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

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

Gastineau Channel Historical Society
Sentinel Island Moorage Float
Juneau, Alaska

NMFS Consultation Number: AKRO-2019-03407

Action Agencies: **US Army Corps of Engineers**
NMFS Office of Protected Resources

Affected Species and Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Steller Sea Lion, Western DPS (*Eumetopias jubatus)*	Endangered	Yes	No	No	No
Humpback Whale, Mexico DPS (*Megaptera novaeangliae*)	Threatened	Yes	N/A	No	N/A

Consultation Conducted By: National Marine Fisheries Service, Alaska Region

Issued By: for James W. Balsiger, Ph.D.
Regional Administrator

Date: June 25, 2020

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TERMS AND ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
AMHS	Alaska Marine Highway System
BA	Biological Assessment
BMPs	Best management practices
CFR	Code of Federal Regulations
dB	decibels
DPS	Distinct Population Segment
DTH drilling	Down-the-hole drilling
EDPS	Eastern Distinct Population Segment
ESA	Endangered Species Act
ESCA	Endangered Species Conservation Act
FR	Federal Register
ft	feet
GCHS	Gastineau Channel Historical Society
GOA	Gulf of Alaska
Hz	Hertz
IHA	Incidental Harassment Authorization
IPCC	Intergovernmental Panel on Climate Change
ITS	Incidental Take Statement
kHz	kilohertz
m	Meter(s)
mi	Mile(s)
min	Minute(s)
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
PBFs	Physical or biological features
PCE	Primary constituent element
PND	PND Engineers, Inc.
PR1	Office of Protected Resources, NMFS Headquarters
PRD	Protected Resources Division, Alaska NMFS
PSO	Protected Species Observer
PTS	Permanent Threshold Shifts
RPA	Reasonable and Prudent Alternative
SEL	Sound Exposure Level
SPL	Sound Pressure Level
SSL	Steller sea lion
SSV	Sound source verification
TTS	Temporary Threshold Shifts
USACE	US Army Corps of Engineers

USC	United States Code
USFWS	US Fish and Wildlife Service
WDPS	Western Distinct Population Segment
WNP	Western North Pacific

1. INTRODUCTION

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 16 USC § 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)(1)).

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 to minimize such impact, and sets forth terms and conditions to implement those measures.

In this document, the action agencies are the United States Army Corps of Engineers (USACE), which proposes to authorize construction activities associated with the Sentinel Island Moorage Float, and the NMFS Office of Protected Resources, Permits and Conservation Division (PR1), which proposes to permit Marine Mammal Protection Act (MMPA) Level B take (i.e., take by harassment) of Steller sea lions (*Eumetopias jubatus*) and humpback whales (*Megaptera novaeangliae*) in conjunction with this project. The consulting agency for this proposal is NMFS's Alaska Region. This document represents NMFS's Biological Opinion (Opinion) on the effects of this proposal on endangered and threatened species.

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

1.1 Background

This Opinion considers the effects of construction activities associated with the access dock and float at Sentinel Island within Favorite Channel/Lynn Canal in Juneau, Alaska. These actions may affect the Mexico distinct population segment (DPS) of humpback whales and western DPS of Steller sea lions. Critical habitat has been proposed for humpback whales (84 FR 54354, October 9, 2019) but has not yet been designated for this DPS or species. Critical habitat for Steller sea lions is designated at Benjamin Island, a location that will be exposed to potential stressors associated with the proposed action.

This Opinion is based on information provided in the Incidental Harassment Authorization (IHA) application as revised and submitted by PND Engineers, Inc. (PND), in February 2020; the Proposed Incidental Harassment Authorization Federal Register Notice (85 FR 18196; April 1, 2020); the revised Biological Assessment for the Sentinel Island Moorage Float (February 2020); email and telephone conversations between NMFS Alaska Region and NMFS PR1 staff; and other sources of information cited in the References section.

A complete record of this consultation is on file at NMFS's Juneau, Alaska office.

1.2 Consultation History

Our communication with PR1, USACE, and PND regarding this consultation is summarized as follows:

- **April 26, 2019**: USACE submitted request for concurrence (informal consultation).
- **May 20, 2019**: NMFS requested information of the USACE via email and raised concerns about protected species observers being able to effectively monitor the extent of the proposed shutdown zone.
- **May 21, 2019**: USACE indicated via email that they will seek the required information from the applicant, and confirm the effectiveness of monitoring the shutdown zone.
- **May 28, 2019**: USACE provided NMFS with a letter designating PND as their non-federal representative for this consultation.
- **May 30, 2019**: PND hosted a teleconference with NMFS and USACE to discuss next steps for this consultation.
- **June 6, 2019**: NMFS provided PND and USACE with ADF&G Steller sea lion haulout count data via email.
- **June 10, 2019**: NMFS notified PND and USACE via email that NMFS could not concur with a "not likely to adversely affect" determination due to proximity of the construction to a consistently used Steller sea lion haulout, the size of the ensonified zones, and the anticipated number of Steller sea lions and humpback whales likely to occur in the ensonified zones.
- **July 25, 2019**: The USACE withdrew the request for concurrence.
- **September 3 and 4, 2019**: PND solicited technical assistance in requesting a formal consultation and an IHA. NMFS provided guidance in locating best available information about Steller sea lions and harbor seals in the action area.
- **November 5, 2019**: The USACE requested initiation of formal consultation for the proposed action.
- **November 19, 2019**: NMFS requested that PND and USACE postpone the request for initiation of formal consultation until PR1 was prepared to request consultation initiation for the IHA to enable simultaneous consultation.
- **November 22, 2019**: The USACE responded via email that they had no concerns with postponing.
- **November 25, 2019**: PND confirmed that postponing the initiation until PR1 was prepared to initiate for the IHA was fine. NMFS provided a list of additional information needs to PND and USACE via email.

