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

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

Whittier Head of the Bay Cruise Ship Dock, Passage Canal, Whittier, Alaska

NMFS Consultation Number: AKRO-2022-02953

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

Affected Species and Determinations:

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

Consultation Conducted By: National Marine Fisheries Service, Alaska Region

Issued By: 

Jonathan M. Kurland
Regional Administrator

Date: March 28, 2023

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

TERMS AND ABBREVIATIONS

µPa	Micro Pascal
ADEC	Alaska Department of Conservation
ADFG	Alaska Department of Fish and Game
AKR	Alaska Region
AMHS	Alaska Marine Highway System
ARRC	Alaska Railroad Company
BA	Biological Assessment
CY	Cubic Yards
dB re 1µPa	Decibel referenced 1 microPascal
DPS	Distinct Population Segment
DTH	Down-the-hole
EPA	Environmental Protection Agency
ERT	Early Review Team
ESA	Endangered Species Act
°F	Fahrenheit
FR	Federal Register
FRN	Federal Register Notice
ft	Feet
GOA	Gulf of Alaska
HF	High frequency
Hz	Hertz
IHA	Incidental Harassment Authorization
IPCC	Intergovernmental Panel on Climate Change
ITA	Incidental Take Authorization
ITS	Incidental Take Statement
kHz	Kilohertz
km	Kilometers
kn	Knots
LF	Low frequency
LOC	Letter of Concurrence
m	Meter
MF	Mid frequency
mi	Mile
MMPA	Marine Mammal Protection Act

µPa	Micro Pascal
nm	Nautical miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
Opinion	Biological Opinion
OW	Otariid water
Pa	Pascals
PBF	Physical or biological features
PCE	Primary constituent element
PK	Peak sound level
ppm	Parts per million
PSO	Protected Species Observer
PTS	Permanent Threshold Shift
PW	Phocid water
PWS	Prince William Sound
RMS	Root Mean Square
RPA	Reasonable and prudent alternative
RPM	Reasonable and prudent measure
SEL	Sound Exposure Level
SELcum	Cumulative sound exposure levels
Solstice	Solstice Alaska Consulting, Inc.
SPL_{PK}	Peak sound pressure level
TL	Transmission loss
TMC	Turnagain Marine Construction
TTS	Temporary Threshold Shift
USACE	U.S. Army Corps of Engineers
USFWS	United States Fish and Wildlife Services
WNP	Western North Pacific
Yds	Yards

1. INTRODUCTION

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

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

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

In this document, the action agencies are NMFS Office of Protected Resources, Permits and Conservation Division (hereafter referred to as "Permits Division") and U.S. Army Corps of Engineers (hereafter referred to as USACE). 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 Turnagain Marine Construction (TMC) for harassment of marine mammals incidental to the proposed action. The USACE plans to issue a Rivers and Harbors Act Section 10 and Clean Water Act section 404 (33 C.F.R. 1344) permit for the proposed action (POA-2022-00233). TMC plans to construct a cruise ship berth and associated facilities on the western shore of Passage Canal, approximately 1.2 kilometers (km) northwest of downtown Whittier, Alaska. The consulting agency for this proposal is NMFS's Alaska Region. This document represents NMFS's biological opinion (opinion) on the effects of this proposal on endangered and threatened species and designated critical habitat.

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

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

1.1 Background

This opinion is based on information provided in the IHA application, the proposed IHA (88 FR 9227, February 13, 2023), and the Biological Assessment. Other sources of information relied upon include consultation communications (emails and virtual meetings), recent consultations completed in the same region, previous monitoring reports, and marine mammal surveys conducted in Prince William Sound (PWS). A complete record of this consultation is on file at NMFS's Anchorage, Alaska office.

The proposed action involves the construction of a cruise ship berth and associated facilities on the western shore of Passage Canal, approximately 1.2 km northwest of downtown Whittier, Alaska (Figure 1 and Figure 2).

Figure 1. Whitter Head of the Bay Cruise Ship Dock Project Location and Vicinity Map.

Figure 2. Whittier Head of the Bay Cruise Ship Dock Project Location.

This opinion considers the effects of pile driving activities, including vibratory and impact pile driving and down-the hole (DTH) drilling, and vessel transit of materials and construction barges through habitat occupied by ESA-listed marine mammals. These actions have the potential to affect endangered fin whale (*Balaenoptera physalus*), threatened Mexico distinct population segment (DPS) humpback whale (*Megaptera novaeangliae*), endangered Western North Pacific (WNP) DPS humpback whale, endangered North Pacific right whale (*Eubalaena japonica*), endangered sperm whale (*Physeter macrocephalus*), endangered Western DPS Steller sea lion (*Eumetopias jubatus*), Steller sea lion critical habitat, and Mexico DPS humpback whale critical habitat. There is no critical habitat for WNP DPS humpback whales and North Pacific right whales in the action area.

1.2 Consultation History

- June 14, 2022 – NMFS Alaska Region (AKR) received a letter from the USACE designating Solstice Alaska Consulting, Inc. (Solstice) as their non-Federal representative
- September 16, 2022 – NMFS Permits Division received an IHA application from Turnagain Marine Construction (TMC)

- September 22, 2022 – NMFS AKR issued an expedited Letter of Concurrence (LOC) to USACE for a geotechnical boring study in Passage Canal to support design efforts for the cruise ship docking facility
- October 14, 2022 – The IHA application was forwarded to NMFS AKR
- November 8, 2022 – NMFS AKR received the Biological Assessment (BA) prepared by Solstice from the USACE
- November 29, 2022 – Early Review Team (ERT), with participants from the NMFS Permits Division and NMFS AKR, met to discuss the project
- December 5, 2022 – NMFS AKR submitted questions to Solstice
- December 14, 2022 – Responses to questions received from Solstice
- January 11, 2023 – NMFS AKR submitted follow-up questions to Solstice
- January 20, 2023 – NMFS AKR met with Solstice and USACE to discuss take estimates and the use of a bubble curtain during pile driving activities
- January 30, 2023 – NMFS AKR, NMFS Permits Division, Solstice, and USACE met to discuss revisions to the IHA application and BA with the inclusion of the bubble curtain and the potential NMFS timeline shift
- February 3, 2023 – Revised BA from Solstice received, consultation initiated
- February 8, 2023 – Request for consultation, draft IHA, and proposed Federal Register Notice (FRN) received from the NMFS Permits Division
- February 10, 2023 – Revised Initiation Memo received from NMFS Permits Division
- February 13, 2023 – 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 C.F.R. § 402.02.

This opinion considers the effects of TMC's construction of a cruise ship berth and associated facilities on the western shore of Passage Canal. The proposed project is located at latitude 60.784°N and longitude -148.716°W, approximately 1.2 km northwest of downtown Whittier, Alaska. The proposed action will also include vessel transit of two materials barges to and from Seattle, Washington, one construction barge to and from Juneau, Alaska, and one construction barge to and from Seward, Alaska.

The action is expected to occur over a period of approximately 18 months. Pile driving will occur intermittently during the work period, for durations of minutes to hours at a time. Pile installation and removal will occur over 129 nonconsecutive days within the construction window.

The following description of the proposed action derives primarily from the IHA application, the proposed IHA (88 FR 9227, February 13, 2023), and the Biological Assessment.

2.1.1 Proposed Activities

2.1.1.1 Construction Activities

TMC proposes to construct a cruise ship berth and associated facilities (Figure 3). In total, 144 steel piles will be installed; 72 permanent piles will be guided into place by 72 temporary piles, which will be removed. The in-water components supporting the cruise ship berth are seventy-two 36-inch diameter temporary steel piles, thirty-six 36-inch diameter permanent steel piles, sixteen 42-inch diameter steel piles, and twenty 48-inch diameter permanent steel piles. Additional project components include bull rail, fenders, mooring cleats, pre-cast concrete dock surface, mast lights, and other dock components that will be installed out of the water.

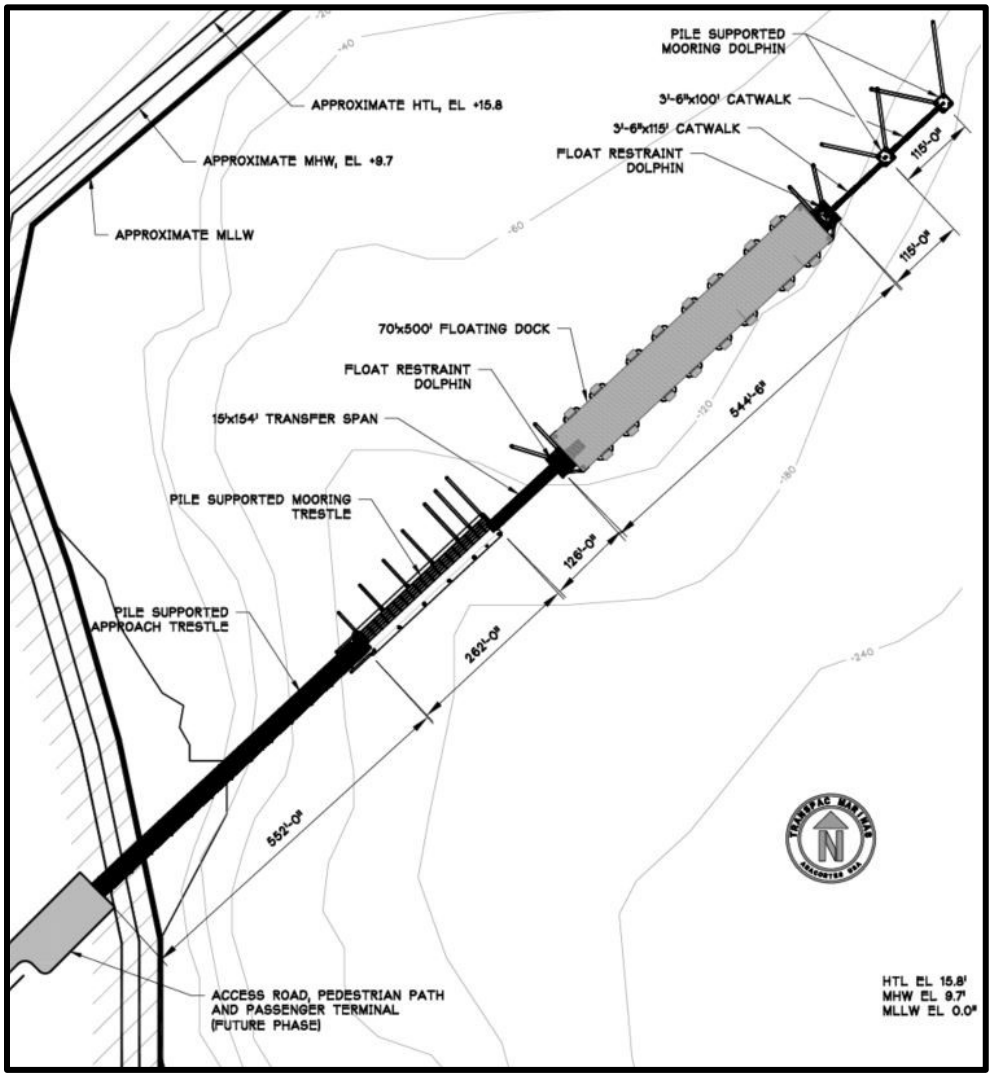

Figure 3. Whitter Head of the Bay Cruise Ship Dock Project Proposed Dock Design.

Two construction barges, the Swiftwater crane barge (~230 feet (ft)) and the Brightwater crane barge (~280 ft), will be used to support construction and two materials barges, each approximately 250 ft in length, will serve as a staging area during construction. Pile installation equipment deployed from the construction barges includes a vibratory hammer, diesel impact hammer, and drilled shaft drill (Table 1).

Table 1. Pile Installation Equipment.

Driving Mechanism	Pile Drive	Properties
Vibratory pile driving	ICE 44B/ Static weight 12,250 pounds	202 tons centrifugal force 207 tons driving force
Impact pile driving	Diesel Delmag D46	Max energy 107,280 foot pounds Speed (blows per minute) 34-53
Drilled shaft (DTH drilling)	Holte Top Drive	Max energy 100,000 foot pounds

Two 20-ft skiffs with single 90-horsepower Honda outboard motors will be used to support construction activities. The skiffs will transport workers from the shore to the barge work platform, a distance of less than 1,500 ft. Multiple shore-to-barge trips are expected each day during construction. Additionally, one of the skiffs may be used to support marine mammal monitoring activities.

TMC has divided the work area based on the capacity of their bubble curtain, which has a maximum deployment depth of 60 ft. Area 1 includes piles installed within the 60-ft isobath or shallower, and Area 2 includes piles installed in depths greater than the 60-ft isobath. The bubble curtain will be deployed during all pile-driving activities within Area 1, and during impact pile driving in Area 2 (as requested by USFWS). Area 1 encompasses the thirty-six 36-inch permanent piles supporting the approach trestle and the thirty-six 36-inch temporary piles used as template guides. Area 2 encompasses the sixteen 42-inch and twenty 48-inch permanent piles for the mooring trestle and dolphins, and the thirty-six 36-inch temporary piles used as template guides. Work in Area 1 will occur for a total of approximately 156 hours over 58.5 days, and work in Area 2 will occur for approximately 165 hours over 70 days (Table 2).

Three or four temporary 36-inch steel piles will be vibrated into position to a depth of 10 ft to create pile templates, which will be used to guide the permanent piles into place. As many as 36 of the temporary piles may require DTH drilling in locations where the bedrock is shallow. Within the pile template frame, the permanent piles will be vibrated into dense material, the impact hammer will be used to drive the permanent piles to tip elevation, and then the DTH hammer, placed inside of the pilings, will be used to drill a shaft into the bedrock. The rock shaft will be filled with concrete in order to anchor the permanent piles to the bedrock. The pile templates will be removed and installed for placement of all of the permanent piles.

The thirty-six 36-inch permanent piles supporting the approach trestle will be vibrated to at least 24 ft below the mudline, when possible. If the soil depth is less than 24 ft, the piles will be drilled at least 10 ft into bedrock with a DTH hammer and bit.

The sixteen 42-inch and twenty 48-inch permanent piles will be vibrated through the soil layer, a

38-inch diameter shaft will be drilled through the piles into the bedrock with the DTH hammer and bit, and the shaft will be filled with concrete to a depth of at least 25 ft to anchor the piles. For each 36-inch temporary pile, an estimated 2 cubic yards (CY) of drill cuttings will be produced. An estimated 10 CY of drill cuttings will be produced for each of the 36-, 42-, and 48-inch permanent piles.

2.1.1.2 Transport of Materials and Equipment

Project materials will be transported via the two materials barges towed from Seattle, Washington to the Whittier project site. The Swiftwater construction barge will be towed from Juneau in Southeast Alaska and the Brightwater construction barge will be towed from Seward to the project site. All barges will be towed at a speed of approximately eight knots. Once at the project site, the construction barges will be secured in place by four mooring anchors. The material barges will be tied to the construction barges, and materials will be moved from the staging barge to the construction barge and project site by a crane on the construction barge. Local barge moves to the next pile installation area will occur at a speed of less than two knots in approximately 100-ft increments.

Table 2. Whittier Head of the Bay Cruise Ship Dock Project Pile Driving Summary.

			36-inch Temporary Piles		Permanent Pile Installation			
			Installation	Removal	36-inch	42-inch	48-inch	Totals
Vibratory Pile Driving	Total Quantity		72	72	36	16	20	
	Maximum piles per day		4	4	4	4	2	
	Time per pile (minutes)		10	10	15	15	15	
	Time per day (minutes)		40	40	60	60	30	
	Area 1	Number of days	9	9	9	0	0	27
		Total hours	6	6	9	0	0	21
	Area 2	Number of days	9	9	0	4	10	32
		Total hours	6	6	0	4	5	21
Impact Pile Driving	Total Quantity		0	0	36	16	20	
	Maximum piles per day		0	0	4	3	2	
	# of Strikes per Pile		0	0	1,800	2,400	2,400	
	Time per pile (minutes)		0	0	45	60	60	
	Time per day (minutes)		0	0	180	180	120	
	Area 1	Number of days	0	0	9	0	0	9
		Total hours	0	0	27	0	0	27
	Area 2	Number of days	0	0	0	5.3	10	15.3
		Total hours	0	0	0	16	20	36
Down-the-Hole Drilling	Total Quantity		36	0	36	16	20	
	Maximum piles per day		4	0	2	2	2	
	Time per Pile (minutes)		60	0	150	150	150	
	Time per day (minutes)		240	0	300	300	300	
	Area 1	Number of days	4.5	0	18	0	0	22.5
		Total hours	18	0	90	0	0	108
	Area 2	Number of days	4.5	0	0	8	10	22.5
		Total hours	18	0	0	40	50	108

2.1.2 Mitigation Measures

General Mitigation Measures

1. TMC will inform NMFS of impending in-water activities a minimum of one week prior to the onset of those activities (email information to akr.section7@noaa.gov).
2. If project activities will occur outside of the time window specified in this letter, TMC 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. Project staff will cut all materials that form closed loops (e.g., plastic packing bands, rubber bands, and all other loops) prior to proper disposal in a closed and secured trash bin to reduce the risk of entanglement.
4. Project staff will properly secure all ropes, nets, and other materials to prevent marine mammal entanglement hazards from entering public waterways.
5. TMC will conduct briefings for construction supervisors and crews and the monitoring team prior to the start of all pile driving activity, and upon hiring new personnel, to explain responsibilities, communication procedures, the marine mammal monitoring protocol, and operational procedures.

Oil and Spill Prevention

6. TMC will provide and maintain a spill cleanup kit on-site at all times, to be implemented as part of the Shipboard Oil Pollution Emergency Plan for oil spill prevention and response.
7. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, and similar equipment will be checked regularly for drips or leaks, and maintained and stored properly to prevent spills.
8. Oil booms will be readily available for oil or another containment should a release occur.
9. All chemicals and petroleum products will be properly stored to prevent spills.
10. No petroleum products, cement, chemicals, or other deleterious materials will be allowed to enter surface waters.

Protected Species Observer Related Measures

11. One or more PSOs will perform PSO duties onsite throughout construction and pile driving activities.
12. For each in-water activity, PSOs will monitor all marine waters within the indicated shutdown zone radius for that activity (Table 3).

Table 3. Shutdown and Monitoring Zones.

