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

Sitka Seaplane Base Construction, Sitka, Alaska

NMFS Consultation Number: AKRO-2023-02513

Action Agencies: National Marine Fisheries Service (NMFS), Office of Protected Resources, Permits and Conservation Division; City and Borough of Sitka, *as designated representative for the* Federal Aviation Administration (FAA)

Affected Species and Determinations:

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

Consultation Conducted By: National Marine Fisheries Service, Alaska Region

Issued By: ______________________
Jonathan M. Kurland
Regional Administrator

Date: May 1, 2024

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TERMS AND ABBREVIATIONS

Acronym/ Abbreviation	**Definition**
ADOT	Alaska Department of Transportation & Public Facilities
AKR	Alaska Region
ARBO	Arctic Regional Biological Opinion
ASLC	Alaska SeaLife Center
BA	Biological Assessment
CBS	City Borough of Sitka
CI	Confidence Interval
CSEL	Cumulative Sound Exposure Level
CV	Coefficient of Variance
CWA	Clean Water Act
dB re 1µPa	Decibel referenced 1 microPascal
District Court	U.S. District Court for the District of Alaska
DOWL	Dowl Engineers
DPS	Distinct Population Segment
EEZ	Exclusive Economic Zone
EPA	Environmental Protection Agency
ESA	Endangered Species Act
°F	Fahrenheit
FR	Federal Register
ft	Feet
g	Gallons
HTL	High Tide Line
Hz	Hertz
IHA	Incidental Harassment Authorization
in^3	Cubic Inches
IPCC	Intergovernmental Panel on Climate Change
ITA	Incidental Take Authorization
ITS	Incidental Take Statement
IWC	International Whaling Commission
kHz	Kilohertz
km	Kilometers
kn	Knots

Acronym/ Abbreviation	**Definition**
L	Liter
m	Meter
mi	Mile
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
ms	Milliseconds
μPa	Micro Pascal
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NRC	National Research Council
NSF	National Science Foundation
Opinion	Biological Opinion
Pa	Pascals
PR1	NMFS Permits Division
PTS	Permanent Threshold Shift
RMS	Root Mean Square
RPA	Reasonable and Prudent Alternative
s	Second
SEL	Sound Exposure Level
SPLASH	Structure of Populations, Level of Abundance and Status of Humpback Whales
SSB	Sitka Seaplane Base
SSL	Steller Sea Lion
TTS	Temporary Threshold Shift
USACE	United States Army Corps of Engineers
VMS	Vessel Monitoring System
WDPS	Western Distinct Population Segment

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. A more recent proposed rule was published in the *Federal Register* on June 22, 2023 (88 FR 40753).

In this document, the action agencies are the Federal Aviation Administration (FAA) and the National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division (from now on referred to as PR1) for their issuance of an Incidental Take Authorization (IHA) under the Marine Mammal Protection Act (MMPA) for each of the two proposed phases of the project. The FAA proposes to make improvements to the Sitka Seaplane Base in Sitka, Alaska. On November 2, 2020, the FAA designated the City and Borough of Sitka (CBS) as its non-federal representative for the purposes of completing this consultation. The CBS has contracted with DOWL Engineers (DOWL) to provide concept planning and environmental review (Environmental Assessment) for the project. DOWL has subcontracted with Solstice Alaska Consulting, Inc. (Solstice AK) to address biological resources and particularly marine biology issues under the ESA and the Marine Mammal Protection Act (MMPA). PR1 requested consultation on the proposed issuance of the IHAs under section 101(a)(5)(D) of the MMPA for the aforementioned activities. Additionally, PR1 requested consideration of the potential authorization of take in the year following the initial IHA (e.g. Phase II) if the criteria published in the Federal Register (FR 88, 1884, January 11, 2024) are met. 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 listed and proposed 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 December 8, 2023, Biological Assessment (BA) and subsequent revisions submitted by Solstice AK, and the Incidental Harassment Application (IHA) and subsequent revisions prepared by PR1. A complete record of this consultation is on file at NMFS's Alaska Regional Office.

The proposed action involves construction of a new Sitka Seaplane Base (SPB) to replace the existing seaplane base in Sitka, AK (Figure 1). Construction is expected to start in the summer of 2024.

The project would consist of several components, completed over two phases with construction from July 2024 through the end of July 2026:

This opinion considers the effects of the following in-water activities:

1. installation and removal of temporary support/ guidance piles
2. installation of permanent piles
3. support and material supply vessel transit

Additionally, this opinion considers the effects of the associated proposed issuance of an IHA on endangered North Pacific right whale (*Eubalaena japonica*), fin whale (*Balaenoptera physalus*), sperm whale (*Physeter macrocephalus*), threatened Mexico DPS humpback whales (*Megaptera novaeangliae*), endangered Western DPS Steller sea lion (*Eumetopias jubatus*), and associated critical habitat. The action agency also requested a conference on the proposed listing of the sunflower sea star (*Pycnopodia helianthoides*) (88 FR 16212, March 16, 2023) in the consultation, and requested concurrence with a likely to adversely affect determination.

Figure 1. Project Location in Southeast Alaska (HDR 2022)

Figure 2. Project Location in Sitka, AK (HDR 2022)

1.2 Consultation History

- November 2, 2020 - NMFS Alaska Region (AKR) received a letter from the FAA designating the CBS and their consultants as their non-federal representatives for the purposes of the ESA consultation.
- November 5, 2020 - NMFS AKR received a letter from Solstice AK requesting initiation of formal consultation under Section 7(a)(2) of the ESA for the construction of the Sitka SPB.
- December 16, 2020 - NMFS AKR received a draft Biological Assessment (BA) for the Sitka SPB from Solstice AK.
- The project was paused for several months while planning and engineering was finalized with CBS.
- April 5, 2021 - NMFS AKR received a letter from Solstice AK requesting initiation of formal consultation under Section 7(a)(2) of the ESA for the construction of the Sitka SPB.
- April 12, 2021 - NMFS AKR received an email from the FAA stating that the CBS could proceed with the Finding of No Significant Impact (FONSI) for the SPB contingent upon completion of the ESA consultation.
- April 2021 - NMFS AKR received a revised BA from Solstice AK.
- December 6, 2021 - NMFS AKR received a request for expedited informal consultation

on the geotechnical investigations for the proposed Sitka sea plane base from the FAA.

- February 7, 2022 - NMFS AKR issued a letter of concurrence to the FAA for their geotechnical investigation project (AKRO-2021-03432).
- August 11, 2023 - NMFS AKR received a revised BA from Solstice AK.
- September 1, 2023 - NMFS Permits Division (PR1) received an IHA application for the Sitka Seaplane Base (SPB) project.
- September 20, 2023 - NMFS PR1 sent revision requests to Solstice AK for the IHA application.
- October 12, 2023 - Solstice AK submitted responses and revisions to the IHA application.
- October 27, 2023 - The Early Review Team (ERT) which involves participants from NMFS AKR and PR1, met to discuss the project.
- November 2023 - Solstice AK and PR1 had email exchanges to clarify additional questions on the project and the IHA.
- December 5, 2023 - PR1 determined the IHA application adequate and complete.
- December 8, 2023 - NMFS AKR received the revised BA prepared by Solstice AK. December 18, 2023 - NMFS AKR notified Solstice AK and CBS that formal consultation had been initiated.
- January 10, 2024 - NMFS AKR received the draft federal register notice and IHA from PR1.
- January 11, 2024 - The Proposed IHA published in the *Federal Register* (88 FR 1884, January 11, 2024); NMFS AKR received a request for consultation from PR1.
- February 12, 2024 - The public comment period on the IHA closed.
- February 13, 2024 - PR1 notified AKR that no comments were received on the IHA.

2 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

2.1 Proposed Action

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

This opinion considers the effects of CBS's proposed construction of the new SPB. The project includes the removal and installation of both temporary and permanent piles to support the floating dock structures and an approach ramp. Additional above-water improvements will include blasting and excavation to prepare the area for upland facilities (bridge abutment, vehicle turnaround, parking, basic amenities, curb, vehicle driveway, security fencing, and landscape buffer). The United States Army Corps of Engineers (USACE), Alaska District will issue a Rivers and Harbors Act Section 10 and Clean Water Act Section 404 permit for the project. NMFS PR1 will issue an IHA to take marine mammals by harassment under the MMPA incidental to these actions in Sitka Sound near Sitka, AK. Construction is expected to occur over approximately two years beginning as early as July 2024.

2.1.1 Proposed Activities

The City and Borough of Sitka is located in Sitka Sound on the west side of Baranof Island, approximately 150 kilometers southwest of Juneau in southeast Alaska (Figure 1). The proposed Sitka SPB site is located on the east side of Japonski Island near the main harbor entrance to the Sitka Channel (Figure 2). The current Sitka SPB (FAA identifier A29) is located on the eastern shore of Sitka Channel, near Eliason Harbor and downtown Sitka. The existing site's proximity to Sitka Sound Seafoods fish processing plant has created additional wildlife conflicts. The new Sitka SPB would address existing capacity, safety, and condition deficiencies for critical seaplane operations, and allow seaplanes to transit Sitka Channel more safely.

The project would consist of several components, completed over two phases:

The following components are proposed for Phase I (construction from July 2024 through July 2025):

- Seaplane ramp float
- Drive-down float
- Pedestrian and vehicle transfer bridge
- Approach dock
- Uplands approach, storage area, and parking

The following components are proposed for Phase II (construction from July 2025 through July 2026):

- Transient seaplane float
- Turnaround float
- Expanded uplands approach, storage area, and parking
- Drive-down launch ramp

The two proposed construction phases of Sitka SPB Project are detailed below and illustrated in Figure 3 and Figure 4.

2.1.1.1 Phase I (July 2024-July 2025)

During Phase I, in-water construction activities are expected to occur for a total of approximately 45 hours over 31 days (not necessarily consecutive). Most of the in-water work time would be spent down-the-hole (DTH) pile driving (34 hours). All permanent piles would be initially installed with a vibratory hammer. After vibratory pile driving, piles would be socketed into the bedrock with DTH drilling equipment. Finally, piles would be driven the final few inches of embedment with an impact hammer. Under Phase I (Figure 3; Table 2-1), the proposed project would construct and install the following pile-supported components:

- 80-foot by 24-foot approach dock
- 120-foot by 12-foot pedestrian and vehicle transfer bridge
- 128-foot by 68-foot drive-down float
- 417-foot by 46-foot seaplane ramp float to support 10 Cessna and 4 Beaver seaplane berths
- Install and remove 12 temporary, 16-inch-diameter steel piles, as templates to guide proper installation of permanent piles (these temporary piles would be removed prior to project completion) (Table 3-1).
- Install 10 permanent 16-inch-diameter galvanized steel piles and 16 permanent 24-inch-diameter galvanized steel piles to support the approach dock, pedestrian and vehicle transfer bridge, bridge landing and drive-down float, and seaplane ramp float (Table 3-1).
- Install other SPB float components such as electricity connections, waterlines, lighting, passenger walkway, handrail, and mast lights.

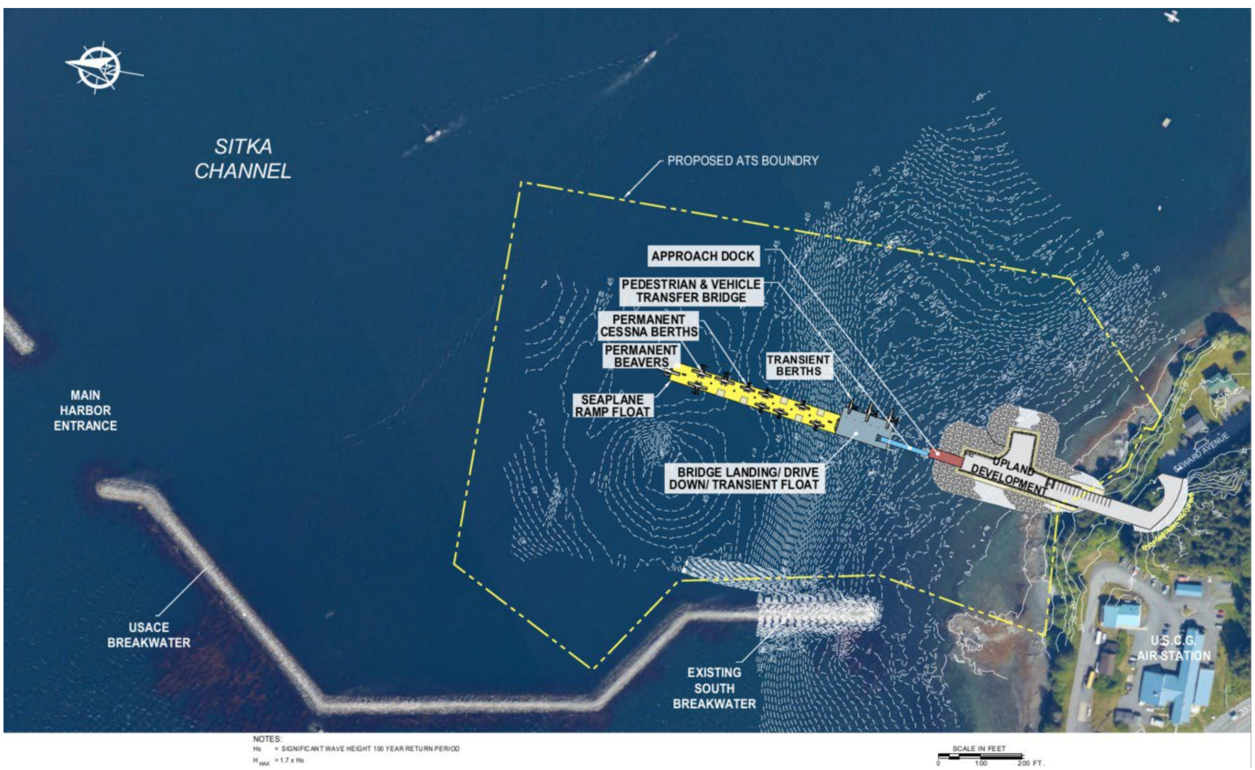

Figure 3. Sitka SPB project area and proposed activities for Phase I of construction (Solstice AK 2023).

Upland Activities:

The project would conduct rock blasting and excavation of about 10,100 cubic yards (CY) of material extending from about 16 to 60 vertical feet above mean lower low water (MLLW; 0.00

datum) located at the end of the Seward Avenue in the southwest corner of the project uplands.

- All blasting and excavating would occur above high tide line (HTL; +13 feet).
- Rock blasting and excavation would extend approximately 200 horizontal feet inland.
- One blasting event per day on 47 days (not consecutive) at an estimated 90 decibels (dB; at the blast center) per event (Southeast Earth Movers 2020).
- Construct 2.6 acres of uplands including bridge abutment, vehicle turnaround, parking, basic amenities, curb, vehicle driveway, security fencing, and landscape buffer (Figure 5).
- Discharge of 0.03 acres of fill between mean high water (MHW; +9.16 feet) and HTL (+13 feet) and 1.3 acres below MHW.
- Side slopes of fill would have ratio of 2 horizontal to 1 vertical (2H:1V) slopes with heavy open graded armor rock and interstitial spaces.

2.1.1.2 Phase II

Construction of Phase II would follow a sequence similar to Phase I with in-water work occurring for approximately 13 hours over 9 days (not necessarily consecutive). Most of the in-water work time would be spent DTH pile driving (9 hours). As in Phase I, in Phase II all permanent piles would be initially installed with a vibratory hammer. After vibratory driving, piles would be socketed into the bedrock with DTH drilling equipment. Finally, piles would be driven the final few inches of embedment with an impact hammer. Under Phase II (Figure 4; Table 2-1), the proposed project would:

- Construct and install the following pile-supported components:
    - 56-foot by 32-foot vehicle turnaround float.
    - 144-foot by 56-foot transient float to support 5 transient seaplane berths.
- Install and remove 6 temporary 16-inch-diameter steel piles as templates to guide proper installation of permanent piles (these temporary piles would be removed prior to project completion) (Table 3-1).
- Install 6 permanent 24-inch-diameter galvanized steel piles to support the vehicle turnaround float and transient float (Table 3-1).
- Install other SPB float components such as bull rail, floating fenders, mooring cleats, electricity connections, waterlines, lighting, passenger walkway, handrail, and mast lights.
- Add an additional 1.2 acres of supporting infrastructure with the addition of a 183-foot by 34-foot seaplane haul-out ramp, seaplane staging areas, expanded parking, curb, security fencing, landscape buffer, and a covered shelter (Figure 5).
- Discharge of 0.5 acres of fill between MHW (+9.16 feet) and HTL (+13 feet) and 0.8 acres below MHW.
- Side slopes of fill would have ratio of 2 horizontal to 1 vertical (2H:1V) slopes with heavy open graded armor rock and interstitial spaces.

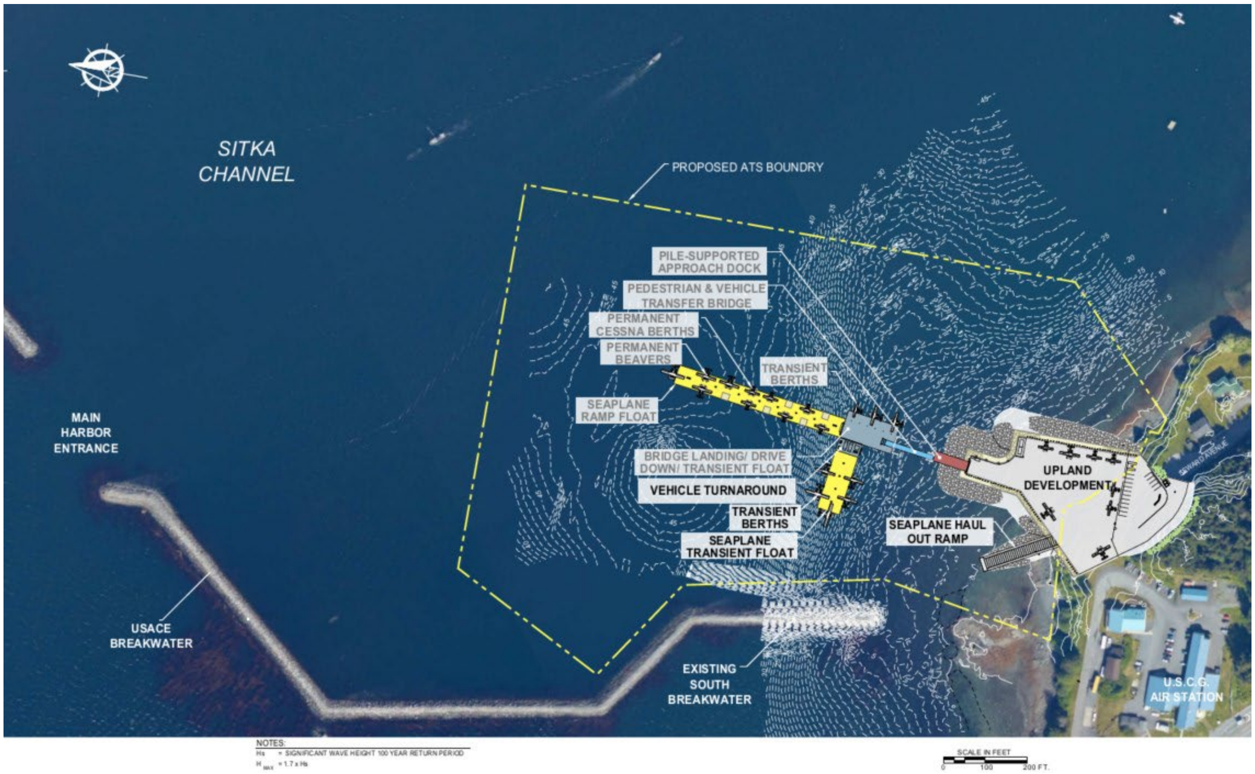

Figure 4. Sitka SPB project area and proposed activities for Phase II of construction. Items completed in Phase I are noted in grey text (Solstice AK 2023).

2.1.1.3 Pile Installation and Removal Methods

Installation and Removal of Temporary (Template) Piles

A maximum of 12 temporary 16-inch-diameter piles would be installed using a vibratory hammer and impacting hammer to construct the approach dock, bridge abutment, and floats during Phase I. These piles would be removed using the vibratory hammer.

A maximum of six temporary 16-inch-diameter piles would be installed using a vibratory hammer and impacting hammer in constructing the project floats during Phase II. These piles would be removed using the vibratory hammer.

Installation of Permanent Piles

All permanent 16-inch-diameter and 24-inch-diameter piles would be initially installed with a vibratory hammer. After vibratory driving, piles would be socketed into the bedrock with down-the-hole (DTH) drilling equipment. Finally, piles would be driven the final few inches of embedment with an impact hammer.

Piles at the end of the seaplane ramp float and the corners of the drive-down float would be installed as a steel pipe pile frame for added stability and reinforcement.

See Table 2-1 for a summary of the numbers and types of piles to be installed and removed during Phase I and Phase II, as well as the estimated durations of each activity.

Table 2-1. Phase I and II Summary of Piles to be Installed and Removed (Solstice AK 2023).

