level A isopleths are shown in Table 8. Level A harassment thresholds for impulsive sound sources are defined for both cumulative sound exposure level and peak sound pressure level, with the threshold that results in the largest modeled isopleth for each marine mammal hearing group used to establish the Level A harassment isopleth.

Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise 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. 2007; 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 when exposed to underwater anthropogenic noise above received levels of 120 dB re 1 μPa rms for non-impulsive sources (e.g., vibratory pile-driving) and above 160 dB re 1 μPa rms for non-explosive impulsive (e.g., impact pile-driving) or intermittent sources. The proposed construction activity for the Freight Dock project includes the use of non-impulsive 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

[24]NMFS User Spreadsheet Tool https://www.fisheries.noaa.gov/s3/2024-12/2024-BLANK-USER-SPREADSHEET-508-public-OPR1.xlsx accessed January 2024.

topography. The general formula for underwater TL is:

TL = B * Log10 (R1/R2), where
TL = transmission loss in dB
B = transmission loss coefficient
R1 = the distance of the modeled SPL from the driven pile
R2 = the distance from the driven pile of the initial measurement

When site-specific transmission loss measurements are unavailable, 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 the proposed activity.

Using the practical spreading model, the underwater noise was determined to fall below the Level B harassment threshold of 120 dB rms for marine mammals at a maximum radial distance of 13,594 m for vibratory installation of 30-inch piles. Other pile driving activities, including impact pile driving and vibratory pile installation or removal of smaller piles and sheet piles, have smaller Level B harassment zones. Level B harassment isopleths are reported in Table 8.

Table 7. NMFS User Spreadsheet inputs for calculating Level A and Level B isopleths.

Activity	Pile Size/Type	Structural Feature	Method	Duration (min)/ Strikes per pile	Max Piles per Day	Sound Source Level at 10 m
Temporary Install + Remove	24-inch steel pipe	Template Piles	Vibratory	60	6	163.0 dB rms
Permanent Removal		Existing Dolphin Piles	Vibratory	90	4	
Permanent Installation	PS31 (or similar) sheet pile pairs	Bulkhead	Vibratory	30	20 pairs	160.7 dB rms
	HP14 steel H-piles	Anchor piles	Vibratory	60	2	150.0 dB rms
	30-inch steel pipe	Fender Piles	Vibratory	60	4	167.0 dB rms
		New Dolphin Piles	Vibratory	60	2	167.0 dB rms
			Impact	1,800		190.0 dB rms

Note: Vibratory pile driving calculations use a weighting factor adjustment of 2.5 kHz and impact pile driving calculations use a weighting factor adjustment of 2 kHz. All calculations use a transmission loss of 15.

Table 8. Level A and Level B harassment isopleths for pile driving activities.

Activity	Pile Size/Type	Level A Harassment (m)		Level B Harassment (m)
		Low Frequency Cetaceans	Otariids	
Vibratory Installation and Removal	24-inch steel pipe	41.4	17.9	7,356
	PS31 (or similar) sheet pile pairs	40.9	17.7	5,168
	HP14 steel H-piles	2.7	1.2	1,000
	30-inch steel pipe fender piles	58.4	25.3	13,594
	30-inch steel pipe dolphin piles	36.8	15.9	13,594
Impact	30-inch steel pipe dolphin piles	930.4	308.1	1,000

6.2.1.2 Marine Mammal Occurrence and Exposure Estimates

Limited sightings data exist for Resurrection Bay and at-sea densities have not been determined for marine mammals in the area. Scientific literature, previous monitoring reports from construction projects in inner Resurrection Bay, and local knowledge from tour guide operators were referenced to determine exposure estimates in the construction action area.

Fin Whales

Fin whales are typically found in deep, offshore waters and are rare in Resurrection Bay. There have been several sightings of fin whales in recent years in inner Resurrection Bay: a single fin whale was observed twice on June 23, 2019; three to four fin whales were observed on July 1, 2024; and, a pair of fin whales was observed on July 20, 2024.[25] A freshly dead fin whale carcass was discovered on the bulbous bow of a cruise ship in Seward harbor in May 2016; the strike location is unknown but likely occurred in the area (Helker et al. 2019). Based on these observations, NMFS expects that two fin whales could be exposed to Level B harassment from noise generated by pile driving activities. Here we assume that if an animal is present in the ensonified area, it will be exposed to acoustic harassment, acknowledging that not all animals within the action area will be so exposed.

Mexico and Western North Pacific Humpback Whales

Humpback whales are common in inner Resurrection Bay; over 100 opportunistic sightings were reported between 2003 and 2024. Seward tour boat captains estimate that at least one humpback whale typically enters inner Resurrection Bay each day in May and June, with less frequent visits into July. McCaslin (2019) conducted observations from a commercial whale-watching vessel operating out of Seward between May and August and recorded 14 individuals and three pairs of humpbacks in inner Resurrection Bay during 37 trips. Humpback whales may be present in

[25] https://happywhale.com/browse accessed December 2024.

Resurrection Bay year-round, but we expect the highest numbers to occur in inner Resurrection Bay between April and October.

Based on the above sightings data and seasonal patterns, NMFS expects that one humpback whale per day from April through October and one humpback whale every other day from November through March could be exposed to Level B harassment from noise generated by pile driving activities. The project schedule indicates that in-water activities will occur on 80 days between April and October and on 75 days between November and March. Therefore, 80 humpbacks (1/day x 80 days) between April and October and 38 humpbacks (rounded up from 37.5; 1/every other day x 75 days) between November and March may be exposed to Level B harassment from pile driving noise. In total, NMFS expects that 118 humpback whales could be exposed to Level B harassment from noise generated by pile driving activities. Wade (2021) reported that 11 percent of humpback whales in this area are expected to be from the Mexico DPS and one percent are expected to be from the Western North Pacific DPS. Therefore, NMFS expects that 13 individuals from the Mexico DPS and one individual from the Western North Pacific DPS may be exposed to Level B harassment from pile driving noise. Here we assume that if an animal is present in the ensonified area, it will be exposed to acoustic harassment, acknowledging that not all animals within the action area will be exposed.