Area/ Attenuation	Pile Size/Type	Activity	Sound Level at 10 m	Shutdown Zone (m)		Monitoring Zone (m)
				LF Cetaceans	Otariids	
Area 1[1] Water Depth ≤ 60 ft **Bubble Curtain**	36-inch Permanent	Impact	179 dB SEL 187 rms	2,055	80	635[2]
		Vibratory	161 dB rms	10	10	5,415
		DTH Drilling	159 dB SEL 169 dB rms	800	35	16,345
	36-inch Temporary	Vibratory Install/Removal	161 dB rms	10	10	5,415
		DTH Drilling	159 dB SEL 169 dB rms	700	35	16,345
Area 2 Water Depth ≥ 60 ft **Unattenuated**	36-inch Temporary	Vibratory Install/Removal	166 dB rms	35	15	11,660
		DTH Drilling	164 dB SEL 174 dB rms	1,485	70	16,345
	42-inch Permanent	Impact	186.7 dB SEL 198.6 dB rms	6,575	260	3,745[2]
		Vibratory	168.2 dB rms	35	15	16,345
		DTH Drilling	164 dB SEL 174 dB rms	1,770	70	16,345
	48-inch Permanent	Impact	186.7 dB SEL 198.6 dB rms	5,015	200	3,745[2]
		Vibratory	168.2 dB rms	35	15	16,345
		DTH Drilling	171 dB SEL 174 dB rms	5,050	200	16,345

[1] A 5 dB reduction was applied to sound source levels for pile driving activities occurring in Area 1 where a bubble curtain will be deployed.
[2] During impact pile driving, the shutdown zone is larger than the monitoring zone for LF Cetaceans.

13. A multi-ring unconfined bubble curtain will be deployed during installation and removal of all piles occurring in water depths of 60 ft or less (Area 1). The bubble curtain must be operated as necessary to achieve optimal performance. At a minimum, TMC must adhere to the following performance standards:
    a. The bubble curtain must distribute air bubbles around 100 percent of the piling circumference for the full depth of the water column.
    b. The lowest bubble ring must be in contact with the substrate for the full circumference of the ring, and the weights attached to the bottom ring shall ensure 100 percent substrate contact. No parts of the ring or other objects shall prevent full substrate contact.
    c. Air flow to the bubblers must be balanced around the circumference of the pile.
    d. The pile being driven must be completely enclosed by bubbles for the full depth of the water column and with radial dimension such that the rings are no more than 0.5 m from the outside surface of the pile.
14. A 10-meter shutdown zone will be applied during construction activities where acoustic injury is not the primary concern (barge movements, pile positioning, etc.). Monitoring will start 15 minutes before these activities begin and end when the action is complete.
15. PSOs will be positioned such that they will collectively be able to monitor the entirety of each activity's shutdown zone. The project proponent will coordinate with NMFS on the placement of PSOs prior to commencing in-water work.
16. Prior to commencing pile driving and DTH drilling activities, PSOs will scan waters within the appropriate shutdown zone and confirm no listed species are within the shutdown zone for at least 30 minutes immediately prior to initiation of the activity. If one or more listed species are observed within the shutdown zone, pile driving and DTH drilling activities will not begin until the listed species exit the shutdown zone of their own accord, or the shutdown zone has remained clear of listed species for 30 minutes immediately prior to the activity.
17. This pre-construction activity observation period will take place at the start of each day of in-water activities, each time in-water activities have been shut down or delayed due the presence of a listed species, and following cessation of in-water activities for a period of 30 minutes or longer.
18. The on-duty PSOs will continuously monitor the shutdown zone and adjacent waters during in-water activities for the presence of listed species.
19. In-water activities will take place only:
    a. between sunrise and sunset
    b. during conditions with a Beaufort Sea State of 4 or less
    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)

20. If visibility degrades such that a PSO can no longer ensure that the shutdown zone remains devoid of listed species during in-water activities, the crew will cease in-water work until the entire shutdown zone is visible and the PSO has indicated that the zone has remained devoid of listed species for 30 minutes.
21. The PSO will order in-water activities to immediately cease if one or more listed species has entered, or appears likely to enter, the associated shutdown zone.
22. If in-water activities are shut down for less than 30 minutes due to the presence of listed-species in the shutdown zone, pile driving and DTH drilling activities may commence when the PSO provides assurance that listed species were observed exiting the shutdown zone. Otherwise, the activities may only commence (using soft-start procedures for impact pile driving and DTH drilling) after the PSO provides assurance that listed species have not been seen in the shutdown zone for 30 minutes (for large cetaceans) or 15 minutes (for pinnipeds).
23. Following a lapse of in-water activities of more than 30 minutes, the PSO will authorize resumption of pile driving and DTH drilling activities 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.
24. If a listed species is observed within a shutdown zone or is otherwise harassed, harmed, injured, or disturbed, PSOs will immediately report that occurrence to NMFS AKR using the contact information specified in Table 4.

<u>Protected Species Observer Requirements</u>

25. The action agency or its designated non-federal representative will provide resumes or qualifications of PSO candidates to the NMFS consultation biologist or section 7 coordinator for approval at least one week prior to in-water work. NMFS will provide a brief explanation of lack of approval in instances where an individual is not approved.
26. PSOs must be independent (i.e., not construction personnel) and will have no other assigned tasks during monitoring periods.
27. At least one PSO will have prior experience performing the duties of a PSO during construction activity.
28. PSOs will complete PSO training prior to deployment. The training will include:
    a. field identification of marine mammals and marine mammal behavior;
    b. ecological information on marine mammals and specifics on the ecology and management concerns of those marine mammals;
    c. ESA and MMPA regulations;
    d. proper equipment use;
    e. methodologies in marine mammal observation and data recording and proper reporting protocols; and
    f. an overview of PSO roles and responsibilities.

29. When a team of three or more PSOs is required, a lead observer or monitoring coordinator will be designated. The lead observer must have prior experience performing the duties of a PSO during construction activity
30. PSOs will work in shifts lasting no longer than four hours with 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.
31. PSOs will:
    a. have vision that allows for adequate monitoring of the entire shutdown zone
    b. be able to identify to species all marine mammals that occur in the action area
    c. have the ability to effectively communicate orally, by radio and in person, with project personnel to provide real-time information on listed species
    d. have the ability and authority to order appropriate mitigation response, including shutdowns, to avoid takes of all listed species
    e. be able to collect field observations and record field data accurately and in accordance with project protocols
    f. have writing skills sufficient to create understandable records of observations
32. The PSOs will have the following equipment to address their duties:
    a. binoculars (7x50 or higher magnification) with built-in rangefinder or reticles (rangefinder may be provided separately)
    b. instruments to estimate the geographic coordinates of observed marine mammals, including a hand-held GPS unit, compass and/or inclinometer
    c. tools which enable them to accurately determine the position of a marine mammal in relation to the shutdown zone
    d. two-way radio, or equivalent, to communicate with the onsite project manager
    e. watch or chronometer
    f. tide tables for the project area
    g. a legible copy of this Biological Opinion and all appendices
    h. legible and fillable observation record form allowing for required PSO data entry
33. Prior to commencing in-water work 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 listed species are observed likely to enter or within the shutdown zone, and will request that the point of contact instruct the crew to notify the PSO when a marine mammal is observed. If the point of contact goes "off shift" and delegates his duties, the PSO must be informed and brief the new point of contact.

Impact Pile driving

Please see the measures above for required shutdown zones.

34. If no listed species are observed within the impact pile driving shutdown zone for 30 minutes immediately prior to pile driving, soft-start procedures will be implemented immediately prior to activities. Soft start requires contractors to provide an initial set of strikes at no more than half the operational power, followed by a 30 second waiting period, then two subsequent reduced power strike sets. A soft start must be implemented at the start of each day's impact pile driving, any time pile driving has been shutdown or delayed due the presence of a listed species, and following cessation of pile driving for a period of 30 minutes or longer.
35. Following this soft-start procedure, operational impact pile driving may commence and continue provided listed species remain absent from the shutdown zone.
36. Following a lapse of impact pile driving activities of more than 30 minutes, the PSO will authorize resumption of impact pile driving using soft-start procedures 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.
37. Pile caps (pile softening material) will be used to minimize noise during impact pile driving. The contractor will use high-density polyethylene or ultra-high-molecular-weight polyethylene softening material on all templates to eliminate steel-on-steel noise.

Down the Hole (DTH) Drilling

Please see the measures above for required shutdown zones.

38. If no listed species are observed within the DTH shutdown zone for 30 minutes immediately prior to DTH drilling, soft-start procedures will be implemented immediately prior to activities. Soft start requires contractors to activate the drilling equipment at no more than half the operational power for several seconds, followed by a 30 second waiting period, then two subsequent reduced power start-ups. A soft start must be implemented at the start of each day's DTH drilling, any time DTH drilling has been shutdown or delayed due the presence of a listed species, and following cessation of DTH drilling for a period of 30 minutes or longer.
39. Following this soft-start procedure, operational DTH drilling may commence and continue provided listed species remain absent from the shutdown zone.
40. Following a lapse of DTH drilling activities of more than 30 minutes, the PSO will authorize resumption of DTH drilling 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 Pile Driving

Please see the measures above for required shutdown zones

41. If no listed species are observed within the vibratory pile driving shutdown zone for 30 minutes immediately prior to pile driving, vibratory pile driving may commence.

42. This pre-pile driving observation period will take place at the start of each day's vibratory pile driving, each time pile driving has been shut down or delayed due the presence of a listed species, and following cessation of pile driving for a period of 30 minutes or longer.
43. Following a lapse of vibratory pile driving activities of more than 30 minutes, the PSO will authorize resumption of vibratory pile driving 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.

Project-Dedicated Vessels

44. Vessel operators will:
    a. maintain a watch for marine mammals at all times while underway
    b. stay at least 91 m (100 yds) away from listed marine mammals, except they will remain at least 460 m (500 yards) from endangered North Pacific right whales
    c. travel at less than 5 knots when within 274 m (300 yds) of a whale
    d. avoid changes in direction and speed when within 274 m (300 yds) of a whale, unless doing so is necessary for maritime safety
    e. not position vessel(s) in the path of a whale, and will not cut in front of a whale in a way or at a distance that causes the whale to change direction of travel or behavior (including breathing/surfacing pattern)
    f. check the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged
    g. reduce vessel speed to 10 knots or less when weather conditions reduce visibility to 1.6 km (1 mi) or less
45. If a whale's course and speed are such that it will likely cross in front of a vessel that is underway, or approach within 91 m (100 yds) of the vessel, and if maritime conditions safely allow, the engine will be put in neutral and the whale will be allowed to pass beyond the vessel. Vessel crew will ensure that no whales are within 50 meters of the vessel when propellers are re-engaged, minimizing risk of marine mammal injury.
46. Vessels will take reasonable steps to alert other vessels in the vicinity of whale(s).
47. Vessels will not allow lines to remain in the water unless both ends are under tension and affixed to vessels or gear. No materials capable of becoming entangled around marine mammals will be discarded into marine waters.
48. 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)). Specifically, pilot and crew will not:
    a. approach, by any means, including by interception (i.e., placing a vessel in the path of a humpback), within 91 m (100 yards) of any humpback whale;

b. cause a vessel or other object to approach within 91 m (100 yds) of a humpback;

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

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

49. Vessels will not approach within 5.5 km (3 nm) of rookery sites listed in (50 CFR § 224.103(d)).

50. Vessels will not approach within 914 m (3,000 ft) of any Steller sea lion haulout or rookery.

General Data Collection and Reporting

Data Collection

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

52. The project proponent will ensure that PSO data is submitted electronically in a format that can be queried such as a spreadsheet or database (i.e. digital images of data sheets are not sufficient).

53. PSOs will record the following:

    a. the date, shift start time, shift stop time, and PSO identifier

    b. date and time of each reportable event (e.g., a marine mammal observation, operation shutdown, reason for operation shutdown, change in weather)

    c. weather parameters (e.g., visibility, percent glare, cloud cover), including sea state using the Beaufort Wind Force Scale (https://www.weather.gov/mfl/beaufort)

    d. species, numbers, and, if possible, sex and age class of observed marine mammals, and observation date, time, and location

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

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

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

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

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

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

Data Reporting

54. All observations of North Pacific right whales will be reported to NMFS within 24 hours. These observation reports will include the following information:
    a. date, time, and geographic coordinates of the observation(s)
    b. number of North Pacific right whales observed, including number of adults/juveniles/calves observed, if determinable
    c. Environmental conditions, including sea conditions, visibility, lighting conditions, and percent ice cover at the time of observation
55. Observations of humpback whales will be transmitted to AKR.section7@noaa.gov by the end of the calendar year, including data specified in mitigation measure #52 above as well as any photographs or videos of humpback whales captured.

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(s) is observed entering a shutdown zone before operations can be shut down, or is injured or killed as a direct or indirect result of this action), the PSO will immediately report the incident to NMFS AKR. The PSO record(s) will include:
    a. all information to be provided in the final report (see *Final Report* heading)
    b. number of animals of each threatened and endangered species affected
    c. the date, time, and location of each event (provide geographic coordinates)
    d. description of the event
    e. the time the animal(s) was first observed or entered the shutdown zone, and, if known, the time the animal was last seen or exited the zone, and the fate of the animal
    f. mitigation measures implemented prior to and after the animal was taken
    g. if a vessel struck a marine mammal, the contact information for the PSO on duty, or the contact information for the individual piloting the vessel if there was no PSO on duty
    h. Photographs or video footage of the animal(s), if available

Stranded, Injured, Sick or Dead Marine Mammal

57. If PSOs observe an injured, sick, or dead marine mammal (i.e., stranded marine mammal), they will notify the Alaska Marine Mammal Stranding Hotline at 877-925-7773. The PSOs will submit photos and available data to aid NMFS in determining how to respond to the stranded animal. If possible, data submitted to NMFS in response to stranded marine mammals will include date/time, location of stranded marine mammal, species and number of stranded marine mammals, description of the stranded marine mammal's condition, event type (e.g., entanglement, dead, floating), and behavior of live-stranded marine mammals.

Illegal Activities

58. If PSOs observe marine mammals being disturbed, harassed, harmed, injured, or killed (e.g., feeding or unauthorized harassment), these activities will be reported to NMFS Alaska Region Office of Law Enforcement at (Table 4; 1-800-853-1964).

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

Monthly Reports

60. Interim monthly monitoring reports, including data sheets, will be submitted. These reports will include a summary of marine mammal species and behavioral observations, shutdowns or delays, and work completed.

61. Monthly reports will be submitted to AKR.section7@noaa.gov by the 15th day of the month following the reporting period. For example, the report for activities conducted in June 2023 will be submitted by July 15, 2023.

Final Report

62. A draft final report will be submitted to NMFS (AKR.section7@noaa.gov) within 90 calendar days of the completion of the project. A final report must be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report. The report will summarize all in-water activities associated with the proposed action and results of PSO monitoring.

63. The final report will include:

    a. summaries of monitoring effort, including dates and times of construction, dates and times of monitoring, dates and times and duration of shutdowns due to marine mammal presence

    b. date and time of marine mammal observations, geographic coordinates of marine mammals at their closest approach to the project site, marine mammal species, numbers, age/size/sex categories (if determinable), and group sizes

    c. number of marine mammals observed (by species) during periods with and without project activities (and other variables that could affect detectability)

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

    e. numbers of marine mammal observations/individuals seen versus project activity at time of observation

    f. distribution of marine mammals around the action area versus project activity at time of observation

    g. detailed information about implementation of any mitigation measures (e.g., shutdowns and delays), a description of actions that ensued, and resulting behaviors of the animal, if any.

h. an evaluation of the effectiveness of the mitigation measures, including use of the bubble curtain

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

Table 4. **Summary of Agency Contact Information.**

Reason for Contact	**Contact Information**
Request S7 Consultation	AKR.PRD.Section7@noaa.gov
Consultation Questions & Unauthorized Take	Greg Balogh: greg.balogh@noaa.gov & Kathleen Leonard: kathleen.leonard@noaa.gov
Reports & Data Submittal	AKR.section7@noaa.gov (include NMFS AKRO tracking number in subject line)
Stranded, Injured, Entangled, or Dead Marine Mammal	NOAA Fisheries Stranding Hotline (24/7 coverage) 877-925-7773
Oil Spill & Hazardous Materials Response	U.S. Coast Guard National Response Center: 1-800-424-8802 & AKRNMFSspillResponse@noaa.gov
Illegal Activities	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: 907-586-7236

2.2 Action Area

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

The cruise ship berth and associated facilities will be constructed on the western shore of Passage Canal, approximately 1.2 km northwest of downtown Whittier, Alaska. Passage Canal is approximately 12 miles (mi) long and less than 2 mi across at the widest point. The fjord reaches depths over 1,000 ft at the entrance near Decision Point and Blackstone Bay, with shallower depths of approximately 100 to 200 ft at the head.

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 (i.e., with and without bubble curtains), and empirical measurements of noise. Received sound levels associated with DTH drilling for all pile sizes are expected to decline to 120 dB re 1µPa rms within 39,811 meters of the source, see the Acoustic Threshold section for more information on the factors included in this calculation. The land mass structure of Passage Canal, however, obstructs underwater sound transmission and the action area for pile driving activities is truncated to 16,345 m (Figure 4).

The expected transit routes of the materials and construction barges are also considered part of the action area. The two materials barges will be towed from Seattle, Washington (Figure 5), the Swiftwater construction barge will be towed from Juneau to the Whittier project site (Figure 6), and the Brightwater construction barge will be towed from Seward to the Whittier project site (Figure 6).

