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

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

Trident Bunkhouse Dock Replacement Project, Kodiak, Alaska

NMFS Consultation Number: AKRO-2022-03622

Action Agency: National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division (Permits Division); United States Army Corps of Engineers (USACE)

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

Consultation Conducted By: National Marine Fisheries Service, Alaska Region

Issued By: ______________________________
For Jonathan M. Kurland
Regional Administrator

Date: February 21, 2024

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TERMS AND ABBREVIATIONS

AKR	Alaska Region
BA	Biological Assessment
dB re 1μPa	Decibel referenced 1 microPascal
DPS	Distinct Population Segment
EEZ	Exclusive Economic Zone
ESA	Endangered Species Act
FR	Federal Register
ft	Feet
Hz	Hertz
IHA	Incidental Harassment Authorization
IPCC	Intergovernmental Panel on Climate Change

ITS	Incidental Take Statement
IWC	International Whaling Commission
kHz	Kilohertz
km	Kilometers
L	Liter
m	Meter
mi	Mile
MMPA	Marine Mammal Protection Act
μPa	Micro Pascal
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
Opinion	Biological Opinion
Pa	Pascals
PTS	Permanent Threshold Shift
RMS	Root Mean Square
RPA	Reasonable and Prudent Alternative
s	Second
SEL	Sound Exposure Level
SPL	Sound Pressure Level
SPLASH	Structure of Populations, Level of Abundance and Status of Humpback Whales
SSL	Steller Sea Lion
TTS	Temporary Threshold Shift
USACE	United States Army Corps of Engineers

1 INTRODUCTION

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

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

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 ("2019 Regulations," see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court's July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government's request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different. New proposed rules were published in the *Federal Register* on June 22, 2023 (88 FR 40753).

In this document, the action agency is the United States Army Corps of Engineers (USACE) which proposes to issue permits under the Rivers and Harbors (Section 10) and Clean Water Acts (Section 404) to Trident Seafoods (the applicant) for the repair of their bunkhouse dock in Kodiak, Alaska, along the western shore of Near Island Channel, using pile driving and down the hold drilling (DTH). In addition, the NMFS Office of Protected Resources and Conservation Division (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 Trident, the applicant, for harassment of marine mammals incidental to the proposed action (88 FR 88874, December 26, 2023). Solstice, Alaska Consulting, Inc. (Solstice) prepared the biological assessment (BA), marine mammal monitoring and mitigation plan (4MP), and Letter of Authorization (LOA) application for Trident, the applicant. 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 October 2023 final Biological Assessment (BA), September 2023 IHA application, and the November 2023 4MP. Other sources of information relied upon include email and phone conversations among NMFS AKR, Solstice, and NMFS Permits Division. A complete record of this consultation is on file at NMFS's Anchorage, Alaska, office.

The proposed action involves the repair of the degrading dock supporting the Trident Seafood's bunkhouse to ensure continued safe housing for fish processing employees. Repair will include removal and installation of temporary piles using pile driving, and installation of permanent piles using DTH. Work will begin in March 2024 and span 8 weeks with 55 non-continuous days of in-water work.

Figure 1. Location of the Trident bunkhouse dock to be replaced (in yellow text) and other relevant landmarks.

This opinion considers the effects of dock repair and replacement through pile driving and DTH, and the associated proposed issuance of an IHA, on the threatened Mexico distinct population segment (DPS) humpback whale (*Megaptera novaeangliae*), endangered Western North Pacific DPS humpback whale, endangered Western DPS (WDPS) Steller sea lion (*Eumetopias jubatus*), endangered fin whale (*Balaenoptera physalus*), endangered North Pacific right whale (*Eubalaena japonica*), and endangered sperm whale (*Physeter macrocephalus*) and their designated critical habitats. In addition, the action agency requested a discretionary conference opinion on the sunflower sea star (88 FR 16212, March 16, 2023). The action agency also requested in the consultation concurrence with a not likely to adversely affect determination for Mexico and Western North Pacific DPS humpback whale and Steller sea lion critical habitat. North Pacific right whale critical habitat does not overlap with any part of the action area, therefore there will be no effect of the proposed action on this critical habitat.

1.2 Consultation History

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

- December 7, 2022: USACE designated Solstice Alaska Consulting (herein: Solstice) as the non-federal representative for the project

- May 17, 2023: The BA was received by NMFS on May 17, 2023
- July 6, 2023: A kickoff meeting was held between NMFS AKR, NMFS Permits Division, and Solstice to discuss the overall project and expected timelines
- August 4, 2023: NMFS AKR contacted Solstice about the status of an updated BA; this was sent previously but had not been received by NMFS due to technical issues
- August 10, 2023: NMFS AKR provided detailed comments to Solstice on the updated BA
- August 28, 2023: Solstice informed NMFS that the project was being delayed until March 2024 and that a new BA would be provided after Labor Day
- September 1, 2023: Solstice provided a revised BA and NMFS AKR responded immediately upon review with comments on September 5, 2023
- October 27, 2023: Solstice provided the final BA to NMFS AKR
- December 1, 2023: After several email exchanges with Solstice, NMFS AKR concluded that BA was sufficient and initiated section 7 consultation
- December 20, 2023: NMFS Permits Division requested initiation of section 7 consultation with NMFS AKR
- December 26, 2023: The proposed rule for the requested IHA was published in the federal register for a 30 day public comment period (88 FR 88874).

2 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

2.1 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. 50 C.F.R. § 402.02.

This opinion considers the effects on ESA listed species from the proposed repair and replacement of Trident's bunkhouse dock in Kodiak, Alaska, and of NMFS Permits Division's issuance of an IHA to take listed marine mammals by harassment under the MMPA incidental to Trident's construction activities. The proposed action will take place along the western shore of Near Island Channel in Kodiak, Alaska, at Latitude 57.785854°, Longitude -152.406346°. Construction is expected to begin in March, 2024, and last for eight weeks. Removal and installation of dock piles would take ~94 hours over the course of 55 non-consecutive days.

2.1.1 Proposed Activities

The project will consist of removal of existing concrete decking and a total of 235 piles. Temporary piles will be installed to aid in the installation of permanent piles and new decking will be installed. Project-associated vessels (n=ten) will be used for supporting construction activities, delivering new and removing old materials, and transporting construction personnel.

Removal of Existing Dock Components

The existing concrete dock deck will be removed first and then piles in need of replacement will be removed through vibratory (~10 percent of piles), deadpull, or cutting at the mudline. A total of 235 piles will be removed: 60, 16-inch steel piles; 75, 14-inch steel H-piles; and 100, 14-inch timber piles. Removal will take an estimated 40 min per day for steel piles and 50 minutes per day for timber piles, for a total of 280 minutes over seven days and 200 minutes over four days, respectively. Materials removed from the dock will be loaded and stored on a materials barge and then shipped to Seattle, Washington, for disposal at a permitted location at the end of the project.

Installation and Removal of Temporary Piles

To aid in the support of installing permanent piles, 20, 24-inch steel pipe temporary piles will be driven to refusal (~1.5 meters into the bedrock) using vibratory driving or DTH drilling. An ICE 28-B vibratory hammer with 271 tons of driving force, and a Holt 6,000 series Pinnacle Summit 180 DTH hammer with 6,500-94,000 foot per pound torque will be used. Piles will be installed in groups of four and a frame will be welded around the grouped piles to guide the installation of permanent piles. The temporary piles will later be removed either by deadpull or with the vibratory hammer, as needed. Installation and removal will each take an estimated 40 minutes per day for three days.

Installation of Permanent Piles

Using the temporary piles as a guide, 26, 16-inch and 52, 24-inch steel piles will be installed. These piles will be driven to at least 3 meters into the bedrock with the vibratory hammer and then socketed to the final depth by DTH. Vibratory installation of both pile sizes will take an estimated 2 minutes per pile, for a total of 156 minutes over 18 days. DTH finishing will take an estimated 270 minutes per day for 16-inch piles and 240 minutes per day for 24-inch piles, for a total drilling time of 1,170 and 3,120 minutes, respectively. Once permanent piles are installed and temporary piles removed, the new dock components will be installed with no in-water activity.

Project Vessels

A total of ten project-related vessels will be used during the course of the proposed project: two construction barges located onsite to support construction; two materials barges delivering and staging materials; one 45-ft tug for moving the barges onsite (delivered to site by one of the construction barges); four 24-ft skiffs for transporting workers to and from the platform; and one 85-ft tug for transporting the construction and materials barges. The construction barges will travel to Kodiak, Alaska, from Juneau, Alaska, over an estimated seven days and materials barges will travel from Washington State over an estimated 10 days. The tugs transporting the barges will travel between six and eight knots along well-established vessel routes (Fig. 2).

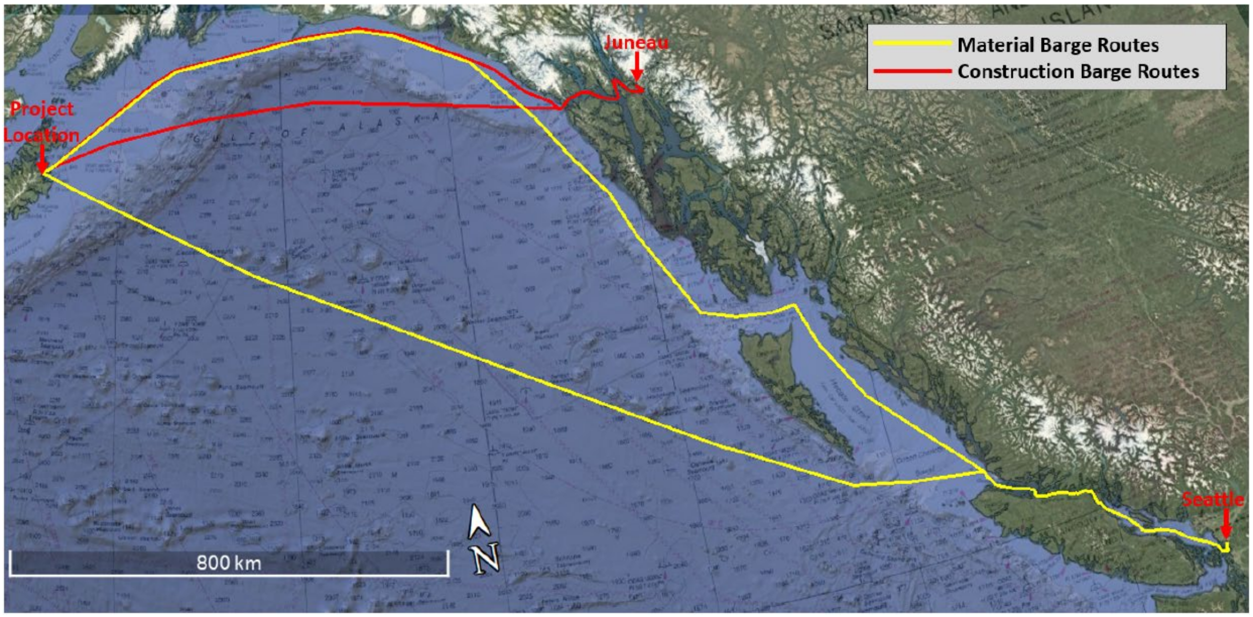

Figure 2. Proposed transit routes for project-related tugs and barges.

2.1.2 Mitigation Measures

To minimize impacts to marine mammals, including ESA-listed species, Trident proposes to implement the following mitigation measures during construction and pile driving activities. To reduce project impacts, the design is such that dredging or blasting is not required and the diameter, number, and footprint of piles in minimized to the extent practicable.

<u>Oil and Spill Prevention/Trash Disposal</u>

1. The contractor 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.

2. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, and similar equipment would be checked regularly for drips or leaks and maintained and stored properly to prevent spills.

3. Oil booms will be readily available for oil or another containment should a release occur.

4. All chemicals and petroleum products will be properly stored to prevent spills.

5. No petroleum products, cement, chemicals, or other deleterious materials will be allowed to enter surface waters.

6. Project-associated staff will cut all materials that form closed loops (e.g., plastic packing

bands, rubber bands, and all other loops) prior to proper disposal in a closed and secured trash bin.

7. Trash bins will be properly secured with locked or secured lids that cannot blow open, preventing trash from entering into the environment, thus reducing the risk of marine mammal entanglement should waste enter marine waters;

8. Project-associated staff will properly secure all ropes, nets, and other marine mammal entanglement hazards to ensure they do not blow or wash overboard.

General Conditions for In-Water Work Designed to Reduce Impacts to ESA-Listed Species

9. NMFS will be informed of impending in-water activities at least one week prior to the onset of those activities.

10. If construction activities will occur outside of the time window specified in the requested IHA, NMFS will be notified immediately of the situation, but at least 60 days prior to the end of the specified time window to allow for reinitiation of consultation.

11. Lines attached to heavy items on the ocean bottom (e.g., anchors) will incorporate weak links at the point of connection that can be broken by entangled whales.

12. The contractor is required to 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.

13. All in-water work will be completed within approximately 94 hours over 55 days (not consecutive).

Protected Species Observer (PSO)-related measures

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

14. One to four (depending on in-water activity) NMFS-approved PSOs, able to accurately identify and distinguish species of Alaska marine mammals, will be present before and during all in-water construction and demolition activities (Appendix C).

15. Prior to in-water construction activities, a shutdown zone will be established (Table 1). For this project, the shutdown zone includes all marine waters within an established distance from the sound source.

Table 1. Single activity shutdown zones based on Level A isopleths.

Activity	Distance (m) to Level A Thresholds	
	Low Freq Cetaceans	**Otariid**
In-water Activities		
Barge movements	10	10
Vibratory Pile Removal/Driving		
14-inch timber pile removal	10	10
14-inch H-pile removal	10	10
16-inch steel pile removal	10	10
16-inch steel pile installation (permanent)	10	10
24-inch steel pile installation (temporary)	10	10
24-inch steel pile removal (temporary)	10	10
24-inch steel pile installation (permanent)	10	10
DTH		
16-inch steel pile installation (permanent)	50	10
24-inch steel pile installation (temporary)	265	15
24-inch steel pile installation (permanent)	320	15

16. PSOs will be positioned such that they can collectively monitor the entirety of each activity's shutdown and monitoring zone (Table 2) and adjacent waters. PSO locations will be coordinated with NMFS prior to PSO deployment.