Steller Sea Lions

Steller sea lions are common in inner Resurrection Bay, there are multiple haulout locations in the outer bay area, and the Chiswell Islands rookeries are approximately 55 km southwest of the construction site. Seward tour boat captains estimate that at least five to ten Steller sea lions can be found foraging daily throughout inner Resurrection Bay, often near Seward Harbor. Steller sea lions are also commonly observed near Lowell Point, Tonsina Point, Fourth of July Beach, North Fox Island, and Hat Island. Steller sea lions may be present in Resurrection Bay year-round, but we expect the highest numbers to occur in inner Resurrection Bay between April and October.

Based on the above sightings data and seasonal patterns, NMFS expects that eight Western DPS Steller sea lions per day from April through October and two Western DPS Steller sea lions per day from November through March could be exposed to Level B harassment from noise generated by pile driving activities. The project schedule indicates that in-water activities will occur on 80 days between April and October and on 75 days between November and March. Therefore, 640 sea lions (8/day x 80 days) between April and October and 150 sea lions (2/day x 75 days) between November and March may be exposed to Level B harassment from pile driving noise. In total, NMFS expects that 790 Western DPS Steller sea lions could be exposed to Level B harassment from noise generated by pile driving activities. Here we assume that if an animal is present in the ensonified area, it will be exposed to acoustic harassment, acknowledging that not all animals within the action area will be so exposed.

6.2.2 ESA-Proposed Sunflower Sea Stars

6.2.2.1 Project Footprint

A temporary template will be constructed to aid in sheet pile cell installation. The temporary piles will likely be 24-inch steel pipe piles; however, smaller H-piles may be used instead. The temporary piles will be installed and removed for a total of 30 installations and 30 removals (Table 9).

The dock structure will consist of 425 interlocking sheet piles pairs. Fourteen HP14 steel H-piles will be installed at the end of each sheet pile tailwall, and serve as anchor piles to further support the structure. Additionally, rock revetments will be installed for scour protection and slope erosion protection. Approximately 134,800 CY of fill material will be placed below the high tide line, encompassing an area of 4.75 acres (19,223 m^2).

The existing four 24-inch mooring dolphins at the south end of the Freight Dock will be removed prior to the dock extension. The 24-inch mooring dolphins may be salvaged and reinstalled, or four new 30-inch mooring dolphins may be installed instead. An additional fourteen 30-inch steel pipe fender piles will be installed; the new heavy-duty fenders will each have two fender piles installed along the dock face in order to protect the dock from moored vessels.

Table 9. Project footprint for sunflower sea stars.

Activity	Pile Size/Type†	# of Piles	Surface Area/Pile (m^2)*	Total Surface Area (m^2)
Permanent Pile Installation	HP14 steel H-piles	14	0.099	1.386
	30-inch steel pipe	18	0.456	8.208
Temporary Pile Installation	24-inch steel pipe	30	0.292	8.760
Permanent Pile Removal	24-inch steel pipe	4	21.014	84.056
Temporary Pile Removal	24-inch steel pipe	30	21.014	630.420
Fill Placement	-	-	-	19,222.570
			TOTAL	**19,955**

†In instances where the pile size has not been determined (e.g., temporary template piles and mooring dolphins), the larger pile size was used in the surface area calculations.

*The surface area for piles being installed was calculated using the formula for the area of a circle ($A = \pi r^2$), as only the bottom surface of the pile will contact the seafloor and potentially disturb sunflower sea stars. The surface area for piles being removed was calculated using the formula for the area of a cylinder ($A = 2\pi rh + 2\pi r^2$), as sunflower sea stars could potentially be attached to the pile throughout the water column. r is the radius of the pile and h is the height (or water depth) of the pile. Nautical charts for the area indicate a water depth of approximately 10.668 m near the Freight Dock.

6.2.2.2 Sunflower Sea Star Occurrence and Exposure Estimates

We assume that the sunflower sea star occupies inter-and sub-tidal habitats throughout the Gulf of Alaska, including the project construction action area. Surveys and data for sunflower sea stars in most Alaska waters are very sparse, and there have been no recent surveys conducted in inner Resurrection Bay. However, sunflower sea stars have been observed and reported opportunistically near the Seward Harbor.[26]

Sunflower sea star abundance varied geographically in Alaska prior to the SSWS pandemic. Densities in nearby western Prince William Sound were considered high, with an average of 0.233 sunflower sea stars/m^2 (Konar et al. 2019); however, post-pandemic densities in the area are now much lower at 0.04 sunflower sea stars/m^2 (Traiger et al. 2022). Gulf Watch Alaska conducted nearshore marine ecosystem monitoring in the Kenai Fjords National Park region (in close proximity to the construction site) and estimated a density of 0.0125 sunflower sea stars/m^2 in 2024.

The total calculated project footprint for sunflower sea stars is 19,955 m^2. Using the 0.0125 density estimate, an estimated 250 sunflower sea stars (rounded up from 249.4) may be exposed to direct physical contact via pile driving activities (including pile installation, pile removal, and fill placement) or capture and relocation efforts (e.g., pre-construction surveys).

6.3 Response Analysis

As discussed in the *Approach to the Assessment* section of this opinion, response analyses determine how listed and proposed species are likely to respond after being exposed to an action's effects on the environment or directly on listed and proposed 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 and proposed individuals. Ideally, our response analyses consider and weigh evidence of adverse consequences, beneficial consequences, or the absence of such consequences.