Project Component	**Temp Install**	**Temp Remove**	**Perm Install**	**Perm Install**	**Total**	**Temp Install**	**Temp Remove**	**Perm Install**	**Total**	**Total**
	Phase I					**Phase II**				**I & II**
Diameter of Steel Pipe Piles (inches)	16	16	16	24		16	16	24		
Total # of Piles	12	12	10	16	50	6	6	6	18	68
Vibratory Pile Driving [1]										
Total Quantity	12	12	10	16	50	6	6	6	18	68
Max # Piles Vibrated Per Day	6	6	6	6		6	6	6		
Vibratory Time Per Pile (minutes)	10	10	10	10		10	10	10		
Vibratory Time Per Day (minutes)	60	60	60	60		60	60	60		
Number of Days	2.0	2.0	1.7	2.7	**8.4**	1.0	1.0	1.0	**3.0**	**11.4**
Vibratory Time Total (hours)	2.0	2.0	1.7	2.7	**8.4**	1.0	1.0	1.0	**3.0**	**11.4**
Down-The-Hole Pile Drilling										
Total Quantity			10	16	26			6	6	32
Max # of Piles Installed per Day			2	2	4			2	2	
# of Strikes Per Pile			36,000	54,000				54,000		
# of Strikes Per Second			10	10				10		
Actual Drilling Time Per Pile (minutes)			60	90				90		
Time per Day (minutes)			120	180				180		
Number of Days			5.0	8.0	**13.0**			3.0	**3.0**	**16.0**

Project Component	Temp Install	Temp Remove	Perm Install	Perm Install	Total		Temp Install	Temp Remove	Perm Install	Total	Total
	Phase I						**Phase II**				**I & II**
DTH Drilling Time Total (hours)			10.0	24.0	**34.0**				9.0	**9.0**	**43.0**
Impact Pile Driving											
Total Quantity	12		10	16			6		6		
Max # Piles Impacted Per Day	4		4	4			4		4		
# of Strikes Per Pile	175		175	175			175		175		
Impact Time Per Pile (minutes)	5		5	5			5		5		
Impact Time Per Day (minutes)	20		20	20			20		20		
Number of Days	3.0		2.5	4.0	**9.5**		1.5		1.5	**3.0**	**12.5**
Impact Time Total (hours)	1.0		0.8	1.3	**3.1**		0.5		0.5	**1.0**	**4.1**

[1] The total number of days and total time in hours are the same for vibratory pile driving because the applicant has assumed a maximum of 60 minutes (1 hour) of vibratory pile driving per day.

2.1.1.4 Other In-water Construction and Heavy Machinery Activities

In addition to the activities described above, the proposed action would involve other in-water construction and heavy machinery activities. Examples of other types of activities include using standard barges, tugboats, or other equipment to place and position piles on the substrate via a crane (i.e., “stabbing the pile”).

The seaplane floats (constructed elsewhere) would consist of treated timber and galvanized steel fasteners. The submerged timber structural elements of the floats will be pressure treated with creosote. All other timber components that will not be fully submerged will be pressure treated with ammoniacal copper zinc arsenate. All preservative treatment will be in accordance with best management practices (BMPs) as set forth by the *Western Wood Preservers Institute*. Floatation includes closed cell expanded polystyrene billets covered with 100 percent solid polyurethane and/or polyethylene floatation tubs to protect from physical damage, water absorption, colonization by encrusting organisms, and other factors.

2.1.1.5 Blasting, Excavating, and Filling Methods

To develop the SPB uplands, the project would require rock blasting and excavating 9,500 CY above HTL (+13 feet) and excavating an additional 5,925 CY of common material above HTL in Phase I. Drilling and blasting would be expected to occur for 564 hours over 47 days (12 hours per day) during Phase I. Material would be excavated from the supratidal shoreline (+16 to +60 feet above MLLW). Excavated soils would be stored at an upland location to dry before being used as fill within the proposed uplands. There would be no blasting or excavating during Phase II.

Following blasting and excavating, excavated materials, armor rock, and underlayment would be placed above and below HTL to develop the SPB uplands such as bridge abutment, approach, vehicle turnaround, parking, basic amenities, curb, and vehicle driveway totaling 34,650 CY during Phase I and 56,650 CY during Phase II. The fill would be placed using an excavator and dozer and then compacted using a vibratory soil compactor.

2.1.2 Construction Vessels and Movements

The Contractor is expected to mobilize two barges: one with a crane mounted on it and a staging/work barge that will be moved into place with a tugboat. Additional barges and tugs will be used to deliver equipment as needed. Construction materials will arrive from Seattle, Washington, and coastal Alaska, following well-established, frequently used navigation lanes throughout Southeast Alaska. A small support skiff will be used during construction activities to move workers and materials from shore to active construction. Within the action area, project-related vessels will not exceed 10 knots.

2.1.3 Construction Sequence and Duration

Construction of the project is expected to occur over approximately two years with Phase I beginning as early as July 2024 and Phase II being completed by the end of July 2026. Pile installation and removal will be intermittent during this period, depending on weather, construction and mechanical delays, protected species shutdowns, and other potential delays and logistical constraints.

During Phase I, in-water pile driving activities are expected to occur for a total of approximately 45 hours over 31 days (not necessarily consecutive). Most of the in-water pile-driving time would be spent DTH pile driving (34 hours). Additionally, placement of fill below HTL would occur over an estimated 652 hours of 55 days.

Construction of Phase II would follow a similar sequence with in-water work (pile driving) occurring for approximately 13 hours over 9 days (not necessarily consecutive). Most of the in-water pile-driving time would be spent DTH pile driving (9 hours). Additionally, placement of fill below HTL would occur over an estimated 285 hours or 24 days.

Uplands work would be completed independently of pile supported structures. Uplands project construction would begin with clearing the uplands area, blasting, and excavating. Excavated materials would be placed on uplands to be used as fill. Placement of fill would create 2.6 acres for Phase I (includes 1.3 acres of fill below HTL) and an additional 1.2 acres during Phase II (includes 1.3 acres of fill below HTL). Please see Table 5-1 for a conservative estimate of quantities involved in blasting, excavating, and placement of fill.

The total construction duration accounts for the time required to construct both phases of the project, accounting for potential delays in material deliveries, equipment maintenance, inclement weather, and shutdowns that may occur to prevent impacts to marine mammals.

2.1.4 Mitigation Measures

For all reporting that results from implementation of these mitigation measures, NMFS will be contacted using the contact information specified in Table 2-2. In all cases, notification will reference the NMFS consultation tracking number AKRO-2023-02513.

2.1.4.1 General Mitigation Measures

1. CBS will inform NMFS of impending in-water activities a minimum of one week prior to the onset of those activities.
2. If construction activities will occur outside of the time window specified in these measures, the applicant will notify NMFS of the situation at least 60 days prior to the end of the specified time window to allow for reinitiation of consultation.
3. Project-associated staff will cut all materials that form closed loops (e.g., plastic packing bands, rubber bands, and all other loops) prior to proper disposal in a closed and secured

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

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

2.1.4.2 Protected Species Observer (PSO) Measures

5. A minimum of two (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. For each in-water activity, PSOs will monitor all marine waters within the indicated shutdown and/or monitoring zone radius for that activity. See Figure 3, 4, and 5 in Section 2.2 for specific shutdown and monitoring zones.
6. PSOs will be positioned such that they will collectively be able to monitor the entirety of each activity's shutdown zone. The action agency will coordinate with NMFS on the placement of PSOs prior to commencing in-water work.
7. Prior to commencing any in-water work, PSOs will scan waters within the appropriate shutdown zone and confirm no listed marine mammal species are within the shutdown zone for at least 30 minutes immediately prior to initiation of in-water activity. If one or more listed marine mammal species are observed within the shutdown zone, the in-water activity will not begin until the listed marine mammal species exit the shutdown zone of their own accord. Alternately, if the PSO has continuously scanned these waters and has not observed listed marine mammals within the zone for 30 minutes, then the in-water work may commence.
8. The pre-construction-activity-observation-period described in the above measure will take place at the start of each day of in-water activities, each time in-water activities have been shut down or delayed due the presence of a listed marine mammal species, and following cessation of in-water activities for a period of 30 minutes or longer.
9. The on-duty PSOs will continuously monitor the shutdown zone and adjacent waters during all in-water operations for the presence of listed species.
10. In-water activities will take place only:
    a. between local sunrise and sunset;
    b. during conditions with a Beaufort Sea State of 4 or less; and
    c. when the entire shutdown zone and adjacent waters are visible (e.g., monitoring effectiveness is not reduced due to rain, fog, snow, haze or other environmental or atmospheric conditions).
11. If visibility degrades such that a PSO can no longer ensure that the shutdown zone remains devoid of listed marine mammal 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 marine mammal species for 30 minutes.

12. The PSO will order in-water activities to immediately cease if one or more listed marine mammal species has entered, or appears likely to enter, the associated shutdown zone.
13. If in-water activities are shut down for less than 30 minutes due to the presence of listed marine mammal species in the shutdown zone, in-water work may commence when the PSO provides assurance that listed marine mammal species were observed exiting the shutdown zone. Otherwise, the activities may only re-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).
14. 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 the PSO provides assurance that listed marine mammal species have not been present in the shutdown zone for at least 30 minutes immediately prior to resumption of operations.
15. If a listed marine mammal species is observed within a shutdown zone or is otherwise harassed, harmed, injured, or disturbed, PSOs will immediately report that occurrence to NMFS using the contact information specified in Table 2-2.
16. PSOs will have no other primary duties besides watching for, acting on, and reporting events related to listed species.
17. The action agency or its designated non-federal representative will provide resumes or qualifications of PSO candidates to the NMFS consultation biologist or section 7 coordinator for approval at least one week prior to in-water work. NMFS will provide a brief explanation of disapproval in instances where an individual is not approved.
18. At least one PSO will have prior experience performing the duties of a PSO during construction activity.
19. At least one PSO on the project will complete PSO training prior to deployment (contact NMFS AKR PRD for a list of trained and experienced PSOs). The training will include:
    a. field identification of marine mammals and marine mammal behavior;
    b. ecological information on marine mammals and specifics on the ecology and management concerns of those marine mammals;
    c. ESA and MMPA regulations;
    d. proper equipment use;
    e. methodologies in marine mammal observation and data recording and proper reporting protocols; and
    f. an overview of PSO roles and responsibilities.

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

21. PSOs will:
    a. have vision that allows for adequate monitoring of the entire shutdown zone;
    b. have the ability to effectively communicate orally, by radio and in person, with project personnel;
    c. be able to collect field observations and record field data accurately and in accordance with project protocols;
    d. be able to identify to species all marine mammals that occur in the action area; and
    e. have writing skills sufficient to create understandable records of observations.

22. 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.

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

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

25. 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.

2.1.4.3 Impact Pile driving

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

2.1.4.4 Down the Hole (DTH) drilling

28. If no listed species are observed within the DTH pile driving shutdown zone for 30 minutes immediately prior to pile driving, soft-start procedures will be implemented immediately prior to activities. Soft start requires contractors to activate the drilling equipment at no more than half the operational power for several seconds, followed by a 30 second waiting period, then two subsequent reduced power start-ups. A soft start must be implemented at the start of each day's DTH pile driving, any time pile driving has been shutdown or delayed due the presence of a listed species, and following cessation of pile driving for a period of 30 minutes or longer.
29. Following this soft-start procedure, operational pile driving may commence and continue provided listed species remain absent from the shutdown zone.
30. Following a lapse of pile driving activities of more than 30 minutes, the PSO will authorize resumption of pile driving only after the PSO provides assurance that listed species have not been present in the shutdown zone for at least 30 minutes immediately prior to resumption of operations.

2.1.4.5 Use of Creosote Treated Wood Products

31. Composition and treatment of creosote-treated wood will conform to the most current version of the *Production Guide-Best Management Practices for the Use of Preserved Wood in Aquatic and Sensitive Environments* issued by Western Wood Preservers Institute, Southern Pressure Treaters' Association, Southern Forest Products Association, Wood Preservation Canada and the Creosote Council.
32. Construction debris must be salvaged and disposed of properly and will not be allowed to enter aquatic or marine environments.
33. Prefabrication of overwater structures made with creosote-treated wood products will occur before the structure is placed to minimize treated debris entry into aquatic or marine environments.
34. Temporary structures designed to facilitate construction of permanent structures will be

composed of untreated materials.

35. Treated wood products located in areas with current velocities less than 1.0 cm/sec will be coated or wrapped with non-toxic protective barriers that are maintained throughout the life of the structure.
36. 0.5 inch-thick high density polyethylene wear strips will be installed down the length of each treated wooden pile (or component) to prevent abrasion by other components and by vessels.

2.1.4.6 Vessels

37. Vessel operators will:
    a. maintain a watch for marine mammals at all times while underway;
    b. stay at least 91 m (100 yards) away from listed marine mammals;
    c. travel at less than 5 knots (9 km/hour) when within 274 m (300 yards) of a whale;
    d. avoid changes in direction and speed when within 274 m (300 yards) of a whale, unless doing so is necessary for maritime safety;
    e. not position vessel(s) in the path of a whale, and will not cut in front of a whale in a way or at a distance that causes the whale to change direction of travel or behavior (including breathing/surfacing pattern);
    f. check the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the vessel gets underway; and
    g. reduce vessel speed to 10 knots or less when weather conditions reduce visibility to 1.6 km (1 mi) or less.
38. Adhere to the Alaska Humpback Whale Approach Regulations when vessels are transiting to and from the project site: (see 50 CFR §§ 216.18, 223.214, and 224.103(b)) (note: these regulations apply to all humpback whales). Specifically, pilot and crew will not:
    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.
39. If a whale's course and speed are such that it will likely cross in front of a vessel that is underway, or approach within 91 m (100 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.

40. Vessels will take reasonable steps to alert other vessels in the vicinity of whale(s).
41. Vessels will not allow lines to remain in the water unless both ends are under tension and affixed to vessels or gear. No materials capable of becoming entangled around marine mammals will be discarded into marine waters.

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

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

2.1.4.7 Sunflower Sea Stars

44. To prevent direct placement of a pile on a sunflower sea star, a pre-construction survey and biweekly survey of the pilings and seafloor near the project area will take place.
    a. To prevent direct placement of a pile on an ESA-listed sunflower sea star, a pre-construction survey and biweekly (every other week) surveys of the seafloor near the project area will take place.
    b. If a sunflower sea star is identified during the pre-construction or biweekly surveys, more frequent surveys prior to piling may be required.
    c. The contractor, at their own discretion, may monitor the seafloor during the placement of every pile in lieu of a pre-construction or bi-weekly surveys.
    d. 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 immediately released into an intertidal location outside of the disturbed area where harm or injury cannot occur.

2.1.4.8 General Data Collection and Reporting

Data Collection

45. PSOs will record observations on data forms or into electronic data sheets.
46. The action agency will ensure that PSO data will be submitted electronically in a format that can be queried such as a spreadsheet or database (i.e. digital images of data sheets are not sufficient).
47. PSOs will record the following:
    a. the date, shift start time, shift stop time, and PSO identifier;
    b. date and time of each reportable event (e.g., a marine mammal observation,

operation shutdown, reason for operation shutdown, change in weather);

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

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

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

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

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

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

i. geographic coordinates for the observed animals, (or location noted on a chart) with the position recorded using the most precise coordinates practicable (coordinates will be recorded in decimal degrees, or similar standard and defined coordinate system).

Data Reporting

48. Observations of humpback whales will be transmitted to Akr.prd.records@noaa.gov by the end of the calendar year, including information specified in General Data Collection and Reporting (above) and photographs and videos obtained of humpback whales, most notably those of the whale's flukes.

Unauthorized Take

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

    a. all information to be provided in the final report (see Mitigation Measures under the *Final Report* heading below):

    b. number of animals of each threatened and endangered species affected;

    c. the date, time, and location of each event (provide geographic coordinates);

d. description of the event;

e. the time the animal(s) was first observed or entered the shutdown zone, and, if known, the time the animal was last seen or exited the zone, and the fate of the animal;

f. mitigation measures implemented prior to and after the animal was taken;

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).

Stranded, Injured, Sick or Dead Marine Mammal (not associated with the project)

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

Illegal Activities

51. If PSOs observe marine mammals being disturbed, harassed, harmed, injured, or killed (e.g., feeding or unauthorized harassment), these activities will be reported to NMFS Alaska Region Office of Law Enforcement at (Table 2-2; 1-800-853-1964).

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

Monthly Report

53. 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.

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

Final Report

55. A draft of the 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.records@noaa.gov. A final report must be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report. If no comments are received from NMFS within 30 calendar days of receipt of the draft report, the report may be considered final. The report will summarize all in-water activities associated with the proposed action, and results of PSO monitoring conducted during the in-water project activities.

56. The final report will include:
    a. summaries of monitoring efforts, including dates and times of construction, dates and times of monitoring, dates and times and duration of shutdowns due to marine mammal presence;
    b. date and time of marine mammal observations, geographic coordinates of marine mammals at their closest approach to the project site, marine mammal species, numbers, age/size/sex categories (if determinable), and group sizes;
    c. number of marine mammals observed (by species) during periods with and without project activities (and other variables that could affect detectability);
    d. observed marine mammal behaviors and movement types versus project activity at time of observation;
    e. numbers of marine mammal observations/individuals seen versus project activity at time of observation;
    f. distribution of marine mammals around the action area versus project activity at time of observation; and
    g. digital, queryable documents containing PSO observations and records, and digital, queryable reports.

2.1.4.9 Summary of Agency Contact Information

Table 2-2. Summary of Agency Contact Information

Reason for Contact	**Contact Information**
Consultation Questions & Unauthorized Take	AKR.prd.section7@noaa.gov and Leanne Roulson (leanne.roulson@noaa.gov)
Reports & Data Submittal	AKR.prd.records@noaa.gov (please include NMFS tracking number AKRO-2022-03506 in subject line)

Reason for Contact	Contact Information
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 proposed project would be located within the Channel Rock Breakwaters in the Sitka Channel spanning between Japonski Island and Baranof Island (Figure 2). The Channel Rock Breakwaters provide protection for the harbor and other facilities and structures located throughout the channel. Sitka Channel is about 150 feet wide and about 22 feet deep at its narrowest. The mean tide range is 7.7 feet, the diurnal tide range is 9.94 feet, and the extreme range is 18.98 feet (NOAA Station 9451600). Sitka Channel connects to the larger Sitka Sound, an active fishery and transportation corridor.

NMFS defines the ensonified portion of the action area for this consultation to include the area within which project-related noise levels exceed 120 dB re 1 µPa root mean square (rms) and are expected to approach ambient noise levels (i.e., the point where no measurable effect from the project would occur). As shown in Figure 5, the project action area extends 13.6 kilometers (8.5

miles) from the construction site during Phase I and Phase II.

The ensonified area (action area) is truncated where land masses obstruct underwater sound transmission. The breakwaters on the north side of Japonski Island protect the harbor entrance and would largely block sound transmission from project activities. Therefore, the action area is largely confined to marine waters within the northern half of Sitka Channel, although there are a few narrow areas where sound extends north past the breakwaters and south past the end of Sitka channel. Sound would extend approximately 6.0 kilometers (3.7 miles) from the western opening in the Channel Rock Breakwaters, 7.0 kilometers (4.3 miles) from the eastern opening in the Channel Rock Breakwaters, and 13.6 kilometers (8.5 miles) from the south end of Sitka Channel (Figure 5). The transit routes to be taken by the material and construction barges are also considered a part of the action area due to the potential impacts of large vessels on the marine environment (Figure 6 and Figure 7).

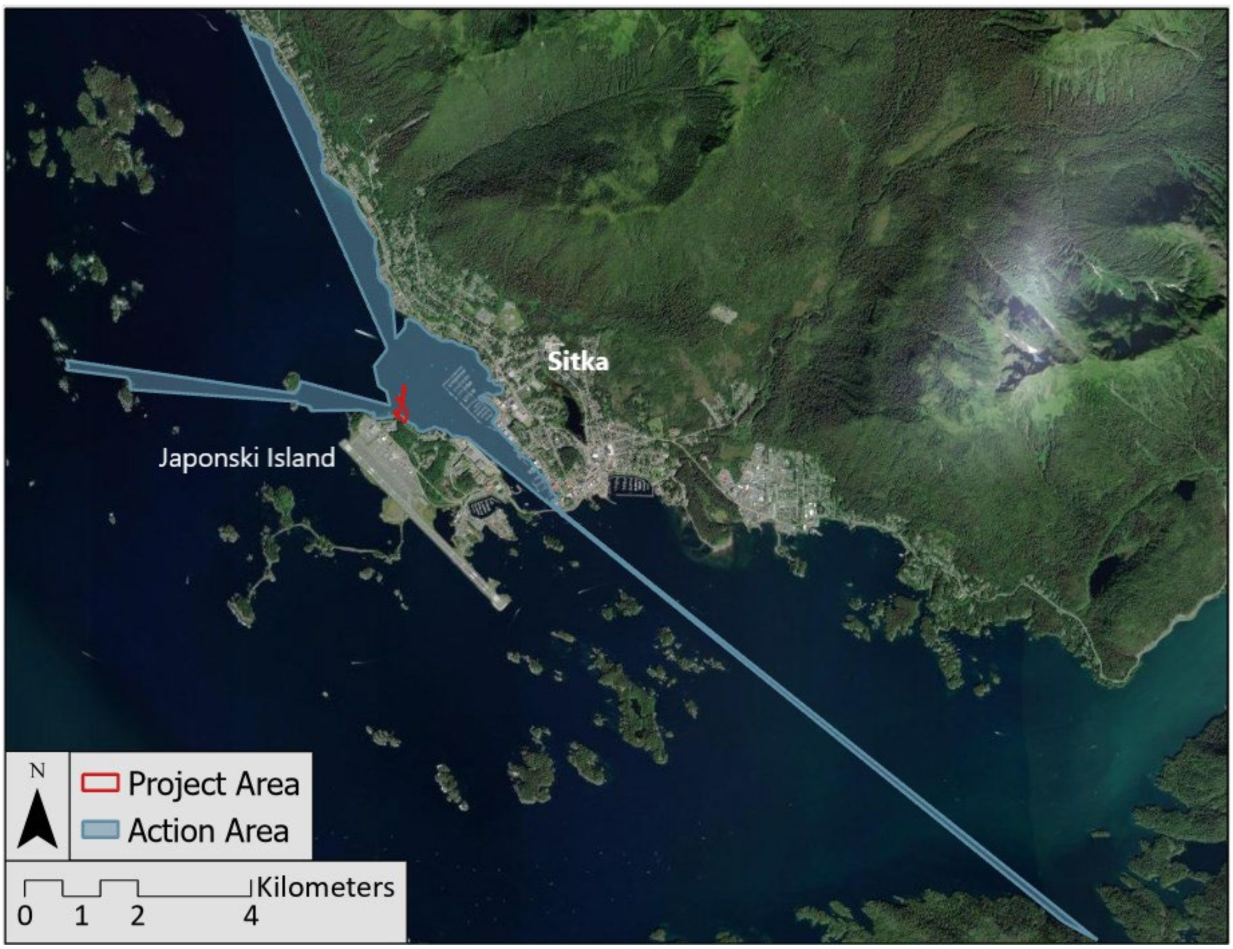

Figure 5. Sitka SPB Action Area based on expected ensonified area extent (HDR 2022).