Table 2. Level B zones to be monitored for in-water activities expected to cause harassment of listed marine mammals.

Activity	Distance (m) to Level B Thresholds
	Low Freq Cetaceans
In-water Activities	
Barge movements	10
Vibratory Pile Removal/Driving	
14-inch timber pile removal	6,310

Activity	Distance (m) to Level B Thresholds
	Low Freq Cetaceans
14-inch H-pile removal	1,000
16-inch steel pile removal	5,415[a]
16-inch steel pile installation (permanent)	5,415[a]
24-inch steel pile installation (temporary)	5,415
24-inch steel pile removal (temporary)	5,415
24-inch steel pile installation (permanent)	5,415
DTH[b]	
16-inch steel pile installation (permanent)	6,310
24-inch steel pile installation (temporary)	6,310
24-inch steel pile installation (permanent)	6,310

[a] The Level B threshold for 16-inch piles used the same sound source levels as the 24-inch piles due to the lack of available data on source levels from 16-inch piles, resulting in the same sized Level B thresholds for both 16- and 24-inch piles.

[b] A bubble curtain will be used during DTH activities, resulting in a 5 dB reduction in sound.

17. Prior to commencing any in-water work, PSOs will scan waters within the appropriate shutdown zone and confirm that no listed species are within the shutdown zone for at least 30 minutes immediately prior to initiation of the in-water activity. If one or more listed species are observed within the shutdown zone, the in-water activity will not begin until the listed species exit(s) the shutdown zone of their own accord, or until the shutdown zone has remained clear of listed species for 30 minutes.

18. The on-duty PSOs will continuously monitor the shutdown and monitoring zones and adjacent waters for the presence of listed species during all in-water operations.

19. In-water activities will take place only:

    a. between civil dawn and civil dusk when PSOs can effectively monitor for the presence of marine mammals;

    b. b. during conditions with a Beaufort Sea State of 4 or less; and

    c. when the entire shutdown zone and adjacent waters are visible (e.g., monitoring effectiveness is not reduced due to rain, fog, snow, volcanic ash, etc.).

20. If visibility degrades to where the PSO cannot ensure that the shutdown zone remains devoid of listed species during in-water work, 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 the 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, in-water work may commence when the PSO provides assurance that listed species were observed exiting the shutdown zone. Otherwise, the activities may only commence after the PSO provides assurance that listed species have not been seen in the shutdown zone for 30 minutes (for cetaceans) or 15 minutes (for pinnipeds).

23. Following a lapse of in-water activities of more than 30 minutes, the PSO will authorize resumption of activities (using soft-start procedures for impact pile driving activities) only after assuring that listed species have not been present in the shutdown zone for at least 30 minutes.

24. If a listed species is observed within a shutdown zone or is harassed, harmed, injured, or disturbed due to non-construction related activities, PSOs will immediately report that occurrence to NMFS using the contact information in Table 3.

<u>Protected Species Observer Requirements</u>

25. PSOs will be independent (i.e., not construction personnel) and have no other primary duties beyond watching for, acting on, and reporting events related to listed species.

26. PSOs will be approved by NMFS prior to deployment. PSO resumes will be provided to the NMFS consultation biologist for approval at least one week prior to the start of in-water work. The agency will provide a brief explanation in instances where a PSO is not approved.

27. At least one PSO will have prior experience performing the duties of a PSO during construction activity. When a team of three or more PSOs are required, a lead observer or monitoring coordinator will be designated.

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 Alaska's marine mammals and specifics on the ecology and management concerns of those marine mammals;

c. ESA and MMPA regulations;

d. mitigation measures outlined in the biological opinion;

e. proper use of equipment;

f. methodologies in marine mammal observation and data recording and proper reporting protocols; and

g. an overview of PSO roles and responsibilities.

29. PSOs will:

a. have vision correctable to 20-20;

b. have the ability to effectively communicate orally, by radio and in person, with project personnel;

c. have prior experience collecting field observations and recording field data accurately and in accordance with project protocols;

d. be able to identify species of Alaskan marine mammals;

e. be able to record marine mammal behavior; and

f. have technical writing skills sufficient to create understandable reports of observations.

30. The PSO(s) will use the following to determine the location of observed listed species, to take action if listed species enter the shutdown zone, and to record these events:

a. Binoculars (7x50 or higher magnification)

b. Range finder

c. Tide table

d. Watch or chronometer

e. GPS

f. Compass

g. Grid map

h. Legible copy of the NMFS's biological opinion for this project and all appendices

i. Legible and fillable observation record form allowing for required PSO data entry

j. Two-way radio communication with construction foreman/superintendent

k. A log book of all activities which will be made available to USACE and NMFS upon request

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

32. 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.

33. PSOs will have the ability and authority to initiate appropriate mitigation responses, including shutdowns, to avoid takes of listed species.

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

35. Ramp-up (soft start) procedures will be applied prior to beginning pile driving and DTH activities each day and/or when pile driving hammers have been idle for more than 30 minutes.

36. A bubble curtain will be deployed during all DTH drilling activities.

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

38. 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 injured or killed or is observed entering a shutdown zone before operations can be shut down [unauthorized takes]), it will be reported to NMFS at akr.section7@noaa.gov within one business day. These PSO records will include:

a. information to be provided in the final report (see Mitigation Measures under the

Data Collecting and Reporting heading below);

b. the number and species of listed animals affected;

c. the date, time, and location of each event (with geographic coordinates or identified grid from the grid map);

d. a description of the event;

e. the time the mammal(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 before 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; and

h. photographs or video footage of the animal(s), if available.

39. 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 data that will aid NMFS in determining how to respond to the stranded animal. Data submitted to NMFS in response to stranded marine mammals will include date/time, the location of stranded marine mammal, the species and number of stranded marine mammals, a description of the stranded marine mammal's condition, event type (e.g., entanglement, dead, floating), and the behavior of live-stranded marine mammals.

40. 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 Office of Law Enforcement at (1-800-853-1964).

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

<u>Strike Avoidance and Vessel Transit</u>

41. Vessel (skiff and barge) operators will take reasonable precautions to avoid interaction with listed whales by taking the following actions:

    a. Vessel operators will maintain a watch for listed marine mammals at all times while underway.

b. Vessels will stay at least 91 meters (100 yards) away from listed marine mammals, or 460 meters (500 yards) from endangered North Pacific right whales (50 CFR § 224.103(c)).

c. Operators will reduce vessel speed to less than 5 knots (9 kilometers/hour) when within 274 meters (300 yards) of a whale.

d. Unless necessary to reduce the risk of collision, vessel operators will avoid changes in direction and speed when within 274 meters (300 yards) of whales.

e. Vessel operators will not position vessel(s) in the path of whales, and will not cut in front of whales in a way or at a distance that causes the cetaceans to change their direction of travel or behavior (including breathing/surfacing pattern).

f. Operating the vessel(s) to avoid causing a whale to make changes in direction.

g. Checking the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the propellers are engaged.

h. Reducing vessel speed to 10 knots or less when weather conditions reduce visibility to 1.6 kilometers (1 miles) or less.

42. 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 meters (100 yards) 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. Vessels will remain 460 meters (500 yards) from North Pacific right whales (50 CFR § 224.103(c)).

43. If the vessel is taken out of gear, 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.

44. Vessels will take reasonable steps to alert other vessels in the area to the presence of whales in the vicinity.

45. Vessels will not allow lines to remain in the water, and no trash or other debris will be thrown overboard, thereby reducing the potential for marine mammal entanglement.

46. The transit route for the vessels will avoid designated critical habitat to the extent practicable.

47. For North Pacific right whales vessels will:

    a. remain 460 meters (500 yards) from North Pacific right whales (50 CFR § 224.103(c).

48. For WDPS Steller Sea Lions:

    a. vessels will not approach within 5.5 kilometers (3 nautical miles) of rookery sites listed in (50 CFR § 224.103(d)); and

    b. vessels will avoid approaching within 914 meters (3,000 feet) of any Steller sea lion haulout or rookery.

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

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

    b. cause a vessel or other object to approach within 100 yards of a humpback whale; or

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

<u>Sunflower Sea Stars</u>

50. To prevent direct placement of a pile on a sunflower sea star, a pre-construction survey and biweekly (every other week) surveys of the seafloor near the project area will take place. If a sunflower sea star is identified during the pre-construction or biweekly surveys, more frequent surveys prior to pile driving may be required.

    a. For the pre-construction survey, divers will observe the area within 10 m shutdown zone for sunflower sea stars. The contractor, at their own discretion, may monitor the seafloor at the placement of every pile in lieu of a pre-construction or monthly surveys.

    b. If a sunflower sea star is attached to a pile being removed from the water, the sunflower sea star will be gently removed from the pile by the Lead PSO, or a crew delegate due to possible safety concerns, and as soon as possible will be released into an intertidal location nearby. The star will not be placed in a container nor transported any significant distance away from the project location. The number of sunflower sea stars moved will be recorded, noting the diameter of each individual, and reported to NMFS (see sunflower sea star fact sheet, Appendix D).

51. If it appears that a sunflower sea star has sea star wasting syndrome or if any dead sunflower sea stars are observed, pictures of the individuals will be taken and infected

individuals will be counted. The infected sunflower sea stars will not be touched or moved. All sunflower sea star findings will be reported to NMFS, including latitude/longitude and transect line, at akr.prd.reports@noaa.gov.

General Data Collecting and Reporting

Data Collection

52. PSOs will record observations on data forms or into electronic data sheets. PSOs will record the following:

    a. the date, shift start time, shift stop time, construction dates, construction start times, construction stop times, and PSO identifier;

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

    c. weather parameters (e.g., percent cloud cover, percent glare, visibility) and sea state where the Beaufort Wind Force Scale will be used to determine sea-state (https://www.weather.gov/mfl/beaufort);

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

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

    f. marine mammal behavior patterns observed, including bearing and direction of travel;

    g. behavioral reactions of marine mammals immediately before and during sound producing activities;

    h. initial, closest, and last sighting locations of observed marine mammal(s), including the distance between the PSO and the mammal(s) and the minimum distance from the sound-producing activity to the mammal(s);

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

    j. geographic coordinates for the observed animal(s), with the position recorded using the most precise coordinates practicable (coordinates will be recorded in decimal degrees or a similar standard, or extrapolated from grid map); and

k. the number of sunflower sea stars moved, date and time of site inspection for sunflower sea stars, tidal stage at the time of scans, water clarity/visibility, number of sunflower sea stars observed and their proximity to the pile driving area within the 10 m shutdown zone.

Data Reporting

53. If possible, observations of humpback whales will be transmitted to akr.prd.reports@noaa.gov, including:

    a. photographs (especially flukes) and video obtained.

    b. geographic coordinates for the observed animals, with the position recorded using the most precise coordinates practicable (coordinates will be recorded in decimal degrees, or a similar standard).

    c. number of animals per observation event; and number of adults/juveniles/calves per observation event (if determinable).

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

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; and

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

55. Submit interim monthly PSO monitoring reports, including data sheets. These reports will include a summary of marine mammal species and behavioral observations, shutdowns or delays, and work completed.

56. Monthly reports will be submitted to akr.prd.reports@noaa.gov by the 15th day of the month following the reporting period. For example, the report for activities conducted in March 2024 will be submitted by April 15, 2024.

57. A final report will be submitted to NMFS within 90 calendar days of the completion of the Project summarizing the data recorded and submitted to akr.prd.reports@noaa.gov. The report will summarize all in-water activities associated with the proposed action, and

results of PSO monitoring conducted during the in-water project activities. The final report will include:

a. summaries of monitoring efforts including total hours, and marine mammal distribution through the study period, accounting for sea state and other factors that affect visibility and detectability of marine mammals;

b. the date, shift start time, shift stop time, construction dates, construction start times, construction stop times, duration of any shutdowns due to marine mammal presence, and PSO identifier;

c. analyses on the effects from various factors that may have influenced detectability of marine mammals (e.g., sea state, number of observers, fog, glare, and other factors as determined by the PSOs);

d. species composition, occurrence, and distribution of marine mammal observations, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover;

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

f. initial, closest, and last marine mammal observation distances versus project activity at time of observation;

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

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

i. distribution of marine mammals around the action area versus project activity at time of observation; and

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

Table 3. Summary of agency contact information.

Reason for Contact	Contact Information
Consultation Questions & Unauthorized Take	AKR.prd.reports@noaa.gov Jenna Malek: jenna.malek@noaa.gov
Reports & Data Submittal	AKR.prd.reports@noaa.gov (please include NMFS AKRO tracking number in subject line)
Stranded, Injured, or Dead Marine Mammal *(not related to project activities)*	Stranding Hotline (24/7 coverage) 877-925-7773
Oil Spill & Hazardous Materials Response	U.S. Coast Guard National Response Center: 1-800-424-8802 & AKRNMFSSpillResponse@noaa.gov
Illegal Activities *(not related to project activities; e.g., feeding, unauthorized harassment, or disturbance to marine mammals)*	NMFS Office of Law Enforcement (AK Hotline): 1-800-853-1964
In the event that this contact information becomes obsolete	NMFS Anchorage Main Office: 907-271-5006 Or NMFS Juneau Main Office: 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 action area for this project includes the area where construction activities will take place including the ensonified areas and the vessel transit routes for materials and construction barges (Figs. 2-4).

The loudest sound source with the greatest propagation distance is anticipated to be associated with DTH. Received levels from DTH with a source level of 167 dB re 1 µPa (rms) (Table 4), may be expected on average to decline to 120 dB re 1 µPa (rms) within ~13.5 km of the pile assuming a sound speed profile with a practical spreading loss (15 Log R). Trident has agreed to use a bubble curtain during DTH that will decrease the sources level to 162 dB re 1 µPa (rms), leading to a decline to 120 dB re 1 μPa (rms) within 6,310 m of the pile. The 120 dB isopleth was chosen because that is where we anticipate DTH and vibratory extraction/installation sound levels would approach ambient sound levels (i.e., the point where no measurable effect from the project would occur). While project sound may propagate beyond the 120 dB isopleth, we do not anticipate that marine mammals would respond in a biologically significant manner at these low levels and large distances from the sources.

Table 4. Sound source levels for dock replacement activities.