- **December 2019 - February 2020**: PND, PR1, and NMFS Alaska Region exchanged multiple emails and phone calls regarding information needs.
- **February 11, 2020:** PR1 requested initiation of formal ESA section 7 consultation for the Sentinel Island Moorage Float proposed action. Consultation is initiated.
- **March 12-13, 2020:** PND proposed significant modifications to the action description and NMFS reinitiated consultation.
- **March 26, 2020**: Final action description solidified.
- **April 1, 2020**: PR1 publishes the action description in the Federal Register (85 FR 18196).

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 (50 CFR 402.02).

The Gastineau Channel Historical Society (GCHS) proposes to construct a dock and float on Sentinel Island in Favorite Channel/Lynn Canal near Juneau, Alaska for the purpose of providing safe access to the historical Sentinel Island Lighthouse. Volunteers and contractors would use the float to conduct maintenance activities, and GCHS would like to offer tours of the lighthouse. GCHS currently rents the lighthouse overnight, and would like to offer day tours in the future.

The proposed project site is located at Latitude 58°33’ N., Longitude 134°55’ W., on the southeast side of Sentinel Island (Figure 1). Sentinel Island is located at the northern end of Favorite Channel where Lynn Canal and Favorite Channel converge. The proposed project site is located north of Auke Bay, just north of the mouths of the Eagle and Herbert Rivers. The substrate at the proposed project site generally consists of bedrock.

2.1.1 Proposed Activities

The Sentinel Island Lighthouse was originally constructed in 1902, reconstructed in 1935, and transferred to the GCHS from the U.S. Coast Guard in 2004. This particular lighthouse has a history of being difficult to access and service, due to the lack of a good landing area and exposure to the wind and sea.

The proposed project would install a pile supported marine float with a metal gangway spanning from the float to a timber platform on Sentinel Island (Figure 2). The facility would be seasonal use only due to wave and wind conditions that would likely damage the facility if left in place during winter months. The float would be removed in winter to be stored at another location. The piles are designed to serve as a gangway storage frame and the gangway will be lifted and hung

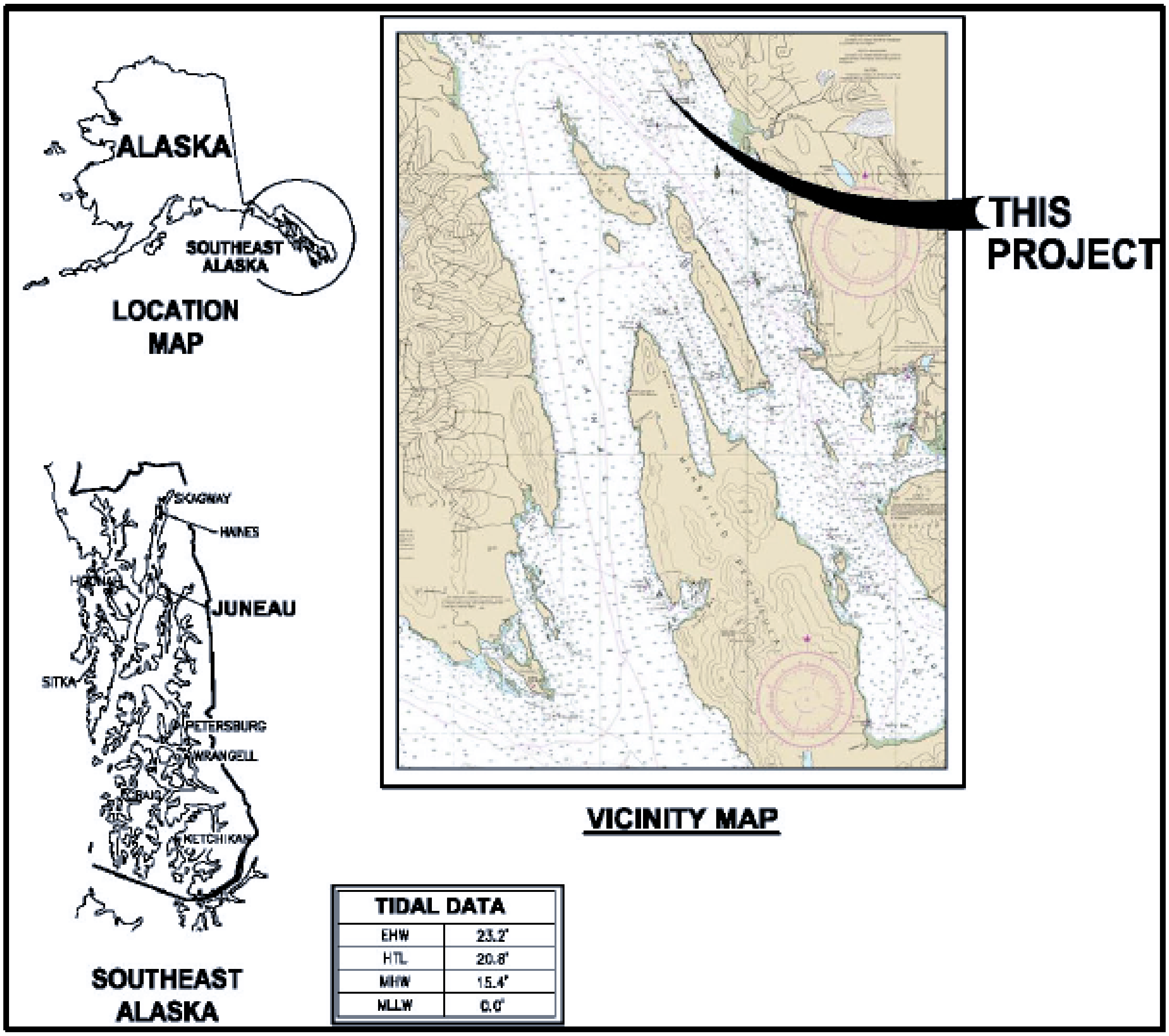

Figure 1. Location of the proposed action north of Juneau, Alaska, within Southeast Alaska.

from the piles out of the water during the winter months. The float is anticipated to be in place at Sentinel Island annually from April to October.