Since hauled-out marine mammals such as Steller sea lions can also be adversely affected by in-air noise, an estimate of the in-air ensonified area was included in the analysis of impacts. Pile driving and removal associated with this project would generate in-air noise above ambient levels within the action area but would not extend more than 22 meters and 30 meters from any type of pile being impacted or vibrated, respectively[1] According to the blasting plan submitted by Solstice AK, uplands rock blasting would not exceed 90 dB for in-air noise at the center of the blast, which is below the in-air noise disturbance threshold for Steller sea lions (100 dB). Given that there are no documented Steller sea lion haulouts in the action area, no in-air disturbance to hauled-out individuals are anticipated as a result of the proposed project; thus, land area is not included in the action area.

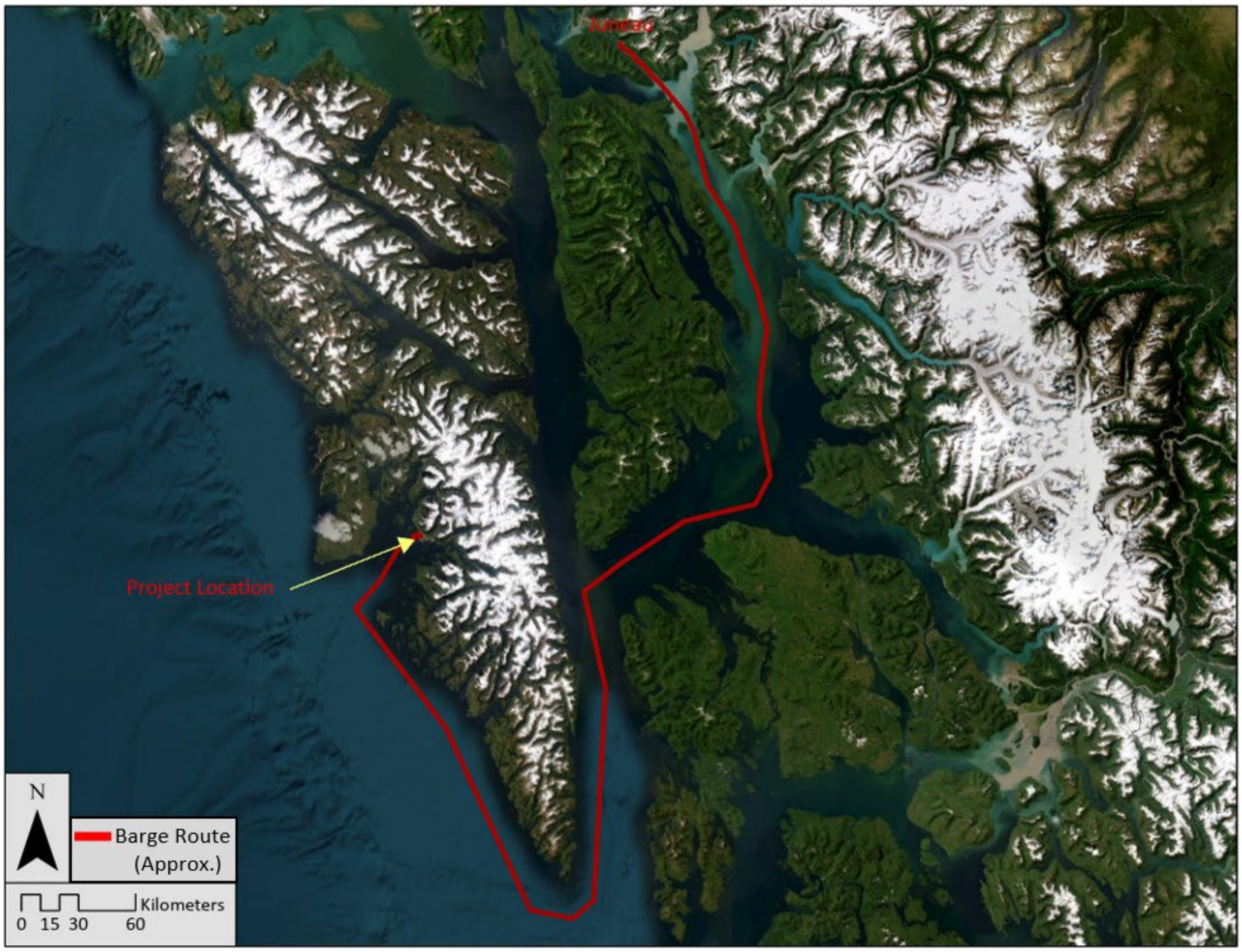

Figure 6. Sitka SPB project expected construction barge route from Juneau to the project site (Solstice AK 2023).

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[1] Predicted distances for in-air threshold distances. The Washington State Department of Transportation has documented un-weighted rms levels for a vibratory hammer (30-inch pile) to an average 96.5 dB and a maximum of 103.2 dB at 15 meters (Laughlin 2010). The sound source level is 106 dB rms at 15 m, the median value during impact installation of 24 to 48-inch-diameter steel piles at Naval Base Kitsap Bangor (Illingworth and Rodkin, Inc. 2012).

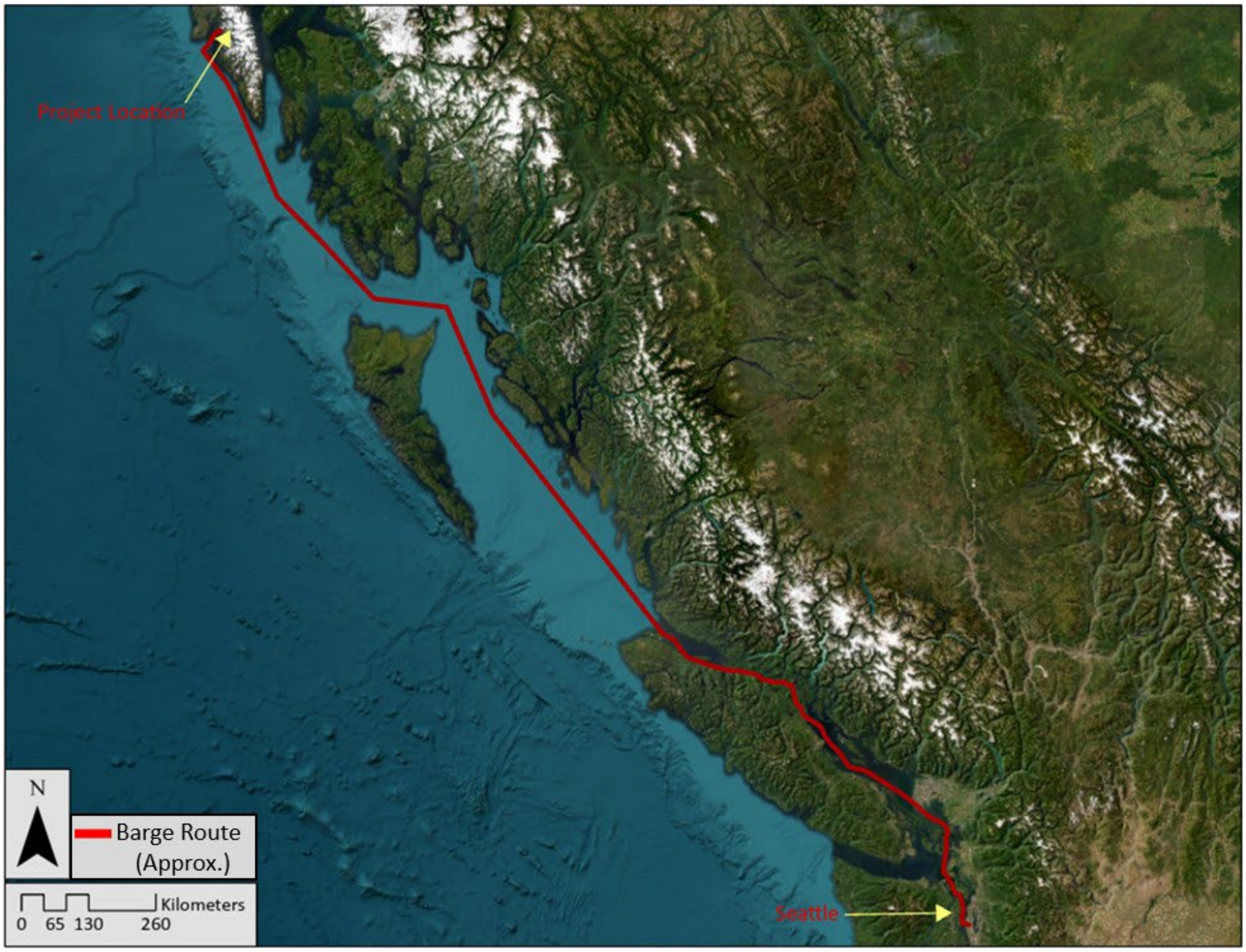

Figure 7. Sitka SPB project expected materials barge route from Seattle, Washington to the project site in Sitka, Alaska (Solstice AK 2023).

2.2.1 Shutdown Zones

To minimize impacts to North Pacific right whales, fin whales, sperm whales, humpback whales, and Steller sea lions monitoring of shutdown and Level A and Level B harassment zones under the MMPA IHA would be implemented to protect and document listed marine mammals in the action area. The largest shutdown zones for Level A harassment of marine mammals for Phase I and II are displayed in Figure 8. Sound capable of producing injury to marine mammals from impact pile installation has the potential to extend up to 375 meters (0.23 miles) from the noise source for high frequency cetaceans (Figure 8). The shutdown zones for Level A harassment due to noise generated by vibratory pile installation are much smaller at 20 meters (65 feet). As shown in Figure 8, the Level A harassment shutdown zones for all project activities are predominately contained within the Channel Rocks breakwaters.

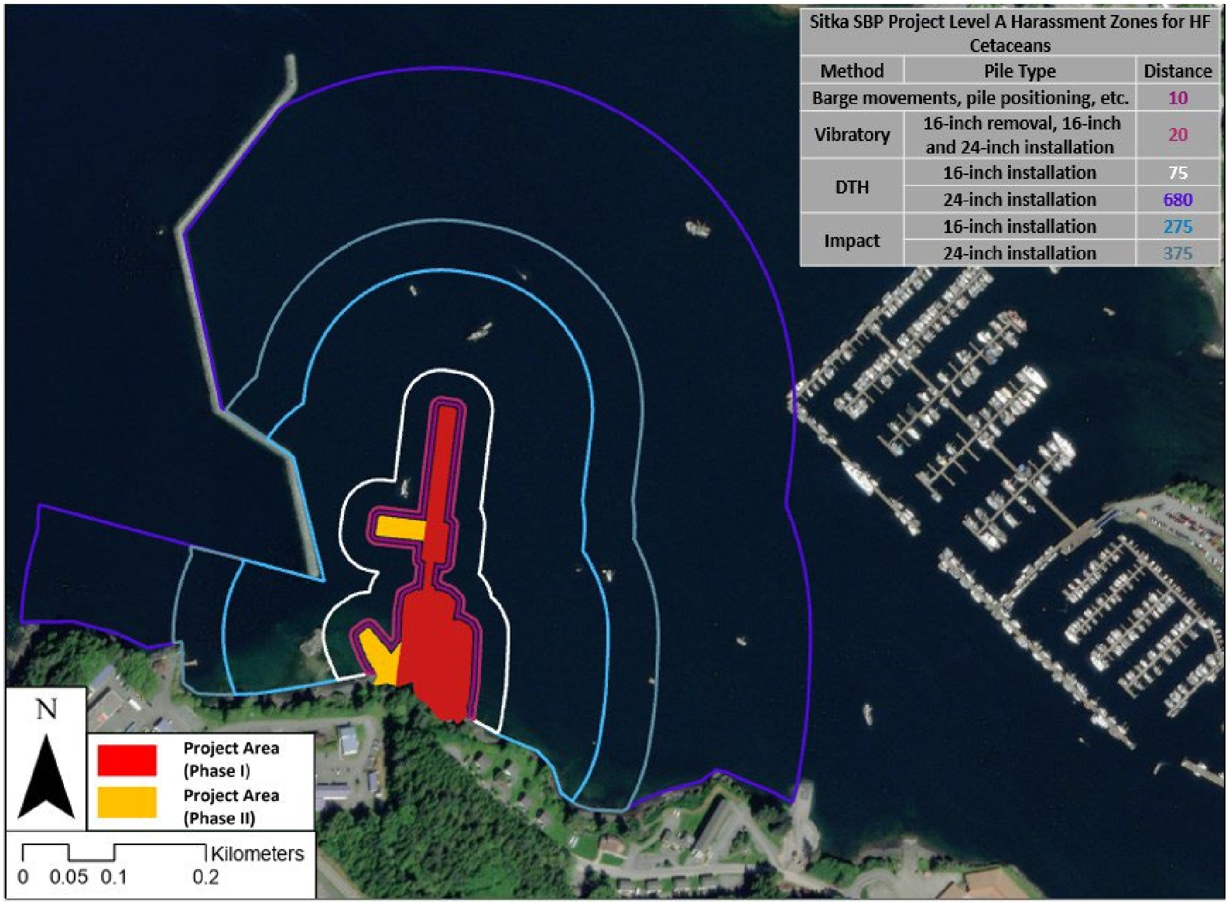

Figure 8. Shutdown zones for project activities exceeding the Level A isopleth (Solstice AK 2023).

The shutdown zones for Level B harassment of marine mammals for Phases I and II are displayed in Figure 9. NMFS assumes that any continuous in-water noise source above 120 dB could result in behavioral effects or harassment of marine mammals. Sound capable of behavioral impacts or harassment from vibratory pile installation has the potential to extend up to 5,412 meters (3.35 miles) from the noise source. DTH activity has the potential to affect the farthest distance. Sound levels from this project's DTH activity approaching the 120 dB isopleth for continuous noise sources could extend approximately 8,500 meters (5.3 miles). However, potential noise effects outside of Sitka harbor would be along the narrow vectors exiting the Sitka Channel to the southeast, which is approximately 100 m wide at its widest point, and Sitka Sound to the west and northwest (Figure 9). The 120 dB isopleth was chosen because that is where we anticipate continuous noise from DTH and vibratory extraction/installation sound levels is unlikely to result in behavioral effects or harassment of marine mammals (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.

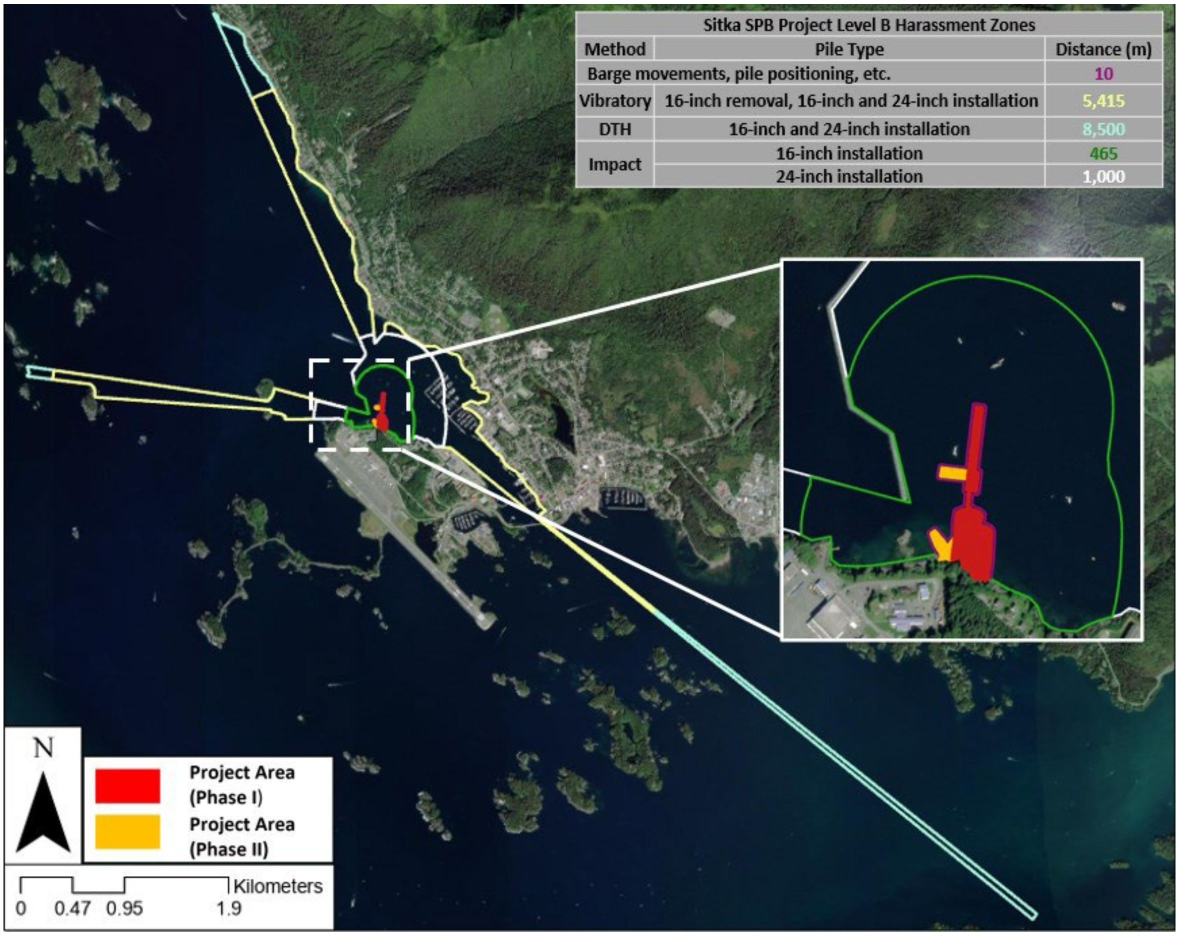

Figure 9. Shutdown zones for project activities exceeding the Level B isopleth (Solstice AK 2023).

3 EFFECTS DETERMINATIONS

Please note the following abbreviations are only used in Table 3-1 and are not, therefore, included in the list of acronyms: E = endangered; T = threatened; LAA = likely to adversely affect; NLAA = may affect, not likely to adversely affect.

3.1 Effects Determinations for ESA-Listed Species

We have assessed the ESA-listed species that may be present in the action area, and our determination of the project's potential effects is shown in Table 3-1 below.

3.1.1 Agency Effects Determinations

Table 3-1. ESA-listed Species in the Action Area and Effect Determinations

Species	Status	Listing	FAA Effect Determination	NMFS Effect Determination
North Pacific Right Whale (*Eubalaena japonica*)	E	NMFS 2008, 73 FR 12024	NLAA	NLAA
Fin Whale (*Balaenoptera physalus*)	E	NMFS 1970, 35 FR 18319	NLAA	NLAA
Sperm Whale (*Physeter macrocephalus*)	E	NMFS 1970, 35 FR 18319	NLAA	NLAA
Humpback Whale, Mexico DPS (*Megaptera novaeangliae*)	T	NMFS 2016, 81 FR 62260	LAA	LAA
WDPS Steller Sea Lion (*Eumetopias jubatus*)	E	NMFS 1997, 62 FR 24345	LAA	LAA
Sunflower Sea Star *(Pycnopodia helianthoides)*	Proposed	N/A	LAA	LAA

3.2 Effects Determinations for Critical Habitat

We have assessed the critical habitats and their overlap with the action area. There is no overlap with critical habitat for North Pacific right whale, Mexico DPS humpback whale, or Steller sea lion; therefore, we conclude there will be no effects to critical habitat due to the proposed action for any of these species. Critical habitat has not been designated for the fin whale, sperm whale, or sunflower sea star.

4 RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT

This opinion considers the effects of the proposed action on the species specified in Table 4-1.

Table 4-1. Listing status and critical habitat designation for species considered in this opinion.