6.3.1 Marine Mammal Responses to Major Noise Sources

Loud underwater noise can result in physical effects on the marine environment that can affect marine organisms. Possible responses by fin whales, Mexico and Western North Pacific DPS humpback whales, and Western DPS Steller sea lions to the impulsive and non-impulsive sound produced by pile driving activities include:

- Physical Response
    - Temporary or permanent hearing impairment
    - Non-auditory physiological effects

[26] https://www.inaturalist.org/observations?nelat=60.1916769839303&nelng=-149.16515596512517&subview=map&swlat=59.819583039735434&swlng=-149.51122530106267&taxon_id=47673 accessed December 2024.

- Behavioral responses
  - Tolerance or habituation
  - Change in dive, respiration, or feeding behavior
  - Change in vocalizations
  - Avoidance or displacement
  - Vigilance
  - Startle or fleeing/flight
  - Auditory interference

As described in the Exposure Analysis, fin whales, Mexico and Western North Pacific DPS humpback whales, and Western DPS Steller sea lions are expected to occur in the construction action area and to overlap with noise associated with pile installation and removal activities. We assume that some individuals are likely to be exposed and respond to these impulsive and non-impulsive noise 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 noise levels loud enough, long enough, or at distances close enough for the proposed action to result in harm to the animal. In other words, we expect no permanent hearing impairment or other injury. We expect no more than two exposures of fin whales, 13 exposures of Mexico DPS humpback whales, one exposure of Western North Pacific DPS humpback whales, and 790 exposures of Western DPS Steller sea lions to noise levels sufficient to cause harassment, as described in Section 6.2.1.2. All instances of harassment are expected to occur at received levels greater than 120 dB and 160 dB for non-impulsive and impulsive noise sources, respectively, meaning some physical and behavioral responses could occur.

The introduction of anthropogenic noise into the aquatic environment from pile driving is 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. 2007). Exposure to anthropogenic noise can also lead to non-observable physiological responses such an increase in stress hormones. Additional noise in marine mammal 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 noise 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 noise 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. 2007). Here we discuss physical auditory effects followed by behavioral effects.

6.3.1.1 Temporary or Permanent Hearing Impairment

NMFS defines a noise-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 2018). 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 2018). 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. For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in 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. 2007).

Although some exposures to sound capable of causing harassment may occur during the course of the proposed action, not all instances will result in TTS because the estimated noise 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.

Auditory Injury

NMFS defines auditory injury as damage to the inner ear that can result in destruction of tissue such as the loss of cochlear neuron synapses or auditory neuropathy (NMFS 2024a). Auditory injury may or may not result in permanent threshold shift (PTS). When 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 may 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 a 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 2018).

The shutdown zones to be implemented are larger than the calculated isopleths to reduce the likelihood that listed marine mammals are exposed to noise levels that could cause PTS or other harmful disturbance. No exposures are expected at levels resulting in PTS due to conservative estimates of MMPA Level A acoustic isopleths and mitigation measures to shut down pile driving activities if a fin whale, humpback 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. 2007). 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. 2007) or any meaningful quantitative predictions of the numbers (if any) of marine mammals that may 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, noise 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 noise 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 noise 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 proposed action may result in ESA-listed marine mammals experiencing stress responses. However, in-water pile driving activities will be staggered over 155 non-consecutive work days and occur for a limited amount of time on each day of in-water work, limiting the potential for chronic stress. Marine mammals that show behavioral avoidance of pile driving activities are especially unlikely to incur auditory impairment or non-auditory physical effects, like stress and distress, because they will be limiting the duration of their exposure. If listed marine mammals are not displaced and remain in the stressful environment (within the behavioral shutdown zone), we expect the stress response will dissipate shortly after the individual leaves the area or after the cessation of the acoustic stressor.

6.3.1.3 Behavioral Disturbance Reactions

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. 2007).

Tolerance 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 tolerate, and possibly 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 et al. 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices, but also 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 well as responses to pulsed sounds.

Some whales may change their behavioral state when exposed to very loud impulsive sound, e.g., reduce the amount of time they spend at the ocean’s surface, increase their swimming speed, change their swimming direction, change their respiration rates, increase dive times, reduce feeding behavior, and/or alter vocalizations and social interactions (Frid and Dill. 2002; Koski et al. 2009; Funk et al. 2010; Melcon et al. 2012). Baleen whales have shown strong overt reactions to impulsive noises at received levels between 160 and 173 dB_{rms} re 1 μPa (Richardson, Wursig and Greene 1986; Ljungblad et al. 1988; McCauley et al. 2000; Miller et al. 2005; Gailey, Würsig and McDonald 2007). Humpbacks exposed to pile driving noise are most likely to respond by avoiding the area (Richardson et al. 1995); changes in vocal behavior could also occur. Steller sea lions exposed to pile driving noise may change their behavioral state by avoiding these sound fields or exhibiting vigilance by raising their heads above the water. In general, pinnipeds seem more tolerant of low frequency noise and less responsive to exposure to industrial sound than most cetaceans (Costa et al. 2003).

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. 2007). The biological significance of many of these behavioral disturbances is also 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 proposed action may result in ESA-listed marine mammals experiencing the behavioral disturbance reactions described above. However, in-water pile driving activities will be staggered over 155 non-consecutive work days and occur for a limited amount of time on each day of in-water work. We expect that disturbed animals would leave the area during pile driving activities for other habitat located throughout Resurrection Bay, and any reactions or behavioral changes are expected to be temporary and subside quickly when the exposure ceases. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to reduce the energy budgets of ESA-listed marine mammals, and their probable exposure to noise sources are not likely to reduce their fitness.

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 may result in a 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; Eickmeier and Vallarta 2022), 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. 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 project activities, contribute to the elevated ambient sound levels, thus intensifying masking.