The project includes the following in-water components: driving six 24-inch diameter steel pipe pilings to support the float and seaward end of the gangway. Pile driving will be conducted from an anchored barge, using a down-the-hole drill to install rock sockets and a vibratory hammer to install pilings. Impact hammers will only be used for piles that encounter soils too dense to penetrate with the vibratory equipment, which is not expected. Vibratory pile driving/drilling equipment will be the primary installation method for the project. The pipe pilings will be installed to a depth of at least 15 feet or more below the surface using a crane-mounted hammer located on a barge. It may take up to 360 minutes per pile of vibratory driving to set each piling. If impact hammering is used, about 250 strokes will be needed to drive each of the pilings to a sufficient depth (approximately 15 minutes of hammering). Down-the-hole drilling would operate for intervals of between 15 minutes and more than five hours. It will take an estimated

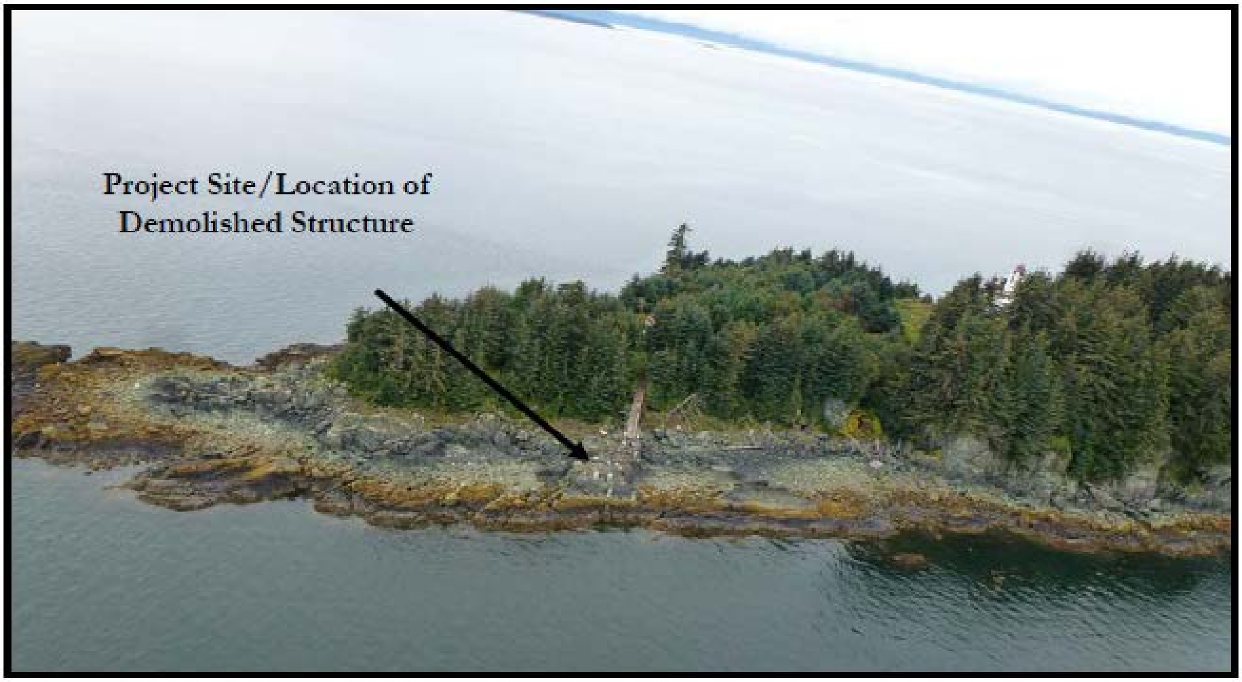

Figure 2. Aerial photo showing the Sentinel Island lighthouse and location of the proposed Sentinel Island moorage float. An old wooden access dock, hoist house, and oil house were previously demolished at this location.

maximum of six hours to drive each piling, and they would be proofed the same day. Pilings will be driven one at a time. Under the best case scenario, using solely vibratory and down-the-hole drilling, two pilings will be set in one day. Therefore, the duration of drilling activity for the six pilings would be between three to six days (Table 1).

The installation of each pile will require a combination of drilling and vibratory hammers. For this application, because all piles will require rock sockets and therefore drilling, the noise level for down-the-hole drilling has been assumed for all pile installation. The process for installing piles will vary slightly based on the amount of overburden at each location, as well as the contractor’s means and methods, however, the general sequence will alternate between vibratory hammer and drilling. Installation starts with use of the vibratory hammer, then drilling will begin at the bedrock interface, and then the final setting of the pile in the drilled socket will be done with the vibratory hammer. The actual amount of time the vibratory hammer will be required varies depending on the overburden present, and the amount of time the vibratory hammer will be used is minimal compared to drilling time.

Vibratory/drill pile installation is expected to result in a Level B acoustic isopleth of 12.1 km, and impact pile driving is expected to result in a Level B acoustic isopleth of 1 km (Table 2). Table 2 also provides expected isopleths for Level A exposure for species groups depending on hearing sensitivities.

Table 1. Pile driving summary[1].

Activity	# piles	Pile Size/Type	Method	Average Piles/day (Range)	Driving Days	Daily Duration	Estimated Total Daily Duration
Pile Installation	6	24-inch; steel	Drilling	1 (1-2)	3-6	360 minutes/ pile	12 hours/ 500 strikes
			Impact (if needed)	1 (0-2)		250 strikes/ pile	

Table 2. Anticipated sound source levels and estimated Level A exposure (PTS onset) distances for categories of marine mammals based on hearing loss sensitivities, and Level B exposure (behavioral disturbance) distances based on the estimated 120 dB (vibratory/ drilling) and 160 dB (impact pile driving) isopleths. [a](Denes et al. 2016), [b](Yurk et al. 2015).