Species	Status	Listing	Critical Habitat
North Pacific Right Whale (*Eubalaena japonica*)	Endangered	NMFS 2008, 73 FR 12024	NMFS 2008, 73 FR 19000 None in the action area
Fin Whale (*Balaenoptera physalus*)	Endangered	NMFS 1970, 35 FR 18319	Not designated
Sperm Whale (*Physeter macrocephalus*)	Endangered	NMFS 1970, 35 FR 18319	Not designated
Humpback Whale, Mexico DPS (*Megaptera novaeangliae*)	Threatened	NMFS 2016, 81 FR 62260	NMFS 2021 86 FR 21082 None in the action area
Western DPS Steller Sea Lion (*Eumetopias jubatus*)	Endangered	NMFS 1997, 62 FR 24345	NMFS 1993, 58 FR 45269 None in the action area
Sunflower Sea Star *(Pycnopodia helianthoides)*	Proposed	N/A	N/A

4.1 Species Not Likely to be Adversely Affected by the Action

NMFS uses two criteria to identify those endangered or threatened species that are likely to be adversely affected. The first criterion is exposure or some reasonable expectation of an 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 that exposure.

We applied these criteria to the species listed above and determined that the following species are not likely to be adversely affected by the proposed action: North Pacific right whales, fin whales, and sperm whales.

4.1.1 North Pacific Right Whales

North Pacific right whales inhabit the Pacific Ocean, particularly between 20°N and 60°N. They primarily occur in coastal or shelf waters, although movements over deep waters are known. Few sightings of right whales occur in Alaska; those that do occur in Alaska are primarily in the central North Pacific and Bering Sea. Since 1996, right whales have been consistently observed in Bristol Bay (southeastern Bering Sea) during the summer months. According to NMFS, right whales are the rarest of all large whale species. Depleted by whaling and illegal harvesting, only an estimated 30 North Pacific right whales remain in the eastern stock (the population of whales that summers in the southeastern Bering Sea and Gulf of Alaska) (NMFS 2015b).

North Pacific right whales are rare in the action area and have not been observed during various marine mammal monitoring efforts around Sitka Channel between 2017 and 2022 (Solstice AK 2023). North Pacific right whales are not expected in the project area because they are very rare, and they have not been documented feeding in or near Sitka Channel.

Though we do not expect North Pacific right whales to occur in the action area where pile driving activities will occur, it is possible these species may be encountered during transit from staging areas to the construction site in Sitka Channel. Therefore, it is possible the species will be at-risk for vessel strike. However, it is extremely unlikely that vessels will strike North Pacific right whales for the following reasons:

- Few, if any, right whales are likely to be encountered because they are generally found in deeper waters than those in which the transit route will occur.
- Although the project duration will encompass two years, material transport is expected to take 24 days or less.
- A limited number of vessels are associated with construction and material transport.
- NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yards of marine mammals.

For these reasons, we conclude the majority of stressors associated with the proposed action would be extremely unlikely to have adverse effects on North Pacific right whales because they are not anticipated to overlap in time and space, and the effects of ship strike are discountable because they are extremely unlikely to occur. Therefore, North Pacific right whales are not likely to be adversely affected by this action.

4.1.2 Fin Whales

Fin whales are found in deep offshore waters. Panigada et al. (2005) found water depth to be the most significant variable in describing fin whale distribution, with more than 90 percent of sightings occurring in waters deeper than 2,000 meters (6,560 feet). Fin whales are rare in the inside waters of Southeast Alaska (Neilson et al. 2012). Fin whales are also rare in the action area and have not been observed during various marine mammal monitoring efforts around Sitka Channel between 2017 and 2022 (Solstice AK 2023). Fin whales are not expected in the project area because of its location in the shallow (<20 m [65 ft]) and narrow north entrance of Sitka Channel

Though we do not expect fin whales to occur in the action area where pile driving activities will occur, it is possible these species may be encountered during transit from staging areas to the construction site in Sitka Channel. Therefore, it is possible the species will be at-risk for vessel strike. However, it is extremely unlikely that vessels will strike fin whales for the following reasons:

- Few, if any, fin whales are likely to be encountered because they are generally found in deeper waters than those in which the transit route will occur.
- Although the project duration will encompass two years, material transport is expected to take 24 days or less.
- A limited number of vessels are associated with construction and material transport.
- NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yards of marine mammals.

For these reasons, we conclude the majority of stressors associated with the proposed action would be extremely unlikely to have adverse effects on fin whales because they are not anticipated to overlap in time and space, and the effects of ship strike are discountable because they are extremely unlikely to occur. Therefore, fin whales are not likely to be adversely affected by this action.

4.1.3 Sperm Whales

Sperm whales are found typically far from land throughout the world's oceans in deep waters between about 60°N and 60°S. They tend to inhabit areas with a water depth of 600 meters (1,970 feet) or more and are uncommon in waters less than 300 meters (980 feet) deep (NMFS 2023d). Sperm whale calls have been detected year-round in the Gulf of Alaska (Mellinger et al. 2004). Sperm whales are rare in the action area and have not been observed during various marine mammal monitoring efforts around Sitka Channel between 2017 and 2022 (Solstice AK 2023). Sperm whales are not expected in the project area because of its location in the shallow (<20 m [65 ft]) and narrow north entrance of Sitka Channel.

Though we do not expect sperm whales to occur in the action area where pile driving activities will occur, it is possible these species may be encountered during transit from staging areas to the construction site in Sitka Channel. Therefore, it is possible the species will be at-risk for vessel strike. However, it is extremely unlikely that vessels will strike sperm whales for the following reasons:

- Few, if any, sperm whales are likely to be encountered because they are generally found in deeper waters than those in which the transit route will occur.
- Although the project duration will encompass two years, material transport is expected to take 24 days or less.
- A limited number of vessels are associated with construction and material transport.
- NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yards of marine mammals.

For these reasons, we conclude the majority of stressors associated with the proposed action would be extremely unlikely to have adverse effects on sperm whales because they are not anticipated to overlap in time and space, and the effects of ship strike are discountable because they are extremely unlikely to occur. Therefore, sperm whales are not likely to be adversely affected by this action.

Critical habitat has not been designated for the sperm whale.

4.2 Status of Listed Species Likely to be Adversely Affected by the Action

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

For each species, we present a summary of information on the population structure and distribution of the species to provide a foundation for the exposure analyses that appear later in this opinion. Then we summarize information on the threats to the species and the species' status given those threats to provide points of reference for the jeopardy determinations we make later in this opinion. That is, we rely on a species' status and trend to determine whether an action's effects are likely to increase the species' probability of becoming extinct. For designated critical habitat, we present a summary of the critical habitat designation, the geographical area of the designation, and any physical or biological features essential to the conservation of the species, as well as any relevant threats and management considerations. That is, we rely on the status of critical habitat and its function to determine whether an action's effects are likely to diminish the value of critical habitat as a whole for the conservation of listed species.

4.2.1 Mexico DPS Humpback Whales

Humpback whales are found in all oceans of the world with a broad geographical range from tropical to temperate waters in the Northern Hemisphere and from tropical to near-ice-edge waters in the Southern Hemisphere. Additional information on humpback whale biology and natural history is available at:

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

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

4.2.1.1 Status and Population Structure

In 1970, the humpback whale was listed under the Endangered Species Conservation Act (ESCA) as endangered worldwide (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. Humpback whales are also 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 recognizing 14 DPSs on September 8, 2016 (81 FR 62259). Four of these DPSs were designated as endangered and one as threatened, with the remaining nine not warranting ESA listing status.

Based on an analysis of migration between winter mating/calving areas and summer feeding areas using photo-identification, Wade (2021) concluded that whales feeding in Alaskan waters belong primarily to the Hawaii DPS (recovered), with small numbers from the WNP DPS (endangered) and Mexico DPS (threatened). There are approximately 1,084 animals in the WNP DPS and 2,913 animals in the Mexico DPS (Wade 2021). The population trend is unknown for both DPSs. The Hawaii DPS is estimated at 11,540 animals, and the annual growth rate is between 5.5 and 6.0 percent. Humpback whales in the Southeast Alaska summer feeding area are comprised of approximately 98 percent Hawaii DPS individuals and 2 percent Mexico DPS individuals.

4.2.1.2 Distribution

Relatively high densities of humpback whales occur throughout much of Southeast Alaska and northern British Columbia, particularly during the summer months. The abundance estimate for humpback whales in Southeast Alaska is estimated to be 5,890 (CV= 0.08) animals, which includes whales from the unlisted Hawaii DPS (98 percent) and threatened Mexico DPS (2 percent; Wade 2021).

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 summer 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 Bering Sea, and along the Aleutian Islands (Wild et al. 2023). Large numbers of humpbacks have also been reported in waters over the continental shelf, extending up to 100 nm offshore in the western Gulf of Alaska (Wade 2021).

Although migration timing varies among individuals, most whales depart for Hawaii or Mexico in fall or winter and begin returning to Southeast Alaska in spring, with continued returns through the summer and a peak occurrence in Southeast Alaska during late summer to early fall. However, there are significant overlaps in departures and returns (Baker et al. 1985; Straley 1990).

4.2.1.3 Presence in the Action Area

Relatively high densities of humpback whales occur throughout much of Southeast Alaska and northern British Columbia. Southeast Alaska was identified as a biologically important area (BIA) for seasonal feeding due to the high density of animals from March-November (Ferguson et al. 2015). The second version of BIAs split the previous Southeast BIA with three seasonal occurrences into 10 BIAs and 2 Watch List areas, each with their own temporal delineation (Wild et al. 2023). Sitka Sound is within seasonal humpback whale feeding BIAs from March-May and September-December (Wild et al. 2023). Project vessels deployed from Juneau and/or Seattle are expected to transit through multiple Southeast BIAs.

Several surveys and project-related marine mammal monitoring efforts have documented humpback whale abundance near the Sitka Channel (Solstice AK 2023). In general, these surveys, spanning different seasons and locales, support the potential presence of humpback whales in the Sitka Channel area year-round, but that their presence is more likely during the summer months (June- August) (Solstice AK 2023). Anecdotal information from local residents suggests that humpback whales' utilization of the area is intermittent year-round. Their abundance, distribution, and occurrence are dependent on and fluctuate with fish prey.

4.2.1.4 Foraging and Prey Selection

Humpback whales exhibit flexible feeding strategies, sometimes foraging alone and sometimes cooperatively (Clapham 1993). Humpback whales are 'gulp' or 'lunge' feeders, capturing large mouthfuls of prey during feeding rather than continuously filtering food, as may be observed in some other large baleen whales (Goldbogen et al. 2008; Simon et al. 2012). When lunge feeding, whales advance on prey with their mouths wide open, then close their mouths around the prey and trap them by forcing engulfed water out past the baleen plates.

Compared to some other baleen whales, humpbacks are relatively generalized in their prey selection. In the Northern Hemisphere, known prey includes euphausiids (krill), copepods, juvenile salmonids, herring, Arctic cod, walleye pollock, pteropods, and cephalopods (Johnson and Wolman 1984; Perry et al. 1999; Straley et al. 2018). Pacific herring serve an important ecological role within Sitka Sound and are known to spawn on intertidal and subtidal substrates within the project area in spring (ADFG 2019).

In the North Pacific, humpback whales forage in the coastal and inland waters along California, north to the Gulf of Alaska and the Bering Sea, and west along the Aleutian Islands to the Kamchatka Peninsula and into the Sea of Okhotsk (Tomilin 1967; Johnson and Wolman 1984).

4.2.1.5 Reproduction

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

4.2.1.6 Hearing, Vocalization, and Other Sensory Capabilities

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

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

Social sounds associated with aggressive behavior by male humpback whales in breeding areas are very different than songs and extend from 50 Hz to 10 kHz (or higher), with most energy in components below 3 kHz (Tyack and Whitehead 1983; Silber 1986). These sounds appear to have an effective range of up to 9 km (Tyack and Whitehead 1983).

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

4.2.1.7 Threats

Natural Threats

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

Thirteen marine mammal species in Alaska were examined for domoic acid; humpback whales indicated a 38 percent prevalence (Lefebvre et al. 2016). Saxitoxin was detected in 10 of the 13 species, with the highest prevalence in humpback whales at 50 percent. The occurrence of the nematode *Crassicauda boopis* appears to increase the potential for kidney failure in humpback whales and may be preventing some populations from recovering (Lambertsen 1992).

Anthropogenic Threats

Historically, commercial whaling represented the greatest threat to every population of humpback whale and was ultimately responsible for humpback whales being listed as an endangered species. In 1965, the International Whaling Commission banned commercial hunting of humpback whales in the Pacific Ocean, and, as a result, this threat has largely been curtailed. No commercial whaling occurs within the range of Mexico DPS humpbacks, and Alaskan subsistence hunters are not authorized to take humpback whales.

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

Commercial fisheries pose a threat to marine mammal stocks. Reductions in seasonal availability and distribution of fish can cause cumulative effects on many species that depend on reliable sources of prey for survival.

Fishing gear entanglement is a major threat. Entanglement may result in only minor injury or may potentially significantly affect individual health, reproduction, or survival. Every year humpback whales are reported entangled in fishing gear in Alaska, particularly pot gear and gill net gear. 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). 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).

Aquaculture operations may pose an entanglement risk to humpback whales (Price et al. 2017). Humpback whales in Southeast Alaska have been observed feeding around and near salmon aquaculture facilities (Chenoweth et al. 2017). In June 2018, NMFS received a report of a humpback whale damaging a floating salmon net pen near Ketchikan. The encounter did not result in entanglement, but it illustrates the potential for interactions. The aquaculture industry is growing in Alaska, increasing the potential for marine mammal entanglements.

4.2.2 Western DPS Steller Sea Lion

More detailed background information on the status of WDPS Steller sea lions can be found in the latest stock assessment report (Muto et al. 2019) and the recovery plan for WDPS Steller sea lions (NMFS 2008). Information on Steller sea lion biology, threats, and habitat (including critical habitat) is available online at: https://www.fisheries.noaa.gov/species/steller-sea-lion .

4.2.2.1 Status and Population Structure

On November 26, 1990, NMFS issued the final rule to list Steller sea lions as a threatened species under the ESA (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; Figure 10). At that time, the eastern DPS was listed as threatened, and the western DPS was listed as endangered. On November 4, 2013, the eastern DPS was removed from the endangered species list (78 FR 66140).

Data from 1978-2017 suggest WDPS Steller sea lions were at their lowest levels in 2002 but have shown an increasing trend in abundance in much of their range since then, although strong regional differences exist. While most regions show positive trends, regions of the Aleutian Islands exhibit generally negative trends (Muto et al. 2019). Contrary to the general population increase since 2002, pup counts in the eastern (-33%) and central (-18%) Gulf of Alaska declined sharply between 2015 and 2017. The most recent surveys of WDPS Steller sea lions in Alaska suggest a minimum population estimate of 54,267 individuals; estimates for WDPS in Russia suggest there may be approximately 23,000 animals, which is less than the 1960 levels but more than the low in 2005 (Muto et al. 2019). Overall, the WDPS Steller sea lion population in Alaska (non-pups only) was estimated to be increasing at about 2.14 percent per year from 2002-2017 (Muto et al. 2019).

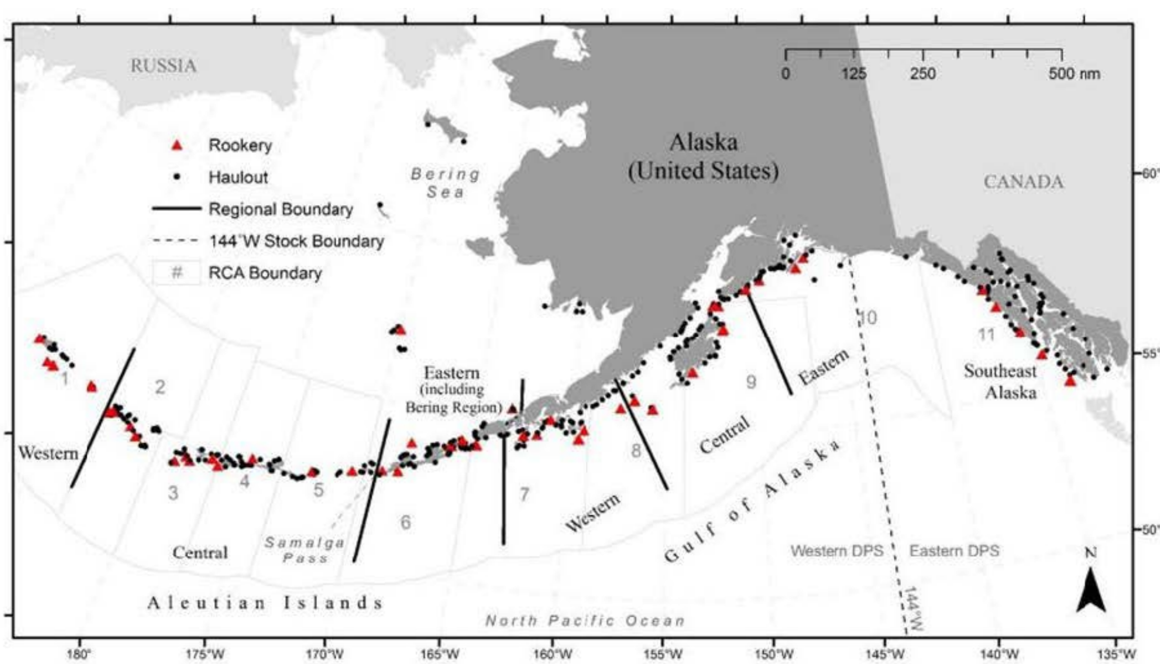

Figure 10. NMFS Steller sea lion survey regions, rookeries, haulouts, and line at 144W depicting the separation of eastern and western distinct population segments. (Fritz et al, 2016).

Estimated annual mortality is 0.22 for ages 0 to 2, dropping to 0.07 at age 3, then increasing gradually to 0.15 by age 10 and 0.20 by age 20 (York 1994). Population modeling suggests decreased juvenile survival likely played a major role in the decline of sea lions in the central Gulf of Alaska during 1975-1985 (Pascual and Adkison 1994, York 1994, Holmes and York 2003).

4.2.2.2 Distribution

The WDPS of Steller sea lions includes animals west of Cape Suckling, Alaska (144° W; 62 FR 24345). However, individuals move between rookeries and haul out sites regularly, even over long distances between eastern and western DPS locations (Calkins and Pitcher 1982a, Raum-Suryan et al. 2002, Raum-Suryan et al. 2004). Most adult Steller sea lions occupy rookeries during the summer pupping and breeding season and exhibit a high level of site fidelity. During the breeding season, some juveniles and non-breeding adults occur at or near the rookeries, but most are on haulouts (sites that provide regular retreat from the water on exposed rocky shoreline, gravel beaches, and wave-cut platforms or ice; (Rice 1998a, Ban 2005, Call and Loughlin 2005). During fall and winter many sea lions disperse from rookeries and increase use of haulouts, particularly on terrestrial sites but also on sea ice in the Bering Sea.

Critical habitat has been defined in Southeast Alaska at major haulouts and major rookeries (50 CFR 226.202), but the project action area does not overlap with Steller sea lion critical habitat. The Biorka Island haulout is the closest designated critical habitat and is approximately 25 km southwest of the project area.

4.2.2.3 Presence in the Action Area

Within the action area, Steller sea lions are anticipated to be predominantly from the EDPS, but a small number of WDPS Steller sea lions may occur. Based on surveys and genetic analysis conducted by (Hastings et al. 2020), an estimated 2.2 percent of Steller sea lions in the vicinity of the project are WDPS Steller sea lions. Therefore, for the purposes of this opinion, NMFS considers that 2.2 percent of the total Steller sea lions in the action area are from the endangered WDPS and the remaining 97.8 percent are from the delisted EDPS.

Steller sea lions do not migrate, but they often disperse widely outside of the breeding season. An area of high occurrence extends from the shore to water depths of 273 fathoms (500 m). In the Gulf of Alaska, foraging habitat is primarily shallow, nearshore, and continental shelf waters 4.3 to 13 nm offshore with a secondary occurrence inshore of the 3,280 ft. (1,000 m) isobath, and a rare occurrence seaward of the 3,280 ft. (1,000 m) isobath.

Steller sea lions occur year-round in the action area. Several surveys and project-related marine mammal monitoring efforts have documented Steller sea lion abundance near the Sitka Channel (Solstice AK 2023). In general, these surveys, spanning different seasons and locales, support the potential presence of Steller sea lions in the Sitka Channel area year-round, but notes that they are most abundant during January and February (Solstice AK 2023). Surveys from 1994 through 2022 documented individuals and groups of Steller sea lions ranging from 2-3 (most common) to

100 (Solstice AK 2023). Steller sea lions are also attracted to the project area in summer because fishing charter operations often dump fish carcasses nearby. Steller sea lions are likely to be in the project area during all phases of construction.

4.2.2.4 Foraging and Prey Selection

Steller sea lions consume a variety of demersal, semi-demersal, and pelagic prey, indicating a potentially broad spectrum of foraging styles, probably based primarily on availability. Overall, the available data suggest two types of distribution at sea by Steller sea lions: 1) less than 20 km (12 mi) from rookeries and haulout sites for adult females with pups, pups, and juveniles, and 2) much larger areas (greater than 20 km [12 mi]) where these and other animals may range to find optimal foraging conditions once they are no longer tied to rookeries and haulout sites for nursing and reproduction. Loughlin (1993) observed large seasonal differences in foraging ranges that may have been associated with seasonal movements of prey, and Merrick (1995) concluded on the basis of available telemetry data that seasonal changes in home range were related to prey availability.