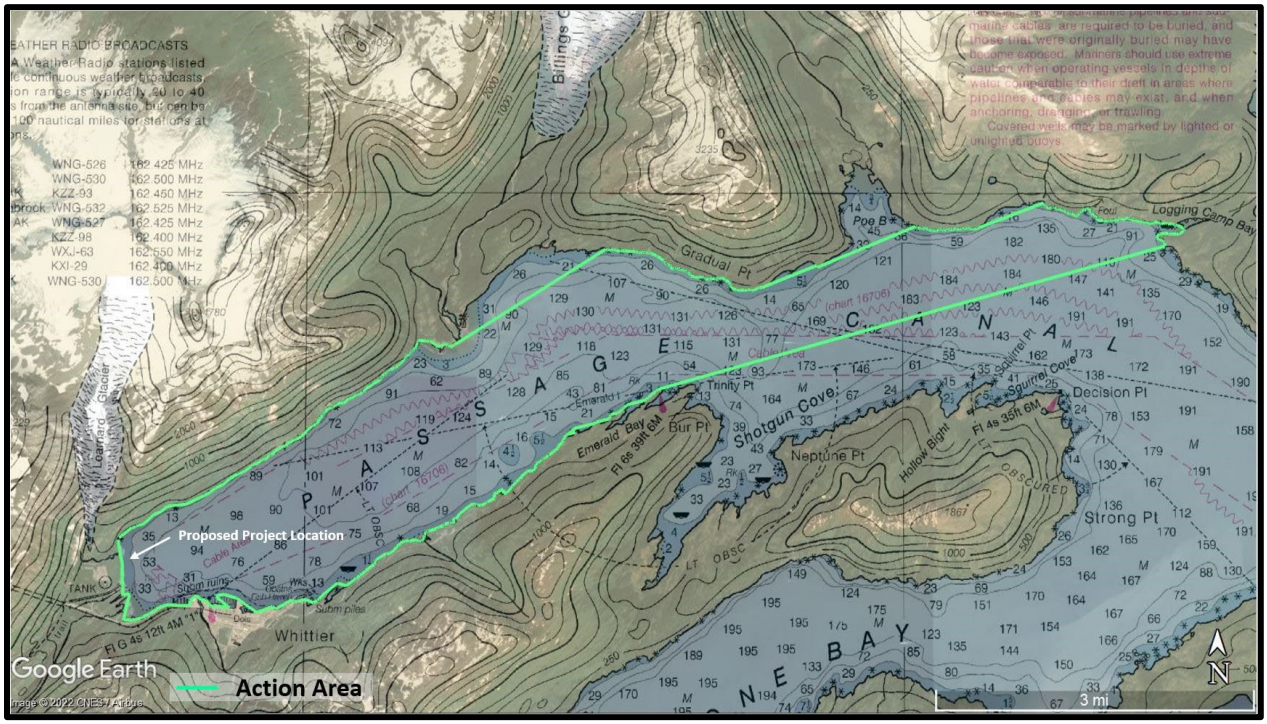

Figure 4. Whittier Head of the Bay Cruise Ship Dock Action Area.

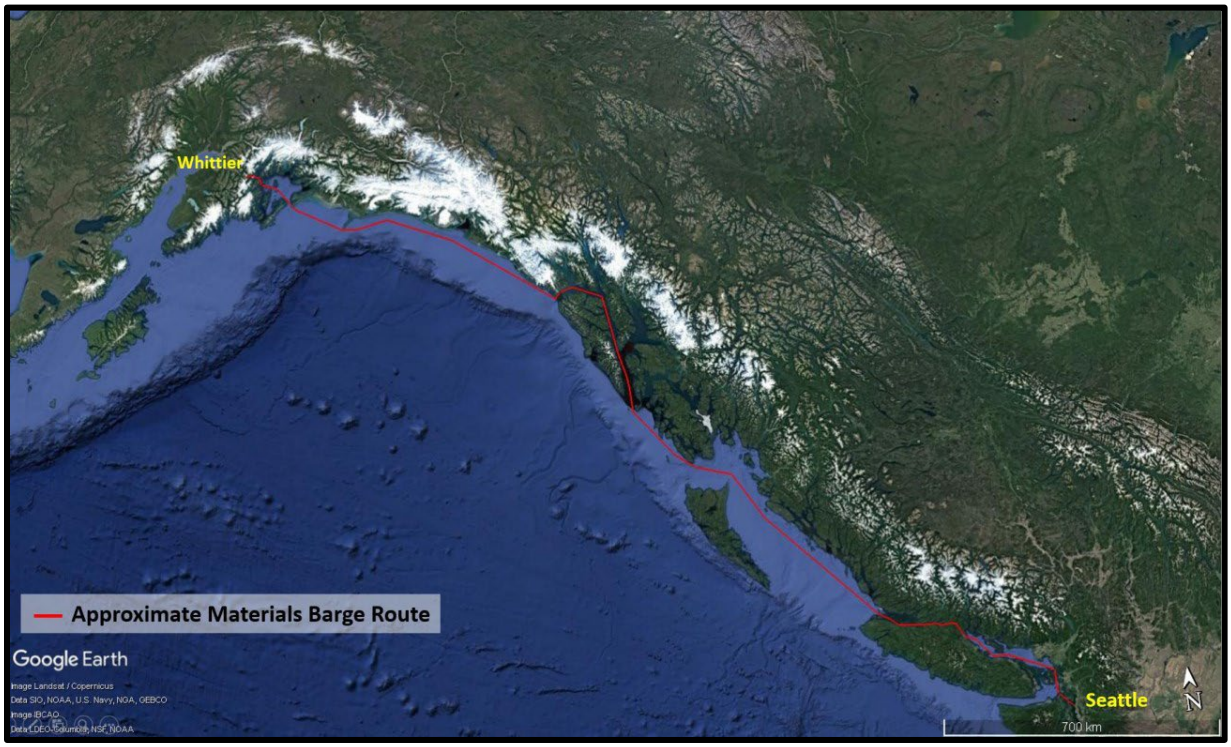

Figure 5. Approximate Route from Seattle to Whittier for Materials Barges.

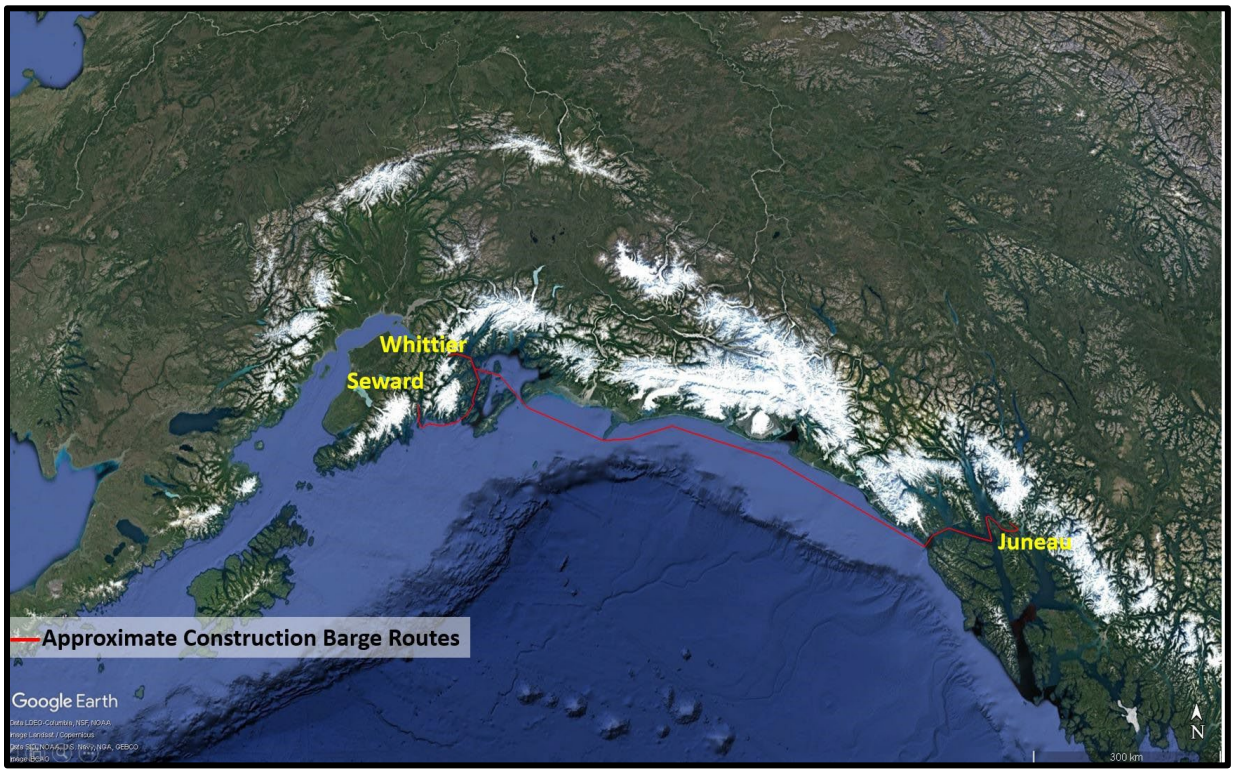

Figure 6. Approximate Routes from Juneau and Seward for Construction Barges.

3. APPROACH TO THE ASSESSMENT

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

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

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

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

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

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

- Identify the 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 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. Section 5 of the opinion discusses the environmental baseline.

- Analyze the effects of the proposed action. Identify the listed species that are likely to co-occur with these effects in space and time and the nature of that co-occurrence (these represent our *exposure analyses*). In this step of our analyses, we try to identify the number, age (or life stage), and 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 species are likely to be exposed to an action's effects and the nature of that exposure, we examine the scientific and commercial data available to determine whether and how those listed species are likely to respond given their exposure (these represent our *response analyses*). Response analysis is considered in Section 6.3 of this opinion.

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

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

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

- If necessary, define a reasonable and prudent alternative to the proposed action. If, in completing the last step in the analysis, NMFS determines that the action under consultation is likely to jeopardize the continued existence of listed species or destroy or

adversely modify designated critical habitat, NMFS must identify a reasonable and prudent alternative (RPA) to the action.

4. RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT

This opinion considers the effects of the proposed action on the species and designated critical habitats specified in Table 5. Although critical habitat has been designated for the Western North Pacific DPS of humpback whale and the North Pacific right whale, there is no critical habitat for these populations in the action area.

Table 5. **Listing status and critical habitat designation for species considered in this opinion.**

Species	Status	Listing	Critical Habitat
North Pacific Right Whale *(Eubalaena japonica)*	Endangered	NMFS 2008, 73 FR 12024	NMFS 2008, 73 FR 19000 None in the action area
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 None in the action area
Fin Whale (*Balaneoptera physalus*)	Endangered	NMFS 1970, 35 FR 18319	Not designated
Sperm Whale (*Physeter macrocephalus*)	Endangered	NMFS 1970, 35 FR 18319	Not designated
Steller Sea Lion, Western DPS *(Eumetopias jubatus)*	Endangered	NMFS 1997, 62 FR 24345	NMFS 1993, 58 FR 45269

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

As described in the Approach to the Assessment section of this opinion, NMFS uses two criteria to identify those endangered or threatened species or critical habitats that are likely to be adversely affected. The first criterion is exposure or some reasonable expectation of a co-occurrence between one or more potential stressors associated with the proposed activities and a listed species or designated critical habitat.

The second criterion is the probability of a response given exposure. For endangered or threatened species, we consider the susceptibility of the species that may be exposed. For example, species exposed to vessel sound that are not likely to exhibit physical, physiological, or behavioral responses given that exposure (at the combination of sound pressure levels and distances associated with an exposure), are unlikely adversely affected by the exposure. We

determine that an action would not likely adversely affect an animal if one could not meaningfully measure or detect the effects, or if the effects are extremely unlikely to occur.

In addition, if proposed activities are not likely to destroy or adversely modify critical habitat, further analysis is not required.

We applied these criteria to the species and critical habitats listed above and determined that the following species and designated critical habitats are not likely to be adversely affected by the proposed action: North Pacific right whale, fin whale, sperm whale, Mexico DPS humpback whale critical habitat, and Steller sea lion critical habitat. Below we discuss our rationale for those determinations.

4.1.1 North Pacific Right Whale, Fin Whale, Sperm Whale

North Pacific right whales are among the world's rarest marine mammals (Wade et al. 2011). The eastern population, whose summer range includes the Gulf of Alaska and the Bering Sea, has a minimum abundance estimate of 26 whales (Muto et al. 2021). Sperm whales are primarily found in deep waters (greater than 300 m) and the population in Alaska is relatively small with approximately 345 animals (Muto et al. 2021). There are no reliable estimates for the entire Northeast Pacific stock of fin whales; however, the best provisional estimate is 3,168 whales (Muto et al. 2021). Fin whales are most often sighted in deep, offshore waters, but have also been seen on the continental shelf and slope of the Gulf of Alaska (Rone et al. 2017).

4.1.1.1 Vessel Traffic

The routes proposed for the materials and construction barges overlap with the ranges of the North Pacific right whale, fin whale, and sperm whale, and these species may be encountered during transit. For this project we assume the two materials barges will each make one round trip from Seattle, Washington, the Swiftwater construction barge will make one round trip from Juneau, and the Brightwater construction barge will make one round trip from Seward, Alaska to the project site in Whittier, Alaska. All barges will be towed at a speed of approximately eight knots. Project vessels will have a short-term presence in the Gulf of Alaska (GOA) and the North Pacific. 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 knot speed restriction when within 300 yds of observed whales. Project vessels will also be maneuvered to keep at least 500 yds away from any observed North Pacific right whales, 100 yds 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 barges and

tugs, disturbances rising to the level of harassment are extremely unlikely to occur.

NMFS has interpreted the term “harass” in the Interim Guidance on the ESA Term "Harass" (Wieting 2016) 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.” 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, because vessels will be in transit, the duration of the exposure to ship noise will be brief. NMFS expects that a vessel traveling at 10 knots in deep ocean water will ensonify a given point in space to levels above 120 dB for less than 7 minutes. The project vessels will emit continuous sound while in transit, which will alert marine mammals before the received sound level exceeds 120 dB. Therefore, a startle response is not expected. Rather, 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 number of times marine mammals react to 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, North Pacific right whales, fin whales, or sperm 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.

Vessel strike is an ongoing source of mortality for large cetaceans (Vanderlaan and Taggart 2007, Schoeman et al. 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 2012, 108 whale-vessel collisions were recorded in Alaska; humpback whales were the most frequent victims, accounting for 86 percent of all reported collisions (Neilson et al. 2012). The majority of reported vessel strikes occurred in Southeast Alaska where vessel traffic is much greater (Neilson et al. 2012). Twenty-six large whales in Alaska, including 18 humpbacks, were struck by vessels between 2016 and 2020 (Freed et al. 2022). 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.

There have been no reported vessel strikes of North Pacific right whales since 1978 and one sperm whale mortality due to ship strike was reported in 2017. Fin whales are more vulnerable to ship strikes and mortality, and strikes were reported in Alaska in 2014, 2016, 2018, and 2020 (Freed et al. 2022). 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 North Pacific right whale, fin whale, or sperm whale is extremely low and any adverse effects due to vessel strikes are extremely unlikely to occur.

In summary, we conclude that vessel traffic associated with the proposed action is not likely to adversely affect the North Pacific right whale, fin whale, or sperm whale.

4.1.1.2 Pile Driving Activities

The cruise ship berth and associated facilities will be constructed approximately 1.2 km northwest of downtown Whittier, Alaska. The land mass structure of Passage Canal obstructs underwater sound transmission and the action area for pile driving activities is truncated to 16,345 m (Figure 4). We are unaware of records of North Pacific right whales, fin whales, and sperm whales occurring in Passage Canal, and these species are not expected to occur in the area affected by pile driving activities. Therefore, adverse effects to those species are extremely unlikely.

In summary, NMFS concurs that pile driving activities associated with the proposed action are not likely to adversely affect the North Pacific right whale, fin whale, or sperm whale. These species will not be discussed further.

4.1.2 Effects to Critical Habitat

The materials and construction barges will pass through critical habitat for the Mexico DPS humpback whale and Steller sea lion. Critical habitat was designated for the Mexico DPSs on April 21, 2021 (Figure 7; 86 FR 21082). Only one PBF was identified, adequate prey resources. Although humpback whales are generalist predators and prey availability can vary seasonally and spatially, 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 a vessel on the surface of the water will have a measureable 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.

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

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

Mitigation measures #48 and #49 are in place to protect Steller sea lion critical habitat from vessel disturbance.

In addition, we expect the project vessels will be traveling in normal shipping lanes when in Steller sea lion range and that Steller sea lions at haulouts or rookeries near those shipping lanes are habituated to shipping traffic. The passage of a vessel on the surface of the water is not expected to disrupt or disturb any of the primary prey species which Steller sea lions depend upon and therefore the quality of their prey resources will not be diminished. For these reasons we conclude that there is no aspect of the passage of the materials and construction barges 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 materials and construction barges over the water surface of critical habitat for Mexico DPS humpback whale and Steller sea lion will have an immeasurably small effect on the features determined to be essential for these species.

The ensonfied action area for pile driving activities extends through Passage Canal. It ends approximately 3.5 km west of the Mexico DPS humpback whale critical habitat boundary (Figure 7), but overlaps with Steller sea lion designated critical habitat (Figure 8). While all of the important aquatic features for Steller sea lions exist in the action area for pile driving activities, prey availability has been declining in recent years and sea lions may prefer other suitable habitat. The herring population in Prince William Sound declined drastically in the 1990s and again during the Pacific marine heatwave (NMFS 2020). Pacific cod biomass in the Gulf of Alaska has been declining since 2009 and plunged sharply downward between 2016 and 2017 (NMFS 2020). The Steller sea lion rookery nearest to this project is on Seal Rocks, located in the Hinchinbrook Entrance between Hinchinbrook and Montague Islands, 124 km southeast of the proposed berth site. The nearest major haulouts are Perry on Perry Island, approximately 44 km southeast of the proposed berth site, and Dutch Group on Dutch Group Island, approximately 52 km[1] southeast of the proposed berth site.

Based on the distance of the construction site from major haulouts and rookeries, and the mitigation measures in place to avoid impacts to marine mammals and designated critical habitat, we expect any adverse effects to designated critical habitat for Steller sea lions would be immeasurably small.

Therefore, we determine that this proposed action is not likely to adversely affect critical habitat for Mexico DPS humpback whales and Steller sea lions. As such, critical habitat will not be discussed further in this opinion.

[1] https://www.fisheries.noaa.gov/inport/item/17921 accessed 2/17/23.

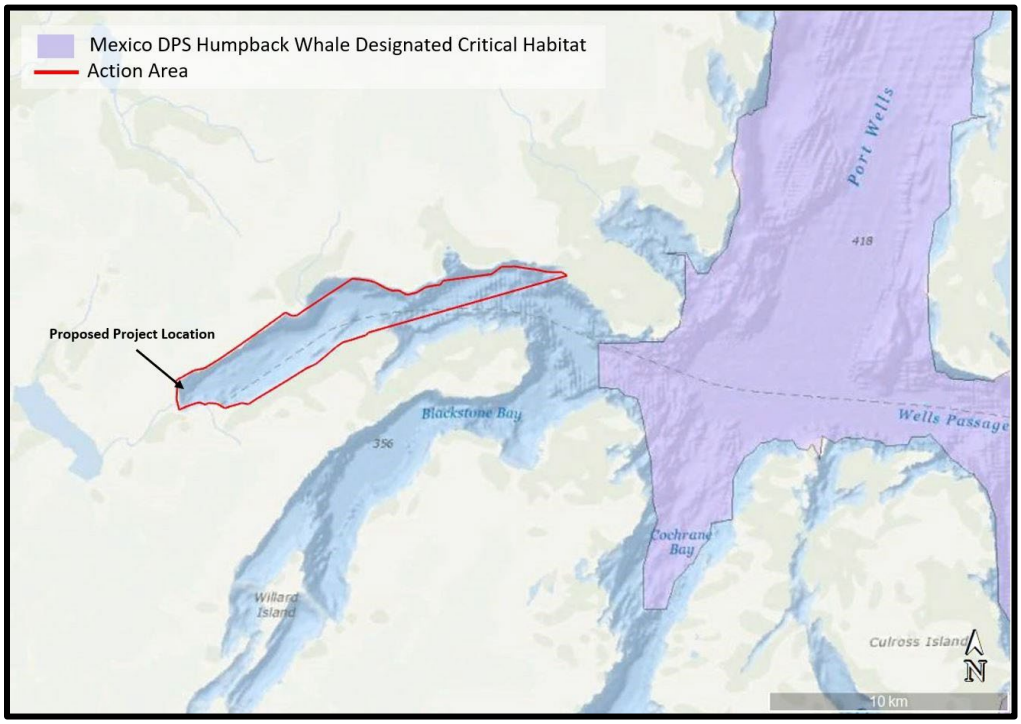

Figure 7. Mexico DPS Humpback Whale Critical Habitat near the Construction Action Area.