Noise from pile driving activities may mask acoustic signals important to fin whales, humpback whales, and Steller sea lions. However, pile driving activities will be intermittent, occur during daylight hours, and affect a limited area. Masking only exists for the duration of time that the masking sound is emitted and interfering with biologically important sounds; extended periods of time where masking could occur are not expected.

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 harass 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.

6.3.2 Sunflower Sea Star Responses to Direct Contact

As described in the Exposure Analysis, sunflower sea stars are expected to occur in the action area and overlap with pile driving activities. We expect that some individuals will be exposed to and disturbed by project activities. The total calculated project footprint for sunflower sea stars is 19,955 m^2 and an estimated 250 sunflower sea stars may be exposed to direct physical contact via pile driving activities, including construction and pre-construction surveys.

The mitigation measures will reduce, but not eliminate, the risk of sunflower sea star injury or mortality from pile installation, pile removal, or fill placement. Direct contact with piles and fill is expected to adversely affect sunflower sea stars and result in injury or mortality. The range-wide population for sunflower sea stars is estimated at 600 million, and the 250 individuals potentially impacted by project activities represents a very small fraction of the population. Therefore, the estimated level of injury or mortality from direct contact with piles and fill is not expected to have population-level effects nor significantly impede recovery of the species in the Gulf of Alaska where the pandemic was less severe, there is evidence of recovery, and millions of sunflower sea stars persist.

Sunflower sea stars detected alive and not exhibiting SSWS will be exposed to direct human contact via capture and relocation efforts. Individuals will be relocated to areas of similar quality habitat and are not expected to return to the project footprint during construction activities. Relocation will introduce some stress for those sunflower sea stars captured, and may also expose them to a greater predation risk as they move to find shelter and attach to the substrate. However, it is reasonable to conclude that gentle removal and relocation is less likely to result in injury or death than leaving the sea stars in an area where they may be crushed by active pile driving or buried by fill. Sea stars can regenerate tube feet and arms if injured during removal or relocation, which may reduce potential for long-term effects. Large sea stars held at the Alaska SeaLife Center are gently touched and handled regularly without apparent behavioral or survival effects.

6.3.3 Response Analysis Summary

Reactions and behavioral changes of listed marine mammals to pile driving activities 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). Some animals may leave the area during pile driving activities if they were disturbed, and high-quality habitat is located throughout Resurrection Bay and the surrounding waters. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to reduce the energy budgets of fin whales, humpback whales, or Steller sea lions, and their probable exposure to noise sources are not likely to reduce their fitness.

Some sunflower sea stars are expected to experience injury, behavioral modification (e.g., temporarily reduced feeding), stress, or displacement resulting from capture and relocation efforts. Individual sea stars may expend minimal additional energy to find a suitable area to become established after relocation, but this additional energy expenditure is not expected to result in any long-term changes to their energy budget or survival. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to increase the energy budgets of sunflower sea star individuals, and their probable exposure to these stressors are not likely to reduce their fitness. Injury and mortality from direct contact with piles and fill are expected to adversely affect sunflower sea stars. The range-wide population for sunflower sea stars is estimated at 600 million, and the 250 individuals potentially impacted by project activities represents a very small fraction of the population. The estimated level of injury or mortality is not expected to have population-level effects nor significantly impede recovery of the species in the Gulf of Alaska where the pandemic was less severe, there is evidence of recovery, and millions of sunflower sea stars persist.

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.

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 area's 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 area are described in the Status of the Species and the Environmental Baseline sections.

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, which we expect to continue in the future, and those summarized below. Reasonably foreseeable future state, local, or private actions include vessel traffic (e.g., shipping and tourism) state fisheries, and pollution, and are discussed in the following sections.

7.1 Vessel Traffic, Shipping, and Tourism

Seward has deep-water piers and 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. An annual average of approximately 5,800 large vessel transits were recorded in Resurrection Bay (AOOS 2020).

Alaska's summer 2019 cruise ship visitor volume was 44 percent higher than in 2010, and 18 percent of cruise ship passengers in 2019 stopped in Seward (McDowell Group 2020a). After a downturn of visitors caused by the COVID-19 pandemic, approximately 1.9 million cruise ship passengers are expected to visit Alaska in 2025 and there are 63 cruise ships scheduled to visit Seward in 2025.[27] The influx of visitors suggests an increasing demand for tourism in the area, including vessel-based activities like whale-watching and sport-fishing. Larger vessels and longer tourist seasons have the potential to bring many more passengers to Seward in the future.

Additionally, many residents maintain a recreational and commercial fishing lifestyle. The action area experiences moderate levels of commercial fishing vessels and recreational marine vessel traffic during the summer season.

Vessel traffic is expected to continue in Resurrection Bay. 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 noise and presence, and small spills.

7.2 State of Alaska Fisheries

ADFG manages fish stocks and monitors and regulates fishing under the state jurisdiction to maintain sustainable stocks. Fishing, a major industry in Alaska, is expected to continue in the area. The City of Seward is the only community in the North Gulf Coast management area and consists of all fresh and salt waters between Gore Point and Cape Fairfield.[28] Tourism, including the growing sport fish charter industry, is vital to its economy. There are more than 100 tour and charter fishing boats participating in sport/recreational fishing. Additionally, there are a variety of vessels that make up Seward's commercial fishing fleet, including long-liners, purse-seiners, and gill-netters. The Resurrection Bay area is home to one of the largest marine coho salmon fisheries in the Pacific Northwest and sport anglers target hatchery king salmon as well as wild pink and chum salmon and Dolly Varden char. Bottomfish such as halibut, rockfish, and lingcod are also popular targets.