4.2.2.5 Reproduction

Female Steller sea lions reach sexual maturity and first breed between three and eight years of age and the average age of reproducing females (generation time) is about 10 years (Pitcher and Calkins 1981, Calkins and Pitcher 1982, York 1994). They give birth to a single pup from May through July and then breed about 11 days after giving birth. For more information see our website (https://www.fisheries.noaa.gov/species/steller-sea-lion), the Steller Sea Lion Recovery Plan (https://www.fisheries.noaa.gov/resource/document/recovery-plan-steller-sea-lion-revision-eastern-and-western-distinct-population), and the most recent stock assessment report (https://repository.library.noaa.gov/view/noaa/20606).

4.2.2.6 Hearing, Vocalization, 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. Steller sea lions have similar hearing thresholds in-air and underwater to other otariids. In-air hearing ranges from 0.250-30 kHz, with their best hearing sensitivity at 5-14.1 kHz (Muslow and Reichmuth 2010). An underwater audiogram shows the typical mammalian U-shape. Higher hearing thresholds, indicating poorer sensitivity, were observed for signals below 16 kHz and above 25 kHz (Kastelein et al. 2005).

4.2.2.7 Threats

Brief descriptions of threats to Steller sea lions follow. More detailed information can be found in the Steller sea lion Recovery Plan (available at: http://alaskafisheries.noaa.gov/protectedresources/stellers/recovery/sslrpfinalrev030408.pdf), the Stock Assessment Reports (available at: http://www.nmfs.noaa.gov/pr/sars/species.htm), and the most recent Alaska Groundfish Biological Opinion (NMFS 2014a).

Natural Threats

Killer Whale Predation

The Steller Sea Lion Recovery Plan (NMFS 2008b) ranked predation by killer whales as a potentially high threat to the recovery of the WDPS. Steller sea lions in both the eastern and western stocks are eaten by killer whales (Dahlheim and White 2010).

Relative to other WDPS sub-regions, transient killer whale abundance and predation on Steller sea lions has been well studied in the Prince William Sound and Kenai Fjords portion of the eastern GOA. Steller sea lions represented 33% and 5% of the remains found in deceased killer whale stomachs in the GOA, depending on the specific study results (Heise et al. 2003). The abundance of transient killer whales in the eastern GOA was estimated to be 18 (Matkin et al. 2012). Nineteen transient killer whales were identified in Kenai Fjords from 2000 through 2005 and killer whale predation on six pup and three juvenile Steller sea lions was observed. It has been estimated that 11% of the Steller sea lion pups born at the Chiswell Island rookery (in the Kenai Fjords area) were preyed upon by killer whales from 2000 through 2005. GOA transient killer whales were concluded to have a minor impact on the recovery of the sea lions in the area (Maniscalco et al. 2007). Steller sea lion pup mortality was studied using remote video at Chiswell Island. Pup mortality up to 2.5 months postpartum averaged 15.4%, with causes varying greatly across years (2001–2007). They noted that high surf conditions and killer whale predation accounted for over half the mortalities. Even at this level of pup mortality, the Chiswell Island Steller sea lion population has increased (Maniscalco et al. 2008).

Environmental Variability and Drivers in the Bering Sea and Gulf of Alaska/North Pacific

The Steller Sea Lion Recovery Plan ranks environmental variability as a potentially high threat to recovery of the WDPS (NMFS 2008b). 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 (Wiese et al. 2012). Populations of Steller sea lions in the GOA and Bering Sea have experienced large fluctuations due to environmental and anthropogenic forcing (Mueter et al. 2009). As we work to understand how these mechanisms affect various trophic levels in the marine ecosystem, we must consider the additional effects of global warming, which are expected to be most significant at northern latitudes (IPCC 2013).

Other natural threats that were ranked as low by the Steller Sea Lion Recovery Plan (NMFS 2008) include disease and parasites and shark predation.

Anthropogenic Threats

Competition between Commercial Fishing and Steller Sea Lions for Prey Species

Commercial fisheries pose a threat to marine mammal stocks. Reductions in seasonal availability and distribution of fish can cause cumulative effects on many species that depend on reliable sources of prey for survival. Competition between commercial fishers and sea lions for prey was ranked as a potentially high threat to the recovery of WDPS. Substantial scientific debate surrounds the question about the impact of potential competition between fisheries and Steller sea lions. It is generally well accepted that commercial fisheries target several important Steller sea lion prey species (NRC 2003) including salmon species, Pacific cod, Atka mackerel, pollock, and others. These fisheries could be reducing sea lion prey biomass and quality at regional and/or local spatial and temporal scales such that sea lion survival and reproduction are reduced. NMFS (2014) analyzes this threat in detail.

Fishing Gear and Marine Debris Entanglement

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked interactions or entanglement with fishing gear and marine debris as a low threat to the recovery of the WDPS. Helker *et al.* (2015) report 352 cases of serious injuries to EDPS Steller sea lions from interactions with fishing gear between 2009 and 2013, mostly from troll gear and other marine debris. Raum-Suryan *et al.* (2009) found 386 animals either entangled in marine debris or having ingested fishing gear over the period 2000-2007 in Southeast Alaska and northern British Columbia.

The estimated mean annual mortality and serious injury rate in U.S. commercial fisheries in 2011-2015 is 31 Steller sea lions from the WDPS (31 from observer data + 0.2 from stranding data). No observers have been assigned to several fisheries that are known to interact with WDPS Steller sea lions; thus, the estimated mortality and serious injury is likely an underestimate of the actual level (Muto et al. 2018).

Aquaculture operations may pose an entanglement risk to Steller sea lions. The aquaculture industry is growing in Alaska, increasing the potential for marine mammal entanglements.

Vessel Traffic and Strike

Vessel traffic, sea lion research, and tourism may disrupt sea lion feeding, breeding, or aspects of sea lion behavior. The Steller Sea Lion Recovery Plan (NMFS 2008) ranked disturbance from these sources as a low threat to the recovery of the WDPS. Disturbances from these sources are not likely affecting population dynamics in the WDPS.

NMFS Alaska Region Stranding Program has records of four occurrences of Steller sea lions being struck by vessels in Southeast Alaska; three were near Sitka. Vessel strike is not considered a major threat to Steller sea lions.

Other anthropogenic threats that were ranked as low by the Steller Sea Lion Recovery Plan

(NMFS 2008) include illegal shooting, mortality and disturbance from research activites, and subsitence and Native harvest.

4.2.3 Sunflower Sea Stars

4.2.3.1 Population Structure and Status

On August 18, 2021, the Center for Biological Diversity petitioned NMFS to list the sunflower sea star (*Pycnopodia helianthoides*) under the ESA. NMFS determined that the proposed action may be warranted (86 FR 73230, December 27, 2021) and 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.

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 2022). Sunflower sea stars are currently estimated to number approximately 600 million (Lowry 2022). Declines in the northern portion of its range (i.e., Alaska and British Columbia) were less pronounced than in the southern portion, but still exceeded 60 percent. Species-level impacts from SSWS, both during the pandemic and on an ongoing basis, have been identified as the major threat affecting the long-term persistence of the sunflower sea star (Lowry 2022).

Recent counts in areas of Alaska near Cook Inlet, Prince William Sounds, and the Kenai Fjords showed large increases in sunflower sea star abundance in 2022 compared to previous years (Heather Coletti et al. 2023).

4.2.3.2 Distribution and Habitat Use

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). Sunflower sea stars occur in a wide range of intertidal and subtidal habitats from northern Baja California, Mexico, to the central Aleutian Islands, Alaska (Jewett et al. 2015; Gravem et al. 2021; Lowry 2022). They occupy waters from the intertidal 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, and are most abundant in Alaska and British Columbia (Gravem et al. 2021).

They are found along the outer coasts and inside waters, which have complex geophysical features including glacial fjords, sounds, embayments, and tidewater glaciers. Preferring temperate waters, they inhabit kelp forests and rocky intertidal shoals (Shivji et al. 1983; Lowry 2022), and are regularly found in eelgrass meadows as well (Dean and Jewett 2001; Gravem et al. 2021).

4.2.3.3 Presence in the Action Area

No sunflower sea stars were observed in the project footprint during an intertidal survey conducted in 2020 (Solstice AK 2020a), but the depths and substrate could potentially support their presence. Alaska Department of Fish and Game (ADFG) completed surveys in and around the Sitka Channel (Sites 113-40, 41, 42, and 43) and found average densities of 0.002 sunflower sea stars/m^2 (Lowry 2023). The iNaturalist website catalogs sunflower sea star observations and has several records from recent years (2018-2023) in areas south of the Sitka Channel, including a few near the O'Connell Bridge (https://www.inaturalist.org/observations?place_id=any&subview=map&taxon_id=47673) Therefore, it is reasonable to assume that sunflower sea stars may be found in the project area, albeit in low densities.

4.2.3.4 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).

4.2.3.5 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.

4.2.3.6 Threats to the Species

Brief descriptions of threats to sunflower sea stars follow. More detailed information can be found in the draft ESA Status Review report for the species (Lowry et al. 2022).

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).

The causative agent of SSWS is currently unknown and various hypotheses regarding transmission dynamics and the lethality of SSWS under diverse physiochemical conditions exist. A number of factors ranging from environmental stressors to the microbiome in sea stars may play a role (Lloyd and Pespeni 2018; Konar et al. 2019; Aquino et al. 2021). Ocean warming has also been linked to SSWS outbreaks, hastening disease progression and severity (Harvell et al. 2019; Aalto et al. 2020).

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 expected impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR § 402.02).

This section discusses the environmental baseline, focusing on existing anthropogenic and natural activities within and near the action area and their influences on listed species may be adversely affected by the proposed action. Species that may be affected by the proposed action include Mexico DPS humpback whales, WDPS Steller sea lion, and sunflower sea star. Although some of the activities discussed below are outside the action area, they may still have an influence on listed species or their habitat in the action area.

5.1 Climate Change

Global climate change is a threat that affects all species. Because it is a shared threat, we present this narrative here rather than in each of the species-specific effect analyses 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:
https://www.ipcc.ch/reports/
https://climate.nasa.gov/evidence/
http://nsidc.org/arcticseaicenews/
https://arctic.noaa.gov/Report-Card

The listed and proposed species we consider in this opinion live in the ocean and depend on the ocean for nearly every aspect of their life history. Factors which affect the ocean, like temperature and pH, can have direct and indirect impacts on listed and proposed species and the resources they depend upon. Global climate change may affect all the species we consider in this opinion, but it is expected to affect them differently. First, we provide background on the physical effects climate change has caused on a broad scale; then we focus on changes that have occurred in Alaska. Finally, we provide an overview of how these physical changes translate to biological effects.

5.1.1 Physical Effects

5.1.1.1 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[2], 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; 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 (Figure 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[2]. Some of the most pronounced effects of climate change in Alaska include disappearing sea ice, shrinking glaciers, thawing permafrost, and changing ocean temperatures and chemistry (Chapin et al. 2014).

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[2] https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202213 viewed 3/11/2024.

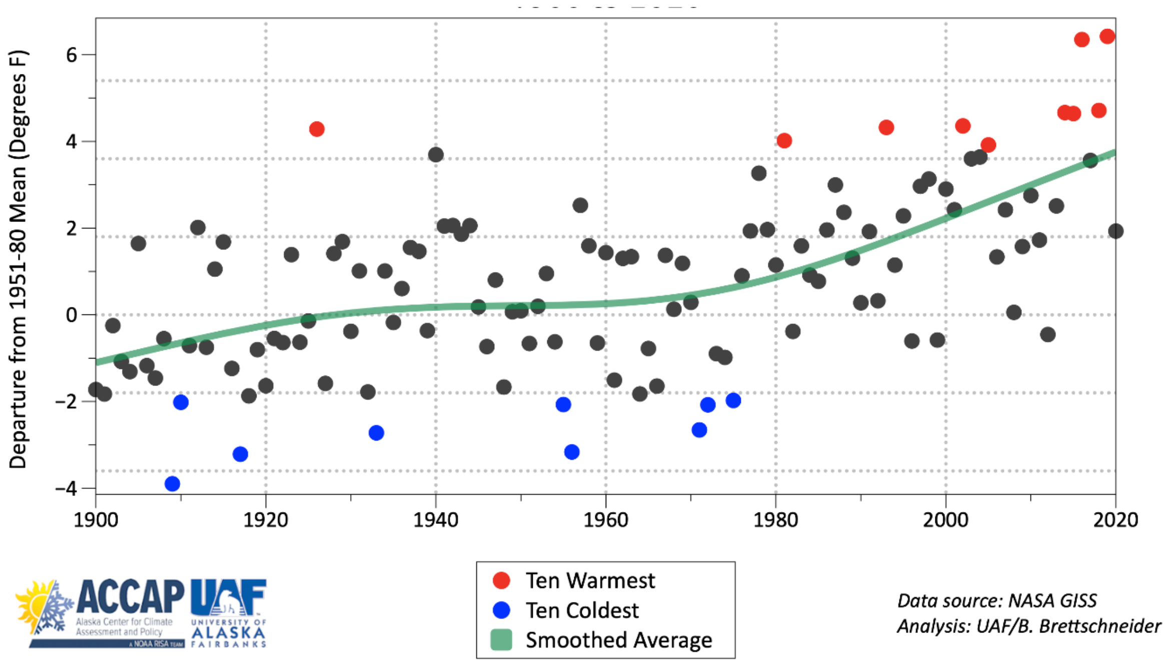

Figure 11. Alaska Annual Temperature 1900 to 2020.

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

The seas surrounding Alaska have been unusually warm in recent years, with unprecedented warmth in some cases (Thoman and Walsh 2019). This effect can be seen throughout the Alaska region, including the Bering, Chukchi, and Beaufort seas (Figure 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).

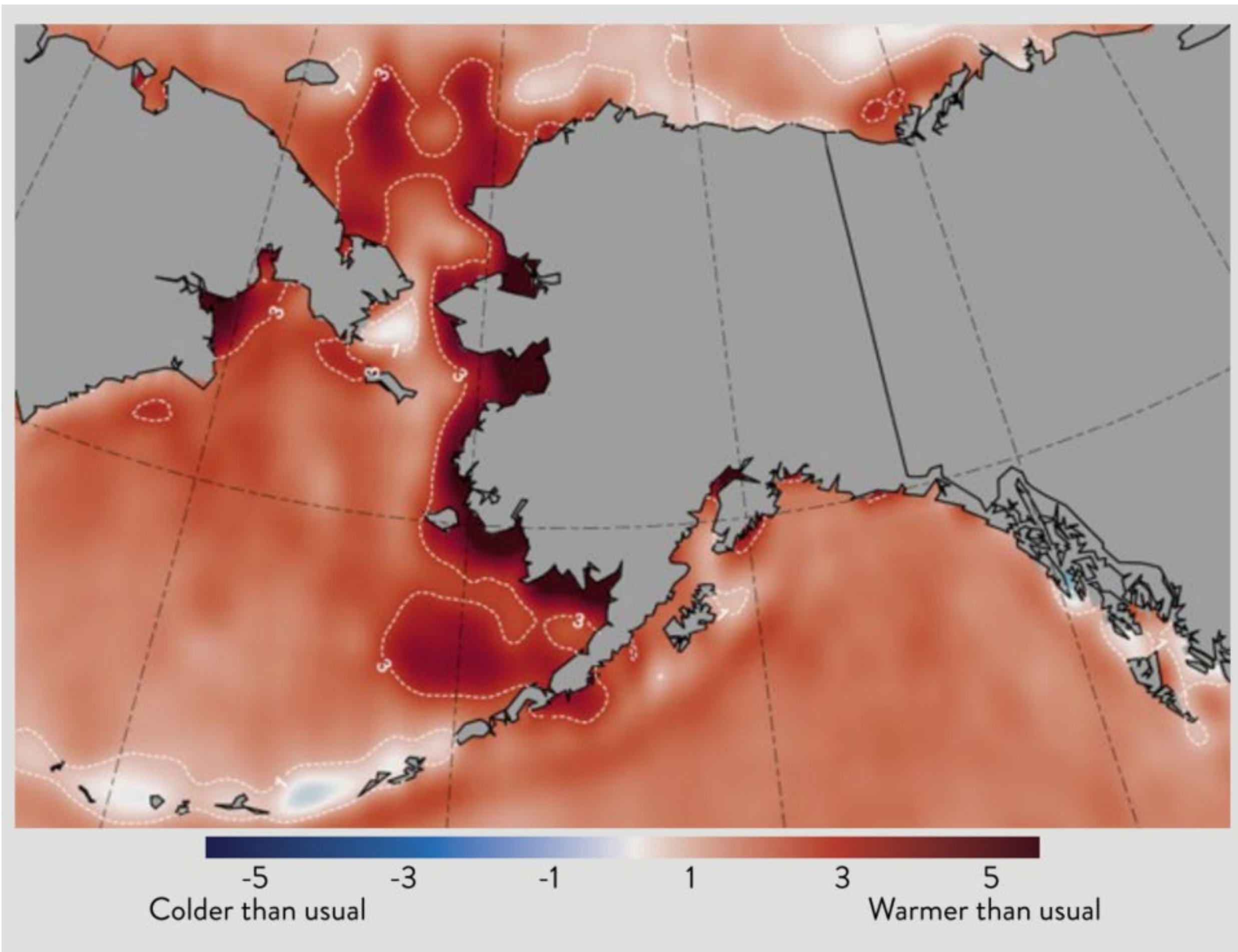

Figure 12. Shades of red indicate summer sea surface temperatures that were warmer than average during 2014-2018, especially along the west coast.

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). 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[3] 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 WDPS 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 (Figure 13). 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).

[3]NOAA Fisheries, Alaska Fisheries Science Center website. Available at https://apps-afsc.fisheries.noaa.gov/REFM/stocks/Historic_Assess.htm, accessed 2/17/24.

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

5.1.1.3 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 424.5 ppm[4].

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).

[4] NOAA Global Monitoring Laboratory website. Trends in Atmospheric Carbon Dioxide. Available at https://www.esrl.noaa.gov/gmd/ccgg/trends/, accessed 3/11/ 2024.

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.

5.1.2 Regional Effects

Sitka is located in Sitka Sound on the southwest side of Baranof Island. Sitka Harbor and the Sitka Channel are approximately 27 km (16.5 mi) from the open Pacific Ocean; however, Sitka is protected by Japonski Island and several small islands that reduce its exposure to waves and weather somewhat. The Sitka Channel is generally characterized by semidiurnal tides with a mean tide range of 2.34 m (7.7 feet), the diurnal tide range is 3.01 m (9.94 feet), and the extreme range is 5.73 m (18.98 feet) (data for Station 9451600, NOAA 2024). Freshwater inputs to Sitka Sound include many anadromous streams, but the Indian River is the closest tributary to the action area. The bathymetry of the sound is variable depending on location and proximity to shore, islands, or rocks. Depths approach approximately 176 meters (580 feet) within Sitka Sound but near the Sitka Channel depths range from 6.7 meters (22 feet) in the channel to 15.3 m (50 feet) near the Channel Rocks.

All areas of the action area are being affected by climate change. Although the species living in the Arctic successfully adapted to changes in the climate in the past, the current rate of change is accelerated (Simmonds and Eliott. 2009). As described above, effects to Arctic ecosystems are very pronounced, wide-spread, and well documented. While a changing climate may create opportunities for range expansion for some species, the life cycles and physiological requirements of many specialized polar species are closely linked to the annual cycles of sea ice and photoperiod and they may be less adaptable (Doney et al. 2009; Wassmann et al. 2011). Because the rate of change is occurring so quickly, the changes may exceed species' ability to adapt.

Indirect threats associated with climate change include increased human activity as a result of regional warming. 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.

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, but the impact on recruitment of important prey of humpback whales 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 2008a).

5.2 Natural Catastrophic Changes

Coastal Alaska is a region of known seismic and volcanic activity and tsunami events. Earthquakes, volcanic eruptions, landslides, and tsunamis can alter the physical environment instantaneously. Catastrophic events are infrequent but have the potential to impact marine mammals by: decreasing prey abundance as a result of direct mortality; rendering habitat unsuitable (or more suitable) for marine mammals and prey species; directly removing (or creating) habitat; and, degrading habitat quality (e.g., volcanic ash outfall could affect siltation and water chemistry; NMFS 2016).

5.3 Vessel Traffic

Sitka has the second-highest number of commercial vessel port calls (approximately 1,800 in 2018) following Ketchikan in Alaska. CBS Harbor Department operates and maintains the following five boat harbors in the Sitka area: Crescent Harbor, Sealing Cove Harbor, ANB Harbor, Thomsen Harbor, and Eliason Harbor as well as the existing sea plane base (A29). Thomsen and Eliason Harbors are directly across Sitka Channel from the proposed project. Sitka is part of the Alaska Marine Highway with sailings multiple days a week and provides transit to numerous communities in Southeast Alaska, Washington State, and Canada. Marine vessels that use the action area include passenger ferries, commercial freight vessels/barges, commercial tank barges, cruise ships, commercial fishing boats, charter vessels, recreational vessels, kayaks, and floatplanes.

Ongoing vessel activities in and around Sitka Channel, as well as land-based industrial and commercial activities, result in elevated in-air and underwater acoustic conditions in the action area. Background sound levels likely vary seasonally, with elevated levels during summer when the cruise ship, commercial, and fishing industries are at their peaks.