Activity	Source Level	Behavioral Disturbance Isopleth (Level B) All Species	PTS isopleths (meters) Level A	
			Humpback Whales	Steller Sea Lions
Vibratory Driving/DTH drilling – continuous	166.2 dB_{RMS} at 33 ft (10m)[a]	12.1 km (7.5 miles)	80 m (263 ft)	4 m (13 ft)
DTH drilling – impulsive	N/A	N/A	137 m (447 ft)	6 m (17 ft)
Impact Driving	175 $dB_{SS\ SEL}$ at 33 ft (10m)[b] (single strike)	1 km (3280 ft)	184 m (605 ft)	8 m (25 ft)

To estimate the noise impacts, it is conservatively assumed that a contractor will be able to install two piles per day, resulting in up to 12 hours of work per day. As such, in all Level A isopleth calculations it is assumed that up to two piles could be driven per day, for both drilling and impact methods. However, the maximum number of days over which work may occur is considered. In order to be conservative when estimating the number of days an animal may be exposed, the maximum number of days (six) is used.

After the piles are installed, the float will be installed by placing it in the water and connecting the external pile hoops to the piles. The gangway will then be set in place, spanning from the uplands to the float. It is anticipated that all construction will be completed within one week,

[1] Piles per day and driving days are given as ranges. Actual driving days are dependent on conditions encountered in the field and the contractor's means and methods. For each pile, a combination of a vibratory hammer and down-the-hole drilling (and if needed, an impact hammer) will be used throughout the pile driving process and throughout each day of pile driving.

however this is dependent on the contractor's means and methods, and one week of work may be spread out over the authorization period. The 16 by 60 foot float and 8 by 88 foot gangway will be fabricated offsite, moved to the installation site, and unloaded from a barge. Alternatively, the float may be towed to the site. Construction materials will be transported to the site using a tug/barge combination. The barge will remain anchored on-site during construction, making only minor adjustments in position as required to perform the work.

Additionally, there will likely be a work skiff onsite to transport workers between the barge and shore, to transport the monitor(s) to and from Sentinel Island from the mainland daily, and to transport workers to and from Sentinel Island and the mainland as necessary.

After construction is complete the contractor will remove the barge from the site using a tug boat. The barge route to and from the site is currently unknown and will be dependent on the contractor selected. It will also be dependent on the other projects the selected contractor has going on prior to and after the Sentinel Island Moorage project, as that schedule will determine where the equipment needs to be transported after the project is complete.

The work will occur between July 15 and September 20, 2020. The daily construction window for pile driving/drilling would begin no sooner than 30 minutes after sunrise and would end 30 minutes prior to sunset to allow for marine mammal monitoring.

2.1.2 Mitigation Measures

The proposed project intends to avoid impacts to marine mammals and the marine environment to the extent practicable, but some impacts cannot be avoided entirely, as this project is dependent upon maritime access and construction activity.

The proposed IHA requires the following mitigation measures:

(a) For in-water construction, heavy machinery activities other than pile driving (e.g., use of barge-mounted excavators, or dredging): if a marine mammal comes within 10 m, GCHS will cease operations and reduce vessel speed to the minimum level required to maintain steerage and safe working conditions.

(b) GCHS will conduct briefings for construction supervisors and crews, the monitoring team, and GCHS staff prior to the start of all pile driving activity, and when new personnel join the work, in order to explain responsibilities, communication procedures, the marine mammal monitoring protocol, and operational procedures.

(c) Shutdown zones for impact and vibratory pile driving and down-the-hole drilling will be observed for all marine mammals (Table 3).

(d) If a marine mammal is entering or is observed within the established shutdown zone (Table 3), pile driving will be halted or delayed. Pile driving will not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone; 15 minutes have passed without subsequent detections of small cetaceans and pinnipeds; or 30 minutes have passed without subsequent detections of large cetaceans.

(e) Marine mammal monitoring by dedicated Protected Species Observers (PSOs) will take place from 30 minutes prior to initiation of pile driving activity through 30 minutes post-completion of pile driving activity. Pile driving may commence when observers determine that the shutdown zone is clear of marine mammals. In the event of a delay or shutdown of activity resulting from marine mammals in the shutdown zone (Table 3), the marine mammals' behavior will be monitored and documented until the animals leave of their own volition, at which point activity may begin.

Table 3. Proposed shutdown and monitoring zones for each activity type for humpback whales and Steller sea lions.

Source	Shutdown Zone		Monitoring Zone
	Humpback Whales	Steller Sea Lions	All Species
Vibratory Pile Driving	80 m (265 ft)	10 m (35 ft)	12.1 km (7.5 miles)
Down the Hole Drilling	140 m (460 ft)	10 m (35 ft)	12.1 km (7.5 miles)
Impact Pile Driving	185 m (605 ft)	10 m (35 ft)	1000 m (3280 ft)

(f) Should environmental conditions deteriorate such that the entire shutdown zone cannot be effectively monitored for all marine mammal species, pile driving will be delayed until the PSO is confident marine mammals within the shutdown zone will be detected.

(g) GCHS must use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of strikes at reduced energy, followed by a 30-second waiting period, then two subsequent reduced energy strike sets. A soft start will be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer.

(h) If a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized takes are met, is observed approaching or within the Level B harassment or shutdown zones, pile driving activities must shut down immediately using delay and shut-down procedures. Activities will not resume until the animal has been confirmed to have left the area or no marine mammals have been sighted in the area for over 30 minutes.