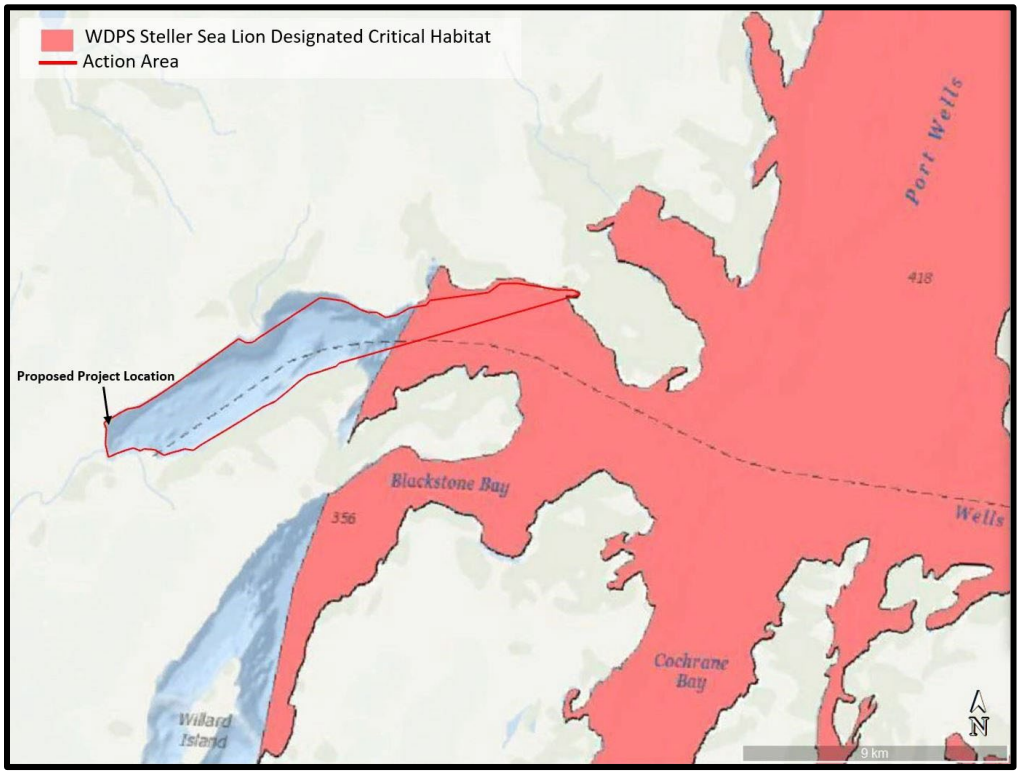

Figure 8. Steller Sea Lion Critical Habitat near the Construction Action Area.

4.2 Climate Change

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

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

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

http://nsidc.org/arcticseaicenews/

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

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

Air temperature

Recording of global temperatures began in 1880, and the last nine years (2014–2022) have ranked as the nine warmest years on record[2]. The yearly temperature for North America has increased at an average rate of 0.23°F since 1910; however, the average rate of increase has doubled since 1981 (0.49°F)[3].

The Arctic (latitudes between 60ºN and 90ºN) has been warming at more than two times the rate of lower latitudes since 2000. This is due to "Arctic amplification", a characteristic of the global climate system influenced by changes in sea ice extent, albedo, atmospheric and oceanic heat transports, cloud cover, black carbon, and many other factors (Serreze and Barry 2011, Richter-Menge et al. 2017, Richter-Menge 2019). The average annual temperature is now 3-4°F warmer than during the early and mid-century (Figure 9; Thoman and Walsh 2019). The average annual temperature for Alaska in 2022 was 28.6°F, 2.6°F above the long-term average, ranking 16th warmest in the 98-year record for the state[4]. Some of the most pronounced effects of climate change in Alaska include disappearing sea ice, shrinking glaciers, thawing permafrost, and changing ocean temperatures and chemistry (Chapin et al. 2014).

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

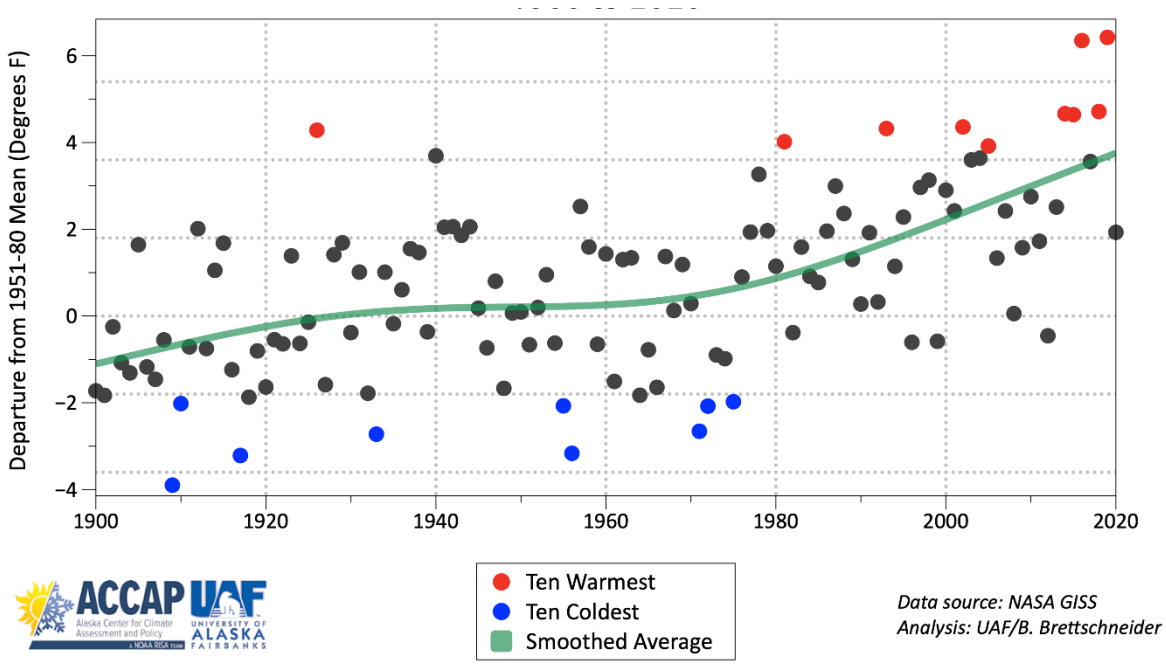

Figure 9. Alaska Annual Temperature 1900 to 2020.

Marine water temperature

Higher air temperatures have led to higher ocean temperatures. More than 90 percent of the excess heat created by global climate change is stored in the world's oceans, causing increases in ocean temperature (IPCC 2019, Cheng et al. 2020). The four highest annual global ocean heat content (OHC), which measures the amount of heat stored in the upper 2000 m (6,561 ft) of the ocean, have all occurred in the last four years (2019–2022), and regions of the North Pacific, North Atlantic, Mediterranean, and southern oceans recorded their highest OHC since the 1950s[5].

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

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

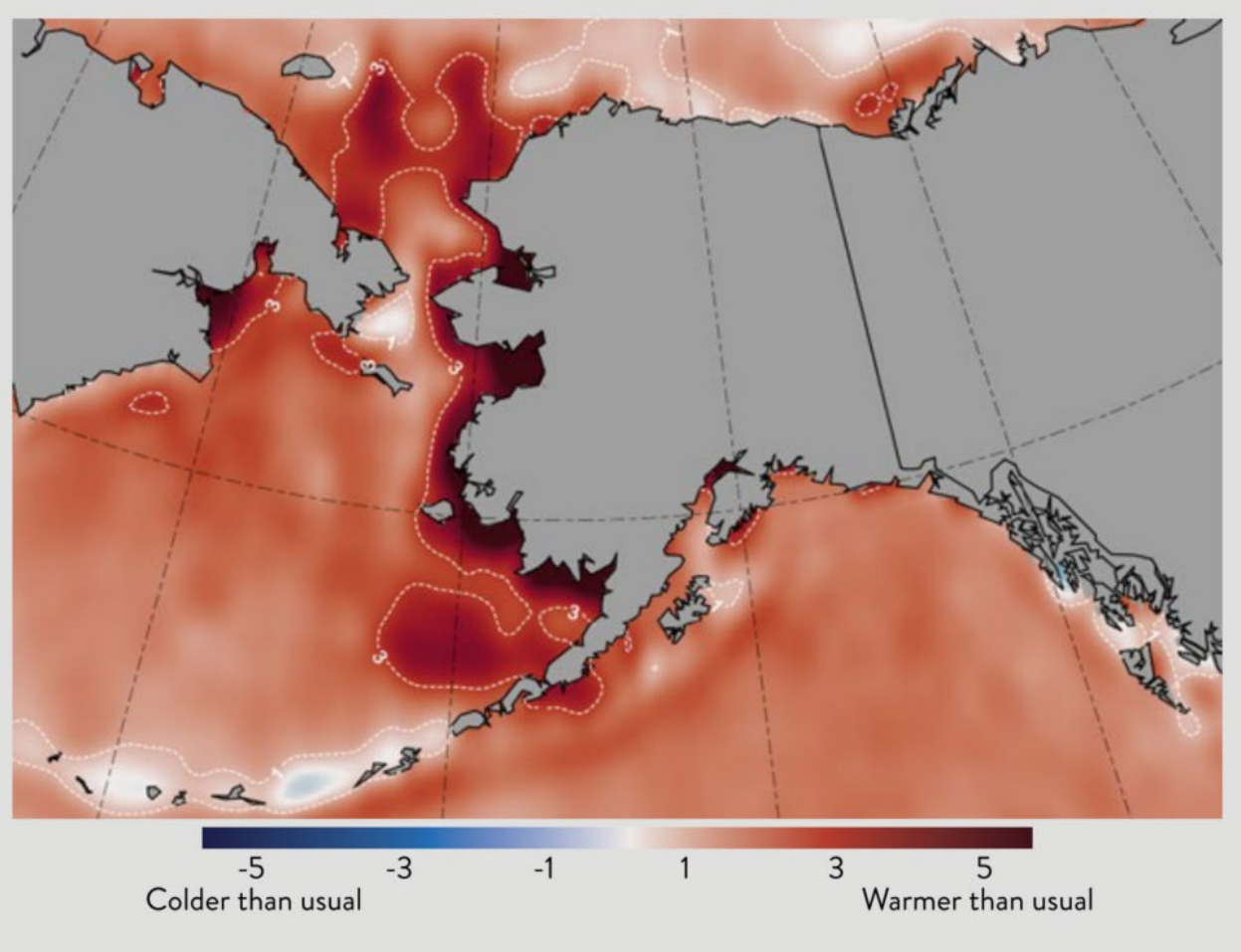

Figure 10. Summer Sea Surface Temperatures 2014-2018 (Thoman and Walsh 2019).

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

Another ocean water anomaly is the marine heat wave, a coherent area of extreme warm temperature at the sea surface that persists (Frölicher et al. 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 et al. 2018). The Pacific marine heatwave began to dissipate in mid-2016, but warming re-intensified in late-2018 and persisted into fall 2019 (Suryan et al. 2021). Consequences of this event included an unprecedented harmful algal bloom that extended from the Aleutian Islands to southern California, mass strandings of marine mammals, shifts in the distribution of invertebrates and fish, and shifts in abundance of several fish species (Cavole et al. 2016).

Cetaceans, forage fish (capelin and herring), Steller sea lions, adult cod, chinook and sockeye salmon in the Gulf of Alaska were all impacted by the Pacific marine heatwave (Bond et al. 2015, Peterson et al. 2016, Sweeney et al. 2018).

The 2018 Pacific cod stock assessment[6] 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 Pacific marine heatwave. 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 et al. 2020). As of 2022, Pacific cod has not recovered from the decline during the 2014-2016 marine heatwave[7].

Ocean Acidification

For 650,000 years or more, the average global atmospheric carbon dioxide (CO2) concentration varied between 180 and 300 parts per million (ppm), but since the beginning of the industrial revolution in the late 1700s, atmospheric CO2 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 CO2 released, which has buffered the increase in atmospheric CO2 concentrations (Feely et al. 2004, Feely et al. 2009). Despite the oceans' role as large carbon sinks, the CO2 level continues to rise and is currently at 419 ppm[8].

As the oceans absorb CO2, the buffering capacity and pH of seawater are 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 et al. 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 et al. 2009).

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

[6] https://www.fisheries.noaa.gov/alaska/population-assessments/2018-north-pacific-groundfish-stock-assessments accessed 2/17/23.
[7] https://apps-afsc.fisheries.noaa.gov/REFM/docs/2022/GOA-ESR-Brief.pdf accessed 2/17/23.
[8] https://gml.noaa.gov/ccgg/trends/ accessed 2/17/23.

Models and observations indicate that rapid sea ice loss will increase the uptake of CO2 and exacerbate the problem of aragonite undersaturation in the Arctic (Yamamoto et al. 2012, DeGrandpre et al. 2020).

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

Climate change is projected to have substantial direct and indirect effects on individuals, populations, species, and the structure and function of marine, coastal, and terrestrial ecosystems in the foreseeable future (Hinzman et al. 2005, Burek et al. 2008, Doney et al. 2012, Huntington et al. 2020). The physical effects on the environment described above have impacted, are impacting, and will continue to impact marine species in a variety of ways (IPCC 2014), including shifting abundances, changes in distribution, changes in timing of migration, changes in periodic life cycles of species. For example, cetaceans with restricted distributions linked to water temperature may be particularly susceptible to range restriction (Learmonth et al. 2006, Isaac 2009). 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 and Critical Habitat Likely to be Adversely Affected by the Action

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

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

For designated critical habitat, we present a summary of the critical habitat designation, the geographical area of the designation, and any physical or biological features essential to the conservation of the species, as well as any relevant threats and management considerations. That is, we rely on the status of critical habitat and its function as a whole to determine whether an action's effects are likely to diminish the value of critical habitat as a whole for the conservation of listed species.

4.3.1 Western North Pacific DPS and Mexico DPS Humpback Whales

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.

Additional information on humpback whale biology and natural history is available at:

https://www.fisheries.noaa.gov/species/humpback-whale

http://alaskafisheries.noaa.gov/pr/humpback

https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-species-stock

Status and Population Structure

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

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

Based on an analysis of migration between winter mating/calving areas and summer feeding areas using photo-identification, (Wade 2021) concluded that whales feeding in Alaskan waters belong primarily to the Hawaii DPS (recovered), with small numbers from the WNP DPS (endangered) and Mexico DPS (threatened). There are approximately 1,084 animals in the WNP DPS and 2,913 animals in the Mexico DPS (Wade 2021). The population trend is unknown for both DPSs. The Hawaii DPS is estimated at 11,540 animals, and the annual growth rate is between 5.5 and 6.0 percent. Humpback whales 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 WNP DPS individuals.

Distribution

Humpback whales generally undertake seasonal migrations from their tropical calving and

breeding grounds in winter to their high-latitude feeding grounds in summer, although some individuals may remain in Alaska waters year-round. Most humpbacks that feed in Alaska winter in temperate or tropical waters near Mexico, Hawaii, or in the western Pacific near Japan. In the spring, those animals migrate back to Alaska, where food is abundant. They tend to concentrate in several areas, including Southeast Alaska, Prince William Sound, Kodiak, the mouth of Cook Inlet, and along the Aleutian Islands (Ferguson et al. 2015). Large numbers of humpbacks have also been reported in waters over the continental shelf, extending up to 100 nm offshore in the western Gulf of Alaska (Wade 2021).

Presence in the Action Area

Marine Transit Routes

The summer feeding range of humpback whales in the North Pacific includes coastal and inland waters around the Pacific Rim from Point Conception, 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 and north of the Bering Strait (Muto et al. 2021). Humpback whales are also found in deep waters south of the continental shelf from the eastern Aleutians through the Gulf of Alaska. Relatively high densities of humpback whales occur throughout much of Southeast Alaska and northern British Columbia. Southeast Alaska has been identified as a biologically important area (BIA) for seasonal feeding due to the high density of animals from March-November (Ferguson et al. 2015).

All four project vessels will transit through Mexico DPS critical habitat and the Prince William Sound (PWS) BIA; the two materials barges and Swiftwater construction barge will also travel through the Southeast Alaska BIA.

Passage Canal

PWS has been an important feeding ground for humpback whales in the North Pacific (Teerlink et al. 2015; Figure 11). Humpbacks may be present year-round in PWS but are typically observed during seasons of high prey concentration (Ferguson et al. 2015). Herring are the primary food source for humpbacks in PWS, and whale numbers peak in the spring when herring are spawning and in the fall when the herring return for overwintering. Most of PWS was identified as a BIA for seasonal humpback feeding, with the greatest densities reported in September-December (Ferguson et al. 2015).

The action area for pile driving activities is outside of the boundaries of the BIA as well as the Mexico DPS humpback whale critical habitat. Humpback sightings in Passage Canal are infrequent, but there have been two recent reports of single animals observed in 2020[9] and 2022 (J. Moran, pers. comm).

[9] https://m.facebook.com/AlaskasNewsSource/videos/1177543022598153/?locale2=sw_KE accessed 2/17/2023.