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

5.3.1 Vessel Strike Risk

Ship strikes can cause major wounds or death to marine mammals. An animal at the surface could be struck directly by a vessel, a surfacing animal could hit the bottom of a vessel, or a vessel propeller could injure or kill an animal below the water surface. From 1978-2011, there were at least 108 recorded whale-vessel collisions in Alaska, with the majority occurring in Southeast Alaska between May and September (Neilson et al. 2012b). Small recreational vessels traveling at speeds over 13 knots (14.9 miles per hour) were most commonly involved in ship strike encounters; however, all types and sizes of vessels were reported (Neilson et al. 2012b).

The majority of vessel strikes involved humpback whales (86 percent) and the number of humpback strikes increased annually by 5.8 percent from 1978 to 2011. Seventeen humpback whales were reported struck by vessels between 2013 and 2015 (Delean et al. 2020), and 18 humpbacks were reported struck by vessels between 2016 and 2020 (Freed et al. 2022) in Alaskan waters. From 2007 to 2013, there were four documented cases of Steller sea lions killed or injured by vessel strikes in Alaska, none from seaplanes (NMFS 2020a).

The CBS travel and transportation website notes that inside Sitka Channel is a no wake zone requiring vessels to go 4.3 knots (5 miles per hour) or slower; however, outside the channel in Sitka Sound ships may be travelling much faster. The largest ships usually travel at speeds between 20-24 knots (23-27 miles per hour).

Vessel traffic in the action area and the surrounding area poses varying levels of threat to humpback whales and Steller sea lions, depending on the type and intensity of the vessel activity and its degree of spatial and temporal overlap with habitats.

5.4 Fisheries

Commercial, recreational, and subsistence fishing occurs in the Southeast Alaska region. Subsistence fisheries include salmon, halibut, herring spawn-on-kelp, shellfish, and groundfish. Eulachon, Dolly Varden, trout, and smelt are also taken for subsistence purposes. Sport fishers have year-round opportunities to catch all five species of Pacific salmon, halibut, lingcod, and rockfish. Salmon, herring, groundfish, and shellfish species are all commercially fished in the area.

The Sitka Sound Seafood Plant was built in 1981 to replace the Seafood Producer's Cooperative facility near Seward, which was destroyed in the1964 earthquake. The Sitka facility provides seafood processing support services for Seafood Producer's Cooperative member fishermen.

The NMFS Alaska Marine Mammal Stranding Network database has records of 224 large whale entanglements between 2000 and 2020.[5] Of these, 64 percent were humpback whales from Southeast Alaska. Most of these whales were entangled with gear between the beginning of June and the beginning of September, when they were on their nearshore foraging grounds in Alaska waters. Between 2000 and 2020, 18 percent of humpback entanglements in Southeast Alaska were with pot gear, 33 percent with gillnet and other net-type gears, and less than 1 percent were associated with longline gear. Humpback whales have been reported as entangled in the action area or near the action area in recent years, including two near Ketchikan in 2011 and one near Gravina Island in 2019.

5.5 Pollution

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

Marine water quality in the action area can be affected by discharges from permitted seafood processing, treated sewer system outflows, vessels operating in marine waters, and sediment runoff from paved surfaces and disturbed areas. Large fuel spills are also possible from large vessel groundings or barges transporting fuel.

5.6 Coastal Zone Development

Coastal zone development results in some loss and alteration of nearshore marine species habitat and changes in habitat quality. Increased development may prevent marine mammals from

[5] NMFS Alaska Marine Mammal Stranding Network database, accessed November 5, 2020.

reaching or using important feeding, breeding, and resting areas. The shoreline in the immediate project area is primarily developed with impervious surfaces directly adjacent to the shoreline of the project footprint. Few areas of natural shoreline exist in the project site, mostly near the proposed upland parking area and haul out ramp. There is little opportunity for further development within Sitka Channel as the SPB is located between the US Coast Guard (USCG) Air Strip and Southeast Alaska Regional Health Consortium facilities, which are currently pursuing permits for expansion. Development actions will likely involve repairs, restructuring, or enlarging existing facilities in the Sitka Channel.

5.7 Prior Section 7 Consultations

Based on a search of the Environmental Consultation Organizer (ECO), there have been three formal and nine informal Section 7 consultations conducted for projects in the Sitka Channel area since 2017. Seven expedited informal Section 7 consultations have occurred in or near the SPB project area (Table 5-1), with one being a consultation for geotechnical survey activities at the proposed SPB site (AKRO-2021-03432). The most common stressor among these consultations was acoustic disturbance.

Table 5-1. Recent Section 7 consultations within a three-mile radius of the Sitka Seaplane Base

Project ID	**Project Title**	**Consultation Category**
AKRO-2017-00903	City and Borough of Sitka Gary Paxton Industrial Park Multipurpose Dock Project	Formal
AKRO-2017-00904	Biorka Island Dock Replacement Project Sitka, Alaska	Formal
AKRO-2018-00245	Crescent Bay, City & Borough of Sitka O'Connell Lightering Float Pile Replacement	Formal
AKRO-2016-00232	South Sitka Channel Fuel Float LOC	Informal
AKRO-2017-00909	Sitka Marine Service Center	Informal
AKRO-2018-01684	Sitka North Pacific Seafoods Dock Maintenance Project	Informal
AKRO-2019-00160	USCG Sitka Dock Moorage Short Term Repairs	Informal
AKRO-2019-00440	Sitka Sound Aldrich Dock Project	Informal
AKRO-2019-03001	Crescent Harbor, City and Borough of Sitka, Solstice Alaska Consulting Inc.	Informal
AKRO-2019-03283	Sitka Harbor, 1401-3 HPR Dock Association POA-2019-00536	Informal
AKRO-2019-03761	Sitka Romar Holdings Western Channel Dock	Informal
AKRO-2022-03511	Kelptastic Farms, Sitka POA-2020-00426	Informal
AKRO-2021-00398	Sitka, Breast Island Dock eLOC	Informal Expedited
AKRO-2021-03432	Sitka Seaplane Base Geotechnical Project	Informal Expedited

Project ID	Project Title	Consultation Category
AKRO-2022-00871	Hernendez Dock Modification, Jamestown Bay Sitka	Informal Expedited
AKRO-2022-03086	Caldwell Steel Pile Install in Sitka Channel	Informal Expedited
AKRO-2023-00651	Sitka Channel fender replacement	Informal Expedited
AKRO-2023-01867	Sitka Geotechnical Boring	Informal Expedited
AKRO-2023-03140	Sitka Seawalk Phase II	Informal Expedited

The records are linked in the Environmental Consultation Organizer (ECO) at https://appscloud.fisheries.noaa.gov/suite/sites/eco/page/home

5.8 Environmental Baseline Summary

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

- There are insufficient data to make reliable estimations of the impact of climate change on marine mammals considered in this opinion. Although the effects of climate change and other large-scale environmental phenomena on humpback whales cannot be predicted with certainty, impacts to their prey from oceanic regime shifts, or changes in freshwater habitat (hydrologic changes, increased water temperature) are projected to occur.
- Vessel traffic in the action area poses varying levels of threat to listed marine mammals, depending on the type and intensity of the activity and its degree of spatial and temporal overlap with marine mammals. The presence, movements, and sound of ships in the vicinity of some species may cause them to abandon foraging areas.
- Commercial fisheries may have reduced prey availability for humpback whales.
- Humpback whales have been impacted by entanglement.
- The proposed project is in an area of high human use and some existing habitat alteration for both the sunflower sea star and prey species for the humpback whale.
- Climate change is thought to have exacerbated SSWS, which was the cause of a range wide die-off of sunflower sea stars.

6 EFFECTS OF THE ACTION

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

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

We organize our effects analysis for each species beginning with stressor identification, then assessing the potential for exposure, likely response, and concluding with a risk assessment for the proposed activities.

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

6.1 Project Stressors

Stressors are any physical, chemical or biological phenomena that can induce an adverse response. The effects section starts with identification of the stressors produced by the constituent parts of the proposed action.

Based on our review of the Biological Assessment; the IHA application; the proposed notice for issuing the IHA; personal communications with PR1, the non-federal designee, and others; and other available literature as referenced in this opinion, our analysis recognizes that the SPB project may cause these primary stressors:

1. in-water sound fields produced by impulsive and non-impulsive noise sources related to pile driving activities including vibratory pile driving, impact pile driving, and down-the-hole drilling;
2. vessel strike and disturbance;
3. disturbance to prey and/or habitat including seafloor disturbance from pile driving activities and placement of fill, equipment or anchors, and turbidity and sedimentation; and
4. pollution from unauthorized spills.

6.1.1 Minor Stressors on ESA-Listed or Proposed 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 strike

As discussed in the Environmental Baseline section, Sitka Channel and the surrounding area experiences high levels of vessel traffic year-round, with a seasonal summer increase. Marine vessels that use the action area include passenger ferries, commercial freight vessels/barges, commercial tank barges, cruise ships, commercial fishing boats, charter vessels, recreational vessels, kayaks, and floatplanes.

Vessels associated with the project would follow well-established, frequently utilized navigation lanes as they cross Sitka Sound and enter Eastern, Middle, and Sitka Channels, and they would be traveling at slow speeds. Within the action area, project-related vessels will not exceed 10 knots and will typically be travelling at less than five knots as they navigate the constrained area of Sitka Channel and the areas near Sitka. Mexico DPS humpback whales and WDPS Steller sea lions in the action area are exposed to ship traffic in this area daily and are unlikely to change their behavior in response to vessel traffic associated with this project. There is the potential for some increase in seaplane traffic with improved and updated base facilities, but an increase in large vessels (e.g. fish processors, and research vessels) is not expected as a result of this project.

The possibility of vessel strike associated with the proposed action is extremely unlikely. Between 2014 and 2018 the minimum mean annual mortality and serious injury rate due to ship strikes reported in Alaska for humpback whales was 2.6 whales (Muto et al. 2021). These incidents account for a very small fraction of the total humpback whale population (Laist et al. 2001).

Vessel operations for construction occur at relatively low speed limits (5 knots). Once vessels get to the construction site, they will be moving very slowly for very short distances. Due to the common presence of commercial and recreational vessels in the action area and the relatively small number of vessel transits during the duration of the project, the use of slow-moving tugboats and barges and skiff transits associated with construction of the project is not expected to measurably affect Mexico DPS humpback whales, WDPS Steller sea lions, and sunflower sea stars.

Vessel strike conclusion

Vessel disturbance or strikes of Mexico DPS humpback whales or WDPS Steller sea lions are not expected as a result of the proposed action because: 1) vessel traffic associated with the project is minimal; 2) relatively few humpback whales use Sitka Sound near the Sitka Channel; 3) only two percent of humpback whales that occur in the area are from the listed Mexico DPS; 4) all vessels, including vessels used in construction of the Sitka SPB, are limited to a speed of 10 knots or less; 5) vessels must adhere to the Alaska Humpback Whale Approach Regulations when transiting to and from the project site (see 50 CFR §§ 216.18, 223.214 and 224.103(b)) that prohibit approaching within 100 yards of humpback whales; and 6) the new SPB location would potentially reduce conflicts with marine mammals and overall vessel congestion in Sitka Channel, because the landing and transit areas would be farther away from seafood processing facilities. All of these factors limit the risk of strike; therefore, we conclude that a strike between a project vessel and a listed humpback whale or Steller sea lion is extremely unlikely to occur.

6.1.1.2 Vessel noise

Project vessels are likely to generate underwater sound levels exceeding the non-impulsive threshold of 120 dB, and disturbance to listed species could occur from project vessel noise. The source levels for project vessels (barge movements) are estimated at between 171-176 dB rms, and will drop to a received level of 120 dB within 2,154 meters (or less) of the source (Richardson et al. 1995; Blackwell and Greene 2003; Ireland and Bisson 2016).

Although some marine mammals could receive sound levels exceeding the acoustic threshold of 120 dB from the project vessels, disturbances rising to the level of harassment are extremely unlikely to occur. The nature of the exposure will be low-frequency, with much of the acoustic energy emitted by project vessels at frequencies below the best hearing ranges of humpback whales. In addition, because vessels will be in transit, the duration of the exposure to ship noise will be brief. The project vessels will emit continuous sound while in transit, which will provide a gradual and prolonged onset of vessel sound before the received sound level exceeds 120 dB. Furthermore, vessel noise associated with construction will be minimal because most work will be conducted from anchored barges and work platforms. Propeller cavitation, the predominant contributor to vessel underwater sound, is unlikely to occur when vessels are anchored.

A startle response to vessels that are underway is not expected. Rather, slight deflection and avoidance are expected to be common responses in those instances where there is any response at all. Free-ranging marine mammals may engage in avoidance behavior when surface vessels move toward them, similar to their behavioral responses to predators. Animals have been observed reducing their visibility at the water surface and moving horizontally away from the source of disturbance or adopting erratic swimming strategies (Williams et al. 2002; Lusseau 2003; Lusseau 2006). Studies indicate that dive times and swimming speeds increase, vocalizations and jumping usually decrease, and individuals in groups move closer together (Kruse 1991; Evans et al. 1994). Most animals in confined spaces, such as shallow bays, moved towards more open, deeper waters when vessels approached (Kruse 1991).

Some baleen whales have adjusted their communication frequencies, intensity, and call rate to limit masking effects from anthropogenic sounds such as shipping traffic. Baleen whales may also exhibit behavioral changes in response to vessel noise. Marine mammals that have been disturbed by anthropogenic noise and vessel approaches are commonly reported to shift from resting behavioral states to active behavioral states, suggesting an energetic cost to the affected animal. Responding to vessels is likely stressful to humpback whales, but the biological significance of that stress is unknown (Bauer and Herman 1986).

Humpback cow-calf pairs significantly reduced the amount of time spent resting and milling when vessels approached, as compared to undisturbed whales (Morete et al. 2007).

Marine mammals including listed whales and sea lions that frequent the project area are very likely habituated to vessel disturbance due to the common presence of ferries, cruise ships, fishing vessels, barges, tugboats, and other commercial and recreational vessels that use the harbor. If animals do respond to project vessel noise, they may exhibit slight deflection from the source, engage in low-level avoidance behavior, or short-term vigilance behavior; however, these behaviors are not likely to result in adverse consequences for the animals. The nature and duration of response is not expected to disrupt to a measurable degree important behavioral patterns such as feeding or resting. The best available information indicates that sunflower sea stars are not sensitive to underwater sounds, and we therefore do not expect this stressor to affect them.

Vessel Noise Conclusion

In summary, some marine mammals could be exposed to vessel noise as a result of this action. If exposure occurs, it will be temporary and localized, and likely cause responses that are at a low energy cost to individuals. The proposed mitigation measures are expected to further reduce the number of times marine mammals react to transiting vessels. NMFS concludes that any disturbance of marine mammals from vessel noise will be temporary and the effects to Mexico DPS humpback whales, WDPS Steller sea lions, and sunflower sea stars from vessel noise will be extremely small.

6.1.1.3 Airborne Acoustic Effects

Although pinnipeds are known to haul out regularly on man-made objects, we believe that adverse effects resulting solely from airborne sound are unlikely due to the sheltered proximity between the proposed project area and haulout sites (outside of Sitka Channel). There is a possibility that an animal could surface in-water, but with head out, within the area in which airborne sound exceeds relevant thresholds and thereby be exposed to levels of airborne sound that we associate with harassment, but any such occurrence would likely be accounted for in our estimation of exposures and adverse effects due to underwater sound. Therefore, a separate assessment of stressor effects due to airborne sound for pinnipeds is not warranted, and airborne sound is not discussed further here. Similarly, cetaceans, including humpback whales are not expected to be exposed to airborne sounds that would result in adverse effects.

6.1.1.4 Disturbance to Seafloor, Habitat and/or Prey Resources Related to Marine Mammals and Sunflower Sea Stars

The proposed action will have temporary impacts on water quality (increases in turbidity levels) and on prey species distribution. Pile driving may cause temporary and localized turbidity through sediment disturbance. Turbidity plumes during pile installation and removal will be localized around the pile. Due to temporary, localized, and low levels of turbidity increases, it is not expected that turbidity would result in immediate or long-term effects to the Mexico DPS humpback whale, WDPS Steller sea lions, sunflower sea stars, or their prey.

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

The most likely impact to fish from pile driving and drilling activities at the project area would be temporary behavioral avoidance of the area. The duration of fish avoidance of this area after pile driving ceases is unknown, but a rapid return to normal recruitment, distribution and behavior is expected. In general, impacts to marine mammal prey species are expected to be minor and temporary given the small area of pile driving within the action area relative to known feeding areas for humpback whales. In general, we expect fish will be capable of moving away from project activities to avoid exposure to noise. We expect the area in which stress, injury, TTS, or changes in balance of prey species may occur will be limited by the Channel Rocks breakwaters which will block much of the sound generated by the pile driving and drilling operations. We consider potential adverse impacts to prey resources from pile-driving and drilling in the action area to be immeasurably small.

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

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

Construction activities will temporarily increase in-water noise and may adversely affect prey in the action area. Adverse effects on prey species populations during project construction will be short-term, based on the short duration of the project. After pile driving activities are completed, habitat use and function are expected to return to similar pre-construction levels and fish are expected to reoccupy the area.

An Erosion and Sediment Control Plan, and other best management practices will be implemented during construction to prevent contaminants from entering the marine environment. Construction will be conducted in accordance with Clean Water Act Sections 404 and 401 regulations to minimize potential construction-related impacts on water quality. As stated in Section 4.2.2.2, sunflower sea stars occur in a wide range of intertidal and subtidal habitats from northern Baja California, Mexico, to the central Aleutian Islands, Alaska. Any impacts to sunflower sea star habitat are expected to be limited and temporary.

Given the numbers of fish and other prey species in the vicinity, the short-term nature of effects on fish species, and the mitigation measures to protect fish and marine mammals during construction, the proposed action is not expected to have measurable effects on the distribution or abundance of potential marine mammal prey species. Any behavioral avoidance by fish of the disturbed area would still leave sufficiently large areas of fish and marine mammal foraging habitat outside the Sitka Channel.

The surrounding area is not a significant foraging ground for humpback whales. There are no known aggregations of forage fish important to humpback whales in the project vicinity that will be impacted by the action. Implementation of the mitigation measures described in Section 2.1.4 of this opinion will avoid or minimize effects to prey resources. In summary, the effects of disturbance to the seafloor, habitat, and prey resources resulting from the Sitka SPB project activities are expected to have a negligible impact on Mexico DPS humpback whales, WDPS Steller sea lions, and sunflower sea stars.

6.1.1.5 Pollution

While there is potential for an oil or pollutant spill from activities associated with the project, the risk of spills and pollutants related to the project will be mitigated by implementing best management practices and policies to prevent accidental spills. Plans will be in place and materials will be available for cleanup activities if a spill were to occur.

Construction will be conducted in accordance with Clean Water Act Section 404 and 401 regulations to minimize potential construction-related impacts on water quality, and any effects to Mexico DPS humpback whales will be immeasurably small. Therefore, we conclude that the effects from this stressor on humpback whales and sunflower sea stars are immeasurably small.

Pollution into the marine environment from runoff, spills, or outfall pipes may compromise the microbiome of sunflower sea stars leading to death, or making them vulnerable to other stressors (Aquino et al. 2021; McCracken et al. 2023). Relative to SSWS, this is minor threat that is limited in spatial and temporal scope. There is no direct evidence that this stressor is directly impacting sunflower sea stars in the action area.

6.1.2 Major Stressors on ESA-Listed Species

Underwater noise from pile driving activities is likely to adversely affect Mexico DPS humpback whales and WDPS Steller sea lions. This stressor will be analyzed further in the *Exposure Analysis* and *Response Analysis.*

6.1.2.1 Description of Sound Sources

The marine soundscape is comprised of both ambient (naturally-produced) and anthropogenic sounds. The sound level of an area is defined by the total acoustical energy being generated by known and unknown sources. These sources may include physical (e.g., waves, wind, precipitation, earthquakes, ice, atmospheric sound), biological (e.g., sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (e.g., vessels, dredging, aircraft, construction).

Natural sound sources at any given location and time comprise "ambient" sound, while the sum of ambient sounds and typical anthropogenic sound comprises the "background" sound. Received levels of ambient and background sound depend not only on the source levels (as determined by current weather conditions and levels of biological and shipping activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor and is frequency-dependent. As a result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Ambient sound levels at a given frequency and location can vary by 10-20 dB (over three-fold) from day to day (Richardson et al. 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could adversely affect marine mammals.

In-water construction activities associated with the project include vibratory pile removal and installation, impact pile driving, and DTH pile installation. The sounds produced by these activities fall into one of two general sound types: impulsive and non-impulsive. Impulsive sounds (e.g., explosions, gunshots, sonic booms, impact pile driving) are typically transient, brief (less than one second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI (American National Standards Institute) 1986; NIOSH (National Institute for Occupational Safety and Health) 1998; ANSI (American National Standards Institute) 2005; NMFS 2018b). Non-impulsive sounds (e.g., aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems) can be broadband, narrowband or tonal, brief or prolonged (non-impulsive or intermittent), and typically do not have the high peak sound pressure with rapid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH (National Institute for Occupational Safety and Health) 1998; NMFS 2018b). The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (e.g., Ward 1997 in Southall et al. 2007).