Method and Pile Type	**SSL @ 10 meters**		**Source**
Vibratory Hammer	**dB rms**		
14-inch timber piles (removal)	162		CalTrans (2020)
14-inch steel H-pile (removal)	150		CalTrans (2020)
16-inch steel pile (removal and installation)	161		NAVFAC (2015)
24-inch steel pile (installation)	161		NAVFAC (2015)
DTH	**dB rms**	**dB SEL**	
16-inch steel pile (installation)	162 (167)	141 (146)	Guan and Miner (2020), Heyvaert and Reyff (2021)
24-inch steel pile (installation)	162 (167)	154 (159)	Heyvaert and Reyff (2021)
Vibratory In-Air	**dB rms**		
All pile sizes	96.5		Laughlin (2010)

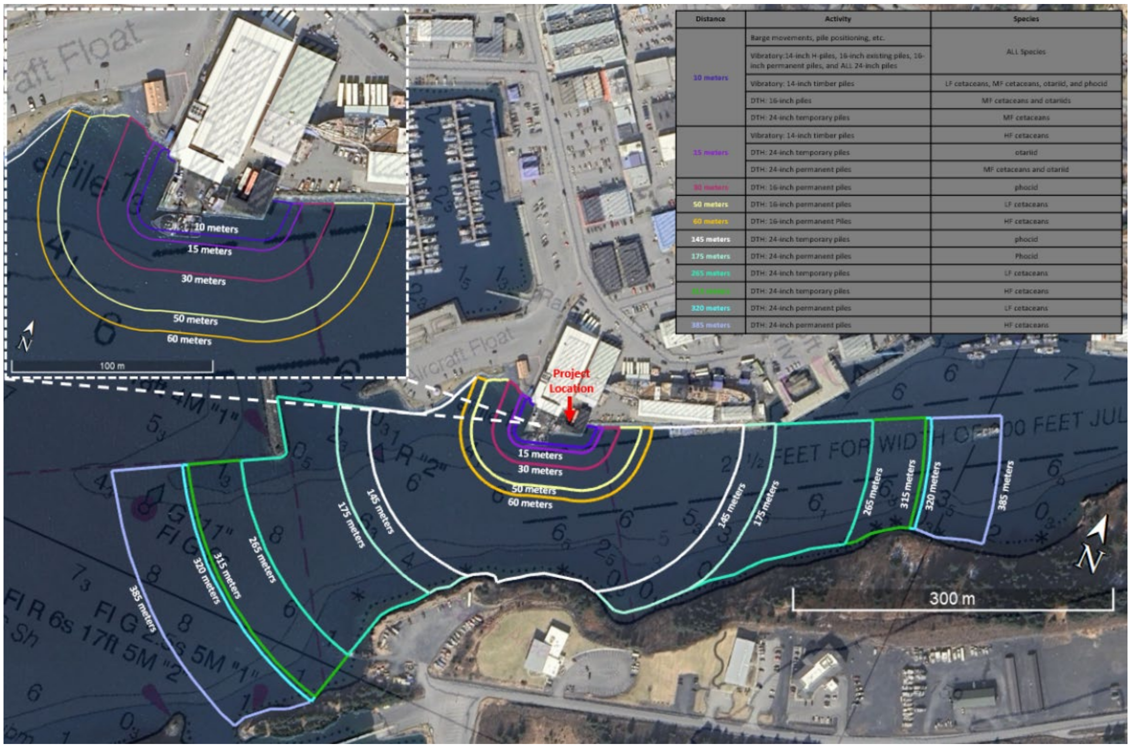

Figure 3. Level A shutdown zones based on activity.

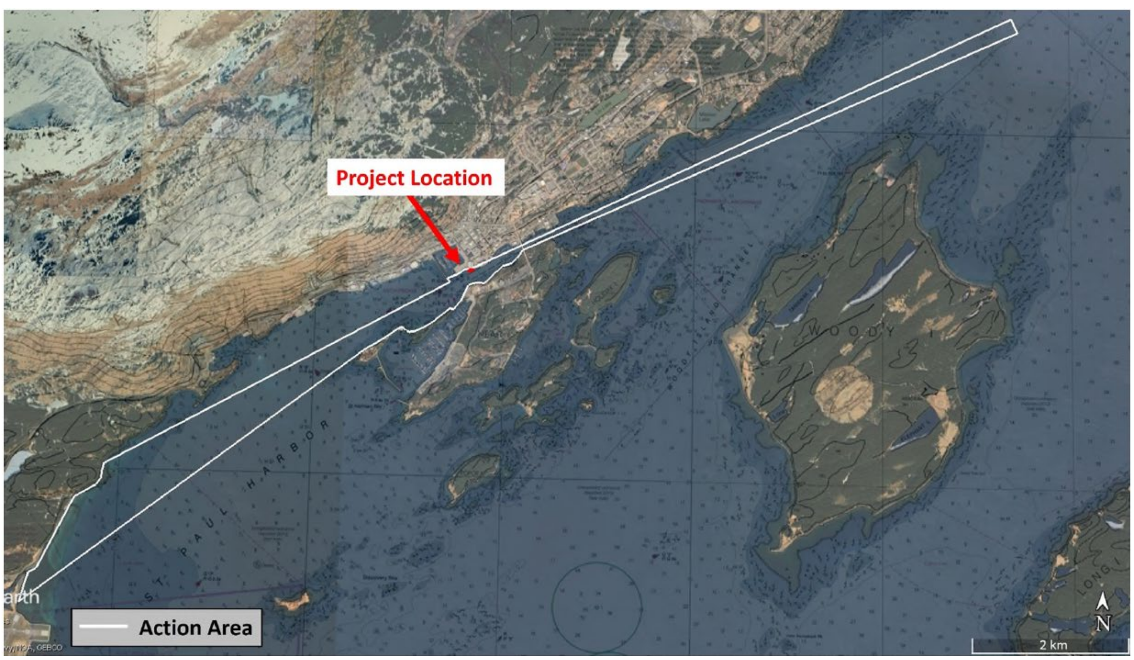

Figure 4. Project action area for construction.

3 APPROACH TO THE ASSESSMENT

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4 RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT

This opinion considers the effects of the proposed action on the species and designated critical habitats specified in (Table 5). Designated critical habitat for Western North Pacific and Mexico DPS humpback whales and Steller sea lions is within the action area.

Table 5. Listing status and critical habitat designation for species that may be affected by the proposed action.

Species	Status	Listing	Critical Habitat
North Pacific Right Whale *(Eubalaena japonica)*	Endangered	NMFS 2008, 73 FR 12024	NMFS 2008, 73 FR 19000
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
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
Sunflower Sea Star (*Pycnopodia helianthroides*)	Proposed Threatened	Proposed, 88 FR 16212	Not proposed at this time

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 habitat that are likely to be adversely affected. The first criterion is exposure or some reasonable expectation of a co-occurrence between one or more potential stressors associated with 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 that are exposed to sound produced by vessels, but are not likely to exhibit physical, physiological, or behavioral responses given that exposure (at the combination of sound pressure levels and distances associated with an exposure), are not likely to be adversely affected by the exposure. We 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, Western North Pacific humpback whale, fin whale, sperm whale, Western North Pacific and Mexico DPS humpback whale critical habitat, and Steller sea lion critical habitat. Below we discuss our rationale for those determinations.

4.1.1 Western North Pacific DPS Humpback Whale, North Pacific Right Whale, Fin Whale, Sperm Whale

Western North Pacific DPS humpback whales make up ~1 percent of all humpback whales feeding in the Gulf of Alaska (Wade 2021), numbering just over 1,000 animals with an unknown population trend (Wade et al. 2016a). North Pacific right whales are among the world's rarest marine mammals (Wade et al. 2011). The eastern population, with a range that includes the Gulf of Alaska and the Bering Sea, is estimated to have less than 50 individuals. 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). 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).

4.1.1.1 **Vessel Traffic**

The routes proposed for the materials and construction barges (Fig. 2) overlap with the ranges of the Western North Pacific DPS humpback whale, 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, and the construction barges will make one round trip from Juneau, Alaska. All barges will be towed at a speed between six and 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 as well as 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 ESA Guidance as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." (Wieting 2016). While listed marine mammals will likely be exposed to acoustic stressors from barging activities, the nature of the exposure (primarily vessel noise) will be low-frequency, with much of the acoustic energy emitted by project vessels at frequencies below the best hearing ranges of many large baleen whales. In addition, 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 seven minutes. The vessels for this project will be traveling even slower, thus reducing the impacts of underwater sound. Vessels will emit continuous sound while in transit, which should alert marine mammals before the received sound level exceeds 120 dB. Therefore, a startle response would not be 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, Western North Pacific DPS humpback whales, 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 transits, slow transit speeds, implementation of the mitigation measures, and the low occurrence of these whale species over the majority of the route and in the project area, 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 Western North Pacific DPS humpback whale, North Pacific right whale, fin whale, or sperm whale.

4.1.1.2 **Pile Driving and DTH**

Dock replacement activities will take place in Near Island Channel, between the main island of Kodiak and Near Island. The surrounding landmasses will truncate the spread of sound to the southeast and funnel it out until it reaches the 120 dB isopleth at 6,310 m to the northeast, or intersects with land to the southwest across St Paul Harbor (Fig. 4). Humpback whales that may enter the action area are most likely from the Mexico or Hawaii DPSs than the Western North Pacific DPS. We are unaware of records of North Pacific right whales, fin whales, or sperm whales occurring in Near Island Channel, and these species are not expected to occur in the area affected by pile driving or DTH 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 Western North Pacific DPS humpback whale, North Pacific right whale, fin whale, or sperm whale. These species will not be discussed further.

4.1.2 Western North Pacific and Mexico DPS humpback whale critical habitat

Critical habitat for the Mexico DPS humpback whale was designated April 21, 2021 (86 FR 21082) (Fig. 4). Critical habitat for the Western North Pacific and Mexico DPSs include areas in the eastern Aleutian Islands, the Shumagin Islands, and around Kodiak Island. The Mexico DPS critical habitat also includes the Prince William Sound area.

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

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

The Trident bunkhouse dock is located in Near Island Channel, which is fairly narrow and a busy thoroughfare for vessel traffic, making it not ideal for active feeding by large whales such as humpbacks. Impacts of sound from the proposed action are only expected to affect humpback whale prey within the immediate vicinity (e.g., tens of meters) of piles being replaced and these impacts will be short in duration, as pile removal/driving will take ~2 minutes per pile, with a maximum of 25 piles worked on in a given day (max of 50 minutes total/day). DTH will take longer, ~45-60 minutes per pile, depending on size, with a maximum of six piles being drilled on a given day (max 6 hours/day).

Prey reaction to this sound is expected to be no more than a brief startle response, with normal activity resuming once the sound has ceased. Additionally, the proposed activities are expected to take 55 non-consecutive days to complete between March and June, which may be early enough that prey species are not as abundant as other times of year, further reducing the potential impacts to humpback whale prey species. Therefore, we conclude that any effects of the proposed pile driving and DTH activities at the Trident bunkhouse dock on Western North Pacific and Mexico DPS humpback whale critical habitat will be insignificant.

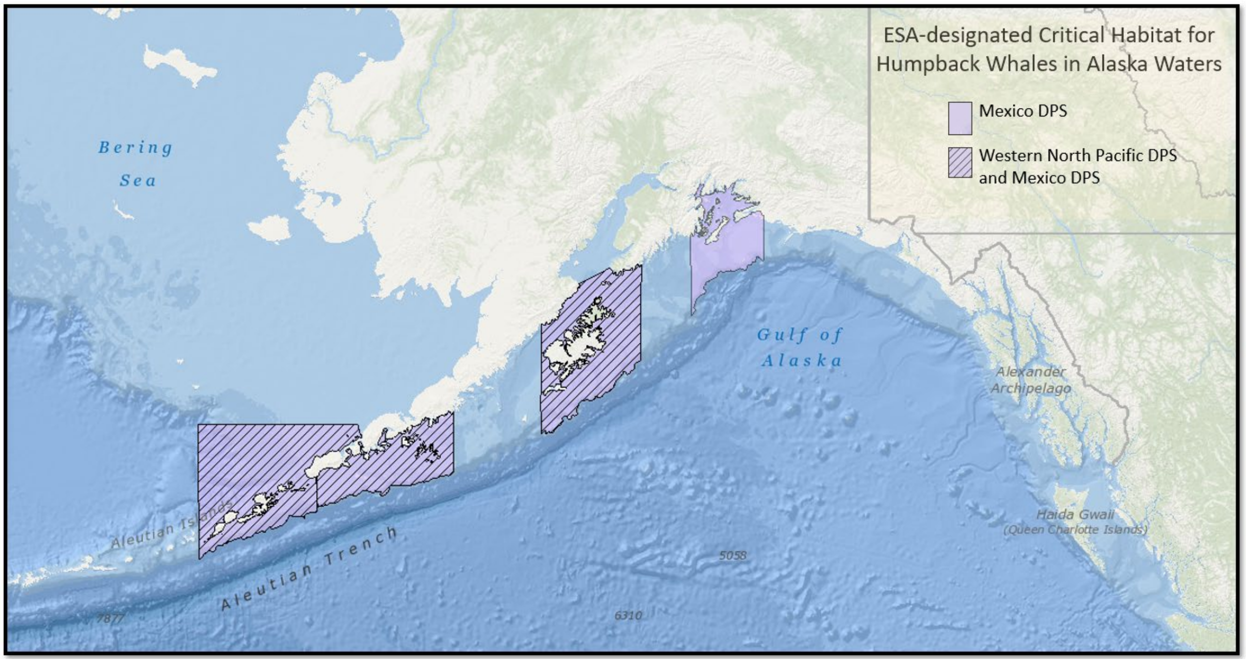

Figure 5. Critical habitat for Mexico DPS humpback whales in waters off Alaska.