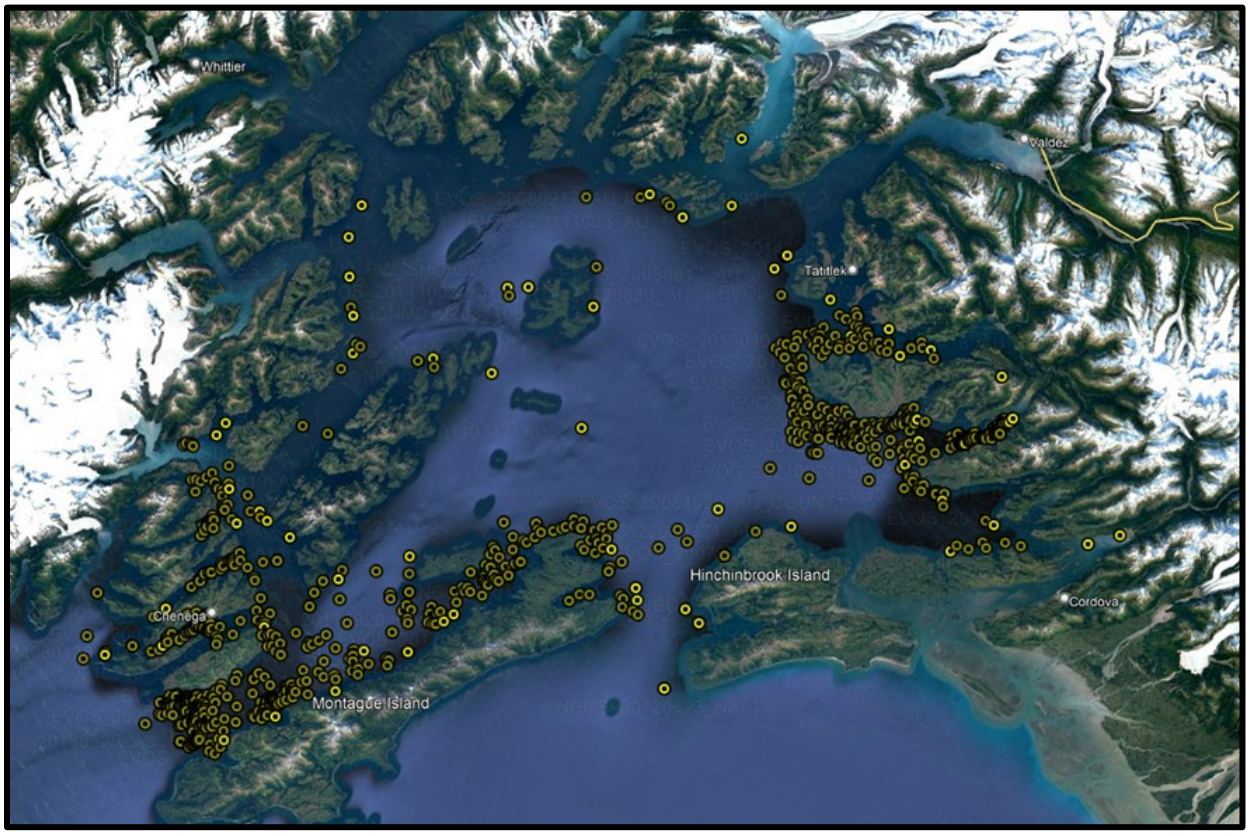

Figure 11. Humpback Whale Sightings (2006-2021) in PWS During Gulf Watch Alaska Humpback Predation on Herring Surveys.

Foraging 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 et al. 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 et al. 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 1967, Johnson and Wolman 1984).

Humpbacks may be present year-round in PWS but the greatest densities have been reported in September through December when prey concentration is high (Ferguson et al. 2015).

Reproduction

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

Hearing, Vocalization, and Other Sensory Capabilities

NMFS categorizes humpback whales in the low-frequency cetacean functional hearing group, with a generalized hearing range between 7 Hz and 35 kHz (NMFS 2018b). Baleen whales have inner ears that appear to be specialized for low-frequency hearing. In a study of the morphology of the mysticete auditory apparatus, Ketten (1997) hypothesized that large mysticetes have acute infrasonic hearing.

Humpback whales produce a wide variety of sounds ranging from 20 Hz to 10 kHz. During the breeding season males sing long, complex songs, with frequencies in the 20-5,000 Hz range and intensities as high as 181 dB (Payne 1970, Winn et al. 1970, Thompson et al. 1986). Source levels average 155 dB and range from 144 to 174 dB (Thompson et al. 1979). The songs appear to have an effective range of approximately 10 to 20 km. Animals in mating groups produce a variety of sounds (Tyack 1981, Silber 1986).

Social sounds associated with aggressive behavior by male humpback whales 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 9 km (Tyack and Whitehead 1983).

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

Threats

Natural Threats

There is limited information on natural sources of injury or mortality to humpback whales. Based upon prevalence of tooth marks, attacks by killer whales appear to be highest among humpback whales migrating between Mexico and California, although populations throughout the Pacific Ocean appear to be targeted to some degree (Steiger 2008). Juveniles appear to be the primary age group targeted.

Thirteen marine mammal species in Alaska were examined for domoic acid; humpback whales indicated a 38 percent prevalence (Lefebvre et al. 2016). Saxitoxin was detected in 10 of the 13 species, with the highest prevalence in humpback whales at 50 percent. The occurrence of the

nematode Crassicauda boopis appears to increase the potential for kidney failure in humpback whales and may be preventing some populations from recovering (Lambertsen 1992).

Anthropogenic Threats

Historically, commercial whaling represented the greatest threat to every population of humpback whales and was ultimately responsible for listing humpback whales as an endangered species. In 1965, the International Whaling Commission banned commercial hunting of humpback whales in the Pacific Ocean, and, as a result, this threat has largely been curtailed. No commercial whaling occurs within the range of Mexico DPS humpbacks, but some "commercial bycatch whaling" has been documented within the Western North Pacific DPS humpback range in Japan and South Korea (Bettridge et al. 2015). Alaskan subsistence hunters are not authorized to take humpback whales.

Vessel strike is one of the main threats and sources of anthropogenic impacts to humpback whales in Alaska. Neilson et al. (2012) summarized 108 large whale ship-strike events in Alaska from 1978 to 2011; 86 percent involved humpback whales. Eighteen humpbacks were struck by vessels between 2016 and 2020 (Freed et al. 2022). Most ship strikes of humpback whales are reported in Southeast Alaska (Helker et al. 2019), where high vessel traffic overlaps with whale presence.

Fishing gear entanglement is another major threat. Entanglement may result in only minor injury or may potentially 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. The minimum mean annual mortality and serious injury rate due to interactions with all fisheries between 2014 and 2018 is 19 humpbacks for the Central North Pacific stock and 1.7 whales for the Western North Pacific stock (Muto et al. 2021). Between 2016 and 2020, entanglement of humpback whales (n = 47) was the most frequent human-caused source of mortality and injury of large whales (Freed et al. 2022).

4.3.2 Western DPS Steller Sea Lions

Status and Population Structure

Steller sea lions were listed as a threatened species under the ESA on December 4, 1990 (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, the eastern DPS was removed from the endangered species list (78 FR 66140). Information on Steller sea lion biology, threats, and habitat (including critical habitat) is available in the revised Steller Sea Lion Recovery Plan (NMFS 2008) and 5-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 (Muto et al. 2021). 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 aerial photographic and land-based surveys of Western DPS Steller sea lions estimated a total Alaska population (both pups and non-pups) of 52,932 (Muto et al. 2021). There are strong regional differences in trends in abundance of Western DPS Steller sea lions, with mostly positive trends in the Gulf of Alaska and eastern Aleutian Islands and generally negative trends in the central and western Aleutian Islands.

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, Muto et al. 2021). Pup counts rebounded to 2015 levels in 2019; however, non-pup counts in the eastern, central, and western Gulf of Alaska regions declined (Muto et al. 2021).

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 (Loughlin et al. 1984). Although Steller sea lions seasonally inhabit coastal waters of Japan in the winter, breeding rookeries outside of the U.S. are located only in Russia (Burkanov and Loughlin 2005). Steller sea lions are not known to migrate annually, but individuals may widely disperse outside of the breeding season (late May to early July; Jemison et al. 2013, Muto et al. 2021).

Land sites used by Steller sea lions are referred to as rookeries and haulouts (Figure 12). Rookeries are used by adult sea lions for pupping, nursing, and mating during the reproductive season. 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 by individual Steller sea lions have been documented (Jemison et al. 2013).

Most adult Steller sea lions occupy rookeries during the pupping and breeding season (Pitcher and Calkins 1981, Gisiner 1985), and exhibit high site fidelity (Sandegren 1970). During the breeding season some juveniles and non-breeding adults occur at or near the rookeries, but most are on haulouts (Rice 1998, Ban 2005, Call and Loughlin 2005).

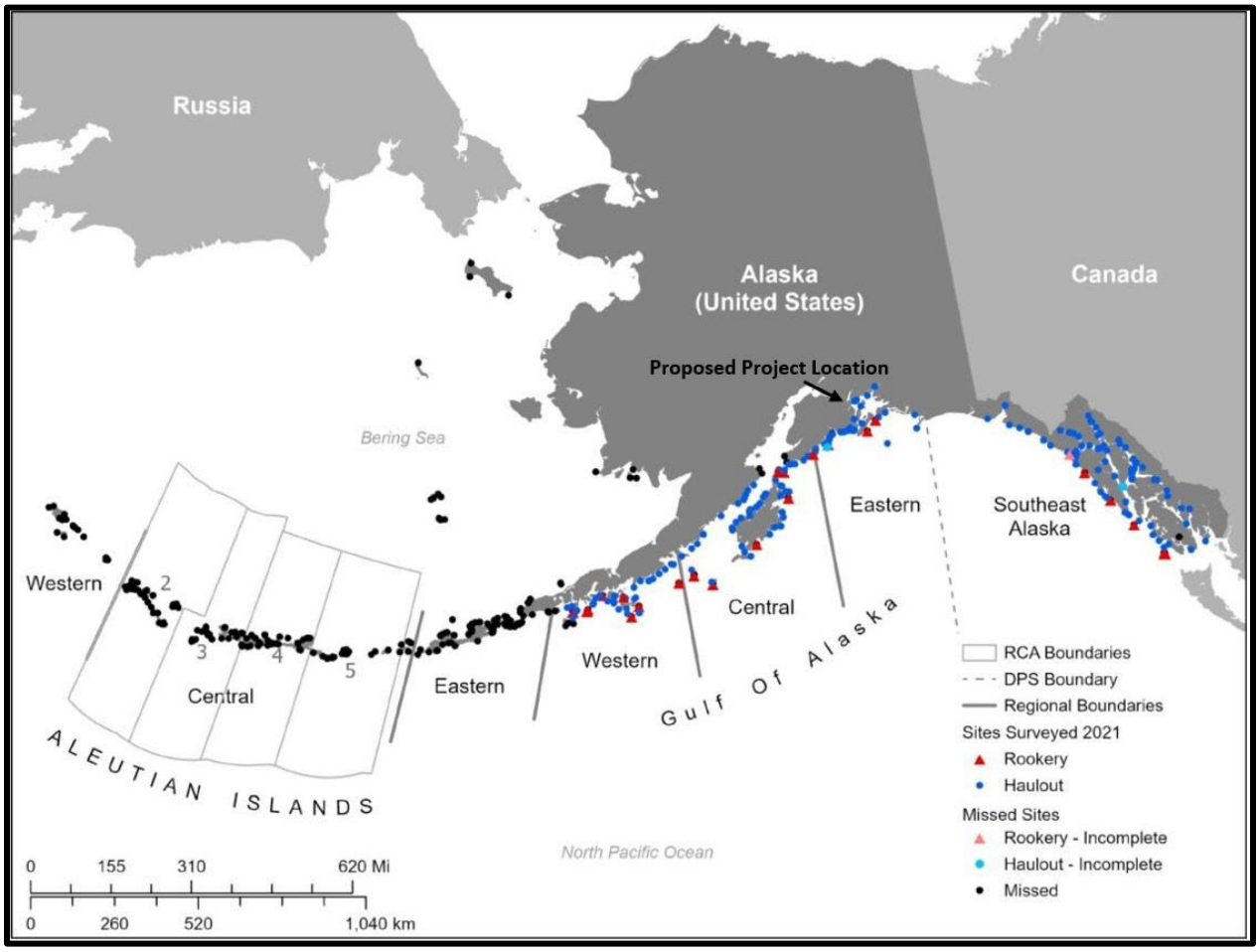

Figure 12. Steller Sea Lion Rookeries and Haulouts.

Presence in the Action Area

Marine Transit Routes

Given the wide dispersal of individuals, both the Western DPS and eastern 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. All four project vessels will transit through Steller sea lion critical habitat in Prince William Sound; the two materials barges and Swiftwater construction barge will also travel in proximity to Steller sea lion critical habitat in Southeast Alaska.

Passage Canal

Steller sea lions are distributed throughout Southcentral Alaska, with patterns loosely correlated to aggregations of spawning and migrating prey species (Sinclair and Zeppelin 2002, Sinclair et

al. 2013). Passage Canal has several anadromous streams that support salmon species and one fish processing plant with a permitted outfall that attracts Steller sea lions.

Steller sea lions are often seen near Whittier from May to August, but are irregularly seen in the area the rest of the year. Ten to twelve sea lions haul out year-round on a channel buoy within Shotgun Cove, the mouth of which is approximately six miles from the project site. The Steller sea lion rookery nearest to this project is on Seal Rocks, located in the Hinchinbrook Entrance between Hinchinbrook and Montague Islands, 124 km southeast of the proposed berth site. The nearest major haulouts are Perry on Perry Island, approximately 44 km southeast of the proposed berth site, and Dutch Group on Dutch Group Island, approximately 52 km[10] southeast of the proposed berth site. The extent of the action area for pile driving activities overlaps with Steller sea lion critical habitat.

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 20 nm of breeding rookeries (Merrick and Loughlin 1997), which is the basis for designated critical habitat around rookeries and major haulout sites.

Steller sea lions tend to make shallow dives of less than 250 m, but are capable of deeper dives (NMFS 2008). Female foraging trips during winter tend to be longer in duration, farther from shore, and with deeper dives. Summer foraging dives, on the other hand, tend to be closer to shore and are shallower (Merrick and Loughlin 1997). Adult females begin a regular routine of alternating foraging trips at sea with nursing their pups on land a few days after birth.

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

Hearing, Vocalizations, and Other Sensory Capabilities

The ability to detect sound and communicate underwater is important for a variety of Steller sea lion life functions, including reproduction and predator avoidance. NMFS categorizes Steller sea lions in the otariid pinniped functional hearing group, with an applied frequency range between 60 Hz and 39 kHz in water (NMFS 2018b). Studies of Steller sea lion auditory sensitivities have found that this species detects sounds underwater between 1 and 25 kHz (Kastelein et al. 2005),

[10] https://www.fisheries.noaa.gov/inport/item/17921 accessed 2/17/23.

and in air between 250 Hz and 30 kHz (Mulsow and Reichmuth 2010). Sound signals from vessels are typically within the hearing range of Steller sea lions, whether the animals are in the water or hauled out.

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.

Anthropogenic Threats

Subsistence hunters removed 209 Western DPS Steller sea lions between 2014 and 2018 in controlled and authorized harvests (Muto et al. 2021). Between 2016 and 2020 human-caused mortality and injury of the Western DPS Steller sea lions (n = 148) was primarily caused by entanglement in fishing gear, in particular, commercial trawl gear (n=113; Freed et al. 2022).

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).

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).

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 individuals of ESA-listed species may commonly exhibit, or be more susceptible to, adverse responses to stressors in some life history states, stages, or areas within their distributions than in others. These localized stress responses or baseline stress conditions may increase the severity of the adverse effects expected from proposed actions.

5.1 Recent Biological Opinions in the Action Area

NMFS AKR has not issued any recent biological opinions for construction in Whittier; however, a Letter of Concurrence was issued in 2019 to the Alaska Department of Transportation and Public Facilities, acting on behalf of the Federal Highway Administration, for widening of the Whittier Ferry Terminal. For this 2019 project, the NMFS Permits Division issued an IHA to the Alaska Department of Transportation and Public Facilities to harass marine mammals incidental to pile driving activities at the Whittier Ferry Terminal.

These documents are available on the NOAA Fisheries website at: https://www.fisheries.noaa.gov/action/incidental-take-authorization-whittier-ferry-terminal-alaska-class-ferry-modification

5.2 Marine Vessel Activity

Whittier is the farthest north year-round ice-free port in Alaska and is an important gateway to Prince William Sound for shipping goods and transporting passengers. Passage Canal experiences moderate levels of marine vessel traffic year-round, with a seasonal summer increase. Vessel traffic is primarily from recreation and transportation/freight vessels, including cruise ships, passenger ferries, charter and commercial fishing vessels, recreational vessels, tour boats, barges, and freight vessels. Freight barges, cruise ships, and ferries are the largest vessels that routinely transit Passage Canal. The Alaska Railroad (ARRC) began freight operations out of Whittier's deep water port in 1964, and approximately 25 percent of their freight cargo for Southcentral Alaska comes through Whittier.

Alaska Marine Lines operates a weekly barge from Seattle to Whittier year-round. Cruise ships stop in Whittier approximately two to three times per week, May through September, and the Alaska Marine Highway ferries come into port five to eight times per week from March through September. Whittier Harbor is also a homeport for day-cruise, charter, commercial fishing, and recreational vessels. There are a number of commercial vessel-based tour companies that include activities such as kayaking, jet skiing, fishing, and sightseeing and wildlife viewing. Smaller vessels (approximately 10 m) are typical for the fishing charters while larger vessels (up to 38 m) are used for the wildlife and scenery cruises.

The proposed vessel transit routes include coastal travel from Seattle, Washington, and Juneau and Seward, Alaska to the project site. We expect the project vessels to travel in normal shipping lanes or corridors where vessel traffic is present year-round in varying degrees, e.g. Southeast, Alaska experiences moderate levels of vessel traffic with highest volumes occurring May through September.

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

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

The project area is subject to noise from many anthropogenic sources, including marine vessels, shoreline construction, and land-based vehicles. Beyond Whittier's immediate surroundings, the project action area extends into Passage Canal, Prince William Sound, the Gulf of Alaska, and the North Pacific Ocean. Some areas are highly developed, e.g., Seattle, while other areas are completely undeveloped. However, regular vessel traffic along the transit routes and within Passage Canal contribute to the baseline noise levels in the action area.

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's surface and moving horizontally away from the source of disturbance or adopting erratic swimming strategies (Williams et al. 2002, Lusseau 2003, 2006). Studies indicate that dive times and swimming speeds increase, vocalizations and jumping 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. Responding to vessels is likely stressful to humpback whales, but the biological significance of that stress is unknown (Bauer and Herman 1986). 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).

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 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).

5.3 Fisheries Interactions Including Entanglement

Commercial, recreational, and subsistence fishing occurs in the action area, although only recreational and subsistence fishing could occur within Passage Canal. 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.