There will be continued risk to marine mammals of prey competition, ship strikes, harassment, and entanglement in fishing gear, and continued risk to sunflower sea stars of bycatch. There is also the risk of displacement from foraging habitat due to human activity associated with fishing. It remains unknown whether and to what extent marine mammal prey may become less available due to commercial, subsistence, personal use, and sport fishing.

[27]https://claalaska.com/wp-content/uploads/2025/01/SEW-Seward-2025.pdf accessed February 2025.
[28]https://www.adfg.alaska.gov/index.cfm?adfg=ByAreaSouthcentralNorthGulfCoast.main accessed February 2025.

7.3 Pollution

As visitors to Seward and the use of Resurrection Bay continues to grow, an increase in pollutants entering Resurrection Bay is likely to occur. The ADEC monitors wastewater discharges and has documented increasing water-quality violations with increasing cruise ship visitation. There were generally about 20 to 25 exceedances a year found in samples from both large and small ships from 2015 to 2018.[29] Detected exceedances have ranged from about 60 to 75 a year in the past few years.

Hazardous materials may also be released into Resurrection Bay from vessels and municipal runoff. Vessels traveling within the action area could accidentally spill oil and oil spilled outside of the action area could migrate into the action area. There are many potential nonpoint sources of pollution within the action area; pollutants can pass from streets, construction, and industrial areas. The EPA and ADEC will continue to regulate the amount of pollutants that enter Resurrection Bay from point and nonpoint sources through NPDES/APDES permits. Permittees will be required to renew their permits, verify they meet permit standards, and potentially upgrade facilities.

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 3) of this opinion, we begin our risk analyses by asking whether the probable physical, physiological, behavioral, or social responses of endangered, threatened, or proposed species are likely to reduce the fitness of endangered, threatened, or proposed 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 and proposed 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

[29] https://www.adn.com/alaska-news/2025/02/25/more-cruise-traffic-in-alaska-is-followed-by-more-wastewater-violations-officials-say/ accessed February 2025.

geographic range.

8.1 Fin Whale and Mexico and Western North Pacific DPS Humpback Whale Risk Analysis

Based on the results of the exposure analysis, we expect two fin whales and 118 humpback whales could be exposed to Level B harassment from noise generated by pile driving activities. For humpback whales in the construction action area, 11 percent are expected to be from the Mexico DPS and less than one percent are expected to be from the Western North Pacific DPS, resulting in exposure of 13 Mexico DPS and one Western North Pacific DPS humpbacks to project sound capable of causing harassment.

Exposure to project-related vessel noise, trash and debris, seafloor disturbance and turbidity, and pollutants and contaminants may occur, but such exposure would have a very small impact, and is not expected to result in take of fin whales or humpback whales. Impacts from vessel noise are expected to be insignificant due to the small marginal increase in such activities relative to the environmental baseline, the transitory nature of project-related vessel traffic and short duration of spatial overlap, low likelihood of exposure to sound that could significantly disrupt behavioral patterns, likely habituation of marine mammals that frequent this heavily trafficked area, and implementation of mitigation measures. Trash will be disposed of in accordance with state law and entanglement hazards will be secured, making exposure to marine debris and entanglement hazards unlikely. Any increases in seafloor disturbance and turbidity would be temporary, localized, and minimal. Based on the localized nature of small spills or pollutant releases, the relatively rapid weathering expected, and the safeguards in place to avoid and minimize spills, we conclude that the probability of the proposed action exposing fin or humpback whales to a spill is extremely small, and thus the effects are considered highly unlikely to occur. Mitigation measures and adherence to Clean Water Act regulations are expected to minimize the risk of exposure to the potential introduction of pollutants and contaminants into the action area.

The increase in ship traffic due to the proposed action will increase the risk of vessel strike. However, adverse effects from vessel strikes are considered extremely unlikely because of the few additional vessels introduced by the action, slow speeds at which these vessels will operate, low density of fin and humpback whales in the action area, existing regulations regarding approaching humpback whales, and mitigation measures that will be implemented. The likelihood of vessel strike is considered to be improbable.

Fin whales and humpback whales may experience stress responses as a result of noise from pile driving activities. Individuals that show behavioral avoidance of pile driving activities are especially unlikely to incur auditory impairment or non-auditory physical effects because they will be further limiting the duration of their exposure. If an animal is not displaced and remains in the stressful environment (within the behavioral harassment zone), we expect the stress response will dissipate shortly after the individual leaves the area or after the cessation of the acoustic stressor. If TTS occurs, it is expected to be mild and temporary, and is unlikely to affect the long-term fitness of the affected individual. We do not expect fin and humpback whales to experience auditory injury or PTS from the proposed action. Noise from pile driving activities may also mask acoustic signals important to fin whales and humpback whales. However, pile driving activities will be intermittent (occurring over 155 non-consecutive work days) and affect a limited area, thereby limiting the potential for these species to experience chronic stress, repeated TTS, or extended periods of masking as a result of project activities. Additionally, ARRC will implement mitigation measures during project activities in order to minimize effects on listed marine mammals and reduce the likelihood that animals will be exposed to sound that could cause harassment.

The proposed activities may cause some individual whales to experience changes in their behavioral states; however, these responses are not likely to alter the physiology, behavioral ecology, and social dynamics of individual whales in ways or to a degree that would reduce their fitness. The most likely responses to noise from project activities include brief startle reactions or short-term behavioral modification. These reactions are expected to subside quickly when the exposure ceases. The primary mechanism by which behavioral changes affect the fitness of individual animals is through the animal's energy budget, time budget, or both. Large whales such as fins and humpbacks 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. Fin whales are rare in the action area, with only a handful of sightings in June and July in the last five years. Humpback whales may occur in small numbers in the action area throughout all months of project activity; however, most sightings are reported during the summer. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to measurably increase energetic costs of fin and humpback whales, and their probable exposure to project-related noise is not likely to reduce their fitness.