4.1.3 Steller Sea Lion Critical Habitat

NMFS designated critical habitat for Steller sea lions on August 27, 1993 (58 FR 45269) (Fig. 5). The following PBFs were identified at the time of listing:

1. Alaska rookeries, haulouts, and associated areas identified at 50 CFR § 226.202(a), including:

   a. Terrestrial zones that extend 914 m (3,000 ft) landward
   b. Air zones that extend 914 m (3,000 ft) above the terrestrial zone
   c. Aquatic zones that extend 914 m (3,000 ft) seaward from each major rookery and major haulout east of 144° W. longitude
   d. Aquatic zones that extend 37 km (20 nm) seaward from each major rookery and major haulout west of 144° W. longitude

2. Three special aquatic foraging areas identified at 50 CFR § 226.202(c):

   a. Shelikof Strait
   b. Bogoslof
   c. Seguam Pass

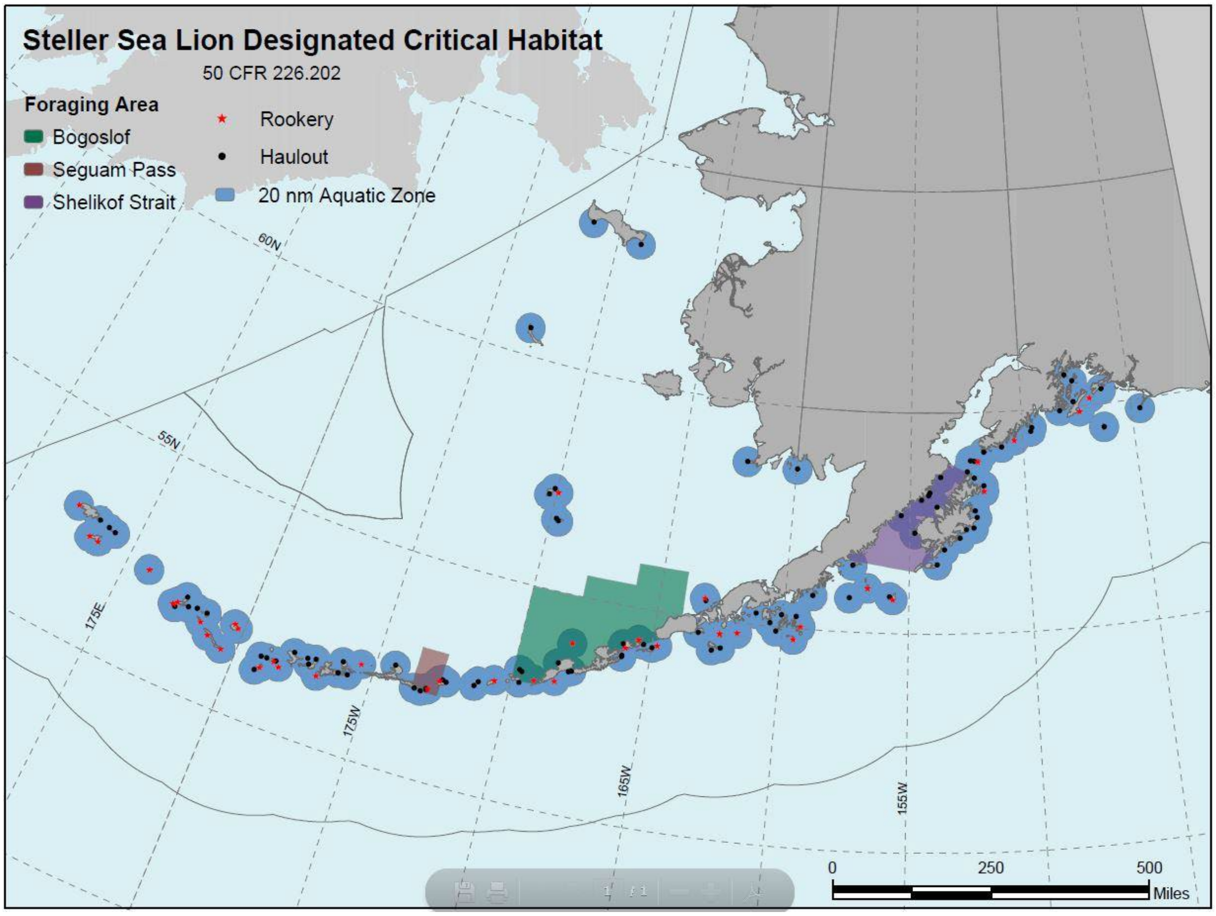

Figure 6. Designated Steller sea lion critical habitat in Alaska.

The Trident bunkhouse dock is located within the 20 nm aquatic zone surrounding two Steller sea lion haulouts in Chiniak Bay. There are no rookeries within the 20 nm aquatic zone. Within the action area, limited project-related vessel transit and pile replacement will generate sound within the 20 nm aquatic zones.

There are 3-mile no transit zones established and enforced around rookeries in the area for further protection (50 CFR § 224.103(d)). NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yards of haulout locations, which will further reduce disturbance by vessels and Trident has agreed that project vessels will remain 5.5 km from rookeries and 914 m from haul outs, respectively (see mitigation measure 48 in Section 2.1.2). Vessel sound has not been shown to affect fish distribution beyond a startle response so we do not expect project vessels to affect Steller sea lion prey near the Trident bunkhouse dock. Spills or otherwise-discharged fuels may occur in Steller sea lion critical habitat during project-related vessel transit or pile repair and replacement. However, Trident will be implementing mitigation measures so that project vessels will avoid approaching within 5.5 km of known Steller sea lion rookeries and major haulouts, reducing the likelihood of released fuels from affecting critical habitat before dispersal and evaporation occurs. Trident has also included mitigation measures for spills (see measures 1 – 5) to reduce the likelihood of oil or other discharges from entering the water during pile driving and DTH.

Sound produced during pile driving and DTH activities in critical habitat could affect prey species, but as mentioned previously, impacts of sound on prey such as fish are expected to be minor (i.e., startle response) and short-lived. The construction site is not close to the haulouts, so any sound produced will have dissipated as it travels through the 20 nm aquatic zone. Furthermore, the area of critical habitat that will experience received sound levels in excess of 120 dB represents an extremely small proportion of critical habitat (i.e., 2.83 km^2 out of 1,149,155 km^2 designated), and occurs within critical habitat that is already industrialized.

Work at this site will also not affect the air and terrestrial zones for the haulouts and does not overlap with any special aquatic foraging areas. Therefore, we conclude that any effects of the proposed construction activities at the Trident bunkhouse dock on Steller sea lion critical habitat will be insignificant.

4.2 Climate Change

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

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

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

http://nsidc.org/arcticseaicenews/

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

Air temperature

Recording of global temperatures began in 1850, and the last ten years (2014–2023) have ranked as the ten warmest years on record[1], with 2023 being the warmest recorded since 1850. The yearly temperature for North America has increased at an average rate of 0.23°F since 1910;

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

however, the average rate of increase has doubled since 1981 (0.49°F)[2].

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 (Fig. 6; Thoman and Walsh 2019). The average annual temperature for Alaska in 2023 was 28.4°F, 2.4°F above the long-term average, ranking as the 17th warmest in the 98-year record for the state[3]. Some of the most pronounced effects of climate change in Alaska include disappearing sea ice, shrinking glaciers, thawing permafrost, and changing ocean temperatures and chemistry (Chapin et al. 2014).

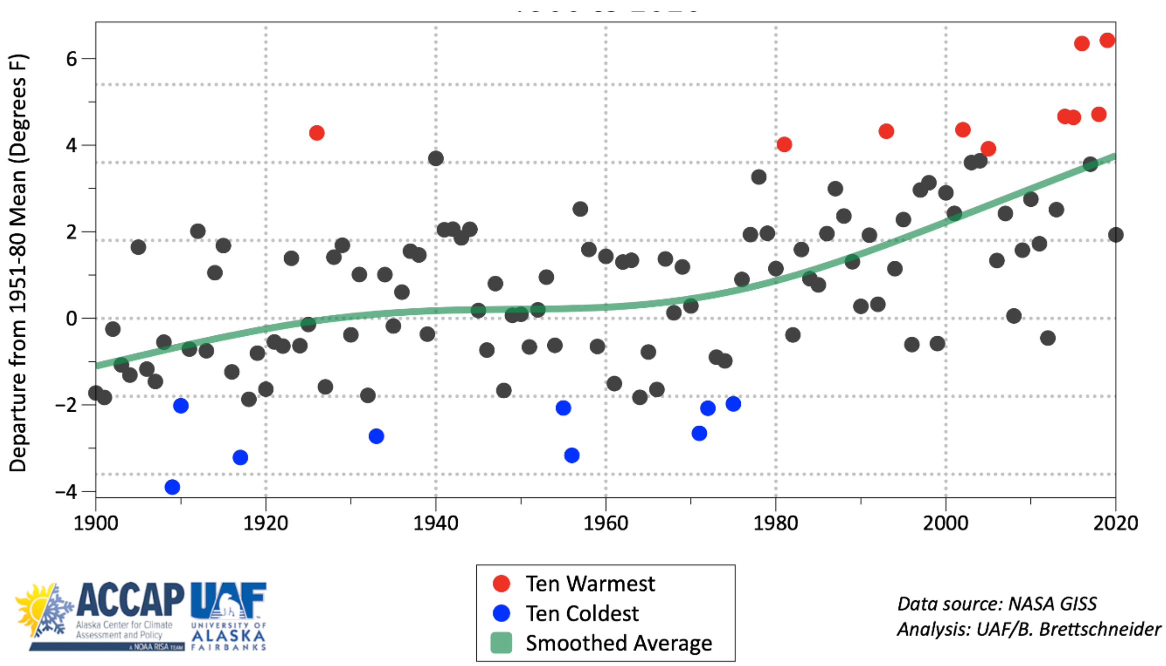

Figure 7. Alaska Annual Temperature 1900 to 2020.

Marine water temperature

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

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[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/national/202213 viewed 2/17/2023.

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

The seas surrounding Alaska have been unusually warm in recent years, with unprecedented warmth in some cases (Thoman and Walsh 2019). This effect can be seen throughout the Alaska region, including the Bering, Chukchi, and Beaufort seas (Fig. 7). Along the west coast, the surface waters were 4–11ºF warmer than average in the summer of 2019 (Thoman and Walsh 2019).

Warmer ocean water affects sea ice formation and melt. In the first decade of the 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 minus 2.7 percent per decade (Stroeve et al. 2007, Stroeve and Notz 2018). None of the species we are considering in this biological opinion are directly dependent on or greatly affected by sea ice or changes to sea ice. Humpback and fin whales have been sighted in the Bering Sea in recent years, but this is primarily during summer months when the sea ice has retreated (Clarke et al. 2020). WDPS Steller sea lions can be found on St Lawrence Island and even farther north, but are not dependent seasonal on sea ice movement.

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

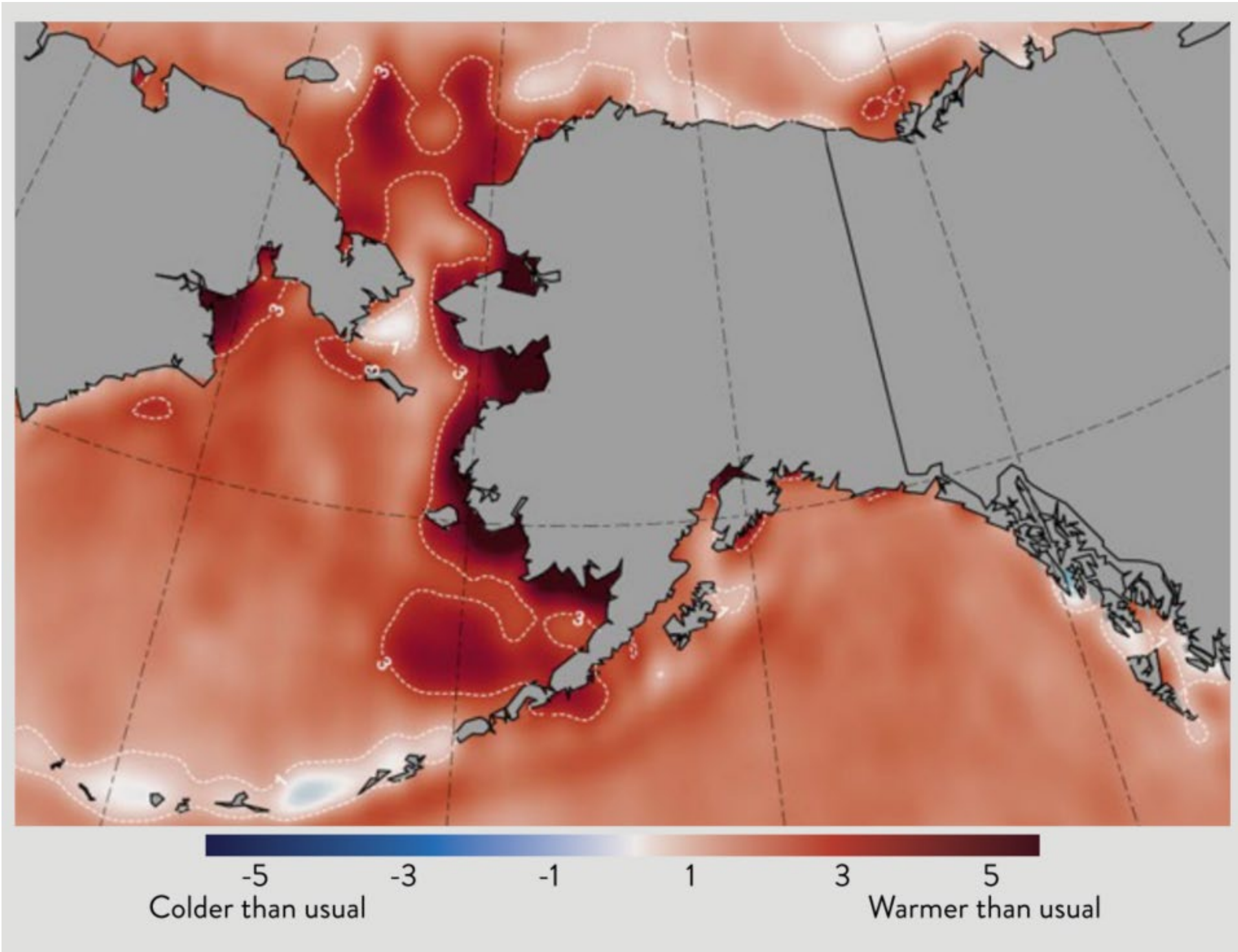

Figure 8. Shades of red indicate summer sea surface temperatures that were warmer than average during 2014-2018, especially along the west coast.