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; however, the frequency of these interactions does not appear to have a significant adverse consequence for humpback whale populations. Most entanglements occur between early June and early September, when humpbacks are foraging in nearshore Alaska waters. A photographic study of humpback whales in southeastern Alaska found at least 53 percent of individuals showed some kind of scarring from fishing gear entanglement (Neilson et al. 2005).

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

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

Commercial fisheries may indirectly affect marine mammals by reducing the amount of available prey or affecting prey species composition. Competition could exist between listed species and commercial fishing for prey species 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). In other parts of the action area the broad distribution of prey and seasonal fisheries that differ from listed species presence in the area may minimize competition as well.

The PWS salmon fisheries have greatly expanded since the mid-1970s, largely due to the addition of five salmon hatcheries. During the 2022 PWS Area commercial salmon season, 454 drift gillnet, 26 set gillnet, and 206 purse seine commercial permit holders fished in at least one fishing period[11]. The estimated value of salmon harvest, commercial and hatchery cost recovery, was approximately $96.91 million. Shrimp and scallops as well as king, Dungeness and Tanner crabs are harvested in PWS and as those resources declined over the years, fisheries developed for groundfish including Pacific cod, sablefish, and pollock. Herring are the primary prey species of humpback whales in PWS; the commercial fishery has been closed for over two decades because age structure and projected available surplus in the spawning biomass have not supported a fishery[12].

5.4 Pollution

Intentional and accidental discharges of contaminants pollute the marine waters of Alaska. Intentional sources of pollution, including domestic, municipal, and industrial wastewater discharges are managed and permitted by the Alaska Department of Environmental Conservation. Pollution may also occur from unintentional discharges and spills.

Passage Canal was not identified as an impaired waterbody in the 2020 Integrated Water Quality Monitoring and Assessment Report[13]. The Whittier Seafood Plant is the only permitted outfall in Passage Canal and it discharges approximately two kilometers away from the construction site.

There is one active onshore contaminated site and associated groundwater plume about 700 m southeast of the project area. The Department of Defense fuel tank farm contained 19 above ground storage tanks and 6 underground storage tanks. There were spills and accidental releases

[11] https://www.adfg.alaska.gov/static/applications/dcfnewsrelease/1442856406.pdf accessed 2/22/23.
[12] https://www.adfg.alaska.gov/FedAidPDFs/FMR21-18.pdf accessed 2/22/23.
[13] https://dec.alaska.gov/water/water-quality/integrated-report/ accessed 3/1/23.

from equipment failure, and cleanup and monitoring of the site is ongoing[14]. Downgradient ecological impacts from contamination have not been detected within the marine environment. The Whitter Small Boat Harbor is also considered an active site.

Along the marine transit route, the most likely sources of pollution and contaminants would be ballast water discharge and accidental spills of oil, fuel, and other materials from traversing vessels. Ships can potentially release pollutants and non-indigenous organisms through the discharge of ballast water. Marine organisms picked up in ship ballast water and released into non-native habitats are responsible for significant ecological and economic perturbations costing billions of dollars; this is a recognized worldwide problem. Discharges of wastes from vessels are regulated by the United States Coast Guard and, by law, no discharges of any kind are allowed within three miles of land. The Alaska Department of Fish and Game (ADFG) developed an Aquatic Nuisance Species Management Plan (Fay 2002) in order to protect Alaska's waters. The effects of discharged ballast water and the possible introduction of invasive species on humpback whales and Steller sea lions are unknown.

Increased vessel activity in the action area will temporarily increase the risk of accidental fuel and lubricant spills. Accidental spills may occur from a vessel leak or if the vessel runs aground. From 1995 to 2012, approximately 400 spills (100 to 300,000 gallons) occurred in Alaska's marine waters. Most were in nearshore and shallow coastal waters and were primarily diesel (BLM 2019). Small spills combined with the dispersive action of waves and currents likely reduces the probability of an encounter and adverse reaction of a listed species to extremely low levels.

5.4.1 Exxon Valdez Oil Spill

On March 24, 1989 the oil tanker Exxon Valdez ran aground in PWS, spilling 11 million gallons of oil. The spill affected more than 1,300 miles of shoreline. Skimming operations in 1989 recovered about 8.5 percent (22,000 barrels or 918,000 gallons) of the original volume and clean-up operations from the beaches recovered about 5-8 percent (13,000-21,000 barrels) of the oil (Loughlin 1994). By the second week of the spill it was estimated that about 30 percent of the spilled oil was lost to weathering processes, 40 percent beached within PWS, 25 percent exited into the Gulf of Alaska, and 5 percent remained floating in the Sound (Loughlin 1994).

The oil killed an estimated 250,000 seabirds, 2,800 sea otters, 300 harbor seals, 250 bald eagles, as many as 22 killer whales, and billions of salmon and herring eggs.
Sea otters, Steller sea lions and harbor seals had elevated hydrocarbon levels, but only sea otters and harbor seals showed population declines associated with the spill (Loughlin et al. 1996). Humpback whales were not severely affected by the Exxon Valdez oil spill; results of a two-year study post-spill did not indicate a change in abundance, calving rates, seasonal residency time of female-calf pairs, or mortality (Loughlin 1994). Evidence indicates that direct mortalities of Steller sea lions from EVOS were minor and the population decline observed pre-spill continued during the post-spill period (Loughlin 1994).

[14] https://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/SiteReport/1314 accessed 3/1/23.

5.5 Coastal Zone Development

Coastal zone development results in the loss and alteration of nearshore marine mammal habitat and changes in habitat quality. Increased development may prevent marine mammals from reaching or using important feeding, breeding, and resting areas. 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 Whittier include a fish processing plant, small boat harbor, ferry terminal, cruise ship terminal, and other infrastructure. Beyond Whittier's immediate surroundings, the project action area extends through Passage Canal and into Prince William Sound, 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.

Of the approximately 40 km of shoreline in Passage Canal, approximately 3.6 km have been developed; approximately 90 percent of the coastline and nearshore habitat remain untouched. Past and on-going development in Passage Canal has resulted in some modifications to shoreline and nearshore habitat, which may affect prey species for ESA-listed species to a small extent. In-water development such as the Whittier Harbor and breakwater, AMHS ferry terminal, ARRC rail barge slip, private marina (Cliffside Marina), existing cruise ship dock, and a two-lane road and railroad tracks have impacted the south shoreline of Passage Canal. Future development along the proposed extension to Shotgun Cove Road may also impact the shoreline. The shoreline immediately adjacent to the construction site has been developed with man-made industrial structures including the Whittier Airport, a small parking area, and was previously the site of the Department of Defense fuel tank farm (approximately 245 m west of the shoreline). Coastal zone development may result in some loss and alteration of nearshore marine species habitat and changes in habitat quality.

5.6 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 2014). There is little doubt that human influence has been the dominant cause of the observed warming since the mid-20th century (IPCC 2014). The impacts of climate change are especially pronounced at high latitudes and in polar regions. Average temperatures have increased across Alaska at more than twice the rate of the rest of the United States[15].

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

[15] https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-alaska_.html accessed 3/1/23.

and their interactions on listed species in Alaska are hard to predict.

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

An Unusual Mortality Event (UME) of large cetaceans occurred in Alaskan waters in 2015-2016. Reports of dead whales included 22 dead humpback, 12 fin, 2 gray, 1 sperm, and 6 unidentified whales. The fin whales were observed stranded within a 27-day period around Kodiak Island. This was concurrent with an unusually large number of dead whales found in British Columbia. The strandings were concurrent with the arrival of the Pacific marine heatwave, one of the strongest El Nino weather patterns on record, decreasing ice extent in the Bering Sea, and one of the warmest years on record in Alaska in terms of air temperature.

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

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

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

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

anthropogenic forcing (Mueter et al. 2009).

Natural Catastrophic Changes

Humpback whales and Steller sea lions inhabit regions of known seismic and volcanic activity and tsunami events. Earthquakes, volcanic eruptions, landslides, and tsunamis can alter the physical environment instantaneously. Catastrophic events are infrequent but have the potential to impact marine mammals by: decreasing prey abundance as a result of direct mortality; rendering habitat unsuitable (or more suitable) for marine mammals and prey species; directly removing (or creating) habitat areas (e.g., elevation changes, landslides, and tsunamis could remove (or create) haulouts and rookeries or alter access to habitat); and, degrading habitat quality (e.g., volcanic ash outfall could affect siltation and water chemistry; NMFS 2016). To date, natural catastrophes are not known to have impacted these species.

5.7 Environmental Baseline Summary

Several of the activities described in the Environmental Baseline have adversely affected listed species that occur in the action area:

- Vessel traffic in the action area poses varying levels of threat to the listed species, depending on the type and intensity of the shipping activity and its degree of spatial and temporal overlap with habitats. Vessel types involved in whale strikes have included cruise ships, recreational vessels, and fishing vessels. The presence, movements, and sound of ships in the vicinity of some species may cause them to abandon breeding or foraging areas.
- Commercial fisheries may have reduced prey availability.
- Humpback whales and Steller sea lions have been impacted by entanglement.
- The Exxon Valdez oil spill released 11 million gallons of oil, impacting 1,300 miles of shoreline and hundreds of thousands of marine birds and mammals.
- The proposed project is in an area of moderately high human use and some existing habitat alteration.
- There are insufficient data to make reliable estimations of the impact of climate change on marine mammals considered in this opinion. The feeding range of humpback whales is larger than that of other species and consequently, as feeding generalists, it is likely that these whales may be more resilient to climate change than other species with more restricted foraging habits.

  Although the effects of climate change and other large-scale environmental phenomena on Steller sea lion habitat cannot be predicted with certainty, impacts to their prey from oceanic regime shifts, or changes in freshwater habitat (hydrologic changes, increased water temperature) are projected to occur.

Mexico and WNP DPS of humpback whales and Western DPS Steller sea lions in the action area appear to be increasing in population size – or, at least, their population sizes do not appear to be declining – despite their continued exposure to the direct and indirect effects of the activities discussed in the Environmental Baseline.

6. EFFECTS OF THE ACTION

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

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

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

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

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

6.1 Project Stressors

Stressors are any physical, chemical or biological phenomena that can induce an adverse response. The effects section starts with identification of the stressors produced by the constituent parts of the proposed action. Based on our review of the data available, the proposed activities may cause these stressors:

1. Underwater noise produced by impulsive and non-impulsive noise sources related to pile driving activities including vibratory pile driving, impact pile driving, and down-the-hole drilling
2. Vessel strike and disturbance
3. Disturbance to habitat including seafloor disturbance from pile driving activities and placement of equipment or anchors, turbidity and sedimentation, and marine mammal prey
4. Pollution

6.1.1 Minor Stressors on ESA-Listed Species and Critical Habitat

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

6.1.1.1 Vessel Strike

As discussed in the Environmental Baseline section, Passage Canal experiences moderate levels of vessel traffic year-round, with a seasonal summer increase. Vessel traffic is primarily from recreation and transportation/freight vessels, including cruise ships, passenger ferries, charter and commercial fishing vessels, recreational vessels, tour boats, barges, and freight vessels.

There may be a temporary, localized, and small increase in vessel traffic during construction. Four barges, two construction and two materials, will be present during the in-water work. The construction barges will be secured in place by four mooring anchors and the material barges will be tied to the construction barges. Local barge moves to the next pile installation area will occur at a speed of less than two knots in approximately 100-ft increments. Two 20-ft skiffs will transport workers from the shore to the barge work platform, a distance of less than 1,500 ft. The tugs transporting the barges from Seattle, Juneau, and Seward to the project area will travel at slow speeds (max eight knots) and follow well-established, frequently utilized navigation lanes.

Cruise ship traffic into PWS and Passage Canal is expected to increase upon completion of the Whittier Head of the Bay cruise ship dock. The increase will equate to one to two more cruise ships per week or approximately 45 more ships annually, arriving in the summer months from May to September. Cruise ships will maintain designated routes at the standard speed for these vessels (18 to 20 knots) in the open ocean, and slower speeds when traveling in Passage Canal. Small vessel trips, including fishing charters and wildlife tours, may also increase with the influx of cruise ship passengers in Whittier.

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. From 1978-2011, there were at least 108 recorded whale-vessel collisions in Alaska, with the majority occurring in Southeast Alaska between May and September (Neilson et al. 2012). Small recreational vessels traveling at speeds over 13 knots were most commonly involved in ship strike encounters; however, all types and sizes of vessels were reported (Neilson et al. 2012).

The majority of vessel strikes involved humpback whales (86 percent) and the number of humpback strikes increased annually by 5.8 percent from 1978 to 2011. Seventeen humpback whales were reported struck by vessels between 2013 and 2015 (Delean et al. 2020), and 18 humpbacks were reported struck by vessels between 2016 and 2020 (Freed et al. 2022) in Alaskan waters. There have been nine reported ship strikes in PWS between 2000 and 2021, two of which were in close proximity to the mouth of Passage Canal (NMFS Alaska Regional Office Stranding Database accessed February 2023). Six of the strikes involved humpback whales and the other three involved unidentified large whales. Of the known vessel types involved, four

were categorized as personal sport/recreational vessels and two were commercial recreational vessels.

NMFS assumes that no vessel strikes will occur during the proposed action; however, the action agencies will not have control over cruise ships traveling to Whittier once the cruise ship dock is completed. NMFS assumes that in the absence of contractually-required mitigation measures, there will be an increased risk of vessel strike due to the increase of cruise ship traffic associated with the Whittier Head of the Bay cruise ship dock. To calculate the number of whales that may be struck by additional cruise ships traveling to Whittier, we considered known cruise ship schedules, predicted future cruise ship traffic to the project area, and past ship strike data (Neilson et al. 2012, NMFS Alaska Regional Office Stranding Database). Cruise ship traffic declined during the COVID-19 pandemic; however, numbers rebounded with 45 and 46 cruise ships scheduled to visit Whittier in 2022 and 2023, respectively. One to two more cruise ships per week, or approximately 45 more ships annually (May to September), are expected after completion of the cruise ship dock. From 1978 to 2021, 13 ship strikes involving cruise ships were reported in Alaskan waters, 9 of which involved humpbacks whales (Neilson et al. 2012, NMFS Alaska Regional Office Stranding Database accessed February 2023). This equates to approximately 0.30 large whales and 0.20 humpback whales (0.02 Mexico or WNP DPS) struck by cruise ships in Alaskan waters per year.

There are only four records of stranded Steller sea lions with injuries indicative of vessel strike in Alaska, and none of them are near Passage Canal; three occurred in Sitka and one in Kachemak Bay (NMFS Alaska Regional Office Stranding Database accessed February 2023). Steller sea lions are likely 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). The risk of vessel strike, however, has not been identified as a significant concern for Steller sea lions.

There may be an increased risk of vessel strike due to the increased traffic associated with the construction of the cruise ship dock. Most ship strikes of large whales occur when vessels are traveling at speeds of 10 knots or more (Laist et al. 2001, Jensen and Silber 2004). The slow operational speeds of project vessels and the implementation of mitigation measures (i.e. not approaching marine mammals within 100 yards, not changing direction or speed and reducing speeds around marine mammals) will help minimize the risk of collision for marine mammals that may be present in the action area.

Prince William Sound and Passage Canal experience moderate levels of marine vessel traffic year-round, with seasonal increases between March and September.

The expected increase in annual cruise ship traffic and small vessel trips for passengers would be minor in comparison to the routine vessel traffic present in the area. Additionally, the small vessel trips would be localized to Passage Canal and nearby waters. The Alaska Humpback Whale Approach Regulations implemented by NMFS (see 50 CFR §§ 216.18, 223.214, and 224.103(b)), which would be followed by these commercially operated vessels, further minimize harmful interactions between ships and humpback whales in Alaska.

All of these factors limit the risk of strike from the proposed action; therefore, NMFS concludes

that the likelihood of vessel strike of humpback whales or Steller sea lions is considered to be improbable.

6.1.1.2 Vessel Noise

Project vessels are likely to generate underwater sound levels exceeding the non-impulsive threshold of 120 dB, and disturbance to listed species could occur from project vessel noise. The source levels for project vessels are estimated at between 145–175 dB rms, and would drop to 120 dB within 233 meters (or less) of the source (Richardson et al. 1995, Blackwell and Greene 2003, Ireland and Bisson 2016). Although some marine mammals could receive sound levels exceeding the acoustic threshold of 120 dB from the project vessels, disturbances rising to the level of harassment are extremely unlikely to occur.

The nature of the exposure will be low-frequency, with much of the acoustic energy emitted by project vessels at frequencies below the best hearing ranges of listed marine mammals in the action area. In addition, because vessels will be in transit, the duration of the exposure to ship noise will be temporary and brief. The project vessels will emit continuous sound while in transit, which will alert marine mammals before the received sound level exceeds 120 dB.

A startle response is not expected. Rather, slight deflection and avoidance are expected to be common responses in those instances where there is any response at all. 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, 2006). Studies indicate that dive times and swimming speeds increase, vocalizations and jumping 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. Responding to vessels is likely stressful to humpback whales, but the biological significance of that stress is unknown (Bauer and Herman 1986).

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).

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).

Marine mammals that frequent the project area are very likely habituated to vessel disturbance due to the common presence of ferries, cruise ships, fishing vessels, barges, tugboats, and other commercial and recreational vessels that use the small boat harbor, ferry terminal, and cruise ship terminal. If animals do respond to project vessel noise, they may exhibit slight deflection from the source, engage in low-level avoidance behavior, or short-term vigilance behavior; however, these behaviors are not likely to result in adverse consequences for the animals. The nature and duration of response is not expected to disrupt to a measurable degree important behavioral patterns such as feeding or resting.

Some marine mammals could be exposed to vessel noise as a result of this action. If exposure occurs, it will be temporary and localized, and likely cause responses that are at a low energy cost to individuals. The proposed mitigation measures are expected to further reduce the number of times marine mammals react to transiting vessels. NMFS concludes that any disturbance of marine mammals from vessel noise will be temporary and the effects to listed species from vessel noise will be extremely small.

6.1.1.3 Disturbance to seafloor, habitat, and prey resources

The proposed activities would not result in permanent impacts to habitats used directly by marine mammals except for the actual footprint of the floating dock for the cruise ship dock. The total seafloor area likely impacted by the project is relatively small compared to the available habitat in Southcentral Alaska 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 marine mammals. 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. At best, the construction area provides marginal foraging habitat for marine mammals and fishes. Furthermore, pile driving at the project site would not obstruct movements or migration of marine mammals.

The proposed action will have temporary impacts on water quality (increases in turbidity levels) and on prey species distribution.