(i) Pile driving activities will only be conducted during daylight hours (i.e., pile driving/drilling will begin no earlier than 30 minutes after sunrise, and will end at least 30 minutes before sunset).

(j) GCHS will employ three protected species observers (PSOs) per the following Monitoring Measures.

Monitoring Measures

(a) Marine mammal monitoring will be conducted in accordance with the Marine Mammal Monitoring Plan, dated February 2020, associated with the IHA for the proposed action.

(b) Marine mammal monitoring during pile driving will be conducted by NMFS-approved PSOs[2] in a manner consistent with the following:

i. Independent PSOs (i.e., not construction personnel) who have no other assigned tasks during monitoring periods will be used.

ii. Other PSOs may substitute education (degree in biological science or related field) or wildlife observation training for experience.

iii. Where a team of three or more PSOs are required, a lead PSO will be designated. The lead PSO will have prior experience working as a marine mammal observer.

iv. GCHS must submit PSO curriculum vitae for approval by NMFS prior to the onset of pile driving.

v. Three PSOs are required. A lead PSO will be placed at the site where pile driving will occur to monitor and implement the Level A shutdown zone. Two additional observers would focus on monitoring the Level B harassment zone. See Figure 3 for PSO locations.

Reporting

(a) GCHS will submit a draft report on all monitoring conducted under the IHA within 90 calendar days of the completion of the proposed construction or 60 days prior to the issuance of any subsequent IHA for this project, whichever comes first. A final report will be prepared and submitted within 30 days following resolution of comments on the draft report from NMFS.

(b) The marine mammal report will contain the informational elements described in the Marine Mammal Monitoring Plan, including, but not limited to:

i. Dates and times (begin and end) of all marine mammal monitoring.

ii. Construction activities occurring during each daily observation period, including how many and what type of piles were driven or removed and by what method (i.e., impact or vibratory).

iii. Weather parameters and water conditions during each monitoring period (e.g., wind speed, percent cover, visibility, sea state).

iv. The number of marine mammals observed, by species, relative to the pile location and if pile driving or removal was occurring at time of sighting.

v. Age class and sex, if possible, of all marine mammals observed.

vi. PSO locations during marine mammal monitoring.

vii. Distances and bearings of each marine mammal observed relative to the pile being driven.

[2] Resumes will be submitted to NMFS AKR for review/approval prior to deployment of the PSO.

viii. Description of any marine mammal behavior patterns during observation, including direction of travel and estimated time spent within the Level A and Level B harassment zones while the source was active.

ix. Number of individuals of each species (differentiated by month as appropriate) detected within the monitoring zone, and estimates of number of marine mammals taken, by species (a correction factor may be applied to total take numbers, as appropriate).

x. Detailed information about any implementation of any mitigation triggered (e.g., shutdowns and delays), a description of specific actions that ensued, and resulting behavior of the animal, if any.

xi. Description of attempts to distinguish between the number of individual animals taken and the number of incidences of take, such as ability to track groups or individuals.

xii. An extrapolation of the estimated takes by Level B harassment based on the number of observed exposures within the Level B harassment zone and the percentage of the Level B harassment zone that was not visible for each species.

xiii. Submit all PSO datasheets and/or raw sighting data (raw data forms and a digital spreadsheet).

(c) Reporting injured or dead marine mammals:

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the IHA-holder will report the incident to the NMFS Protected Resources Division Marine Mammal Stranding Hotline (1-877-925-7773) and to the Alaska regional stranding coordinator (907-209-0637) as soon as possible. If the death or injury was clearly caused by the specified activity, the IHA-holder will immediately cease the specified activities until NMFS is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of the IHA. The IHA-holder will not resume their activities until notified by NMFS. The report will include the following information:

i. Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);

ii. Species identification (if known) or description of the animal(s) involved;

iii. Condition of the animal(s) (including carcass condition if the animal is dead);

iv. Observed behaviors of the animal(s), if alive;

v. If available, photographs or video footage of the animal(s); and

vi. General circumstances under which the animal was discovered.

Additional mitigation measures (best management practices) proposed by the applicant and included in the proposed action:

1. Improvement structures were designed to provide barrier-free migration and vertical movement for marine and estuarine fish. The improvements will be maintained in a

manner that does not introduce any pollutants or debris into the water or cause a migration barrier for fish, such that prey continues to be available to marine mammals in the area.

2. The improvement structures are designed to limit contaminant releases and will be maintained in a manner that manages pollutants and debris streams to avoid incidental introduction of deleterious materials into Favorite Channel/Lynn Canal.
3. Fuels, lubricants, chemicals and other hazardous substances will be stored above the high tide line to prevent spills.
4. Oil booms will be readily available for containment should any releases occur.
5. To prevent spills or leakage of hazardous material during construction, standard spill-prevention measures will be implemented during construction. The Contractor will provide and maintain a spill clean-up kit on-site at all times.
6. The contractor will monitor equipment and gear storage areas for drips or leaks regularly, including inspection of fuel hoses, oil drums, oil or fuel transfer valves and fittings, and fuel storage that occurs at the project site. Equipment will be maintained and stored properly to prevent spills.
7. If contaminated or hazardous materials are encountered during construction, all work in the vicinity of the contaminated site will be stopped until a corrective action plan is devised and implemented to minimize impacts on surface waters and organisms in the project area.
8. To avoid impacts to Steller sea lions and their critical habitat to the extent practicable, construction will occur between mid- July and late-September when Steller sea lions typically vacate Benjamin Island. The applicant understands that Steller sea lions do not always vacate the island or return on the authorization dates and will monitor sea lion presence at Benjamin Island to stay within authorized take numbers.
9. Work has been timed to avoid impacts to spring spawning fish and out-migrating juvenile salmon to minimize impacts to marine mammal prey when fish are most susceptible to noise impacts and to avoid impacts to overwintering herring when their energetic content is highest. By timing the project to occur when Steller sea lions are generally absent from the action area, the applicant anticipates that impacts to dense aggregations of prey are minimized.
10. During in-water or over-water construction activities, a shutdown zone of 33 feet (10 m) will be monitored to ensure that marine mammals are not endangered by physical interaction with construction equipment. If a marine mammal is observed in this zone, shutdown will be implemented and vessel speeds reduced to the minimum level required to maintain steerage and safe working conditions.
11. In order to minimize impacts from vessel interactions with marine mammals, the crews aboard project vessels will follow NMFS's marine mammal viewing guidelines and regulations as practicable, including the humpback whale 100 yard avoidance regulation.
12. GCHS has requested a permit for the proposed project under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act from the USACE. To receive that permit, GCHS will be required to avoid, minimize, and mitigate impacts to intertidal