Another ocean water anomaly is described as a marine heat wave. Marine heat waves are described as a coherent area of extreme warm temperature at the sea surface that persists (Frölicher et al. 2018). Marine heatwaves are a key ecosystem driver and there has been an increase from 30 percent in 2012 to nearly 70 percent of global oceans in 2016 experiencing strong or severe heatwaves (Suryan et al. 2021). The largest recorded marine heat wave occurred in the northeast Pacific Ocean from 2013-2015 (Frölicher et al. 2018). Initially called "the blob" the northeast Pacific marine heatwave (PMH) first appeared off the coast of Alaska in the winter of 2013-2014 and by the end of 2015 it stretched from Alaska to Baja California. In mid-2016, the PMH began to dissipate, based on sea surface temperature data but warming re-intensified in late-2018 and persisted into fall 2019 (Suryan et al. 2021)(Fig. 8). Consequences of this event included an unprecedented harmful algal bloom that extended from the Aleutian Islands to southern California, mass strandings of marine mammals, shifts in the distribution of invertebrates and fish, and shifts in abundance of several fish species (Cavole et al. 2016). Cetaceans, forage fish (capelin and herring), Steller sea lions, adult cod, chinook and sockeye salmon in the Gulf of Alaska were all impacted by the PMH (Bond et al. 2015, Peterson et al. 2016, Sweeney et al. 2018).

The 2018 Pacific cod stock assessment[4] estimated that the female spawning biomass of Pacific cod (an important prey species for Steller sea lions) was at its lowest point in the 41-year time series, following three years of poor recruitment and increased natural mortality as a result of the PMH. In 2020 the spawning stock biomass dropped below 20 percent of the unfished spawning biomass and the federal Pacific cod fishery in the Gulf of Alaska was closed by regulation to directed Pacific cod fishing (Barbeaux et al. 2020). Twenty percent is a minimum spawning stock size threshold instituted to help ensure adequate forage for the endangered western stock of Steller sea lions.

Events from warming, such as the toxic algal bloom caused by the PMH, can produce biotoxins like domoic acid and saxitoxin that may pose a risk to marine mammals in Alaska. In addition, increased temperatures can increase Brucella infections. In the Lefebvre et al. (2016) study of marine mammal tissues across Alaska, 905 individuals from 13 species were sampled including humpback whales, bowhead whales, beluga whales, harbor porpoises, northern fur seals, Steller sea lions, harbor seals, ringed seals, bearded seals, spotted seals, ribbon seals, Pacific walruses, and northern sea otters (Fig. 8). Domoic acid was detected in all 13 species examined and had a 38 percent prevalence in humpback whales, and a 27 percent prevalence in Steller sea lions. Additionally, fetuses from a beluga whale, a harbor porpoise, and a Steller sea lion contained detectable concentrations of domoic acid documenting maternal toxin transfer in these species. Saxitoxin was detected in 10 of the 13 species, with the highest prevalence in humpback whales (50 percent) and a 10 percent prevalence in Steller sea lions (Lefebvre et al. 2016).

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

Figure 9. Algal toxins detected in 13 species of marine mammals from Southeast Alaska to the Arctic from 2004 to 2013 (Lefebvre et al. 2016).

Ocean Acidification

For 650,000 years or more, the average global atmospheric carbon dioxide (CO_2) concentration varied between 180 and 300 parts per million (ppm), but since the beginning of the industrial revolution in the late 1700s, atmospheric CO_2 concentrations have been increasing rapidly, primarily due to anthropogenic inputs (Fabry et al. 2008, Lüthi et al. 2008). The world's oceans have absorbed approximately one-third of the anthropogenic CO_2 released, which has buffered the increase in atmospheric CO_2 concentrations (Feely et al. 2004, Feely et al. 2009). Despite the oceans' role as large carbon sinks, the CO_2 level continues to rise and is currently at 419 ppm[5].

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

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

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). Models and observations indicate that rapid sea ice loss will increase the uptake of CO_2 and exacerbate the problem of aragonite undersaturation in the Arctic (Yamamoto et al. 2012, DeGrandpre et al. 2020).

Undersaturated waters are potentially highly corrosive to any calcifying organism, such as corals, bivalves, crustaceans, echinoderms and many forms of zooplankton such as copepods and pteropods, and consequently may affect Arctic food webs (Fabry et al. 2008, Bates 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). Conversely, for species that undergo long migrations, if either prey availability or habitat suitability is disrupted by changing ocean temperature regimes or prey availability due to ocean acidification, the timing of migration can change or negatively impact population sustainability (Simmonds and Eliott. 2009). Macleod (2009) estimated that, based on expected shifts in water temperature, 88 percent of cetaceans will be affected by climate change, 47 percent will be negatively affected, and 21 percent will be put at risk of extinction.

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

This opinion examines the status of each species 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 presented 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 above.

4.3.1 Mexico DPS humpback whale

Population Structure and Status

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

Following the cessation of commercial whaling, humpback whale numbers increased. NMFS conducted a global status review (Bettridge et al. 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 et al. (2016b) concluded that whales feeding in Alaskan waters belong primarily to the Hawaii DPS (recovered), with small numbers from the Western North Pacific (endangered) and Mexico DPSs (threatened). The probability of encountering humpback whales from each DPS in the Gulf of Alaska (GOA) can be found in Table 6.

Table 6. Probability of encountering humpback whales from each DPS in the North Pacific Ocean in various feeding areas. Adapted from Wade (2021).

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

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

Whales from these three DPSs overlap on feeding grounds off Alaska and are visually indistinguishable unless individuals have been photo-identified on breeding grounds and again on feeding grounds. All waters off the coast of Alaska may contain ESA-listed humpbacks. Of the three DPSs present in Alaska, we expect that only Mexico and Hawaii DPS individuals may be affected by the proposed action as the Western North Pacific DPS accounts for less than 1 percent of the humpback whales observed in the Gulf of Alaska. More information can be found in the most recent Stock Assessment Report (Muto et al. 2022).

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

Distribution

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

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

Occurrence in the Action Area

Year-round opportunistic aerial surveys conducted around Kodiak Island from 1999 to 2013 (University of Alaska Fairbanks Gulf Apex Predator-Prey (UAF GAP) program) detected humpback whales in every month (Witteveen, pers. comm., 12 January 2015, as cited in Ferguson et al. (2015)). The mean number of whales per month was greatest from July through September, moderate numbers were recorded from October through December, and very few whales were documented from January through June (Witteveen, pers. comm., 12 January 2015, as cited in Ferguson et al. (2015)). During summer (May-September) surveys conducted off northeast Kodiak Island in 2002-2003, humpback whales were documented in Chiniak Bay and Ferguson et al. (2015) identified Biologically Important Areas (BIA) for humpback whale feeding around Kodiak Island (Fig. 9). Given the documented presence of humpback whales in Chiniak Bay and vicinity, and the surrounding BIA, we assume humpback whales from the Mexico DPS could be present in the action area during the proposed activities.

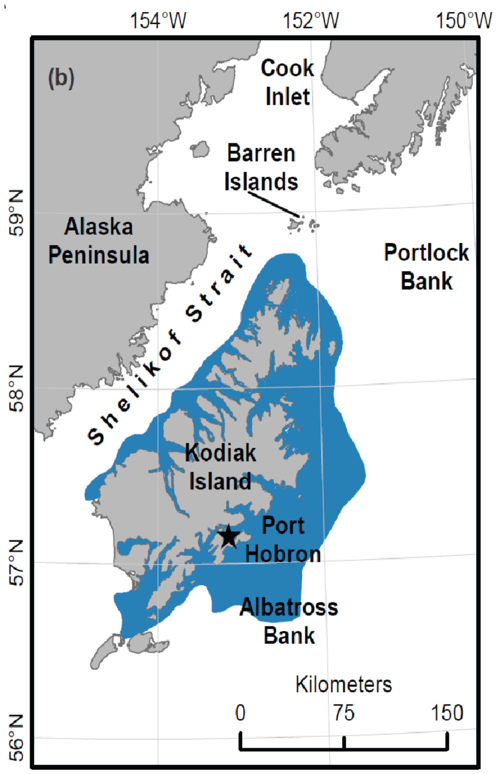

Figure 10. Humpback whale feeding area identified by Ferguson, Curtice and Harrison (2015) around Kodiak Island in the Gulf of Alaska.

Threats to the Species

Natural Threats

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

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

Anthropogenic Threats

Human activities are known to threaten humpback whales. Historically, whaling represented the greatest threat to every population of whales and was ultimately responsible for listing several species as endangered, but this threat has largely been curtailed. No whaling occurs within the range of Mexico DPS humpbacks, but some whaling still occurs in both Japan and South Korea (within the range of Western North Pacific DPS humpbacks)[6]. NMFS estimates that between 2002 and 2006, there were incidental serious injuries to 0.2 humpbacks annually in the Bering Sea/Aleutian Islands sablefish longline fishery. However, NMFS does not consider this estimation reliable because observers have not been assigned to a number of fisheries known to interact with the Mexico and western North Pacific DPSs of humpback whale. In addition, the Canadian observation program is also limited and uncertain (Allen and Angliss 2009).

More humpback whales are killed in collisions with ships than any other whale species except fin whales (Jensen and Silber 2004). Along the Pacific coast, a humpback whale is known to be killed about every other year by ship strikes (Barlow et al. 1997). Neilson et al. (2012) reviewed 108 whale-vessel collisions in Alaska from 1978–2011 and found that 86 percent involved humpback whales. Collision hotspots occurred in southeast Alaska in popular whale watching locations. Vessel collisions are discussed more in the Environmental Baseline (Section 5.5).

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

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

Organochlorines, including Polychlorinated biphenyls (PCB) and Dichlorodiphenyltrichloroethane (DDT), have been identified from humpback whale blubber (Gauthier et al. 1997). Higher PCB levels have been observed in Atlantic waters versus Pacific waters along the United States and levels tend to increase with individual age (Elfes et al. 2010). Although humpback whales off southern California tend to have the highest PCB concentrations of all North Pacific humpback whales, overall levels are on par with other baleen whales, which are generally lower than odontocete cetaceans (Elfes et al. 2010). As with blue whales, these

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

contaminants are transferred to young through the placenta, leaving newborns with contaminant loads equal to that of mothers before bioaccumulating additional contaminants during life and passing the additional burden to the next generation (Metcalfe et al. 2004). Available information does not suggest contaminant levels in humpback whales are having a significant impact on their persistence (Elfes et al. 2010).

Reproduction and Growth

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

Feeding and Prey Selection

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

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

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

Diving and Social Behavior

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

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

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

Vocalization, Hearing, and Other Sensory Capabilities

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

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

4.3.2 Western DPS Steller sea lions

Population Structure and Status

The Steller sea lion was listed as a threatened species under the ESA on November 26, 1990 (55 FR 49204). In 1997, NMFS reclassified Steller sea lions as two DPSs based on genetic studies and other information (62 FR 24345; May 5, 1997). At that time, the Eastern DPS (which includes animals from east of Cape Suckling, Alaska, at 144°W longitude) was listed as threatened and the Western DPS (which includes animals from west of Cape Suckling, at 144°W longitude) was listed as endangered. On November 4, 2013, the Eastern DPS was removed from the endangered species list (78 FR 66140). Information on Steller sea lion biology, threats, and habitat (including critical habitat) is available in the revised Steller Sea Lion Recovery Plan (NMFS 2008) and 5-year Status Review (NMFS 2020).

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

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

Distribution

Steller sea lions range along the North Pacific rim from northern Japan to California, with centers of abundance in the Gulf of Alaska and Aleutian Islands (Fig. 11)(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 round trip migrations of greater than 6,500 km by individual Steller sea lions have been documented and individuals may widely disperse outside of the breeding season (late-May to early-July) (Jemison et al. 2013, Muto et al. 2020). Additionally, sea lions may make semi-permanent or permanent one-way movements from one site to another (Chumbley et al. 1997, Burkanov and Loughlin 2005). Animals from the Eastern

DPS occur primarily east of Cape Suckling, Alaska (144° W) and animals from the endangered western DPS occur primarily west of Cape Suckling.

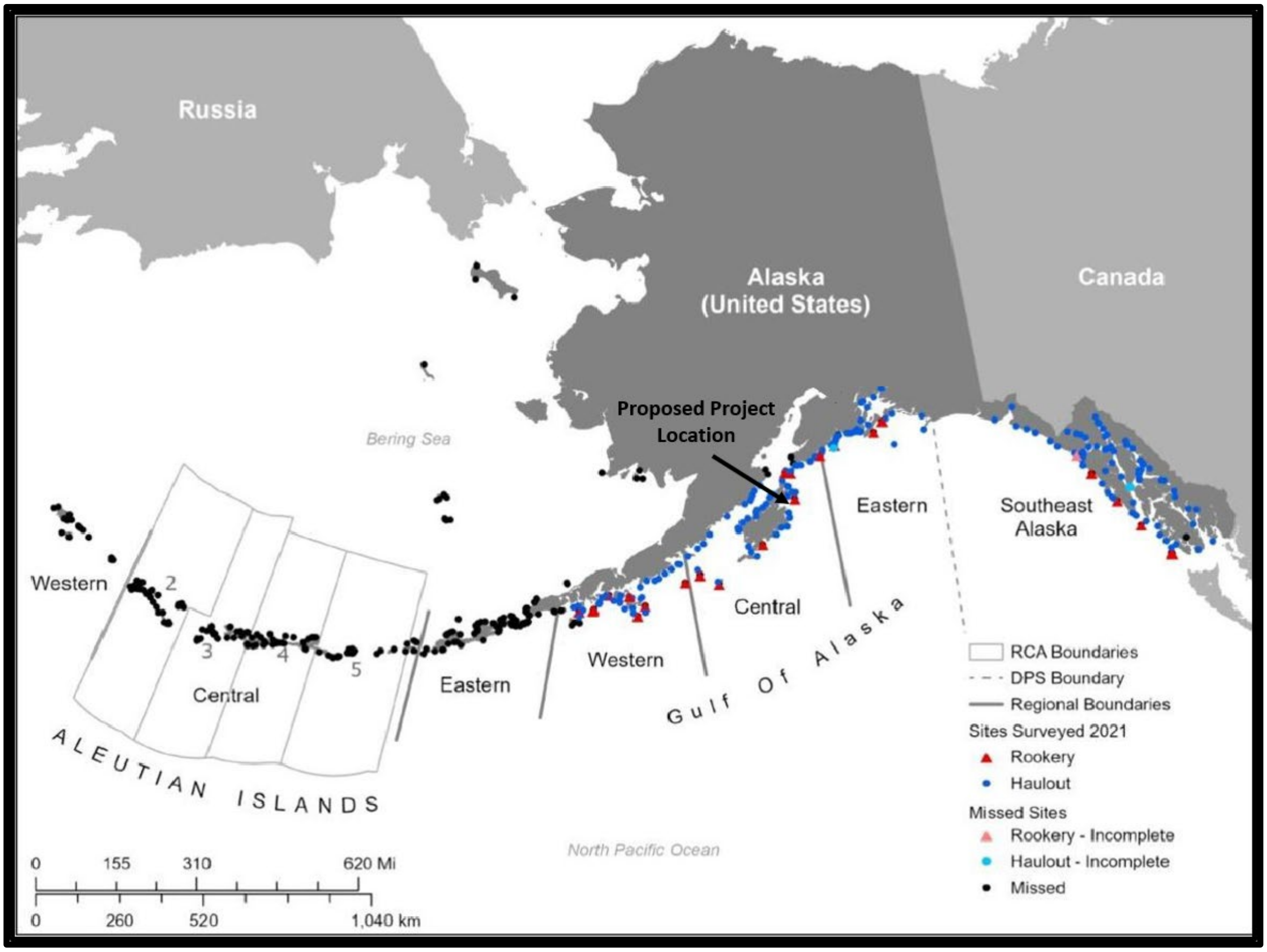

Figure 11. Steller Sea Lion Rookeries and Haulouts.