Impacts to prey species are expected to be minor and temporary, given the small area of activity relative to known feeding areas available to listed marine mammals. We expect fish will be capable of moving away from project activities to avoid exposure to noise. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. We expect the area in which stress, injury, TTS, or changes in balance of prey species may occur will be limited to a few meters directly around ongoing operations. We consider potential adverse impacts to prey resources from project activities in the action area to be immeasurably small.

As mentioned in the Environmental Baseline section, fin whales, Mexico DPS humpback whales, and Western North Pacific DPS humpback whales may be impacted by a number of anthropogenic activities present in Resurrection Bay. Human activity in the area has produced a number of anthropogenic risk factors that marine mammals must contend with, including: coastal and marine development, ship strikes, noise pollution, water pollution, prey reduction, fisheries, and tourism. These risk factors are in addition to those operating on a larger scale such as predation, disease, and climate change. These species may be affected by multiple threats at any given time, compounding the impacts of the individual threats. All of these activities are expected to continue to occur into the foreseeable future. Based on the best information currently available, the proposed action is not expected to appreciably reduce the likelihood of survival or recovery of fin whales, Mexico DPS humpback whales, or Western North Pacific DPS humpback whales.

8.2 Western DPS Steller Sea Lion Risk Analysis

Based on the results of the exposure analysis, we expect 790 Western DPS Steller sea lions may be exposed to noise from pile driving activities.

Exposure to project-related vessel noise, vessel strike, trash and debris, seafloor disturbance and turbidity, and pollutants and contaminants may occur, but such exposure would have a very small impact, and is not expected to result in take of Steller sea lions. Impacts from vessel noise are expected to be immeasurably small due to the small marginal increase in such activities relative to the environmental baseline, the transitory nature of project-related vessel traffic and short duration of spatial overlap, low likelihood of exposure to sound that could significantly disrupt behavioral patterns, likely habituation of marine mammals that frequent this heavily trafficked area, and implementation of mitigation measures. The increase in ship traffic due to the proposed action is unlikely to result in a vessel strike. Project vessels will be operating at slow speeds, the increase in vessel traffic will be small, vessel strike is not considered a significant concern for Steller sea lions, and mitigation measures will be implemented.

Exposure to non-biodegradable marine debris, specifically to debris that can cause entanglement, remains an unquantifiable risk, but associated effects from this project would be minimal. Trash will be disposed of in accordance with state law and entanglement hazards will be secured, making exposure to marine debris and entanglement hazards from this project unlikely. Any increases in seafloor disturbance and turbidity would be temporary, localized, and minimal. Based on the localized nature of small spills or pollutant releases, the relatively rapid weathering expected, and the safeguards in place to avoid and minimize spills, we conclude that the probability of the proposed action exposing Western DPS Steller sea lions to a spill is extremely small, and thus the effects are considered highly unlikely to occur. Mitigation measures and adherence to Clean Water Act regulations are expected to minimize the risk of exposure to the potential introduction of pollutants and contaminants into the action area.

Steller sea lions may experience stress responses as a result of noise from pile driving activities. Individuals that show behavioral avoidance of pile driving activities are especially unlikely to incur auditory impairment or non-auditory physical effects because they will be further limiting the duration of their exposure. If an animal is not displaced and remains in the stressful environment (within the behavioral harassment zone), we expect the stress response will dissipate shortly after the individual leaves the area or after the cessation of the acoustic stressor. If TTS occurs, it is expected to be mild and temporary, and is unlikely to affect the long-term fitness of the affected individual. We do not expect Steller sea lions to experience auditory injury or PTS from the proposed action. Noise from pile driving activities may also mask acoustic signals important to Steller sea lions. However, pile driving activities will be intermittent (occurring over 155 non-consecutive work days) and affect a limited area, thereby limiting the potential for these species to experience chronic stress, repeated TTS, or extended periods of masking as a result of project activities. Additionally, ARRC will implement mitigation measures during project activities in order to minimize effects on listed marine mammals and reduce the likelihood that animals will be exposed to sound that could cause harassment.

It is difficult to estimate the behavioral responses, if any, that Western DPS Steller sea lions in the action area may exhibit to underwater sounds generated by project activities. Though the sounds produced during project activities may not greatly exceed levels that Steller sea lions already experience in Resurrection Bay, some of 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. These responses are not likely to alter the physiology, behavioral ecology, and social dynamics of individual animals in ways or to a degree that would reduce their fitness. Potential reactions are expected to subside quickly when the exposure to project noise ceases.

The primary mechanism by which behavioral changes 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 2008). The closest major rookery or haulout is over 55 km away from the construction site. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to measurably increase energetic costs of Steller sea lions, and their probable exposure to project-related noise is not likely to reduce their fitness.

The probable behavioral responses (i.e., tolerance, short-term masking) to close approaches by vessel operations and potential exposure to noise from pile driving 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.

Impacts to prey species are expected to be minor and temporary, given the small area of activity relative to known feeding areas of listed marine mammals. We expect fish will be capable of moving away from project activities to avoid exposure to noise. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity. We expect the area in which stress, injury, TTS, or changes in balance of prey species may occur will be limited to a few meters directly around ongoing operations. We consider potential adverse impacts to prey resources from project activities in the action area to be immeasurably small.

As mentioned in the Environmental Baseline section, Western DPS Steller sea lions may be impacted by a number of anthropogenic activities present in Resurrection Bay. Human activity in the area has produced a number of anthropogenic risk factors that marine mammals must contend with, including: coastal and marine development, ship strikes, noise pollution, water pollution, prey reduction, fisheries, and tourism. These risk factors are in addition to those operating on a larger scale such as predation, disease, and climate change. The species may be affected by multiple threats at any given time, compounding the impacts of the individual threats. All of these activities are expected to continue to occur into the foreseeable future. Based on the best information currently available, the proposed action is not expected to appreciably reduce the likelihood of survival or recovery of Western DPS Steller sea lions.