habitat. For impacts that cannot be avoided or minimized, GCHS will coordinate compensatory mitigation with USACE.

The applicant will ensure that PSOs have the following additional qualifications:

- Ability to conduct field observations and collect data according to assigned protocols.
- Experience or training in the field identification of marine mammals, including the identification of behaviors.
- Sufficient training, orientation, or experience with the construction operation to provide for personal safety during observations.
- Writing skills sufficient to prepare a report of observations.
- Expected content of this report should include, but is not limited to, the number and species of marine mammals observed; dates and times when in-water construction activities were conducted; dates, times, and reason for implementation of mitigation (or why mitigation was not implemented when required); and marine mammal behavior.
- Ability to communicate orally, by radio or in person, with project personnel to provide real-time information on marine mammals observed in the area as necessary.

The PSOs will have the following equipment to aid in determining the location of observed listed species, to take action if listed species enter the shutdown zone, and to record these events:

  - Binoculars
  - Range finder
  - GPS
  - Compass
  - Two-way radio or cell phone communication with construction foreman/superintendent
  - A log book of all activities, which a digital copy (e.g., Excel spreadsheet) will be made available to USACE and NMFS upon request at any time

2.2 Action Area

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

The action area for this Opinion will include all proposed activities outlined in Section 2.1.1. We define the action area for this consultation to include the area within which project-related noise levels are ≥120 dB re 1 μPa (rms) (i.e., the point where sound from the project drops below the NMFS threshold of concern), and any vessel transit routes that occur due to this action (i.e., the work skiff and tug/barge operations as detailed in Section 2.1.1). Work skiffs transporting construction personnel will likely transit between Sentinel Island and Auke Bay or Amalga Harbor. The barge and tug will likely transit between Sentinel Island and Auke Bay or downtown

Juneau (Gastineau Channel). Noise levels associated with drilling for piling installation will extend further than other construction components of the proposed action, thus the action area extends 12.1 kilometers from the project site (Figure 3) where drilling related noise reaches 120 dB. Drilling noise will be blocked to the west and north of the project location by the land masses of Sentinel, Benjamin, and North Islands. Noise will be further truncated by the mainland to the east (Figure 3).