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

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

Occurrence in the Action Area

WDPS Steller sea lions frequent the marine waters in the vicinity of Kodiak Island. Sea lions have become accustomed to human activity in this area and have been observed in the vicinity of the action area at all times of the year feeding and overwintering. Sea lions utilize the Dog Bay float in St. Herman Harbor, which is ~792 meters from the bunkhouse dock. This float was intended for use by sea lions to reduce human-sea lion conflicts, and it has been fairly successful at achieving that goal. However, sea lions continue to frequent seafood processing plants, such as at Trident's dock. It is inevitable that this species will occur in the action area during the proposed activities. All Steller sea lions that may be overlap with the proposed action are expected to be from the Western DPS.

Threats to the Species

Natural Threats

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

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

Anthropogenic Threats

Steller sea lions were historically and recently subjected to substantial mortality by humans, primarily due to commercial exploitation and both sanctioned and unsanctioned predator control (Scheffer 1950, Atkinson et al. 2008, NMFS 2008). Several dozen individuals may become entangled and drown in commercial fishing gear annually (Atkinson et al. 2008, NMFS 2008). Removal of several hundred individuals occurs by subsistence hunting each year in controlled and authorized harvests. Occasional harvest also occurs in Canada (Fisheries and Oceans Canada

2010). Additional mortality (362 individuals from 1990 to 2003) has occurred from shooting of sea lions interfering in aquaculture operations along British Columbia (Fisheries and Oceans Canada 2010). Illegal shooting is also a continuing threat, but the number of illegally shot sea lions found is relatively low and has not precluded or measurably delayed recovery of the species.

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

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

Heavy metals, including mercury, zinc, copper, metallothionien, and butyltin have been identified in Steller sea lion tissues, but are in concentrations lower than other pinnipeds (Noda et al. 1995, Kim et al. 1996, NMFS 2008). Mercury may be of higher significance, with liver levels being measured above those necessary to impact fish (Holmes et al. 2008). However, contaminants leading to mortality in Steller sea lions have not been identified (NMFS 2008). Contaminant burdens are lower in females than males, because contaminants are transferred to the fetus in utero as well as through lactation (Lee et al. 1996, Myers et al. 2008). However, this means that new generations tend to start with higher levels of contaminants than their parents originally had. Contaminants in Steller sea lion are of additional concern because contaminants in the body tend to be mobilized as fat reserves are used, such as when prey availability is low, a situation that is likely occurring for Steller sea lions today.

Reproduction and Growth

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

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

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

Feeding, Prey Selection, Diving, and Social Behavior

The foraging strategy of Steller sea lions is strongly influenced by seasonality of reproductive activities on rookeries, and the seasonal presence of many prey species. Steller sea lions are generalist predators that eat a variety of fishes and cephalopods (Pitcher and Calkins 1981, Calkins and Goodwin 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 (820 ft) but are capable of deeper dives (NMFS 2008). Female foraging trips during winter tend to be longer in duration and farther from shore (130 km), during which foraging dives are deeper (frequently greater than 250 m). Summer foraging dives, on the other hand, tend to be closer to shore (about 16 km) and shallower (100 to 250 m) (Merrick and Loughlin 1997). Adult females stay with their pups for a few days after birth before beginning a regular routine of alternating foraging trips at sea with nursing their pups on land. Female Steller sea lions use smell and distinct vocalizations to recognize and create strong social bonds with their newborn pups so they can find them upon returning from foraging.

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

Vocalization, Hearing, and Other Sensory Capabilities

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

4.3.3 Sunflower sea star

Population Structure and Status

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

Distribution

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

Occurrence in the Action Area

Currently we assume that the sunflower sea star occupies inter-and sub-tidal habitats throughout southeast Alaska, the Gulf of Alaska, marine waters in lower Cook Inlet (south of the mouth of Kachemak Bay), and around Kodiak Island. Although surveys and data are very sparse in most Alaskan waters, limited transect surveys were conducted by the Alaska Fisheries Science Center Kodiak Laboratory in 2023 on the opposite side of Near Island from the proposed action area (C. Long, pers. comm.). Based on those surveys, we know that the Trident bunkhouse dock falls within the range of the sunflower sea star and the species may be found in the action area.

Threats to the Species

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

Reproduction and Growth

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

Feeding and Prey Selection

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

5 ENVIRONMENTAL BASELINE

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

Recent projects requiring ESA sec 7 consultations that have taken place in the same area as the currently considered project are as follows:

- St Paul Harbor dock replacement, City of Kodiak (pile extraction and driving), AKOR-2021-03122

5.1 Climate Change

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

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

Indirect threats associated with climate change include increased human activity as a result of regional warming. Less ice could mean increased vessel activity or construction activities with an associated increase in sound, pollution, and risk of vessel 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 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).

5.2 Sound

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

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

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

In the Port of Kodiak, ambient underwater sound levels of 125 dB re 1µPa or greater have been measured during normal port construction activities, including vibratory pile driving and DTH (PND 2015).

5.3 Fisheries Interactions

Commercial, recreational, and subsistence fishing occurs in and around the action area considered in this Opinion. Kodiak is Alaska's largest fishing port and ranks among the largest in the United States, with over 2,000 fishing and related vessels. In addition, seafood processing takes place nearly year-round, with an economic output of ~$158 million (McDowell Group 2020b). Commercial fisheries pose a threat to recovering marine mammal stocks in the Gulf of Alaska and the waters of southeast Alaska. Entanglement may result in minor injury or may potentially significantly affect individual health, reproduction, or survival. Additionally, reductions in seasonal availability and distribution of fish can cause cumulative effects on many species that depend on reliable sources of prey for survival.

Bettridge et al. (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, entanglement in fishing gear accounted for mortality and injury of 148 Western DPS Steller sea lions, with commercial trawl gear being the most common cause of entanglement (n=113; Freed et al. 2022).

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

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

5.4 Pollutants and Contaminants

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

In the action area, Munitions and Explosives of Concern (MEC) were historically deposited or disposed of as a result of Department of Defense activities (Hazard ID: 26070). Detonation of any of these MECs could release various forms of contamination into the surrounding marine waters.

5.5 Vessel Interactions

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

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

Vessel sound and presence can impact whales by causing behavioral disturbances, auditory interference, or non-auditory physical and physiological effects (e.g., vessel strike). From 1978-

2011, there were at least 108 recorded whale-vessel collisions in Alaska, with the majority occurring in Southeast Alaska between May and September (Neilson et al. 2012). Small recreational vessels traveling at speeds over 13 knots were most commonly involved in ship strike encounters; however, all types and sizes of vessels were reported (Neilson et al. 2012). The majority of vessel strikes involved humpback whales (86 percent) and the number of humpback strikes increased annually by 5.8 percent from 1978 to 2011. Seventeen humpback whales were reported struck by vessels between 2013 and 2015 (Delean et al. 2020) and 18 humpbacks were reported struck by vessels between 2016 and 2020 (Freed et al. 2022). 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 vessel 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.

There is substantial vessel activity around parts of Kodiak Island, with the Port of Kodiak serving as home to over 770 commercial fishing vessels. There are also two harbors that provide moorage for 650 vessels up to 150 ft in length[7]. Ferries, cruise ships, tankers, commercial fishing vessels, recreational vessels, and barges and tugs are some of the most common vessels that frequent the Port of Kodiak and may be found within the proposed action area.

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

5.6 Coastal Development

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

The coastal zone around the action area is highly developed, with docks and other marine-related infrastructure leaving little of the surrounding coastline in its natural state. Several recent projects, including the Alaska Marine Highway Service Ferry Terminal, the St. Paul Boat Harbor, the City of Kodiak Transient Float, and the Petro Marine Fuel Dock, have all led to

[7] https://www.city.kodiak.ak.us/ph

development of the shoreline within the action area.

5.7 Subsistence Harvest

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

Subsistence hunting of Steller sea lions occurs throughout southcentral and southeast Alaska. As of 2009, data on community subsistence harvest are no longer being consistently collected; therefore, the most recent estimate of annual statewide harvest (excluding St. Paul Island, Atka, and Akutan, which actively collect harvest data)[8] is 172 individuals from the 5-year period from 2004 to 2008. Data were collected on Alaska Native harvest of Steller sea lions for 7 communities on Kodiak Island for 2011 and 15 communities in southcentral Alaska in 2014; the Alaska Native Harbor Seal Commission and ADF&G estimated a total of 20 adult sea lions were harvested on Kodiak Island in 2011, and 7.9 sea lions (CI = 6-15.3) were harvested in Southcentral Alaska in 2014, with adults comprising 84 percent of the harvest (Muto et al. 2017, Muto et al. 2018).

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 aims to minimize the likelihood of false negative conclusions (i.e. concluding that adverse effects are not likely when such effects are, in fact, likely to occur).

We organize our effects analysis using a stressor identification – exposure – response – risk

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

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.

- Underwater sound produced by impulsive and non-impulsive sound sources related to pile repair and replacement activities, including vibratory pile driving, and down-the-hole drilling
- Vessel strike, sound, and disturbance
- Seafloor, habitat, and prey resource disturbance
- Pollutants and contaminants
- Direct pile contact
- Direct human contact

6.1.1 Minor Stressors on ESA-Listed Species 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 DPS humpback whales, WDPS Steller sea lions, and sunflower sea stars.

6.1.1.1 **Vessel Sound**

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

Vessel activity associated with the proposed pile replacement at the Trident bunkhouse dock will be minimal, with approximately ten vessels used throughout the course of the project (two construction barges, two material barges, two tugs, and four skiffs). Barges and their associated tugs are expected to complete one round trip from their location of origin (construction barges from Juneau, AK; material barges from Washington State), traveling at speeds of ~8 knots, and when on site, the barges will move at ~100-foot increments at speeds less than two knots from one pile to the next. Skiffs will have short movements transporting workers to and from the construction platform, raveling at speeds of ~3 knots. The slow vessel speeds will result in lower levels of vessel sound compared to vessels moving at faster speeds. Because pile replacement activities are not expected to last for more than 55 non-consecutive days between March and June, and the project skiffs will only be traveling short distances twice per day (start and end of the working period), the sound produced by the limited number of project vessels is not expected to add to the baseline sound conditions around the Trident bunkhouse dock.

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

6.1.1.2 **Vessel Strike**

The possibility of a vessel strike associated with the proposed action is extremely unlikely. As described in section 6.1.1.1, there will be ten project-related vessels, of which only four skiffs will be moving any considerable distance each day to transport workers. These vessels will be traveling at slow speeds (~3 knots), as will the barges and tugs as they travel to the construction site (6-8 knots). Vessel operators will also reduce speed further to five knots if within 274 m (300 yards) of a whale (see Section 2.1.2). Due to the common presence of commercial and recreational vessels in the action areas and presumable tolerance of marine mammals to regular vessel traffic, the use of slow-moving tugboats, barges, and small skiffs associated with construction is not anticipated to result in vessel strikes of ESA-listed species with the action area.

In addition to the small number of vessels and slower transit speeds, the local bathymetry or other surrounding environmental conditions (e.g., sediment loads, lack of prey species) may greatly reduce the likelihood of humpback whales from entering the action area. Near Island Channel is narrow and fairly shallow (~60 m wide by ~7 m deep) making it unlikely that a large whale would enter large portions of the action area. The mitigation measures in Section 2.1.2. also state that vessels will stay at least 91 m (100 yards) from listed marine mammals, as well as adhere to the Alaska Humpback Whale Approach Regulations (see 50 CFR §§ 216.18, 223.214 and 224.103(b)). All of these factors limit the risk of a vessel interacting with marine mammals in the project action area, leading us to conclude that a vessel strike is extremely unlikely to occur.

6.1.1.3 Seafloor, Habitat, and Prey Resource Disturbance

Removal and replacement of piles at the Trident bunkhouse dock may temporarily increase local turbidity. Pile driving and DTH causes localized increases in turbidity around piles being removed and installed. In general, turbidity associated with pile installation is localized to about a 7.6 m (25 ft) radius around a pile (Everitt et al. 1980) and local tidal activity can reduce turbidity quickly. As the shutdown zone around construction is 10 m (Table 1), listed animals are not expected to be close enough to be affected by project-generated turbidity. Sunflower sea stars may be in close enough proximity to experience localized turbidity, but being highly mobile, they can move from the area if negatively impacted, if they have not already been removed from the area during pre-construction surveys. Therefore, we conclude that effects of seafloor disturbance and increased turbidity on humpback whales, Steller sea lions, or sunflower sea stars would be immeasurably small.