Impact hammers operate by repeatedly dropping a heavy piston onto a pile to drive the pile into the substrate. Sound generated by impact hammers is characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper 2005). Vibratory hammers install piles by vibrating them and allowing the weight of the hammer to push them into the sediment. Vibratory hammers produce significantly less sound than impact hammers. Peak sound pressure levels (SPLs) may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman et al. 2009). Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (Nedwell and Edwards 2002; Carlson et al. 2005). To summarize, impact pile driving has more intense effects over a smaller area, while vibratory pile driving has lower intensity effects over a much larger area.

A DTH hammer drill is used to place hollow steel piles or casings by drilling. A DTH hammer drill is a drill bit that drills through the bedrock using a pulse mechanism that functions at the bottom of the hole. This pulsing bit breaks up rock to allow removal of debris and insertion of the pile. The head extends so that the drilling takes place below the pile. The pulsing sounds produced by DTH hammer drills were previously thought to be non-impulsive. However, recent sound source verification (SSV) monitoring has shown that DTH hammer drill can create sound that can be considered impulsive (Denes et al. 2019). Therefore, NMFS characterizes sound from DTH pile installation as being impulsive when evaluating potential Level A harassment (i.e., injury) impacts and as being non-impulsive when assessing potential Level B harassment (i.e., behavior) effects.

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) (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,[6] expressed in root mean square[7] (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)):

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[6] 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.

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

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

Under the PTS/TTS Technical Guidance, NMFS uses the following thresholds (Table 6-1) for underwater sounds that have the potential to cause auditory injuries, referred to as Level A harassment under section 3(18)(A)(i) of the MMPA (16 U.S.C § 1362(18)(A)(i)) (NMFS 2018). Different thresholds and auditory weighting functions are provided for different marine mammal hearing groups, which are defined in the Technical Guidance (NMFS 2018). The generalized hearing range for each hearing group is in Table 6-2.

CBS's proposed activity includes the use of continuous (vibratory hammer and DTH drilling) and impulsive (DTH drilling and impact pile driving) sources, and therefore the RMS SPL thresholds of 120 and 160 dB re 1 μPa are applicable.

Table 6-1. PTS Onset Acoustic Thresholds for Level A Harassment.

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 6-2. Underwater marine mammal hearing groups.

Hearing Group	ESA-listed Marine Mammals in the Project Area	Generalized Hearing Range[1]
Low-frequency (LF) cetaceans *(Baleen whales)*	Humpback whales (Mexico and Western DPS)	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans *(dolphins, toothed whales, beaked whales)*	None	150 Hz to 160 kHz
High-frequency (HF) cetaceans *(true porpoises)*	None	275 Hz to 160 kHz
Phocid pinnipeds (PW) *(true seals)*	None	50 Hz to 86 kHz
Otariid pinnipeds (OW) *(sea lions and fur seals)*	Steller sea lions (Western DPS)	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[8] 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). For purposes of this consultation, any exposure to Level A or Level B disturbance sound thresholds under the MMPA constitutes an incidental "take" under the ESA and must be authorized by the ITS (Section 10 of this opinion) (except that

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

take is not prohibited for species proposed for listing under the ESA, or for threatened species that do not have ESA section 4(d) regulations).

As described below in Section 5.2, we expect that Mexico DPS humpback whales and WDPS Steller sea lion exposures to noise associated with the proposed action may result in disturbance (Level B harassment). No auditory injury, serious injury, or mortalities are expected as a result of this project.

6.1.3 Major Stressors on Sunflower Sea Stars

New permanent and temporary pilings will come in contact with the benthic environment prior to being driven. In addition, marine invertebrates such as mussels and barnacles, have likely settled and grown on the pilings that will be removed as part of the action description. These are prey items for sunflower sea stars, and it is possible that a few individual sea stars will be attracted onto the pilings prior to the pilings' removal.

Activities impacting the benthic environment due to pile driving and removal may interact with sunflower sea stars on the sea floor or on the pilings that will be removed. Pilings could potentially come in contact with sea stars, or sunflower sea stars could be brought to the surface on pilings when they are removed from the water.

These activities have the potential to directly impact (e.g., harm, wound, kill, collect) sunflower sea stars, as well as impacting sunflower sea star habitat. The potential for an individual sunflower sea star to be hit by a pile during installation or removal is possible. The proposed project would install sets of piles in each phase. In Phase I, twelve temporary, 16-inch diameter piles will be installed and removed. Phase I will also install ten, 16-in and sixteen, 24-in permanent piles. In Phase II, six temporary, 16-inch diameter piles will be installed and removed. Phase II will also install six, 24-in permanent piles. The area covered per pile and the total area covered by each pile type are summarized in Table 6-3.

Table 6-3. Summary of piles to be installed for the Sitka seaplane base and the total seafloor area to be impacted for each pile type and phase. Temporary piles are listed in italics.

Number of Piles	Diameter (in)	Area/Pile (ft^2)	Area/pile (m^2)	Total Area (ft^2)	Total area (m^2)
Phase I					
12	16	1.40	*0.13*	16.76	1.56
12	*16*	*1.40*	*0.13*	*16.76*	*1.56*
10	16	1.40	*0.13*	13.96	1.30
16	24	3.14	*0.29*	50.27	4.67
				Subtotal Phase I	**9.09**
Phase II					
6	16	1.40	*0.13*	8.38	0.78
6	*16*	*1.40*	*0.13*	*8.38*	*0.78*
6	24	3.14	*0.29*	18.85	1.75

Number of Piles	Diameter (in)	Area/Pile (ft^2)	Area/pile (m^2)	Total Area (ft^2)	Total area (m^2)
				Subtotal Phase II	**3.31**
				Total	**11.40**

Based on surveys conducted in 2022 (Lowry 2023), the estimated density of sunflower sea stars present pre-pandemic, and the estimated decline in the population, the expected density in the action area would be 0.002-sunflower sea star per m^2, and less than 0.018 sea star would be likely to be impacted in the 9.09 m^2 affected by the Phase I pile driving and removal. Similarly, less than 0.01 sea star would be likely to be impacted in the 3.31 m^2 affected by the Phase II pile driving and removal. Therefore, NMFS concurs with the CBS conclusion that it would be highly unlikely for there to be any adverse effects to sunflower sea stars within the action area where benthic disturbance due to pile driving would occur (See Lowry et al. 2022).

Although it is unlikely that sea stars will be adversely affected by the pile driving, the project will also fill areas below the HTL. Excavated materials from above the HTL would be placed below the HTL to develop the seaplane base uplands. The fill will be placed using an excavator and dozer and then compacted using a vibratory soil compactor. The total area of placement of fill below the HTL in Phase I will be 1.6 acres (6,475 m^2) and in Phase II will be 1.3 acres (5,261 m^2). Based on surveys conducted in 2022 (Lowry 2023), the estimated density of sunflower sea stars present pre-pandemic and the estimated decline in the population, the expected density in the action area is 0.002-sunflower sea star per m^2, and approximately 12.95 sea star would be likely to be impacted in the 6,475-m^2 affected by the fill placement in Phase I and 10.5 sea stars would be likely to be impacted in the 5,261-m^2 affected by the fill placement in Phase II. Therefore, NMFS expects a total of 23.47 sea stars to be adversely affected by the fill placement.

6.1.3.1 Sea Star Wasting Syndrome

SSWS is the primary threat and stressor to sunflower sea stars across their range. SSWS is thought to be exacerbated by warming ocean temperatures and other climate change related characteristics. A SSWS pandemic occurred across the range of the sunflower sea star from 2013-2017. SSWS is known to occur in sunflower sea stars and other species at smaller geographic and temporal scales and is expected to occur in the future. But the magnitude of future outbreaks is unknown. The pathogen that caused the 2013-2017 SSWS is unknown. As stated above, the draft 2022 Status Review Report for this species identified SSWS as the factor of greatest concern for the species throughout its range, including in the action area.

6.2 Exposure Analysis for ESA Listed Species

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 estimate the number of individuals that are likely to be exposed to an action's effects and the populations or subpopulations those individuals represent.

While North Pacific right whale, sperm whale, and fin whale have been documented in or near Sitka Sound and Sitka Channel, the temporal and/or spatial occurrence of these species is such that take is not expected to occur, and they are not discussed further beyond the explanation provided here. These species are all considered to be rare (no sightings in recent years) or very rare (no local knowledge of sightings within the project vicinity) within Sitka Sound or near the action area. The take of these species has not been requested nor is proposed to be authorized and these species are not considered further in this document.

As discussed in Section 2.1.4 above, CBS proposed mitigation measures that should avoid or minimize exposure of listed species to one or more stressors from the proposed action.

6.2.1 Exposure to Noise from Pile Driving Activities

NMFS expects that humpback whales, Steller sea lions, and the sunflower sea star, will be exposed to underwater noise from pile driving activities (including vibratory pile removal, impact and vibratory pile driving, and DTH). However, as stated above we don't expect any response from the sunflower sea star from the exposure. Possible responses by Mexico DPS humpback whales and WDPS Steller sea lions to the sound produced by pile driving activities include:

- Physical Responses
    - Temporary or permanent hearing impairment (threshold shifts)
    - Non-auditory physiological effects
- Behavioral responses

For this analysis we estimated exposure by considering: 1) acoustic thresholds above which the best available science indicates listed marine mammals will be behaviorally harassed or incur some degree of hearing impairment; 2) the area that will be ensonified above these levels in a day; 3) the expected density or occurrence of listed marine mammals within these ensonified areas; and 4) the number of days of activities.

6.2.1.1 Distances to Level A and Level B sound thresholds

Here, we describe operational and environmental parameters of the activity that are used in estimating the area ensonified above the acoustic thresholds, including source levels and the transmission loss coefficient.

The sound field in the project area is the existing background noise plus additional construction noise from the proposed project. Marine mammals are expected to be affected via sound generated by the primary components of the project (*i.e.,* impact pile driving, vibratory pile driving and removal, and DTH).

The intensity of pile driving sounds is greatly influenced by factors such as the type of piles (material and diameter), hammer type, and the physical environment (*e.g.*, sediment type) in which the activity takes place.

Table 6-4. Summary of In-Water Pile Driving and Removal Proxy Levels (10 m)

Pile Type	Installation Method	Peak SPL (dB re 1 µPa)	RMS SPL (dB re 1 µPa)	SEL_{ss} (dB re 1 μPa^2 sec)	Reference levels
16-inch steel piles	Vibratory hammer	NA	161	NA	CALTRANS (2020), Navy (2015)
24-inch steel piles	Vibratory hammer	NA	161	NA	Navy (2015)
16-inch steel piles	Impact hammer	200	185	175	CALTRANS (2020)
24-inch steel piles	Impact hammer	203	190	177	CALTRANS (2015, 2020)
16-inch rock sockets	DTH system	172	167	146	Heyvaert and Reyff (2021), Guan and Miner 2020.
24-inch rock sockets	DTH system	184	167	159	Heyvaert and Reyff (2021)
Notes: NMFS conservatively assumes that noise levels during vibratory pile removal are the same as those during installation for the same type and size pile; all SPLs are unattenuated and represent the SPL referenced at a distance of 10 m from the source; NA = Not applicable; dB re 1 µPa = decibels (dB) referenced to a pressure of 1 micropascal					

All Level B harassment isopleths are reported in Table 6-5 considering RMS SPLs and the default TL coefficient for practical spreading loss (*i.e.*, 15*Log10(range)). Landforms (including causeways, breakwaters, islands, and other land masses) impede the transmission of underwater sound and create shadows behind them where sound from construction is not audible. At Sitka Channel, Level B harassment isopleths from the project will be blocked by the Channel Rock breakwaters, small islands to the northwest and southeast, and the coastline along Baranof Island northwest of the project site. The maximum distance that a harassment isopleth can extend due to these land masses is 8,500 m.

The ensonified area associated with Level A harassment is technically challenging to predict due to the need to account for a duration component. Therefore, NMFS developed an optional User Spreadsheet tool to accompany the Technical Guidance (NMFS 2018a) that can be used to relatively simply predict an isopleth distance for use in conjunction with marine mammal density or occurrence to help predict potential exposure. We note that because of some of the assumptions included in the methods underlying this optional tool, we expect that the resulting isopleth estimates are typically going to be overestimates of some degree, which may result in an overestimate of potential take by Level A harassment under the MMPA. However, this optional tool offers the best way to estimate isopleth distances when more sophisticated modeling methods are not available or practical. For stationary sources (such as from impact pile driving, vibratory pile driving, and DTH), the optional User Spreadsheet tool predicts the distance at which, if a marine mammal remained at that distance for the duration of the activity, it would be expected to incur PTS. The resulting estimated isopleths are reported in Table 6-5.

Table 6-5. Distances to Level A Harassment and Level B Harassment Thresholds Per Pile Type and Installation Method for Phase I and Phase II.

Activity	Pile Size	Minutes (min) or strikes per pile	Piles per day	Level A harassment distance (m)[1]					Level B harassment distance (m) all hearing groups
				LF	MF	HF	Phocid	Otariids	
Vibratory Installation	16- inch	10 min	6	6.8	0.6	10.1	4.2	0.3	5,412
	24-inch	10[2] min	6[1]	6.8	0.6	10.1	4.2	0.3	
Vibratory Removal	16-inch	10 min	6	6.8	0.6	10.1	4.2	0.3	5,412
Impact Installation	16-inch	175 strikes	4	231	8.2	275	123	9	464.2
	24-inch	175 strikes	4	313	11.1	373	168	12.2	1,000
DTH (Rock Socket)[2]	16-inch	36,000 strikes	2	59	2.1	70.3	31.6	2.3	8,500[3]
	24-inch	54,000 strikes	2	568.9	20.2	677.6	304.4	22.2	

[1] Cetaceans: LF= low frequency, MF=Mid-frequency, HF= High frequency; Pinnipeds (underwater): Phocids, Otariids
[2] A maximum scenario was calculated for this activity.
[3] The calculated Level B harassment zone is 13,594 m. However, the farthest distance that sound will transmit from the source is 8,500 m before transmission is stopped by landmasses.

6.2.2 Marine Mammal Occurrence and Exposure Estimates

In this section we provide information about the occurrence of marine mammals, including density or other relevant information that will inform the exposure calculations. We also describe how this information is synthesized to produce a quantitative estimate of exposure that is reasonably likely to occur. Although construction is currently planned to begin in summer 2024 and extend for two years, unexpected delays associated with construction can occur. To account for this uncertainty, the following exposure estimates assume that construction will occur during the periods of peak abundance for those species for which abundance varies seasonally.

Daily occurrence probability of each marine mammal species in the action area is based on consultation with previous monitoring reports, local researchers and marine professionals. Occurrence probability estimates are based on conservative density approximations for each species and factor in historic data of occurrence, seasonality, and group size in Sitka Sound and Sitka Channel. A summary of proposed occurrence is shown in Table 6-6. To accurately describe species occurrence near the action area, marine mammals were described as either common (species sighted consistently during all monitoring efforts in the project vicinity, assume one to two groups per day), frequent (species sighted with some consistency during most monitoring efforts in the project vicinity, assume one group per week), or infrequent (species sighted occasionally during a few monitoring efforts in the project vicinity, assume one group per 2 weeks).

Table 6-6. Estimated Occurrence of Group Sightings of Listed Marine Mammal Species in and around the Sitka Channel and Sitka Sound.

Species	Frequency	Average Group Size	Expected Occurrence	Avg. Individuals/ Week
Humpback whale	Frequent	3.4	1 group/ week	3.4
Steller sea lion[2]	Common	2.0	1-2 groups/ day	14-28

[1]Likelihood of one group/ day in the Level A harassment zone and likelihood of two groups/day in the level B harassment zone.

While Steller sea lions do not have large Level A harassment zones, they are frequently sighted in the project area and therefore have some potential for auditory injury. Expected take of Steller sea lion by Level A harassment would likely occur only incidental to DTH drilling, due to the larger Level A harassment zones for these activities. See Table 6-5.

Additionally, for listed species that are large and/or infrequent (gray whale and humpback whale) in Sitka Sound and are unlikely to be within the breakwaters where the proposed action will take place, take by Level B harassment is only anticipated to occur incidental to vibratory and DTH methods, given the larger Level B harassment zones which will extend beyond the breakwaters.

Table 6-7 provides more detail on our estimate of the total number of listed species individuals likely to be exposed to the sound levels capable of Level A or B harassment.

In summary, based on the observed occurrence of Steller sea lions in the Sitka Channel area, we expect that 22 individuals are likely to be exposed to sound levels capable of Level A harassment and 160 individuals are likely to be exposed to Level B harassment during the two phases of the project.

Based on the observed occurrence of humpback whales in the Sitka Channel area, we expect that no individuals are likely to be exposed to sound levels capable of Level A harassment and 14 individuals are likely to be exposed to Level B harassment during the two phases of the project.

Table 6-7. Listed Species Occurrence and Estimated Exposure to Level A and B Harassment due to Sound for the Sitka Sea Plane Base Project, Phases I and II.

Species	Frequency	Group Size Range	Average Group Size	Expected occurrence	Activities Leading to Exposure	Total Days of Construction	Estimated Individuals Exposed
Phase I- 2024							
Level A Harassment Exposure							
Steller sea lion	Common	1-8	2.0	2 groups/ day	DTH	8	16
Level B Harassment Exposure							
Humpback whale	Frequent	1-10	3.4	1 group/ week	Vibratory pile/ DTH	21.4	11
Steller sea lion	Common	1-8	2.0	2 groups/ day	All	30.9	123.6
Phase II-2025							
Level A Harassment Exposure							
Steller sea lion	Common	1-8	2.0	1 group/ day	DTH	3	6
Level B Harassment Exposure							
Humpback whale	Frequent	1-10	3.4	1 group/ week	Vibratory pile/ DTH	6	3
Steller sea lion	Common	1-8	2.0	2 groups/ day	All	9	36

6.3 Response Analysis to Sound

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 noise 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 non-impulsive sound produced by pile installation and removal and vessel noise include:

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

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

To calculate expected take of listed species, the exposure estimates are weighted based on calculated percentages of population for each distinct population segment (DPS), assuming that animals present would follow the probability of presence in the project area. Based on surveys and analysis conducted by Hastings et al. (2020), an estimated 2.2 percent of Steller sea lions in the vicinity of the project are Western DPS Steller sea lions and the remaining 97.8 percent are Eastern DPS Steller sea lions. Therefore, we expect no Western DPS Steller sea lions to be included in the estimated Steller sea lions exposed to Level A harassment and three Western DPS Steller sea lions to be included in the estimated Steller sea lions exposed to Level B harassment.

Similarly, the exposure estimates for humpback whales are weighted based on calculated percentages of population for each DPS, assuming that animals present would follow the probability of presence in the project area. For humpback whales, the probability by stock is 98 percent Hawaii DPS and 2 percent Mexico DPS based on Southeast Alaska estimates from NMFS 2021. Therefore, based on the results of our modeling, we expect less than one Mexico DPS humpback whale to be included in the estimated humpback whales exposed to Level B harassment[9] (Table 6-8).

Table 6-8. Estimated Individuals Exposed during Construction Activities for the Sitka Sea Plane Base and Calculated Take Estimates for Listed Species

Species	Activities Leading to Exposure	Total Days of Construction	Estimated Individuals Exposed	Percentage of Listed DPS[1]	Estimated Take of Listed DPS
Phase I- 2024					
Level A Harassment Take Estimate					
Steller sea lion	DTH	8	**16**	2.2	**0**
Level B Harassment Take Estimate					
Humpback whale[2]	Vibratory pile/ DTH	21.4	**11**	2.0	**<1**
Steller sea lion	All	30.9	**123.6**	2.2	**2.72**
Phase II-2025					
Level A Harassment Take Estimate					
Steller sea lion	DTH	3	**6**	2.2	**0**
Level B Harassment Take Estimate					
Humpback whale[2]	Vibratory pile/ DTH	6	**3**	2.0	**<1**

[9] ESA listed Mexico DPS humpback whales take calculation resulted in less than 0.5 takes; therefore, no takes are expected or are proposed for authorization.

Species	Activities Leading to Exposure	Total Days of Construction	Estimated Individuals Exposed	Percentage of Listed DPS[1]	Estimated Take of Listed DPS
Steller sea lion	All	9	**36**	2.2	**<1**

[1]Take estimates are weighted based on calculated percentages of population for each DPS, assuming animals present would follow same probability of presence in project area. Humpback whale probability by DPS is based on Southeast Alaska estimates from NMFS 2021 (98 percent Hawaii DPS; 2 percent Mexico DPS). Take estimates are weighted based on calculated percentages of population for each DPS, assuming animals present would follow same probability of presence in project area. Steller sea lion probability by DPS is based on Hastings et al (2020) (97.8 percent Eastern DPS; 2.2 percent Western DPS).

[2]ESA listed Mexico DPS humpback whales take calculation resulted in less than 0.5 takes; therefore, no takes are expected or are proposed for authorization.

The introduction of anthropogenic noise into the aquatic environment from pile driving activities is the primary means by which marine mammals may be harassed from CBS's specified activity. 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). In general, exposure to pile driving and removal noise has the potential to result in auditory threshold shifts and behavioral reactions (e.g., avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior). Exposure to anthropogenic noise can also lead to non-observable physiological responses such an increase in stress hormones. Additional noise in a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions such as communication and predator and prey detection. The effects of pile driving and removal noise on marine mammals are dependent on several factors, including, but not limited to, sound type (e.g., impulsive vs. non-impulsive), the species, age and sex class (e.g., adult male vs. mom with calf), duration of exposure, the distance between the pile and the animal, received levels, behavior at time of exposure, and previous history with exposure (Wartzok et al. 2003; Southall et al. 2007). Here we discuss physical auditory effects (threshold shifts) followed by behavioral effects.