8.3 Sunflower Sea Star Risk Analysis

Based on the results of the exposure analysis, we expect 250 sunflower sea stars may be exposed to direct contact from pile driving activities (including pile installation, pile removal, and fill placement) and pre-construction surveys.

There are no existing criteria to assess adverse impacts of anthropogenic sound on sunflower sea stars; however, noise is not expected to impact sunflower sea stars in any measurable way because their physiological and behavioral processes are mediated by chemical stimuli. Impacts of noise from pile driving activities and project vessels are expected to be insignificant.

Exposure to project-related trash and debris, seafloor disturbance and turbidity, and pollutants and contaminants may occur, but such exposure would have a very small impact, and is not expected to result in take of sunflower sea stars. Trash will be disposed of in accordance with state law and entanglement hazards will be secured, making exposure to marine debris and entanglement hazards unlikely. Any increases in seafloor disturbance and turbidity would be temporary, localized, and minimal. The new project footprint will result in a loss of slightly less than five acres of non-preferred habitat in an area of low species density, and impacts to sunflower sea stars are expected to be minimal. Based on the localized nature of small spills or pollutant releases, the relatively rapid weathering expected, and the safeguards in place to avoid and minimize spills, we conclude that the probability of the proposed action exposing sunflower sea stars to a spill is extremely small, and thus the effects are considered highly unlikely to occur. Mitigation measures and adherence to Clean Water Act regulations are expected to minimize the risk of exposure to the potential introduction of pollutants and contaminants into the action area.

Sunflower sea stars are carnivorous invertebrates that eat a variety of invertebrates, including clams, mussels, oysters, snails, crabs, and sea urchins. Marine invertebrates such as mussels and barnacles may be in the project footprint, and attached to piles that will be removed. However, Resurrection Bay is relatively unproductive in its subtidal benthic habitats. Previous dive surveys in the area indicated the benthic environment within the harbor was sparsely populated by small sea snails, nudibranchs, and other sea slugs. Given the relatively small project footprint and low amount of prey expected within the footprint, impacts to prey species are expected to be insignificant.

Direct contact from pile driving activities is the primary risk to sunflower sea stars from this project. The mitigation measures will reduce, but not eliminate, the risk of sunflower sea star injury or mortality from pile installation, pile removal, or fill placement. Relocation will introduce some stress for those sunflower sea stars captured, and may also expose them to a greater predation risk as they move to find shelter and attach to the substrate. However, it is reasonable to conclude that gentle removal and relocation is less likely to result in injury or death than leaving the sea stars in an area where they may be crushed by active pile driving or buried by fill. Sea stars can regenerate tube feet and arms if injured during construction or removal or relocation efforts, which may reduce potential for long-term effects. The range-wide population for sunflower sea stars is estimated at 600 million, and the 250 individuals potentially impacted by project activities represents a very small fraction of the population. Additionally, the total project footprint of 19,955 m^2 is extremely small 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). Therefore, the estimated level of injury or mortality from direct contact is not expected to have population-level effects nor significantly impede recovery of the species in the Gulf of Alaska where the pandemic was less severe, there is evidence of recovery, and millions of sunflower sea stars persist.

As mentioned in the Environmental Baseline section, sunflower sea stars may be impacted by a number of anthropogenic activities present in Resurrection Bay. Human activity in the area has produced a number of anthropogenic risk factors that sea stars must contend with, including: coastal and marine development, water pollution, and prey reduction. These risk factors are in addition to those operating on a larger scale such as predation, disease, and climate change. The species may be affected by multiple threats at any given time, compounding the impacts of the individual threats. All of these activities are expected to continue to occur into the foreseeable future. Based on the best information currently available, the proposed action is not expected to appreciably reduce the likelihood of survival or recovery of sunflower sea stars.

9 CONCLUSION

After reviewing the current status of the listed and proposed 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 the fin whale, Mexico or Western North Pacific DPS humpback whale, or Western DPS Steller sea lion. It is also NMFS's conference opinion that the action is not likely to jeopardize the continued existence of the proposed threatened sunflower sea star.

NMFS also concludes that the proposed action is not likely to adversely affect the blue whale, sei whale, Central America DPS humpback whale, Western North Pacific gray whale, North Pacific right whale, sperm whale, Southern Resident DPS killer whale, Cook Inlet beluga whale, or to destroy or adversely modify designated critical habitat for the Mexico DPS humpback whale, Western North Pacific DPS humpback whale, Southern Resident killer whale, Cook Inlet beluga whale, or Steller sea lion.

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, it is expected that take of fin whales, Mexico or Western North Pacific DPS humpback whales, or Western DPS Steller sea lions will be by Level B harassment. NMFS expects incidental take of sunflower sea stars may occur by harm through direct contact with pile driving activities, including construction and pre-construction surveys.

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 CFR 223.213). ESA section 4(d) rules have not been proposed for the proposed sunflower sea star at this time; therefore, ESA section 9 take prohibitions do not apply to this species. We include 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 agencies on their requirement to re-initiate consultation if the amount of take estimated in the jeopardy analysis of this conference opinion is exceeded. This ITS includes reasonable and prudent measures and terms and conditions designed to minimize and monitor take of this 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.

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. MARAD, USACE, 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, ARRC 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)(4)). If MARAD, USACE, 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).

NMFS is reasonably certain the proposed project activities are likely to result in the incidental take of ESA-listed marine mammal species by Level B harassment associated with noise from pile driving. The taking by serious injury or death is prohibited and will result in the modification, suspension, or revocation of the ITS. Table 10 lists the amount of authorized take for ESA-listed and proposed species for this action. The method for estimating the number of listed marine mammal species exposed to sound levels expected to result in Level B harassment is described above in the Exposure Analysis. The method for estimating sunflower sea star exposure to project activities is also described above in the Exposure Analysis.