Construction activities associated with pile removal and replacement would produce non-impulsive (i.e., vibratory pile removal and installation) and impulsive (i.e., DTH) sounds, which could impact prey resources of ESA listed species. 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, Popper and Hastings 2009). Impulsive sounds at received levels of 160 dB may cause subtle changes in fish behavior. Sound pressure levels (SPLs) of 180 dB may cause noticeable changes in behavior (Pearson et al. 1992, Skalski et al. 1992) and SPLs of sufficient strength have been known to cause injury to fish and fish mortality.

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

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 DTH activities on zooplankton would be expected to be restricted to the area within a few meters of pile replacement and would likely be sub-lethal. While previous studies concluded that crustaceans (such as zooplankton) are not particularly sensitive to sound produced by even louder impulsive sounds such as seismic operations (Wiese 1996), a recent study provides evidence that seismic surveys may cause significant mortality (McCauley et al. 2017). However, seismic surveys are significantly louder and lower frequency than the sound sources associated with pile replacement activities and are not directly comparable.

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

Construction activities will temporarily increase turbidity and in-water sound and may adversely affect habitat and prey in the action area. Adverse effects on prey species populations during project activities will be short-term, based on the limited duration of the project (55 non-consecutive days between March and June). After pile driving and DTH activities are completed, habitat use and function are expected to return to similar pre-construction levels and fish, zooplankton, and other prey are expected to repopulate the area. Therefore, we conclude that impacts to seafloor, habitat disturbance, and prey species is minor.

6.1.1.4 **Pollutants and Contaminants**

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

Trident has mitigation measures in place to address oil and spill prevention (Section 2.1.2). These include having a spill cleanup kit and oil booms on-site at all times, regular monitoring of any hoses or valves for fuel or other contaminants, and proper storage of potentially harmful chemicals and contaminants. Based on the localized nature of small spills or pollutant releases, the relatively rapid weathering and dispersion, and the safeguards in place to prevent spills from occurring, NMFS concludes that exposure of listed species to a small oil spill or pollutant release is highly unlikely to occur, and should such exposure occur, its effects upon listed species will be immeasurably small.

6.1.1.5 **Direct Pile Contact**

Direct pile contact is expected only to affect the sunflower sea star. The Trident bunkhouse dock falls within the range of the sunflower sea star as it is south of the Aleutian Islands and in a coastal area.

The sunflower sea star is commonly found in water less than 25 m deep and could be in areas proposed for pile removal and replacement activities. Prior to the SSWS pandemic, abundance of sunflower sea stars varied geographically in Alaska: infrequent in Kachemak Bay (<0.005 m^2); fairly common in the Kenai Fjords National Park (~0.075/m^2); and quite common in western Prince William Sound (average 0.233/m^2) (Konar et al. 2019). Post-pandemic densities are much less and range from 0 to 0.04/m^2 at the sites that once had the highest density (western Prince William Sound) (Traiger et al. 2022). However, limited transect surveys conducted in 2023 by the Alaska Fisheries Science Center's Kodiak Laboratory found a sea star density of 0.20/m^2 in Trident Basin, on the opposite side of Near Island from the proposed action area (C. Long, pers. comm.). Typically, sunflower sea stars are solitary and do not aggregate.

A total of 235 piles will be removed, but only 98 piles will be replaced/driven (20 temporary piles, and 78 permanent piles). For this analysis, we look at the number of sunflower sea stars that could be crushed using 98 pipe piles and current sunflower sea star density numbers. The maximum size of any pile type that will be used at any of the sites is 24-inch. A 24-inch (60.9 cm) pipe pile has a foot print of 0.292 m^2. Consequently, if 98 piles were installed, a total area of 28.6 m^2 of substrate would be covered by pipe piles (98 x 0.292 m^2). Assuming a density of 0.20 sea stars/m^2 at the project site post-SSWS, approximately six sea stars might be impacted by direct pile contact (5.72 sea stars; 28.6 m^2 x 0.20 sea stars/ m^2). Because sunflower sea stars are typically solitary and don't aggregate, it is even more unlikely that one pile would strike two or more individuals. As noted in section 4.3.3, sunflower sea star arms may detach when they are injured and the sea star can regenerate lost arms and parts of the central disc (Chia and Walker 1991). Consequently, it is likely that a pile would need to land squarely on a whole individual for it to be killed. However, mitigation measures are in place to survey and remove sea stars if they are present in the area where pile removal and driving is taking place (mitigation measure 50), make it if less likely that adverse impacts to sea stars would occur.

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

6.1.1.6 **Direct Human Contact**

Trident will be conducting scans for the presence of sunflower sea stars in the 10 m shutdown zone around piles to be removed/replaced. If a sea star is found, it will be carefully removed and reported as outlined in mitigation measures #50, 51, and 57. If we again assume a sea star density of 0.20 /m^2 , we can use the area of the Level A shutdown zones to calculate how many sea stars may be handled. The maximum shutdown zone area is ~314 m^2, which only occurs if there is no obstruction to the dissipation of sound from the pile area.

To calculate the number of sunflower sea stars that may be affected by direct contact, we multiplied the sea star density (0.20/m^2) by the estimated area of the 10 m-radius shutdown zone around each pile to get the number of sea stars that may be present on a given day. We multiplied the daily number by the proposed number of working days (55) to get the project total of ~3,454 sea stars that could be affected by direct human contact as they are removed from the shutdown zone prior to pile removal and replacement.

The maximum number of sea stars that could be affected by relocation efforts is a conservative estimate, as the area to be surveyed is likely smaller than the calculated area of 314 m^2 because tidal fluctuations will impact how much habitat is available for sea stars at a given time and the project activities are likely to occur during lower water levels. Sunflower sea stars are habitat generalists that tend occupy low intertidal and subtidal zones, and are common at depths less than 25 m. The maximum area to be surveyed for sea star removal is 314 m^2, which accounts for an incredibly small amount of the total habitat available for the species in south central Alaska waters. Additionally, removal of sea stars from the shutdown zone is expected to be minor harassment and not cause fatality to the individuals while helping to conserve the species. Based on the amount of area from which sea stars will be removed compared to their total available habitat and the limited impacts expected on individuals, we conclude that effects of direct human contact on sunflower sea stars with be minor.

6.1.2 Major Stressors on ESA-Listed Species and Critical Habitat

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

6.1.2.1 **Threshold Shifts**

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

Temporary Threshold Shift

Temporary threshold shift (TTS) is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter 1970). While experiencing TTS, the hearing threshold rises, and a sound must be stronger in order to be heard. In terrestrial mammals, TTS can last from minutes to days (in cases of strong TTS). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the sound ends. Few data exist on the sound levels and durations necessary to elicit mild TTS in marine mammals, and none of the published data describe TTS elicited by exposure to multiple pulses of sound. Available data on TTS in marine mammals are summarized in Southall et al. (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 sound thresholds for the onset of TTS are conservative. If TTS does occur, it is expected to be mild and temporary and not likely to affect the long-term fitness of the affected individuals.

Permanent Threshold Shift

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

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

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

6.1.2.2 **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 respectively) (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,[9] expressed in root mean square[10] (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 7) 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.

[9] 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.

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

Table 7. PTS Onset Acoustic Thresholds for Level A Harassment (NMFS 2018b).

Hearing Group	PTS Onset Acoustic Thresholds[1] (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
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

[1] 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 8. Underwater marine mammal hearing groups (NMFS 2018b).

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

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

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

Level A harassment radii can be calculated using the optional user spreadsheet[11] associated with NMFS Acoustic Guidance, or through modeling.

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

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

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

and DTH have sound source levels capable of causing take under the MMPA and ESA.

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

6.2 Exposure Analysis

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

As discussed in Section 2.1.2 above, the USACE and NMFS Office of Protected Resources Permits and Conservation Division proposed mitigation measures that should avoid or minimize exposure of Mexico DPS humpback whales, WDPS Steller sea lions, and sunflower sea stars to one or more stressors from the proposed action.

6.2.1 Ensonified Area

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

The sound field in the action area is the existing background sound plus additional construction sound from the proposed project. Marine mammals may be affected via sound generated by the primary components of the project (i.e., vibratory pile removal/installation and DTH pile installation). NMFS used acoustic monitoring data from other locations to develop the source levels used to calculate distances to the Level B thresholds for different sizes of piles and removal/installation methods. The values used and the source from which they were derived are summarized in Table 4 and described in detail below.

Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic sound exposure is also informed to varying degrees by other factors related to the source (e.g., frequency, predictability, duty cycle), the environment (e.g., bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall et al. 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 sound above received levels of 120 dB re 1 μPa rms for continuous or non-impulsive sources (e.g., vibratory pile-driving and DTH) and above 160 dB re 1 μPa rms for non-explosive impulsive (e.g., DTH) or intermittent sources.

Trident's proposed dock replacement activities include the use of continuous and impulsive sources, and therefore the 120 and 160 dB re 1 μPa rms thresholds for Level B behavioral harassment are applicable.

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

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

TL = transmission loss in dB

B = transmission loss coefficient; for practical spreading equals 15

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

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

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

Using the practical spreading model, Trident determined that DTH will result in the underwater sound falling below 120 dB rms at a calculated maximum distance of 6,310 m. Trident will be using a bubble curtain during pile driving and DTH activities, which reduces the sound source level by 5 dB, resulting in a smaller Level B isopleth compared to other DTH activities that have occurred in the vicinity. There are restrictions to the spread of underwater sound to the full distance of the Level B harassment isopleths based on the local geography of the surrounding areas (see Fig. 4).

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

6.2.2 Marine Mammal Occurrence and Exposure Estimates

In this section we provide the information about the presence, density, or group dynamics of humpback whales and WDPS Steller sea lions that informed the exposure estimate calculations. Sunflower sea stars are not expected to be impacted by these sound sources (see Section 6.3.1.5), so exposure estimates for sea stars are not included in this section.

For our calculations, we used either density data (humpback whale) or occurrence data (Steller sea lions). Occurrence data were based mostly on marine mammal monitoring reports from previous projects or studies that had been conducted in the same area. The metrics used and their sources are described in Table 9.

Table 9. Density and occurrence data used for exposure estimates.

Species	Density	Occurrence	Reference
Humpback Whale	0.093 (ind/km^2)	NA	Halpin et al. (2009)
WDPS Steller Sea Lion	NA	40 (ind/day)	ABR Inc. (2016), NMFS (2019)

For humpback whales, for which density data was the best available information, the following equation was used for exposure estimates:

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

Ex: 14-inch timber pile removal = 0.093 ind/km^2 * 2.83 km^2 * 4 days = 1.05 HB whales

These calculations would be completed for each activity and summed to get the total exposure estimate for humpback whales. Fractional estimates were rounded to the nearest whole number. The ensonified area and the number of days for each activity at each site can be found in Table 10. For Steller sea lions, for which occurrence data was available, the following equation was used for exposure estimates:

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

Ex: 14-inch timber pile removal = 40 ind/day * 4 days = 160 SSL

Table 10. Density and occurrence data used for exposure estimates.

Activity	Ensonified area (km^2)	Number of Days
Vibratory Hammer		
14-inch timber pile removal	2.83	4
14-inch H-pile removal	0.33	4

Activity	Ensonified area (km^2)	Number of Days
16-inch steel pile removal	2.65	3
16-inch steel pile installation (permanent)	2.65	5
24-inch steel pile installation (temporary)	2.65	3
24-inch steel pile removal (temporary)	2.65	3
24-inch steel pile installation (permanent)	2.65	13
DTH		
16-inch steel pile installation (permanent)	2.83	4
24-inch steel pile installation (temporary)	2.83	3
24-inch steel pile installation (permanent)	2.83	13

As described in Section 4.3.1., an estimated 11 percent of humpback whales in the Gulf of Alaska are from the Mexico DPS (Wade 2021). Exposure estimates of humpback whales (n=13, based on the sum of exposure estimates from all activities) were multiplied by 11 percent to determine the number of Mexico DPS humpback whales that would be exposed to Level B harassment. All Steller sea lions in the action area are presumed to be from the WDPS. See Table 11 for calculated exposure estimates.

Table 11. Exposure estimates for ESA-listed marine mammal species from pile removal and installation activities.

Species	Exposure Estimate
Mexico DPS Humpback whale (*Megaptera novaeangliae*)	2
Western DPS Steller sea lion (*Eumetopias jubatus*)	2,200

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. Should a Steller sea lion go undetected, initially, by a protected species observer and later be observed within the Level A harassment zone, the mitigation measures (including shutdowns), make it unlikely that an animal would accumulate enough exposure for PTS to occur. Therefore, no take by Level A harassment is proposed or expected to occur.

6.3 Response Analysis

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

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

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

6.3.1 Responses to Major Sound Sources (Pile Removal/Installation Activities)

As described in the *Exposure Analysis*, Mexico DPS humpback whales and WDPS Steller sea lions are anticipated to occur in the action area and are anticipated to overlap with sound associated with pile removal and installation. We assume that some individuals are likely to be exposed and respond to these continuous and impulsive sound sources.

With proper implementation of the mitigation measures and shutdown procedures described in Section 2.1.2, we do not expect that any listed marine mammals will be exposed to sound levels loud enough, long enough, or at distances close enough for the proposed action to cause Level A exposures. All Level B instances of take are expected to occur at received levels greater than 120 dB and 160 dB for non-impulsive and impulsive sound sources, respectively.

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

Exposure to pile removal/driving and DTH sound has the potential to result in auditory threshold shifts and behavioral reactions (e.g., avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior). The effects of pile removal/driving and DTH sound on marine mammals are dependent on several factors, including, but not limited to, sound type (e.g., impulsive vs. non-impulsive), the species, age and sex class (e.g., adult male vs. cow with calf), duration of exposure, the distance between the pile and the animal, received levels, behavior at time of exposure, and previous history with exposure (Wartzok et al. 2003, Southall et al. 2007). Physical auditory effects (threshold shifts) were discussed in section 6.1.2. here we discuss non-auditory physiological and behavioral effects.

6.3.1.1 **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, sound reduction from reduced ship traffic in the Bay of Fundy following September 11, 2001 was linked to a significant decline in fecal stress hormones in North Atlantic right whales, suggesting that chronic exposure to increased sound levels, although not acutely injurious, can produce stress (Rolland et al. 2012). These stress hormones returned to their previous level within 24 hours after the resumption of shipping traffic. Exposure to loud sound can also adversely affect reproductive and metabolic physiology (Kight and Swaddle 2011). In a variety of factors, including behavioral and physiological responses, females appear to be more sensitive or respond more strongly than males (Kight and Swaddle 2011).