6.3.1 Threshold Shifts

NMFS defines a noise-induced threshold shift (TS) as a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS 2018b). In other words, a threshold shift is a hearing impairment and may be temporary (such as ringing in your ears after a loud rock concert), or permanent (such as the loss of the ability to hear certain frequencies or partial or complete deafness). The amount of threshold shift is customarily expressed in dB. As described in NMFS (2018b), there are numerous factors to consider when examining the consequence of TS, including, but not limited to: 1) the signal temporal pattern (e.g., impulsive or non-impulsive), 2) likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS, 3) the magnitude of the TS, 4) time to recovery (seconds to minutes or hours to days), 5) the frequency range of the exposure (i.e., spectral content), 6) the hearing and vocalization frequency range of the exposed species relative to the signal's frequency spectrum (i.e., how and animal uses sound within the frequency band of the signal; e.g., Kastelein et al. 2014), and 7) the overlap between the animal and the sound source (e.g., spatial, temporal, and spectral).

6.3.1.1 Temporary Threshold Shift (TTS)

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 or hours 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).

For low-frequency cetaceans, no behavioral or auditory evoked potential threshold data exist. Therefore, hearing thresholds were estimated by synthesizing information from anatomical measurements, mathematical models of hearing, and animal vocalization frequencies (NMFS 2018b).

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

6.3.1.2 Permanent Threshold Shift (PTS)

When PTS occurs, there is physical damage to the sound receptors in the ear. In severe cases, there can be total or partial deafness, while in other cases the animal has an impaired ability to hear sounds in specific frequency ranges (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.

6.3.2 Non-Auditory Physiological Effects

Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, internal bubble formation, resonance effects, and other types of organ or tissue damage (Cox et al. 2006; Southall et al. 2007). Studies examining such effects are limited. In general, little is known about the potential for pile driving activities to cause auditory impairment or other physical effects in marine mammals. Available data suggest that such effects, if they occur at all, would presumably be limited to short distances from the sound source and to activities that extend over a prolonged period. 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, including some odontocetes and some pinnipeds, 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 sufficiently 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, Rolland et al. (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. During the time following September 11, 2001, shipping traffic and associated ocean noise decreased along the northeastern U.S. This decrease in ocean noise was associated with a significant decline in fecal stress hormones in North Atlantic right whales, suggesting that chronic exposure to increased noise levels, although not acutely injurious, can produce stress (Rolland et al. 2012). These stress hormones returned to their previous level within 24 hours after the resumption of shipping traffic. Exposure to loud noise can also adversely affect reproductive and metabolic physiology (Kight and Swaddle 2011). In a variety of factors, including behavioral and physiological responses, females appear to be more sensitive or respond more strongly than males (Kight and Swaddle 2011).

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

We expect a small number of humpback whales (no more than 14 individuals) may experience TTS and may experience non-auditory physiological effects from project activities. Of the affected whales, we expect that no more than one humpback whale from the ESA-listed Mexico DPS may experience mild stress responses in reaction to project activities within the Level B zone. However, we expect most humpback whales would leave the ensonified areas to avoid excessive noise and avoid stress. If humpbacks are not displaced and remain in a stressful environment (i.e., within the harassment zone of pile driving activities), we expect the stress response will dissipate shortly after the cessation of pile driving activities. However, in any of the above scenarios, we do not expect significant or long-term harm to individuals from a stress response because of this action.

We expect a larger number of Steller sea lions to be exposed and have the potential to experience TTS and may experience non-auditory physiological effects from project activities due to the higher incidence of them in the project area. We estimate that 160 Steller sea lions are likely to be in the project area during activities capable of producing TTS. Of the affected Steller sea lions, we expect that no more than three Steller sea lions from the ESA-listed Western DPS may experience mild stress responses in reaction to project activities within the Level B zone. However, we expect most sea lions would leave the ensonified areas to avoid excessive noise and avoid stress. If sea lions are not displaced and remain in a stressful environment (i.e., within the harassment zone of pile driving activities), we expect the stress response will dissipate shortly after the cessation of pile driving activities. However, in any of the above scenarios, we do not expect significant or long-term harm to individuals from a stress response because of this action.

6.3.3 Behavioral Responses

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

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

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok et al. 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. The opposite process is sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. Behavioral state may affect the type of response as well. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson et al. 1995; NRC 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 (such as those thought to cause beaked whale stranding due to exposure to military mid-frequency tactical sonar);
- Longer-term habitat abandonment due to loss of desirable acoustic environment;
- Longer-term cessation of feeding or social interaction; and
- Cow/calf separation.

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

6.3.4 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. Research suggests that low frequency ambient sound levels have increased by as much as 20 dB (more than a three-fold increase in terms of SPL) in the world's ocean from pre-industrial periods, and that most of these increases are from distant shipping (Hildebrand 2009). All anthropogenic sound sources, such as those from vessel traffic, pile driving, and dredging activities, contribute to the elevated ambient sound levels, thus intensifying masking.

Noise from pile driving activities is relatively short-term. It is possible that pile driving noise or vessel noise resulting from this proposed action may mask acoustic signals important to Mexico DPS humpback whales and WDPS Steller sea lions, but 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

The Sitka SPB project will occur in a moderately busy area, where vessel sounds and dock activity already occur. Pile driving will increase the noise levels, but as explained in section 6.2.1, the pattern of pile driving will be episodic; there will be significant amounts of time when pile driving is not occurring.

6.3.5 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 do not know whether sunflower sea stars possess underwater vibration receptors that could be affected by loud sounds. However, sea stars do not have gas bladders, 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 has 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 scientific and commercial data available, 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.

6.3.6 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).

Large whales such as humpbacks have the ability to store substantial amounts of energy, which allows them 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. Sitka Channel has not been identified as important foraging habitat for humpback whales, and the proposed activities are not expected to displace foraging whales. Because humpbacks are not expected to be feeding in the action area, there is little incentive for them to remain in the action area while the disturbance is occurring.

With proper implementation of the mitigation measures and shutdown procedures described in Section 2.2, we expect that no Mexico DPS humpback whales or WDPS Steller sea lions will be exposed to noise levels loud enough, long enough, or at distances close enough for the proposed action to cause Level A harassment. More detail on the calculations for exposure and take estimates is provided in the *Incidental Take Statement* (See Table 10-1). We expect no more than 1 exposure of Mexico DPS humpback whales and no more than 3 exposures of WDPS Steller sea lions to noise levels sufficient to cause Level B harassment, as described in Section 6.2.2. All Level B instances of take are expected to occur at received levels greater than 120 dB or 160 dB for non-impulsive and impulsive noise sources, respectively.

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

Reasonably foreseeable future state, local, or private actions are hard to predict, but the main actions include activities that relate to vessel traffic and commercial fishing.

The Sitka Sound Seafood Plant was built in 1981 to replace the Seafood Producer's Cooperative facility near Seward, which was destroyed in the1964 earthquake. The Sitka facility provides seafood processing support services for Seafood Producer's Cooperative member fishermen. Depending on the volume of salmon that trollers offload at the facility, fish are either flown to Seattle from Sitka SPB, or get shipped on a freezer container by ferry to Ketchikan and from there to Seattle.

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

Fishing, a major industry in southeast Alaska, is expected to continue in the area. 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 5) to the environmental baseline (Section 4) and the cumulative effects (Section 6) 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 3).

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 Mexico DPS Humpback Whale Risk Analysis

Based on the results of the exposure and response analyses, we expect a maximum of 14 instances of Level B harassment of humpback whales by noise from pile driving activities (impact, vibratory, and DTH), and two percent (<1 individual) of those instances of harassment of humpback whales are expected to affect whales from the threatened Mexico DPS (See Table 6-8). Exposure to vessel noise from transit and potential for vessel strike may occur, but adverse effects from vessel disturbance and noise are likely to be negligible due to the small marginal increase in such activities relative to the environmental baseline and the transitory nature of vessels. Adverse effects from vessel strike are considered extremely unlikely because of the few additional vessels introduced by the action, slow speeds within Sitka Channel, and the unlikelihood of these type of interactions. Disturbance to seafloor, habitat, and prey resources are not expected to adversely affect humpback whales because these disturbances are temporary, and the action area is not important habitat to humpback whales for foraging, migrating, breeding, or other essential life functions. Mitigation measures and adherence to Clean Water Act regulations are expected to minimize the risk of exposure of humpback whales to the potential introduction of pollutants into the action area.

As discussed in the *Proposed Action* and *Status of the Species* sections, this action does not overlap in space or time with humpback whale breeding. Some Mexico DPS humpback whales feed in Southeast Alaska in the summer and fall months and migrate to Mexican waters for breeding and calving in the late winter months. As a result, the probable responses to pile driving and removal noise are not likely to reduce the current or expected future reproductive success of Mexico DPS humpback whales or reduce the rates at which they grow, mature, or become reproductively active.

Therefore, these exposures are not likely to reduce the abundance, reproduction rates, or growth rates (or increase variance in one or more of these rates) of the populations those individuals represent. The short duration of sound generation and the implementation of mitigation measures to reduce exposure to high levels of sound reduce the likelihood that exposure would cause a behavioral response that may affect vital functions, or cause TTS or PTS. Additionally, when considered in conjunction with the effects of the proposed action, cumulative effects of future state or private activities in the action area are likely to affect humpback whales at a level comparable to present. The current and recent population trends for humpback whales in Southeast Alaska indicate that these levels of activity are not hindering population growth.

We do not expect the effects of the proposed project activities combined with the existing activities described in the *Environmental Baseline* (Section 5) and the cumulative effects (Section 7) to hinder population growth of Mexico DPS humpback whales. As a result, this project is not likely to appreciably reduce Mexico DPS humpback whales' likelihood of surviving or recovering in the wild.

8.2 WDPS Steller Sea Lion Risk Analysis

Based on the results of the exposure and response analyses, we expect a maximum of 22 instances of Level A harassment of Steller sea lions by noise from pile driving activities (impact, vibratory, and DTH), and 2.2 percent (<1 individual) of those instances of harassment of Steller sea lions are expected to affect individuals from the endangered Western DPS (See Table 6-8).

In addition, we expect a maximum of 160 instances of Level B harassment of Steller sea lions by noise from pile driving activities (impact, vibratory, and DTH), and 2.2 percent (<3 individuals) of those instances of harassment of Steller sea lions are expected to affect individuals from the endangered Western DPS (See Table 6-8). These estimates represent the maximum number of takes that may be expected to occur, but not necessarily the number of individuals taken, as a single individual may be taken multiple times over the course of the proposed action. Sound from pile 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 Sitka 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 behavioral changes may affect the fitness of individual animals is through the animal's energy budget, time budget, or both. Most adult Steller sea lions occupy rookeries during the pupping and breeding season, which extends from late May to early July (NMFS 2008a). There are no rookeries and the closest haulout is more than 20 km (12 mi) southwest of the proposed action area. The natural surrounding geography will make it highly unlikely that project-related sound will reach this haulout. 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 decreases 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, we do not expect the effects of the proposed project activities combined with the existing activities described in the Environmental Baseline (Section 5) and the cumulative effects (Section 7) to hinder population growth of WDPS Steller sea lions. As a result, this project is not likely to appreciably reduce WDPS Steller sea lions' likelihood of surviving or recovering in the wild.

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 Sitka Channel. Human activity, especially within the 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

Our consideration of probable exposures and responses of proposed threatened sunflower sea stars to construction activities associated with the proposed action is designed to help us assess whether those activities are likely to increase the extinction risk or jeopardize the continued existence of the species.

Effects from exposure to in-air noise, in-water noise, and vessel use are likely negligible due to the lack of expected responses from sea stars to these potential stressors. Effects from disturbance to the benthic environment and pilings and fill where sunflower sea stars may be located are expected to occur at a minor level. The agreed upon mitigations including pre-work surveys will reduce the likelihood of a sea star being impacted by fill or pile placement. We calculated that approximately 0.025 sea stars might be struck by direct pile contact.

Sea stars may also be impacted by direct human contact during pre-construction site inspections or crushed by fill placement. If a sea star is found in the vicinity of a pile that will be removed or installed, it will be moved out of the work area. If a sea star is found during surveys prior to fill placement (covering approximately 2.9 acres [11,736 m^2]), it will be moved out of the work area. Assuming a density of 0.002 sea stars/ m^2 (Lowry 2023), we estimate that a maximum of ~24 sea stars could be impacted by direct human contact during the proposed activities.

The primary threat to sunflower sea stars identified in the draft Status Review Report (Lowry 2022) and proposed rule to list the sunflower sea star as threatened (88 FR 16212; March 16, 2023), is sea star wasting syndrome (SSWS). Based on our analysis, no aspect of the proposed action is expected to increase the prevalence of SSWS in sunflower sea stars.

The geographic scope of this project is small relative to the entire range of the species. Habitat and prey impacts for the sunflower sea star are extremely small. Due to the limited geographic and temporal scope of the project, we do not expect significant increases in vulnerability to a SSWS pandemic as a result of the proposed action. The number of individuals that will be affected is very small relative to the estimated population of sunflower sea stars (over 600 million) (Lowry 2022). Based on some evidence of recent recruitment and localized abundance increases, the current coastal construction regime in Alaska does not appear to be limiting sunflower sea star recovery. Based on the best information currently available, we do not expect the effects of the proposed project activities combined with the existing activities described in the Environmental Baseline (Section 5) and the cumulative effects (Section 7) to hinder population growth of sunflower sea stars. As a result, this project is not likely to appreciably reduce sunflower sea stars' likelihood of surviving or recovering in the wild.

9 CONCLUSION

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).

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, and 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 critical habitat for North Pacific right whale, Mexico DPS humpback whale, or Steller sea lion. 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.

This concludes the conference for the Sitka Seaplane Base project. You may ask NMFS to confirm the conference opinion as a biological opinion issued through formal consultation if the species is listed. The request must be in writing. If NMFS reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, NMFS will confirm the conference opinion as the biological opinion on the project and no further section 7 consultation will be necessary.

10 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA prohibits the take of endangered species unless there is a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 U.S.C. § 1532(19)). "Incidental take" is defined as take that results from, but is not the purpose of, the carrying out of an otherwise lawful activity conducted by the action agency or applicant (50 CFR § 402.02). Based on NMFS guidance, the term "harass" under the ESA means to: "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016). The MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment] (16 U.S.C. § 1362(18)(A)(i) and (ii)). For this consultation, NMFS and PR1 expect that take will be by both Level A and Level B harassment.

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

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

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

The terms and conditions described below must be implemented in order for take authorization of this Incidental Take Statement to be valid, and are nondiscretionary. CBS and PR1 have a continuing duty to regulate the activities covered by this ITS. In order to monitor the impact of incidental take, CBS and PR1 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 CBS or PR1 (1) fails 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) fails 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 (Level B) harassment only and is only anticipated to occur incidental to vibratory and DTH methods, given the larger Level B harassment zones which will extend beyond the breakwaters. The taking by serious injury or death is prohibited and will result in the modification, suspension, or revocation of the ITS.

While Steller sea lions do not have large Level A harassment zones, they are frequently sighted in the project area within the breakwaters and therefore have some potential for auditory injury. Table 10-1 lists the amount and timing by project phase 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 A and Level B harassment is described in Section 6.1.2.

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 listed marine mammals is authorized in this biological opinion (Table 10-1).

Table 10-1. Summary of instances of exposure associated with the proposed pile driving/removal resulting in incidental take of marine mammal DPS by Level A and Level B harassment.

Species	Stock	Phase 1			Phase 2		
		Level A	Level B	Percent of Stock	Level A	Level B	Percent of Stock
Humpback whale[1]	Hawai'i	0	11	0.1	0	4*	0
	Mexico[2]	0	0	0	0	0	0
Steller sea lion[3]	Eastern US	16	121	0.3	6	35	0.1
	Western US	0	3*	0	0	0	0

[1]Take estimates are weighted based on calculated percentages of population for each DPS, assuming animals present would follow same probability of presence in project area. Humpback whale probability by stock based on Southeast Alaska estimates from NMFS 2021 (98 percent Hawaii DPS; 2 percent Mexico DPS).
[2]ESA listed Mexico humpback whales take calculation resulted in less than 0.5 takes, therefore no takes are expected or are proposed for authorization.
[3] Take estimates are weighted based on calculated percentages of population for each DPS, assuming animals present would follow same probability of presence in project area. Steller sea lion probability by stock based on Hastings et al (2020) (97.8 percent Eastern DPS; 2.2 percent Western DPS).

*Where proposed calculated take was less than the average group size, the take was rounded up to a group size as that is likely what would be encountered.

10.1.1 Amount of Take Associated with Sunflower Sea Stars

Based on the estimated density of sunflower sea stars in the action area and calculations of the area to be affected by pile installation and removal of temporary piles, we expect that less than 0.025 sunflower sea stars in total will be taken due to pile driving in Phase I and Phase II (e.g., harm, wound, kill, collect- see Section 6.2.3).

Based on the estimated density of sunflower sea stars in the action area and calculations of the area to be affected by approximately 2.9 acres of fill placement in the intertidal zone, we expect that less than 24 sunflower sea stars in total will be taken due to fill placement in Phase I and Phase II (e.g., harm, wound, kill, collect - see Section 6.2.3).

Table 10-2. Summary of instances of exposure associated with the proposed pile driving/removal resulting in incidental take of sunflower sea stars.

Species	Authorized Non-mammal Takes (animals)
Sunflower sea star (*Pycnopodia helianthroides*)	24

10.2 Effect of the Take

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

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.

Humpback whale populations in southeast Alaska are approximately 98 percent Hawaii DPS individuals and two percent Mexico DPS individuals. The current trend of this DPS is unknown, but thought to be declining from a population of ~3,264 individuals (Wade et al. 2016). However, the proposed activities are expected to cause harassment to no more than 14 individual humpback whales, of which less than one would be from the Mexico DPS. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to increase the energy budgets of humpback whale individuals, and their probable exposure to these stressors are not likely to reduce their fitness or contribute to population level effects.

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 22 individuals for Level A and 159 individuals for Level B, assuming two to four individuals per day will overlap with project activities during the two phases of work. Only 2.2 percent of the Steller sea lions in the vicinity of the project are expected to be WDPS (Hastings et al. 2020); therefore, the estimated take of the listed DPS are 0 for Level A and 3 for Level B, This level of take accounts for a negligible (0.0) percent of the total DPS, and the action occurs in an area with naturally large amount of human activities and associated sound. Although individual Steller sea lions may experience some level of behavioral disturbance, we do not expect this level of take to have a measurable effect on the population.

We estimate that the proposed activities could affect ~24 sunflower sea stars as they are removed from the shutdown zone prior to in-water work, struck by a pile being installed, or crushed by fill placement. 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, 0.0000004 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" are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take." (50 CFR 402.02). Failure to comply with RPMs (and the terms and conditions that implement them) may invalidate the take exemption and result in unauthorized take.

RPMs are distinct from the mitigation measures that are included in the proposed action (described in Section 2.1.4). 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.

NMFS advises the FAA to implement the following reasonable and prudent measures. These measures with their implementing terms and conditions are non-discretionary with respect to Mexico DPS humpback whales and WDPS Steller sea lions. If this conference opinion for sunflower sea stars is adopted as a biological opinion following a listing or designation, these measures that are applicable to sunflower sea stars, with their implementing terms and conditions, will be non-discretionary.

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, Steller sea lions, and sunflower sea stars resulting from the proposed action.

1. CBS and PR1 must implement a monitoring program that includes all items described in the mitigation measures section of this opinion (Section 2.1.4) and reports the total amount of take as a percentage of the ITS estimate so that NMFS AKR can evaluate the exposure estimates contained in this opinion and that underlie this ITS.
2. CBS and PR1 must submit a final report to NMFS AKR that evaluates the mitigation measures and the results of the monitoring program.

10.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. These terms and conditions are in addition to the mitigation measures included in the proposed action, as set forth in Section 2.1.4 of this opinion. CBS, PR1 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, CBS and PR1 must undertake (or require their lessees or permittees to undertake) the following:

1.1. The monitoring zones must be fully observed by NMFS-approved PSOs during all in-water work in order to document observed incidents of harassment as described in the mitigation measures associated with this action.
1.2. If take of any Steller sea lions totals 80 percent (112 individuals) of the MMPA takes expected for this action, CBS will notify NMFS by email, attention: leanne.roulson@noaa.gov , and include AKR.prd.section7@noaa.gov in the recipient list, and discuss the need for reinitiation of consultation.

To carry out RPM #2, CBS and PR1 must undertake (or require their lessees or permittees to undertake) the following:

2.1. Adhere to all monitoring and reporting requirements as detailed in the IHA issued by NMFS under section 101(a)(5) of the MMPA.
2.2. Adhere to all monitoring and reporting requirements in the IHA and revisions described in this biological opinion.
2.3. Submit a project specific report within 90 days of the conclusion of the project that analyzes and summarizes interactions with humpback whales during this project to the Protected Resources Division, NMFS by email to AKR.prd.records@noaa.gov. This report must also contain information described in the mitigation measures located in Section 2.1.4 of this opinion.

11 CONSERVATION RECOMMENDATIONS

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

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

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

5. CBS 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, particularly in the Sitka area.

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

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 CBS, PR1, 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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