NMFS expects that two instances of Level B harassment of fin whales may occur. NMFS expects that 13 instances and 1 instance of Level B harassment of Mexico DPS and Western North Pacific DPS humpback whales, respectively, may occur. While we are only authorizing take of 14 listed humpback whales 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 (118) is exceeded, as it is often impracticable to distinguish between humpback whale DPSs in the field. NMFS expects that 790 instances of Level B harassment of Western DPS Steller sea lions may occur.

Sunflower sea stars may be impacted by direct contact during pile driving activities (including pile installation, pile removal, and fill placement) or capture and relocation efforts (e.g., pre-construction surveys). The estimated density in Resurrection Bay is 0.0125 sunflower sea stars/m^2 and the project footprint is 19,955 m^2. NMFS expects that 250 sunflower sea stars may be exposed to direct physical contact during the project.

Table 10. Incidental take of ESA-listed and proposed species authorized.

Species	Total Amount of Take	
	Level A	Level B
Fin whale	0	2
Mexico DPS humpback whale	0	13
Western North Pacific DPS humpback whale	0	1
Western DPS Steller sea lion	0	790
Sunflower sea stars	250	

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 species. Although the biological significance of the expected behavioral responses of fin whales, Mexico DPS humpback whales, Western North Pacific DPS humpback whales, and Western DPS Steller sea lions remains unknown, this consultation has assumed that exposure to disturbances associated with ARRC pile driving 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 major noise sources, and any associated disruptions, are not expected to measurably affect the reproduction, survival, or recovery of these species. The taking of fin whales, Mexico DPS humpback whales, Western North Pacific DPS humpback whales, and Western DPS Steller sea lions will be by incidental acoustic harassment only, analogous to MMPA Level B take via behavioral disturbance or temporary threshold shift in their hearing. NMFS has therefore determined that the amount or extent of expected take, coupled with other effects of the action, is not likely to result in jeopardy to these species.

The proposed activities could adversely affect 250 sunflower sea stars. The current range-wide 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). The proposed activities will impact, at most, 0.0000417 percent of the population. Take prohibitions have not been proposed for this species at this time. NMFS does not expect take will affect the species' reproduction, survival, or recovery. NMFS has therefore determined that the amount or extent of expected take, coupled with other effects of the action, is not likely to result in jeopardy to the species.

10.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" 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. 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 fin whales, Mexico and Western North Pacific DPS humpback whales, Western DPS Steller sea lions, and sunflower sea stars[30] resulting from the proposed action.

- MARAD, USACE, NMFS Permits Division, and ARRC must monitor and report all authorized and unauthorized takes, and monitor and report the effectiveness of mitigation

[30]The prohibitions against taking species under section 9 of the ESA do not apply to the sunflower sea star, as it is proposed to be listed, and no section 4(d) regulations have been proposed at this time. However, NMFS AKR advises MARAD, USACE, NMFS Permits Division, and ARRC to consider implementing the RPM for the sunflower sea star. If this conference opinion is adopted as a biological opinion following a listing, this measure, with its implementing terms and conditions, will be non-discretionary.

measures incorporated as part of the proposed authorization for the incidental taking of ESA-listed marine mammals (pursuant to section 101(a)(5)(D) of the MMPA) and the proposed sunflower sea star. In addition, they must submit a report to NMFS AKR that evaluates the mitigation measures and reports the results of the monitoring program.

10.4 Terms and Conditions

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. 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. MARAD, USACE, 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)(4))).

Any taking that is in compliance with these terms and conditions is not prohibited under the ESA (50 CFR 402.14(i)(6)). 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 the RPM, MARAD, USACE, NMFS Permits Division, and ARRC through the aforementioned Federal entities must monitor and report all authorized and unauthorized takes, and monitor and report the effectiveness of mitigation measures incorporated as part of the proposed authorization for the incidental taking of ESA-listed marine mammals and proposed sunflower sea stars. A final report will be submitted to NMFS AKR that evaluates the mitigation measures and provides the results of the monitoring program.

This concludes the conference opinion for sunflower sea stars for the Seward Freight Dock biological opinion. ARRC may ask NMFS AKR to confirm the conference opinion as a biological opinion issued through formal consultation if the sunflower sea star is listed. The request must be in writing. If NMFS AKR reviews the action and finds that there have been no significant changes in the action as planned or in the information used during the conference, NMFS AKR will confirm the conference opinion as the biological opinion on the action and no further Section 7 consultation will be necessary.

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 or proposed species or critical habitat or regarding the development of information (50 CFR 402.02).

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

1. 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.
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 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.
4. MARAD, USACE, and NMFS Permits Division should ensure that the entities responsible for conducting the sunflower sea star surveys have experience and expertise with the methodology used to conduct the survey. In addition, NMFS AKR biologists should be invited to the site when a sunflower sea star survey is being conducted or the survey equipment is being tested in order to enable NMFS AKR to better understand the efficacy of the selected methods and equipment.
5. A report detailing the sunflower sea star survey methodology and results should be published or made widely available. The findings will aid other action agencies and projects in developing protocols for future surveys, and will increase general understanding of sunflower sea star movements and densities in the area.

In order to keep NMFS AKR informed of actions minimizing or avoiding adverse effects or benefitting listed and proposed species or their habitats, MARAD, USACE, and NMFS Permits Division should notify NMFS AKR 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 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)(5)).

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 MARAD, USACE, 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 https://www.fisheries.noaa.gov/alaska/consultations/section-7-biological-opinions-issued-alaska-region. 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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