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

The estimated 55 days of in-water activities to repair the Trident bunkhouse dock will be non-consecutive and only during daylight hours, thus limiting the potential for chronic stress. Humpback whales or Steller sea lions that show behavioral avoidance of pile removal/driving and DTH are especially unlikely to incur auditory impairment or non-auditory physical effects because they will be limiting the duration of their exposure.

6.3.1.2 **Behavioral Responses**

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

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

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

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway et al. 1997, Finneran 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). Humpback whales and Steller sea lions are expected to exhibit some of these behavioral responses to the proposed action.

6.3.1.3 **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.

Sound from pile removal/driving and DTH activities is relatively short-term. It is possible that pile driving and DTH sound resulting from this proposed action may mask acoustic signals important to Mexico DPS humpback whales and WDPS 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.

6.3.1.4 **Change in Dive, Respiration, Vocalizations, or Feeding Behavior**

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

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

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

Rates of respiration naturally vary with different behaviors, and alterations to breathing rate as a function of acoustic exposure can be expected to co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may indicate annoyance or an acute stress response. Various studies have shown that respiration rates may either be unaffected or could increase, depending on the species and signal characteristics, again highlighting the importance in understanding species differences in the tolerance of underwater sound when determining the potential for impacts resulting from anthropogenic sound exposure (Kastelein et al. 2000).

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

6.3.1.5 **Effect of Sound on Sunflower Sea Stars**

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

6.3.2 Response Analysis Summary

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

7 CUMULATIVE EFFECTS

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

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

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

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

7.1 Vessel Traffic, Tourism, and Transportation

The action area for the proposed activities experiences moderate to heavy levels of marine vessel traffic year-round with. Marine vessels that use the action areas include cruise ships, passenger ferries, whale watching tour boats, charter and commercial fishing vessels, barges, freight vessels, recreational vessels, and kayaks. Kodiak has one of the largest fishing fleets on the west coast, with 1,200 vessels housed and serviced in two harbors. Additionally, Kodiak also has three deep-water piers to support ferry, cargo, and cruise vessels. From 2018 to 2019, there was an 18 percent increase in the total number of cruise passengers to Alaskan ports (McDowell Group 2020a). Though cruises practically ceased in 2020 and into 2021 due to the pandemic, 2022 saw ~1.15 million cruise passengers came to Alaska, and 2023 saw ~1.65 million. Larger vessels and longer seasons have the potential to bring many more passengers Kodiak, which could have effects on listed species.

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

7.2 Fishing

Fishing, a major industry in Alaska, is expected to continue near the Port of Kodiak and the Trident bunkhouse dock. The bunkhouse serves workers for the Trident seafood processing plant in Kodiak, one of the largest fishing ports on the west coast. 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 13 humpback whales may be exposed to sound from pile removal and installation activities. It is expected that 11 percent of these whales are from the Mexico DPS, for a maximum of two whales from this DPS expected to be exposed to Level B harassment.

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

Disturbance to seafloor, habitat, and prey resources are not expected to adversely affect humpback whales because these disturbances are temporary, and the action area is not important habitat to humpback whales for migrating, breeding, or other essential life functions. Though there is a feeding BIA around Kodiak Island for humpback whales (Fig. 10), the action area of the proposed activities are in areas that are not necessarily preferable for foraging based on vessel traffic and bathymetry. Adherence to mitigation measures is expected to minimize the risk of exposure of humpback whales to the potential introduction of pollutants into the action area.

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

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

Therefore, the exposures from this action are not likely to reduce the abundance, reproduction rates, or growth rates (or significantly increase variance in one or more of these rates) of the humpback whale populations represented in the action area. 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 DPS humpback whales.

As mentioned in the Environmental Baseline section, Mexico DPS humpback whales may be impacted by a number of anthropogenic activities present in Near Island Channel and the surrounding area. The high degree of human activity, especially within Kodiak harbor, has produced a number of anthropogenic risk factors that marine mammals must contend with, including: coastal and marine development, oil and gas development, ship strikes, sound pollution, water pollution, prey reduction, fisheries, tourism, and research. These risk factors are in addition to those operating on a larger scale such as predation, disease, and climate change. The species may be affected by multiple threats at any given time, compounding the impacts of the individual threats. All of these activities are expected to continue to occur into the foreseeable future.

8.2 WDPS Steller Sea Lion Risk Analysis

Based on the results of the exposure analysis, we expect that 2,200 WDPS Steller sea lions may be exposed to sound from pile removal and installation at the Trident bunkhouse dock, using a local occurrence of 40 sea lions per day. This estimate represents the maximum number of takes that may be expected to occur, but not necessarily the number of individuals taken, as a single individual may be taken multiple times over the course of the proposed action. Sound from pile removal and installation activities is likely to cause some individual Steller sea lions to experience changes in their behavioral states that might have adverse consequences (Frid and Dill 2002). However, these responses are not likely to alter the physiology, behavioral ecology, or social dynamics of individual Steller sea lions in ways or to a degree that would reduce their fitness.

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

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

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

It is difficult to estimate the behavioral responses, if any, that WDPS Steller sea lions may exhibit to underwater sounds generated by project activities. Though the sounds produced during project activities may not greatly exceed levels that Steller sea lions already experience in Near Island Channel, 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). There are no rookeries but two haulouts within the 20 nm aquatic zone around Near Island Channel. The natural surrounding geography will make it highly unlikely that project-related sound will reach these haulouts. 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 sound from pile removal and installation activities are not likely to reduce the current or expected future reproductive success or reduce the rates at which Steller sea lions grow, mature, or become reproductively active. Therefore, these exposures are not likely to reduce the abundance, reproduction rates, or survival and growth rates of the population those individuals represent.

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

As mentioned in the Environmental Baseline section, and similar to what was discussed for humpback whales in the previous section, WDPS Steller sea lions may be impacted by a number of anthropogenic activities present in Near Island Channel. Human activity, especially within the Kodiak harbor area, has produced a number of anthropogenic risk factors that marine mammals must contend with, including: coastal and marine development, oil and gas development, ship strikes, sound pollution, water pollution, prey reduction, fisheries, tourism, and research. These risk factors are in addition to those operating on a larger scale such as predation, disease, and climate change. WDPS Steller sea lions may be affected by multiple threats at any given time, compounding the impacts of the individual threats. All of these activities are expected to continue to occur into the foreseeable future.

8.3 Sunflower Sea Star Risk Analysis

Little is known about how sunflower sea stars respond to underwater sound. As concluded in section 6.3.1.5, we expect any effects of sound on sea stars from the proposed action to be insignificant, if there are any effects at all. The primary risks to sea stars from this action are direct pile contact and direct human contact, if sea stars are present in the 10 m shutdown zone. We calculated that approximately six sea stars might be struck by direct pile contact.

Sea stars may also be impacted by direct human contact during pre-construction site inspections. If a sea star is found in the 10 m shutdown zone of a pile that will be removed or installed, it will be moved out of the shutdown zone. Assuming a density of 0.20 sea stars/ m^2 (C. Long, pers comm.), we estimate that a maximum of ~3454 sea stars could be impacted by direct human contact during the proposed activities.

Across all sites included in this action, it is anticipated that sea stars may be impacted by either direct pile or human contact within a 314 m^2 area. Compared to the amount of habitat the species can occupy throughout Alaska and other parts of its range (e.g., low intertidal and subtidal zones down to 435 m, but most common above 25 m), and the expected non-lethal impacts of direct human contact, the proposed action is not expected to decrease the likelihood of survival or recovery of the sunflower sea star.

As mentioned in the Environmental Baseline section, sunflower sea stars may be impacted by a number of anthropogenic activities present in Near Island Channel. Human activity, especially within the Kodiak harbor area, has produced anthropogenic risk factors that marine species must contend with. We expect that the following factors may affect sunflower sea stars: coastal and marine development, oil and gas development, water pollution, prey reduction, and research. These risk factors are in addition to those operating on a larger scale such as predation, disease, and climate change. As with the other species considered in this Opinion, sunflower sea stars may be affected by multiple threats at any given time, compounding the impacts of the individual threats. All of these activities are expected to continue to occur into the foreseeable future.

9 CONCLUSION

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS's biological opinion that the proposed action is not likely to jeopardize the continued existence of Mexico DPS humpback whales, WDPS Steller sea lions, or sunflower sea stars. Further, it is NMFS's biological opinion that the proposed action is not likely to adversely affect WNP DPS humpback whales, fin whales, North Pacific right whales, sperm whales, or destroy or adversely modify designated Mexico DPS humpback whale or Steller sea lion critical habitat. No critical habitat has been designated for fin or sperm whales, and none is currently proposed for sunflower sea stars, therefore none will be affected.

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). For this consultation, USACE and the NMFS Permits Division anticipate that any take of Mexico DPS humpback whales and WDPS Steller sea lions, will be by Level B harassment only. No Level A takes are contemplated or authorized. Further, the USACE anticipates that incidental take of sunflower sea stars may occur by harassment through direct handling.

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

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

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

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

10.1 Amount or Extent of Take

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

The taking of Mexico DPS humpback whales and WDPS Steller sea lions will be by incidental harassment only. The taking by serious injury or death is prohibited and will result in the modification, suspension, or revocation of the ITS. Table 12 lists the amount 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 13 instances of Level B harassment of humpback whales may occur. While we are only authorizing take of two Mexico DPS humpback whale under the ESA, we will consider the ESA-authorized take limit to be exceeded when the MMPA-authorized limit on Level B take of humpback whales is exceeded, as it is impossible to distinguish between DPSs in the field. NMFS expects that 2,200 instances of Level B harassment of WDPS Steller sea lions may occur.

Pile driving and DTH 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).

Table 12. Summary of instances of exposure associated with the proposed pile driving/removal resulting in incidental take of ESA-listed species by Level A and Level B harassment.

Species	Authorized Level A Takes (animals)	Authorized Level B Takes (animals)	Authorized Non-mammal Takes (animals)
Mexico DPS Humpback whale (*Megaptera novaeangliae*)	0	2	0
Western DPS Steller sea lion (*Eumetopias jubatus*)	0	2,200	0
Sunflower sea star (*Pycnopodia helianthroides*)	0	0	3,460

10.2 Effect of the Take

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

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

Mexico DPS humpback whales are estimated to account for ~11 percent of the humpback whales in the Gulf of Alaska. The current trend of this DPS is unknown, but thought to be declining from a population of ~3,264 individuals (Wade et al. 2016b). However, the proposed activities are only expected to cause harassment to two Mexico DPS individuals, which account for 0.0006 percent of the total DPS.

WDPS Steller sea lions are common in the proposed action area and have been encountered often during previous projects (ABR Inc. 2016). The estimated take for the species is 2200, assuming 40 individuals per day will overlap with project activities during the 55 days of work. Though seemingly high, the estimated take accounts for 0.04 percent of the total DPS, and occurs in an area with naturally large amount of human activities and associated sound.

We estimate that the proposed activities could affect ~3,460 sunflower sea stars as they are removed from the shutdown zone prior to in-water work or struck by a pile being installed. The current range-wide (*i.e.,* global) population estimate for the sunflower sea star is nearly 600 million individuals, based on a compilation of the best available science and information (Gravem et al. 2021). The proposed activities will impact, at most, 0.0000058 percent of the population. Take prohibitions have not been proposed for this species at this point.

10.3 Reasonable and Prudent Measures

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

RPMs are distinct from the mitigation measures that are included in the proposed action (described in Section 2.2). We presume that the mitigation measures will be implemented as described in this opinion. The failure to do so will constitute a change to the action that may require reinitiation of consultation pursuant to 50 CFR § 402.16.

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

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

10.4 Terms and Conditions

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

In order to be exempt from the prohibitions of section 9 of the ESA, the 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 USACE and NMFS Permits Division or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR § 402.14(i)(3))).

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

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

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

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

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

2.1 Through the use of PSOs, ensure that marine mammals are not present within the relevant activity-specific Level B monitoring zone for pile removal and installation for at least 30 minutes immediately prior to initiation of the in-water activity (Table 2). If one or more listed species are observed within the Level B monitoring zone, the in-water activity will not begin until the listed species exit the monitoring zone of their own accord, or the monitoring zone has remained clear of listed species for 30 minutes immediately prior to start of activities.

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

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

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

2.5 Submit a project specific report within 90 days of the conclusion of in-water work associated with this project. The report must analyze and summarize marine mammal and sunflower sea star 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 (construction and materials barges and tugs) should participate in the WhaleAlert program to report real-time sightings of whales while transiting in the waters of Southeast Alaska and to minimize the risk of vessel strikes. More information is available at https://www.fisheries.noaa.gov/resource/tool-app/whale-alert.
2. Without approaching whales, project vessel crews should attempt to photograph humpback whale flukes and record GPS coordinates of the sightings during transit. These data should be included in the final report submitted to NMFS AKR.
3. Without approaching whales, project vessel crews should attempt to photograph and/or video North Pacific right whales and record GPS coordinates of the sightings during transit. These data should be submitted to NMFS AKR as soon as possible.
4. Without approaching sea lions, project vessel crews should attempt to photograph Steller sea lions when brand numbers are visible and record GPS coordinates of the sightings during transit. These data should be included in the final report submitted to NMFS AKR.
5. USACE should ensure that the entities responsible for conducting the sunflower sea star surveys have practice and expertise with the methodology they use to conduct the survey, prior to conducting the actual surveys. In addition, USACE should invite PRD biologists to the site when a sunflower sea star survey is being conducted or the equipment to do the survey is being tested to enable PRD to better understand the efficacy of the selected methods and equipment.
6. USACE should publish, or make widely available, a report detailing the methodology used and results of the sunflower sea star surveys conducted as part of this proposed action. Those findings will aid other action agencies and future projects in developing protocols for future surveys, and will increase general understanding of sunflower sea star movements and densities across southcentral and southeast Alaska.

In order to keep NMFS's Protected Resources Division informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, USACE and NMFS

Permits Division should notify NMFS of any conservation recommendations they implement in their final action.

12 REINITIATION OF CONSULTATION

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

13 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

13.1 Utility

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

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

13.2 Integrity

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

13.3 Objectivity

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

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

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

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

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