Pile driving may cause temporary and localized turbidity through sediment disturbance. Turbidity plumes during pile installation and removal will be localized around the pile; turbidity associated with pile installation is localized to about a 7.6 m radius around the pile (Everitt et al. 1980). DTH drilling will release drill cuttings into the marine environment and increase turbidity in the immediate area; however, a sediment curtain will be used to trap released drill cuttings and prevent dispersal, minimizing turbidity impacts. Additionally, the head of Passage Canal is already turbid due to glacial sediment outfall from Learnard Creek.

Humpback whales are not expected to be close enough to the pile driving areas to experience the effects of turbidity, and Steller sea lions can easily avoid localized areas of turbidity at no measurable cost to them. Local strong currents are expected to disperse any additional suspended sediments produced by project activities at moderate to rapid rates depending on tidal stage. Due to temporary, localized, and low levels of turbidity increases, it is not expected that turbidity would result in immediate or long-term effects to the Mexico DPS and WNP DPS of humpback whale, Western DPS Steller sea lion or their prey.

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

The most likely impact to fish from pile driving and drilling activities at the project area would be temporary behavioral avoidance of the 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, TTS, or changes in balance of prey species may occur will be limited to a few meters directly around the pile driving and DTH drilling operations. We consider potential adverse impacts to prey resources from construction activities in the action area to be immeasurably small.

Studies on euphausiids and copepods, two of the more abundant and biologically important groups of zooplankton, have documented some sensitivity of zooplankton to sound (Chu et al. 1996, Wiese 1996); however, any effects of pile driving and drilling activities on zooplankton would be expected to be restricted to the area within a few feet or meters of the project and would likely be sub-lethal.

While previous studies concluded that crustaceans (such as zooplankton) are not particularly sensitive to sound produced by even louder impulsive sounds such as seismic operations (Wiese 1996), a recent study provides evidence that seismic surveys may cause significant mortality (McCauley et al. 2017). However, seismic surveys are significantly louder and lower frequency than the sound sources associated with this project and are not directly comparable.

No appreciable adverse impact on zooplankton populations will occur due in part to large

reproductive capacities and naturally high levels of predation and mortality of these populations. Any mortality or impacts on zooplankton as a result of 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 and the relatively small areas being affected, pile driving activities associated with the proposed action are not likely 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.

6.1.1.4 Pollution

Measures to prevent spills of oil and other pollutants as described in Section 2.1.2 of this opinion will be implemented during construction. The risk of spills and pollutants related to the project will be mitigated by implementing best management practices and policies to prevent accidental spills. Plans will be in place and materials will be available for cleanup activities if a spill were to occur during project construction. Construction will be conducted in accordance with Clean Water Act Section 404 and 401 regulations to minimize potential construction-related impacts on water quality, and any effects to Mexico and WNP DPS humpback whales and Western DPS Steller sea lions would be immeasurably small. Therefore, we conclude that the effects from this stressor are negligible.

Cruise ships have the potential to impact water quality through accidental leakage of fuel, oil, and dumping of wastewater into the ocean during transit. The Alaska Department of Conservation (ADEC) Large Commercial Passenger Vessel Wastewater Discharge General Permit authorizes cruise ships to discharge treated sewage and graywater into Alaskan waters, at least three miles offshore, if the discharge meets state and federal requirements for the disposal of solid and liquid waste. The ADEC permit does not authorize discharge of ballast water in Alaskan waters. The small increase in the number of cruise ships traveling to Whittier would not impact the water quality in Passage Canal as dumping is prohibited in this area.

6.1.2 Major Stressors on ESA-Listed Species and Critical Habitat

The following sections analyze the stressors likely to adversely affect ESA-listed species due to underwater anthropogenic sound. Construction activities will produce non-impulsive (i.e., vibratory pile installation and removal and DTH drilling) and impulsive (i.e., impact pile driving and DTH drilling) sounds. First we provide a brief explanation of the sound measurements and acoustic thresholds used in the discussions of acoustic effects in this opinion.

6.1.2.1 Acoustic Thresholds

Since 1997, NMFS has used generic sound exposure thresholds to determine whether an activity produces underwater and in-air sounds that might result in impacts to marine mammals (70 FR 1871, 1872; January 11, 2005). NMFS has developed comprehensive guidance on sound levels likely to cause injury to marine mammals through onset of permanent and temporary thresholds

shifts (PTS and TTS) (83 FR 28824; June 21, 2018; 81 FR 51693; August 4, 2016). NMFS is in the process of developing guidance for behavioral disruption (Level B harassment). However, until such guidance is available, NMFS uses the following conservative thresholds of underwater sound pressure levels,[16] expressed in root mean square[17] (rms), from broadband sounds that cause behavioral disturbance, and referred to as Level B harassment under section 3(18)(A)(ii) of the Marine Mammal Protection Act (MMPA) (16 U.S.C § 1362(18)(A)(ii)):

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

Under the PTS/TTS Technical Guidance, NMFS uses the following thresholds (Table 6) 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 2018b). Different thresholds and auditory weighting functions are provided for different marine mammal hearing groups, which are defined in the Technical Guidance (NMFS 2018b). The generalized hearing range for each hearing group is in Table 7.

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

Level A harassment radii can be calculated using the optional user spreadsheet[18] associated with NMFS Acoustic Guidance, or through modeling.

Table 6. **PTS Onset Acoustic Thresholds for Level A Harassment (NMFS 2018).**

Hearing Group	PTS Onset Acoustic Thresholds* (Received Level)	
	Impulsive	**Non-impulsive**
Low-Frequency (LF) Cetaceans	*L*pk,flat*:* 219 dB *L*E,LF,24h*:* 183 dB	*L*E,LF,24h*:* 199 dB
Mid-Frequency (MF) Cetaceans	*L*pk,flat: 230 dB *L*E,MF,24h: 185 dB	*L*E,MF,24h: 198 dB
High-Frequency (HF) Cetaceans	*L*pk,flat: 202 dB *L*E,HF,24h: 155 dB	*L*E,HF,24h: 173 dB

[16] 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.

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

[18] The Optional User Spreadsheet can be downloaded from the following website: http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm

Hearing Group	PTS Onset Acoustic Thresholds* (Received Level)	
	Impulsive	**Non-impulsive**
Phocid Pinnipeds (PW) (Underwater)	*L*pk,flat: 218 dB *L*E,PW,24h: 185 dB	*L*E,PW,24h: 201 dB
Otariid Pinnipeds (OW) (Underwater)	*L*pk,flat: 232 dB *L*E,OW,24h: 203 dB	*L*E,OW,24h: 219 dB

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1µPa^{2}s. The subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

Table 7. Underwater Marine Mammal Hearing Groups (NMFS 2018).

Hearing Group	ESA-listed Marine Mammals In the Project Area	Generalized Hearing Range[1]
Low-frequency (LF) cetaceans *(baleen whales)*	Mexico DPS humpback whales WNP DPS humpback whales Fin whales North Pacific right whales	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans *(dolphins, toothed whales, beaked whales)*	Sperm whales	150 Hz to 160 kHz
High-frequency (HF) cetaceans *(true porpoises)*	None	275 Hz to 160 kHz
Phocid pinnipeds (PW) *(true seals)*	None	50 Hz to 86 kHz
Otariid pinnipeds (OW) *(sea lions and fur seals)*	Western DPS Steller sea lions	60 Hz to 39 kHz

[1]Represents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 db threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall et al. 2007) and PW pinniped (approximation).

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).

For purposes of this consultation, any exposure to Level A or Level B disturbance sound thresholds under the MMPA constitutes an incidental "take" under the ESA and must be authorized by the ITS (Section 10 of this opinion) (except that take is not prohibited for threatened species that do not have ESA section 4(d) regulations).

As described below, we expect 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 expected.

6.1 Exposure Analysis

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

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

NMFS expects that humpback whales and Steller sea lions will be exposed to underwater noise from pile driving activities (including vibratory pile driving and removal, impact pile driving, and DTH drilling). Possible responses by Mexico and WNP DPS humpback whales and Western DPS Steller sea lions to the sound produced by pile driving activities include:

- Physical Responses
    - Temporary or permanent hearing impairment (threshold shifts)
    - Non-auditory physiological effects
- Behavioral responses
    - Auditory interference (masking)
    - Tolerance or habituation
    - Change in dive, respiration, or feeding behavior
    - Change in vocalizations

- Avoidance or displacement
- Vigilance
- Startle or fleeing/flight

6.1.1 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 TMC.

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., vibratory pile installation and removal, impact pile driving, and DTH drilling). 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 of piles and installation/removal methods. Additionally, a bubble curtain will be deployed during all activities that fall within the 60-ft isobath (Area 1). A 5 dB reduction is applied to the estimated sound source levels for pile driving activities occurring in Area 1 where the bubble curtain will be in use. The values used and the source from which they were derived are summarized in Table 8.

NMFS developed a spreadsheet tool[19] to help implement the 2018 Technical Guidance (NMFS 2018b) that 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 almost certainly overestimates the number of marine mammals that actually experience PTS if they should cross the Level A isopleth for fairly brief amounts of time. However, these tools offer the best available way to conservatively predict appropriate isopleths until more sophisticated modeling methods are widely available. NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources such as impact driving, vibratory driving, and DTH drilling, the NMFS User Spreadsheet predicts the distance at which a marine mammal would incur PTS if it remained at that distance for the duration of the activity.

Inputs used in the User Spreadsheet are shown in Table 8, and the resulting Level A isopleths are shown in Table 9. Level A harassment thresholds for impulsive sound sources are defined for both cumulative sound exposure levels (SELcum) and peak sound pressure level (SPLPK), with the threshold that results in the largest modeled isopleth for each marine mammal hearing group used to establish the Level A harassment isopleth.

[19] NMFS User Spreadsheet Tool, version 2.2 (updated December 2020), available at https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance, accessed February 25, 2023.

Table 8. NMFS User Spreadsheet Inputs for Calculating Level A and Level B isopleths[1].

Area/ Attenuation	Method	Pile Size/ Type	Weighting Factor Adjustment	# of [3] Piles	Piles per Day	Duration/ Impacts per Pile	Sound Source Level at 10 m	Reference
Area 1[2] Water Depth ≤ 60 ft **Bubble Curtain**	Impact	36-inch Permanent	2	36	4	1,800 strikes	179 dB SEL 187 dB rms	Navy (2015)
	Vibratory	36-inch Permanent	2.5	36	4	15 min/pile	161 dB rms	
		36-inch Temporary Install/Removal		36	4	10 min/pile		
	DTH	36-inch Permanent	2	36	2	150 min/pile	159 dB SEL 169 dB rms	Denes et al. (2019); Reyff and Heyvaert (2019); Guan and Miner (2020); Reyff (2020); Heyvaert and Reyff (2021)
		36-inch Temporary		36	4	60 min/pile		
Area 2 Water Depth ≥ 60 ft **Unattenuated**	Impact	42-inch	2	16	3	2,400 strikes	186.7 dB SEL 198.6 dB rms	Austin et al. (2016)
		48-inch		20	2	2,400 strikes	186.7 dB SEL 198.6 dB rms	
	Vibratory	36-inch Temporary Install/Removal	2.5	36	4	10 min/pile	166 dB rms	Navy (2015)
		42-inch		16	4	15 min/pile	168.2 dB rms	Austin et al. (2016)
		48-inch		20	2	15 min/pile	168.2 dB rms	
	DTH	36-inch Temporary	2	36	4	60 min/pile	164 dB SEL 174 dB rms	Denes et al. (2019); Reyff and Heyvaert (2019); Guan and Miner (2020); Reyff (2020); Heyvaert and Reyff (2021)
		42-inch		16	2	150 min/pile		
		48-inch		20	2	150 min/pile	171 dB SEL 174 dB rms	

[1]All calculations use a transmission loss value of 15.
[2] A 5 dB reduction was applied to sound source levels for pile driving activities occurring in Area 1 where a bubble curtain will be deployed.
[3] In total, there are thirty-six 36-inch permanent piles, seventy-two 36-inch temporary piles, sixteen 42-inch piles, and twenty 48-inch piles.

Table 9. Level A and Level B Harassment Isopleths for Pile Driving Activities.

Area/ Attenuation	Method	Pile Size/ Type	Level A Harassment (m)		Level B Harassment (m)
			LF Cetaceans	Otariids	
Area 1[2] Water Depth ≤ 60 ft **Bubble Curtain**	Impact	36-inch Permanent	2,015.1	78.5	631
	Vibratory	36-inch Permanent	6.8	0.3	5,412
		36-inch Temporary Install/Removal	5.2	0.2	5,412
	DTH	36-inch Permanent	799.7	31.2	18,478
		36-inch Temporary	689.1	26.9	18,478
Area 2 Water Depth ≥ 60 ft **Unattenuated**	Impact	42-inch	6,570.9	256.0	3,744
		48-inch	5,014.6	195.4	3,744
	Vibratory	36-inch Temporary Install/Removal	11.2	0.5	11,659
		42-inch	20.6	0.9	16,343
		48-inch	13.0	0.6	16,343
	DTH	36-inch Temporary	1,484.7	57.9	39,811
		42-inch	1,722.9	67.1	39,811
		48-inch	5,045.7	196.6	39,811

NMFS recommends treating DTH systems as both impulsive and continuous, non-impulsive sound source types simultaneously. Thus, impulsive thresholds are used to evaluate Level A harassment, and continuous thresholds are used to evaluate Level B harassment. With regards to DTH mono-hammers, NMFS recommends proxy levels for Level A harassment based on available data regarding DTH systems of similar sized piles and holes (Denes et al. 2019, Reyff and Heyvaert 2019, Guan and Miner 2020, Reyff et al. 2020, Heyvaert and Reyff 2021).

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 in a manner we consider Level B harassment 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.

TMC's proposed construction activity for the Whittier Head of the Bay cruise ship dock 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 topography. The general formula for underwater TL is:

TL = B * Log10 (R1/R2), where
TL = transmission loss in dB
B = transmission loss coefficient; for practical spreading equals 15
R1 = the distance of the modeled SPL from the driven pile, and
R2 = the distance from the driven pile of the initial measurement

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

Using the practical spreading model, the underwater noise was determined to fall below the Level B threshold of 120 dB rms for marine mammals at a maximum radial distance of 39,811 m for DTH drilling of all pile sizes. The geography of Passage Canal, however, obstructs underwater sound transmission and the maximum Level B harassment zone for the project is truncated to 16,345 m (Figure 4). Sound will also not reach the full distance of the Level B harassment isopleth for vibratory pile installation of 42-inch and 48-inch piles due to the land mass structure of Passage Canal, and will be limited to 16,345 m. Other pile driving activities, including impact pile driving and vibratory pile installation and removal of smaller piles, have smaller Level B harassment zones. All Level B harassment isopleths are reported in Table 9 below.

6.1.2 Marine Mammal Occurrence and Exposure Estimates

Humpback sightings in Passage Canal are infrequent, but there have been two recent reports of single animals observed in 2020 and 2022. There were no humpback whales observed within Passage Canal during the Whittier Ferry Terminal Modification Project in April 2020 (Leonard and Wisdom 2020). PWS has been an important feeding ground for humpback whales in the North Pacific (Teerlink et al. 2015), and was identified as a BIA for seasonal humpback feeding (Ferguson et al. 2015). Humpbacks may be present year-round in PWS but the greatest densities are reported September through December during periods of high prey concentration (Ferguson et al. 2015). Teerlink et al. (2015) constructed the first time series of estimated humpback whale abundance in western PWS and found an increase from 39 to 194 whales (~500 percent) from 1978 to 2009. Straley et al. (2018) conducted vessel-based surveys circumnavigating PWS and determined the average group size was 2.4 humpback whales.

Steller sea lions are often seen near Whittier from May to August, but are irregularly seen in the area the rest of the year. Ten to twelve sea lions haul out year-round on a channel buoy within Shotgun Cove, the mouth of which is approximately six miles from the project site. Nine Steller sea lion groups (27 total animals), ranging in size from one to seven animals, were recorded during monitoring effort for the Whittier Ferry Terminal Modification Project in April 2020 (Leonard and Wisdom 2020). Sightings occurred over a period of 6 days and approximately 86 hours of monitoring. Steller sea lions are gregarious animals that often travel in large groups of up to 45 individuals (Keple 2002), and rafts of several hundred Steller sea lions are often seen adjacent to haulouts. Individual rookeries and haulouts may be comprised of hundreds of animals. Steller sea lion sightings recorded during ADFG's annual Pacific herring monitoring surveys from 2015-2019 had an average group size of four animals[20].

Scientific literature, monitoring reports from previous marine construction projects in the Whittier area, and local knowledge from tour guide operators were referenced to estimate marine mammal occurrence and abundance in the Passage Canal area. Limited sightings data exist for Passage Canal, and TMC interviewed local tour guide operators to obtain the most recent and accurate estimates of species occurrence in the area. This local knowledge, garnered from years spent on the waters of Passage Canal and PWS, provided the best available data. The occurrence rate of listed marine mammals present in the construction action area was classified as either common or infrequent; Steller sea lions were considered common species and humpback whales were considered infrequent species. Common species were estimated to occur twice daily and infrequent species were estimated to occur three times per week in Passage Canal (Table 10).

Table 10. Estimated Occurrence of Group Sightings of Marine Mammals.

Species Occurrence Classificiation	Group Sighting Occurrence Estimate		
	Weekly	Daily[1]	Hourly
Common (Steller sea lion)	14	2	0.17
Infrequent (Humpback whale)	3	0.5	0.04

[1]Based on a 12-hr pile driving work-day, not a standard 24-hr day.

TMC estimated an hourly occurrence probability for each marine mammal species in the construction action area to calculate potential exposure by Level B harassment. Occurrence estimates are based on conservative density approximations for each species and consider previous sighting data, seasonality, and group size in Passage Canal and/or Prince William Sound. Each occurrence is estimated to be a group of animals, as opposed to a single animal. The hourly occurrence estimate was also based on a 12-hr pile driving work-day, rather than a standard, full 24-hr day. The hourly estimate was intended to provide a more accurate representation of expected exposures in Passage Canal.

[20] https://gulf-of-alaska.portal.aoos.org/#module-metadata/ad7118be-ea24-11e0-b488-0019b9dae22b accessed February 26, 2023.

Estimated exposure was calculated by multiplying the hourly occurrence estimate for a species by the estimated average group size and the number of hours of each type of pile driving activity.

Exposure estimate = Hourly occurrence estimate x Average group size x Hours of pile driving

For humpback whales, only hours of pile driving with the largest resulting isopleths (DTH and vibratory driving) were used to calculate exposure estimates. Impact pile driving was excluded from these analyses because the Level A harassment isopleth was larger than the Level B harassment isopleth, and construction would be shut down before a whale could approach the Level B harassment zone. NMFS estimates that 25 humpback whales could be exposed to Level B harassment. 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. Under the MMPA, humpback whales are considered a single stock (Central North Pacific); however, we have divided them here to account for DPSs listed under the ESA. Wade (2021) reported that 11 percent of the individual humpback whales in this area are expected to be from the Mexico DPS and 1 percent are expected to be from the WNP DPS. Therefore, NMFS expects that two individuals from the Mexico DPS and a fraction of one individual, rounded up to one individual, from the WNP DPS of humpback whales may be exposed to Level B harassment.