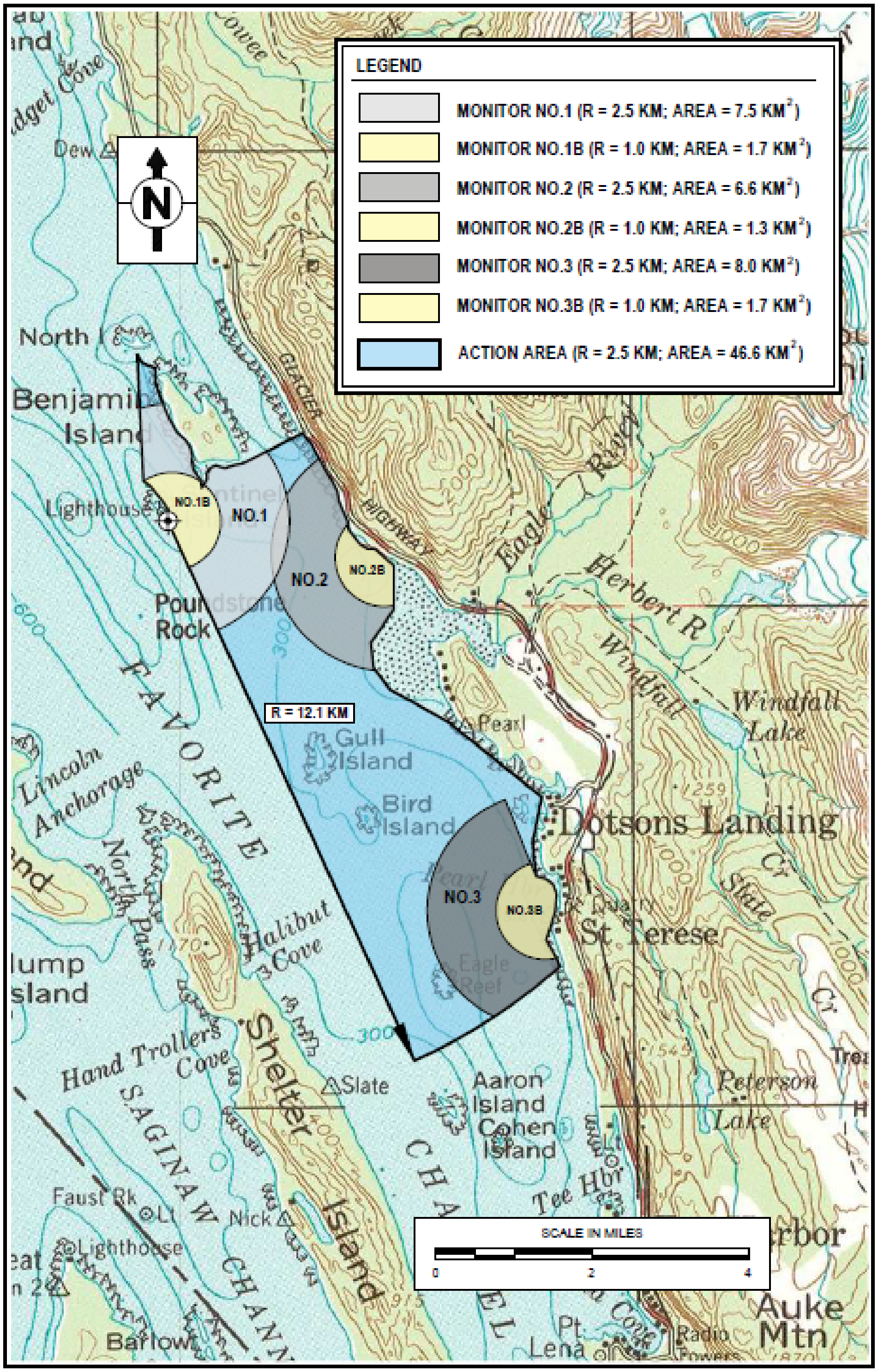

Figure 3. Chart showing the estimated 120 decibel isopleth (light blue) associated with down-the-hole drilling for piling installation. The shaded tan and gray half circles show the locations of three protected species observers and the zones they will monitor for marine mammals.

3. APPROACH TO THE ASSESSMENT

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

"To jeopardize the continued existence of a listed species" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). As NMFS explained when it promulgated this definition, NMFS considers the likely impacts to a species' survival as well as likely impacts to its recovery. Further, it is possible that in certain, exceptional circumstances, injury to recovery alone may result in a jeopardy Biological Opinion (51 FR 19926, 19934 ((June 2, 1986)).

Under NMFS's regulations, the destruction or adverse modification of critical habitat "means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species." (50 CFR 402.02) Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features.

The designation of critical habitat for WDPS Steller sea lions uses the term primary constituent element (PCE) or essential features. The subsequent critical habitat regulations (81 FR 7414, Feb. 11, 2016) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this Opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

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

- Identify those aspects (or stressors) of the proposed action that are likely to have direct or indirect effects on listed species or critical habitat. As part of this step, we identify the action area – the spatial and temporal extent of these direct and indirect effects.
- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action. This section describes the current status of each listed species and its critical habitat relative to the conditions needed for recovery. We determine the rangewide status of critical habitat by examining the condition of its PBFs - which were identified when the critical habitat was designated. Species and critical habitat status are discussed in Section 4 of this Opinion.
- Describe the environmental baseline including: past and present impacts of Federal, state, or private actions and other human activities *in the action area*; anticipated impacts of proposed Federal projects that have already undergone formal or early section 7

consultation, and the impacts of state or private actions that are contemporaneous with the consultation in process. The environmental baseline is discussed in Section 5 of this Opinion.

- Analyze the effects of the proposed actions. Identify the listed species that are likely to co-occur with these effects in space and time and the nature of that co-occurrence (these represent our *exposure analyses*). In this step of our analyses, we try to identify the number, age (or life stage), and gender of the individuals that are likely to be exposed to stressors and the populations or subpopulations those individuals represent. NMFS also evaluates the proposed action's effects on critical habitat features. The effects of the action are described in Section 6 of this Opinion with the exposure analysis described in Section 6.2 of this Opinion.
- Once we identify which listed species are likely to be exposed to an action's effects and the nature of that exposure, we examine the scientific and commercial data available to determine whether and how those listed species are likely to respond given their exposure (these represent our *response analyses*). Response analysis is considered in Section 6.3 of this Opinion.
- Describe any cumulative effects. Cumulative effects, as defined in NMFS's implementing regulations (50 CFR 402.02), are the effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area. Future Federal actions that are unrelated to the proposed action are not considered because they require separate section 7 consultation. Cumulative effects are considered in Section 7 of this Opinion.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat. In this step, NMFS adds the effects of the action (Section 6) to the environmental baseline (Section 5) and the cumulative effects (Section 7) to assess whether the action could reasonably be expected to: (1) appreciably reduce the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species and critical habitat (Section 4). Integration and synthesis with risk analyses occurs in Section 8 of this Opinion.
- Reach jeopardy and adverse modification conclusions. Conclusions regarding jeopardy and the destruction or adverse modification of critical habitat are presented in Section 9. These conclusions flow from the logic and rationale presented in the Integration and Synthesis Section 8.
- If necessary, define a reasonable and prudent alternative (RPA) to the proposed action. If, in completing the last step in the analysis, NMFS determines that the action under consultation is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat, NMFS must identify an RPA to the action.

4. RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT

Two species of marine mammals listed under the ESA under NMFS's jurisdiction may occur in the action area— western Distinct Population Segment (WDPS) Steller sea lions and Mexico DPS humpback whales. Designated Steller sea lion critical habitat occurs within the action area. This Opinion considers the effects of the proposed action on these species (Table 4).

Table 4. Listing status and critical habitat designation for marine mammals considered in this Opinion.

Species	Status	Listing	Critical Habitat
Steller Sea Lion, WDPS (*Eumetopias jubatus*)	Endangered	May 5, 1997, 62 FR 24345	August 27, 1993, 58 FR 45269
Humpback Whale, Mexico DPS (*Megaptera novaeangliae*)	Threatened	September 8, 2016, 81 FR 62260	Not designated

4.1 Climate Change

In accordance with NMFS guidance on analyzing the effects of climate change, NMFS assumes that climate conditions will be similar to the status quo throughout the length of the direct and indirect effects of this project. We present an overview of the potential climate change effects on WDPS Steller sea lions and Mexico DPS humpback whales and their habitat below.