No take by Level A harassment of humpback whales is proposed for authorization or expected to occur due to their large size and ability to be visibly detected in the project area if an animal should approach the Level A harassment zone.

NMFS expects that it is likely that up to 218 Steller sea lions may occur in the ensonified area during 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. Should a Steller sea lion go undetected, initially, by a protected species observer and later be observed within the Level A harassment zone, the mitigation measures (including shutdowns), make it unlikely that an animal would accumulate enough exposure for PTS to occur. Therefore, no take by Level A harassment is proposed or expected to occur as the largest Level A isopleth calculated was 256 m during impact pile driving of the 42-inch piles.

Table 11 below summarizes the estimated exposures of Mexico and WNP DPS humpback whales and Western DPS Steller sea lions to pile driving sound.

Table 11. Estimated Level B Harassment Exposures.

Species	DPS	Hourly Occurrence Estimate	Average Group Size	Pile Driving Hours			Estimated Exposures
				Impact	Vibratory	DTH Drilling	
Humpback Whale	Hawaii	0.04	2.4	N/A	42	216	22
	Mexico						2
	WNP						1
Steller sea lion	Western	0.17	4	63	42	216	218

6.2 Response Analysis

As discussed in the *Approach to the Assessment* section of this opinion, response analyses determine how listed species / critical habitats are likely to respond after being exposed to an action's effects on the environment or directly on listed species themselves. Our assessments try to detect the probability of lethal responses, physical damage, physiological responses (particular stress responses), behavioral responses, and social responses that might result in reducing the fitness of listed individuals. For critical habitat, our assessments try to identify which of the action's effects will impact or alter the physical and biological features of critical habitat and the magnitude of the impacts or alterations relative to the value of critical habitat as a whole for the conservation of a listed species. Ideally, our response analyses consider and weigh evidence of adverse consequences, beneficial consequences, or the absence of such consequences.

Loud underwater noise can result in physical effects on the marine environment that can affect marine organisms. Possible responses by Mexico and WNP DPS humpback whales and Western DPS Steller sea lions to the impulsive and non-impulsive sound produced by pile installation and removal and vessel noise include:

- Physical Response
    - Temporary or permanent hearing impairment (threshold shifts)
    - Non-auditory physiological effects
- Behavioral responses
    - Auditory interference (masking)
    - Tolerance or habituation
    - Change in dive, respiration, or feeding behavior
    - Change in vocalizations
    - Avoidance or displacement
    - Vigilance
    - Startle or fleeing/flight

6.2.1 Responses to Major Noise Sources (Pile Driving/Removal Activities)

As described in the Exposure Analysis, Mexico and WNP DPS humpback whales and Western DPS Steller sea lions are expected to occur in the 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 cause Level A harassment. We expect no more than 2 exposures of Mexico DPS humpback whales, 1 exposure of WNP DPS humpback whales, and 218 exposures of Western DPS Steller sea lions to noise levels sufficient to cause Level B harassment, as described in Section 6.2.2. All level B instances of take are expected to occur at received levels greater than 120 dB and 160 dB for non-impulsive and impulsive noise sources, respectively.

The introduction of anthropogenic noise into the aquatic environment from pile driving activities 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 a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions such as communication and predator and prey detection.

Exposure to pile driving and removal 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 and removal 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 (threshold shifts) followed by behavioral effects.

6.2.1.1 Threshold Shifts

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

Temporary Threshold Shift

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

Although some Level B exposures may occur during the course of the proposed action, not all instances of Level B take will result in TTS because the estimated 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.

Permanent Threshold Shift

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

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

The shutdown zones to be implemented are larger than the calculated isopleths to ensure that no listed marine mammals are exposed to noise levels that could cause PTS or other Level A disturbance. No exposures are expected at levels resulting in PTS due to conservative estimates of Level A isopleths and mitigation measures to shut down pile driving activities if a humpback whale or Steller sea lion approaches a Level A zone.

6.2.1.2 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 might be affected in those ways. Marine mammals that show behavioral avoidance of pile driving are especially unlikely to incur auditory impairment or non-auditory physical effects.

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

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

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments and for both laboratory and free-ranging animals (Jessop et al. 2003, Lankford et al. 2005, Crespi et al. 2013). Stress responses due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker 2000, Romano et al. 2002) and, more rarely, studied in wild populations (Romano et al. 2002). For example, 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 2003a).

The estimated 129 days of pile driving activities will be staggered over an 18-month period and occur for a limited amount of time on each day of in-water work (Table 2), thus limiting the potential for chronic stress. Marine mammals that show behavioral avoidance of pile driving are especially unlikely to incur auditory impairment or non-auditory physical effects because they will be limiting the duration of their exposure.

6.2.1.3 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).

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok et al. 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. Behavioral state may affect the type of response as well. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson et al. 1995, NRC 2003b, 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 including pile driving) have been varied but often consist of avoidance behavior or other behavioral changes, suggesting discomfort (Morton and Symonds 2002, Wartzok et al. 2003, Thorson and Reyff 2006, Nowacek et al. 2007). Responses to non-impulsive sound, such as vibratory pile installation, have not been documented as fully as responses to pulsed sounds.

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

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

The onset of behavioral disturbance from anthropogenic sound depends on both external factors (characteristics of sound sources and their paths) and the specific characteristics of the receiving animals (hearing, motivation, experience, demography), and is difficult to predict (Southall et al. 2007).

6.2.1.4 Auditory Masking

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

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

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

Noise from pile driving activities is relatively short-term. It is possible that pile driving noise or vessel noise resulting from this proposed action may mask acoustic signals important to Mexico and WNP DPS humpback whales and Western DPS Steller sea lions. However, the limited affected area and infrequent occurrence of humpback whales in the action area would result in insignificant impacts from masking.

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

6.2.2 Response Analysis Summary

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

7. CUMULATIVE EFFECTS

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

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 Environmental Baseline (Section 5).

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

7.1 Vessel Traffic and Tourism

The action area experiences moderate levels of marine vessel traffic year-round with the highest volumes occurring April through October. Marine vessels that use the action area include cruise ships, passenger ferries, whale watching tour boats, charter and commercial fishing vessels, barges, freight vessels, recreational vessels, and kayaks.

Freight barges, cruise ships, and ferries are the largest vessels that routinely transit the action area. Approximately 25 percent of the Alaska Railroad freight cargo for Southcentral Alaska comes through Whittier, and Alaska Marine Lines operates a weekly barge from Seattle to Whittier year-round.

Tourism is a large industry in Whittier and PWS. AMHS ferries come to port in Whittier five to eight times per week from March through September. Cruise ships stop in Whittier approximately two to three times per week, May through September. Alaska's summer 2019 cruise ship visitor volume was 44 percent higher than in 2010 (McDowell Group 2020). Fifteen percent of the 1,331,600 cruise ship passengers to visit Alaska in 2019 stopped in Whittier, in the immediate vicinity of the construction project. After a downturn in 2020 and 2021 caused by the COVID-19 pandemic, there are slightly more cruise ships scheduled to visit Whittier in 2022 and 2023 (45 and 46 ships scheduled, respectively) than visited in 2019. Approximately 45 additional cruise ships are expected to visit Whittier annually (May to September) after completion of the cruise ship dock. While future cruise ship traffic is projected to double as a direct result of the proposed project, this is a small increase in overall vessel traffic in the area. However, a potentially two-fold increase in cruise ship passengers will likely also lead to increased small vessel traffic in Passage Canal and PWS. The recent trends in numbers of visitors suggest an increasing demand for tourism in the area, including vessel-based activities like whale-watching and sport-fishing.

Vessel traffic is expected to continue in Passage Canal. 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 Fishing

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

8. INTEGRATION AND SYNTHESIS

The Integration and Synthesis section is the final step of NMFS's assessment of the risk posed to species and critical habitat as a result of implementing the proposed action.

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

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

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

8.1 Humpback Whale Risk Analysis

Based on the results of the exposure analysis, we expect a maximum of 25 humpback whales may be exposed to noise from pile driving; 11 percent, or a maximum of 2 of these whales, are expected to be from the Mexico DPS and 1 percent, or a maximum of 1 of these whales, are expected to be from the WNP DPS.

Exposure to project-related vessel noise and risk of vessel strike may occur, but adverse effects from vessel disturbance and noise are likely 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 the likely habituation of marine mammals that frequent this moderately trafficked area. 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, and existing regulations regarding approaching whales.

Passage Canal is not known to be highly utilized by humpback whales, which is the strongest evidence supporting the conclusion that the proposed action will likely have minimal impact on humpback whale populations.

The projected increase of future cruise ship traffic associated with completion of the Whittier Head of the Bay cruise ship dock will increase the risk of vessel strike in Alaskan waters; an additional 45 cruise ships are expected to visit Whittier annually (May to September). The number of cruise ships arriving in Whittier rebounded after the COVID-19 pandemic, with 45 and 46 cruise ships scheduled to visit Whittier in 2022 and 2023, respectively. From 1978 to 2021, nine humpback whales were struck by cruise ships in Alaskan waters (Neilson et al. 2012, NMFS Alaska Regional Office Stranding Database accessed February 2023).

This equates to approximately 0.20 humpback whales (0.02 Mexico or WNP DPS) struck by cruise ships in Alaskan waters per year. The number of strikes could potentially double, if cruise ship traffic to Whittier were to double in the future as predicted; however, the small number of potential strikes per year will likely have a minimal impact on humpback whale populations. Additionally, NMFS implemented Alaska Humpback Whale Approach Regulations (see 50 CFR §§ 216.18, 223.214, and 224.103(b)), to minimize harmful interactions between ships and humpback whales in Alaska.

The most likely responses from humpback whales to noise from pile driving activities include brief startle reactions or short-term behavioral modification. These reactions are expected to subside quickly when the exposure to pile driving noise ceases. The primary mechanism by which the behavioral changes we have discussed affect the fitness of individual animals is through the animals' energy and time budget. Large whales such as 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. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to reduce the energy budgets of humpback whales, and their probable exposure to project-related noise is not likely to reduce their fitness.

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

8.2 Western DPS Steller Sea Lion Risk Analysis

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

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. Best practices regarding waste management (cutting loops prior to disposal) will further reduce the impact of debris on Steller sea lions. Any increases in turbidity or seafloor disturbance would be temporary, localized, and minimal. Based on the localized nature of small oil spills, the relatively rapid weathering expected, and the safeguards in place to avoid and minimize oil spills, we conclude that the probability of the proposed action causing a small oil spill and exposing Western DPS Steller sea lions is extremely small, and thus the effects are considered highly unlikely to occur.

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 Passage Canal, the sources proposed for use in this project are not among sounds to which they are commonly exposed. In response to project-related sounds, some Steller sea lions may move out of the area or change from one behavioral state to another, while other Steller sea lions may exhibit no apparent behavioral changes at all.

The primary mechanism by which the behavioral changes may affect the fitness of individual animals is through the animal's energy budget, time budget, or both. Most adult Steller sea lions occupy rookeries during the pupping and breeding season, which extends from late May to early July (NMFS 2008). The closest rookery is 124 km southeast of the proposed berth site, and the nearest major haulout is 44 km southeast of the proposed berth site. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to measurably reduce the energy budgets of Steller sea lions in the action area.

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

Based on the results of the exposure analysis, we expect a maximum of 218 Western DPS Steller sea lions may be exposed to noise from pile driving. These estimates represent the maximum number of takes that may be expected to occur, but not necessarily the number of individuals taken, as a single individual may be taken multiple times over the course of the proposed action. Noise from pile driving is likely to cause some individual Steller sea lions to experience changes in their behavioral states that might have adverse consequences (Frid and Dill 2002). However, these responses are not likely to alter the physiology, behavioral ecology, or social dynamics of individual Steller sea lions in ways or to a degree that would reduce their fitness.

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

9. CONCLUSION

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS's biological opinion that the proposed action is not likely to jeopardize the continued existence of Mexico and Western North Pacific DPSs of humpback whales or Western DPS Steller sea lion.

NMFS also concludes that the proposed action is not likely to adversely affect the fin whale, North Pacific right whale, or sperm whale or to destroy or adversely modify designated Mexico DPS humpback whale or Steller sea lion critical habitat.

10. INCIDENTAL TAKE STATEMENT

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

The ESA does not prohibit the take of threatened species unless special regulations have been promulgated, pursuant to ESA section 4(d), to promote the conservation of the species. Federal regulations promulgated pursuant to section 4(d) of the ESA extend the section 9 prohibitions to the take of Mexico DPS humpback whales (50 C.F.R. § 223.213).

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

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

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the terms and conditions set forth in the ITS. NMFS Permits Division and USACE have a continuing duty to regulate the activities covered by this ITS.

In order to monitor the impact of incidental take, NMFS Permits Division and TMC must monitor and report on the progress of the action and its impact on the species as specified in the ITS (50 CFR § 402.14(i)(3)). If NMFS Permits Division and USACE (1) fail to require the permit holder to adhere to the terms and conditions of the ITS through enforceable terms that are added to the authorization, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

10.1 Amount or Extent of Take

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

The taking of Mexico and WNP DPS humpback whales and Western DPS Steller sea lions will be by incidental harassment only. The taking by serious injury or death is prohibited and will result in the modification, suspension, or revocation of the ITS. Table 12 lists the amount and timing of authorized take (incidental take by harassment) for this action. The method for estimating the number of listed species exposed to sound levels expected to result in Level B harassment is described in Section 6.2. NMFS expects that 25 instances of Level B harassment of humpback whales may occur. While we are only authorizing take of two Mexico DPS humpback whale and one WNP DPS of humpback whale under the ESA, we will consider the ESA-authorized take limit to be exceeded when the MMPA-authorized limit on Level B take of humpback whales is exceeded, as it is impossible to distinguish between DPSs in the field. NMFS expects that 218 instances of Level B harassment of Western DPS Steller sea lions may occur.

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

Table 12. Incidental Take of ESA-listed Species Authorized.

Species	Total Amount of Take		Duration Across which Take Will Occur
	Level A	Level B	
Mexico DPS Humpback whale (*Megaptera novaeangliae*)	0	2[1]	18 Months
Western North Pacific DPS Humpback whale (*Megaptera novaeangliae*)	0	1[1]	
Western DPS Steller sea lion (*Eumetopias jubatus*)	0	218	

[1] The proposed IHA (88 FR 9227) indicated a requested Level A take of zero humpback whales and a Level B take of 25 humpback whales. Humpback whales in the project area include individuals from three DPSs. Of the proposed takes, 11 percent are expected to be ESA-listed Mexico DPS animals and 1 percent are expected to be ESA-listed WNP DPS animals.

10.2 Effect of the Take

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

The takes from the proposed action are associated with behavioral harassment from pile driving activities. Although the biological significance of behavioral responses remains unknown, this consultation has assumed that exposure to 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 noise sources and any associated disruptions are not expected to affect the fitness of any individuals of these species, the viability of the population, or the species' survival or recovery.

10.3 Reasonable and Prudent Measures

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

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

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

1. The NMFS Permits Division and USACE will require TMC to conduct operations in a manner that will minimize impacts to Mexico and WNP DPS humpback whales and Western DPS Steller sea lions that occur within or in the vicinity of the project action area.
2. The NMFS Permits Division and USACE will require TMC to implement a comprehensive monitoring program to ensure that Mexico and WNP DPS humpback whales and Western DPS Steller sea lions are not taken in numbers or in a manner not anticipated by this opinion, and to submit a final report to NMFS AKR evaluating the mitigation measures and the results of the monitoring program.

10.4 Terms and Conditions

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. The NMFS Permits Division and USACE or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR § 402.14(i)(3))).

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

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

To carry out RPM #1: NMFS Permits Division, USACE, or its authorization holder must undertake the following:

1. Implement all mitigation measures, including observation and shut down zones and other requirements, as described in the final IHA and the marine mammal monitoring and mitigation plan.
2. In the event that the proposed action causes serious injury or mortality of a marine mammal (e.g. ship strike, stranding, and/or entanglement), TMC will immediately report the incident to NMFS AKR (akr.section7@noaa.gov), Kathleen Leonard (Kathleen.leonard@noaa.gov), and the Marine Mammal Stranding Hotline at 877-925-7773 (Table 4).
3. Following a prohibited take, the NMFS Permits Division and USACE will be required to reinitiate consultation under 50 CFR § 402.16, and any subsequent activities causing incidental take will not be exempt from the take prohibitions of ESA section 9. NMFS AKR will work with the NMFS Permits Division and USACE to determine what is necessary to minimize the likelihood of further prohibited take and ensure ESA compliance.

To carry out RPM #2: NMFS Permits Division, USACE, or its authorization holder must undertake the following:

1. Adhere to all monitoring and reporting requirements as detailed in the IHA issued by NMFS under section 101(a)(5) of the MMPA as reflected in the marine mammal monitoring and mitigation plan.
2. Submit a project specific report within 90 days of the conclusion of in-water work associated with this project. The report must analyze and summarize marine mammal

interactions during this project. The report should be emailed to NMFS AKR at AKR.section7@noaa.gov. This report must also contain information described in the mitigation measures of this opinion.

11. CONSERVATION RECOMMENDATIONS

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

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

1. Project vessel crews should participate in the WhaleAlert program to report real-time sightings of whales while transiting in the waters of Southeast Alaska and to minimize the risk of vessel strikes. More information is available at https://www.fisheries.noaa.gov/resource/tool-app/whale-alert.
2. Without approaching whales, project vessel crews should attempt to photograph humpback whale flukes and record GPS coordinates of the sightings during transit. These data should be included in the final report submitted to NMFS AKR.
3. Without approaching whales, project vessel crews should attempt to photograph and/or video North Pacific right whales and record GPS coordinates of the sightings during transit. These data should be submitted to NMFS AKR as soon as possible.
4. Without approaching sea lions, project vessel crews should attempt to photograph Steller sea lions when brand numbers are visible and record GPS coordinates of the sightings during transit. These data should be included in the final report submitted to NMFS AKR.

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

12. REINITIATION OF CONSULTATION

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

or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount of incidental take is exceeded, section 7 consultation must be reinitiated immediately (50 CFR § 402.14(i)(4)).

13. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

13.1 Utility

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

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

13.2 Integrity

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

13.3 Objectivity

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

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

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

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

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