There is a large and growing body of literature on past, present, and future impacts of global climate change, exacerbated and accelerated by human activities. Effects of climate change include sea level rise, increased frequency and magnitude of severe weather events, changes in air and water temperatures, changes in the quality and quantity of ice, and changes in precipitation patterns, all of which are likely to impact ESA species and habitat. NOAA's climate information portal provides basic background information on these and other measured or anticipated climate change effects (see https://www.climate.gov).

In order to evaluate the implications of different climate outcomes and associated impacts throughout the 21st century, many factors have to be considered with greenhouse gas emissions and the potential variability in emissions serving as a key variable. Developments in technology, changes in energy generation and land use, global and regional economic circumstances, and population growth must also be considered.

The globally-averaged combined land and ocean surface temperature data, as calculated by a linear trend, show a warming of approximately 1.0°C from 1901 through 2016 (Hayhoe et al. 2018). The IPCC Special Report on the Impacts of Global Warming (2018) noted that human-induced warming reached temperatures between 0.8 and 1.2°C above pre-industrial levels in 2017, likely increasing between 0.1 and 0.3°C per decade. Annual average temperatures have increased by 1.8°C across the contiguous U.S. since the beginning of the 20th century with Alaska warming faster than any other state and twice as fast as the global average since the mid-20th century (Jay et al. 2018). Global warming has led to more frequent heatwaves in most land regions and an increase in the frequency and duration of marine heatwaves (IPCC 2018).

Average global warming up to 1.5°C as compared to pre-industrial levels is expected to lead to regional changes in extreme temperatures, and increases in the frequency and intensity of precipitation and drought (IPCC 2018).

This warming is thought to lead to increased decadal and inter-annual variability, and increases in extreme weather events (IPCC 2013b). The likelihood of further global-scale changes in weather and climate events is virtually certain (Overland and Wang 2007, IPCC 2013b, Salinger et al. 2013). Effects to marine ecosystems from increased atmospheric CO_2 and climate change include ocean acidification, expanded oligotrophic gyres, shifts in temperature, circulation, stratification, and nutrient input (Doney et al. 2012). Altered oceanic circulation and warming cause reduced subsurface oxygen (O_2) concentrations (Keeling et al. 2010). These large-scale shifts have the potential to disrupt existing trophic pathways as change cascades from primary producers to top level predators (Doney et al. 2012, Salinger et al. 2013).

The strongest warming is expected in the north, exceeding the estimate for mean global warming by a factor or 3, due in part to the "ice-albedo feedback," whereby as the reflective areas of Arctic ice and snow retreat, the earth absorbs more heat, accentuating the warming (NRC 2012, IPCC 2013a). 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 (NRC 2013).

The indirect effects of climate change on WDPS Steller sea lions and Mexico DPS humpback whales would likely include changes in their distribution in response to changes in the distribution and abundance of prey and the distribution and abundance of competitors or predators. Although the linkage between climate change and future humpback whale prey production is not sufficiently well understood to rate this as an extinction risk (see 81 FR 62275, September 8, 2016), the northeast Pacific marine heat wave (a recent oceanographic phenomenon symptomatic of climate change) is negatively correlated with humpback whale reproduction in Hawaii (Cartwright et al. 2019). Ecosystem models for the Aleutians Islands, Eastern Bering Sea, and Southeast Alaska indicate that Steller sea lions have been both positively and negatively impacted by changes in their food base due to fishing and ocean climate change (Trites et al. 1999, Guénette et al. 2006, NMFS 2008)

4.2 Status of Listed Species

This Opinion examines the status of each species that would be adversely affected by the proposed action. The 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 the definition of "jeopardy" under 50 CFR 402.02.

This section consists of narratives for both of the endangered and threatened species that occur in the action area and that would be adversely affected by the proposed action. In each narrative, 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 or not an action's direct or indirect effects are likely to increase the species' probability of becoming extinct.

After the *Status* subsection of each narrative, we present information on feeding, prey selection, diving, and social behavior of the different species because those behaviors help determine how certain activities may impact each species. We also summarize information on the vocalization and hearing of the species to inform our assessment of how the species are likely to respond to sounds produced from the proposed activities.

More detailed background information on the status of these species can be found in a number of published documents including stock assessment reports on Alaska marine mammals (Muto et al. 2019), status review for humpback whales (Bettridge et al. 2015), 5-year review for WDPS Steller sea lions (NMFS 2020b), and the recovery plan for Steller sea lions (NMFS 2008).

4.2.1 Mexico DPS Humpback Whales

4.2.1.1 Population Structure and Status

Commercial whaling severely reduced humpback whale numbers from historical levels. The humpback whale was listed as endangered under the Endangered Species Conservation Act (ESCA) on December 2, 1970 (35 FR 18319). Congress replaced the ESCA with the ESA in 1973, and humpback whales continued to be listed as endangered. NMFS conducted a global status review and in 2016 changed the status of humpback whales under the ESA. The globally listed species was divided into 14 DPSs, four of which are endangered, one is threatened, and the remaining nine are not listed under the ESA (81 FR 62260; September 8, 2016).

Wade et al. (2016) analyzed humpback whale movements throughout the North Pacific Ocean between winter breeding areas and summer feeding areas, using a comprehensive photo-identification study of humpback whales in 2004-2006 during the SPLASH project (Structure of Populations, Levels of Abundance and Status of Humpbacks). A multi-strata mark recapture model was fit to the photo-identification data using a six-month time-step, with the four winter areas and the six summer areas defined to be the sample strata. The four winter areas corresponded to the four North Pacific DPSs: Western North Pacific (WNP), Hawaii, Mexico, and Central America. The analysis was used to estimate abundance within all sampled winter and summer areas in the North Pacific, as well as to estimate migration rates between these areas. The migration rates were used to estimate the probability that whales from each winter/breeding area were found in each of the six feeding areas. The estimated proportion of humpback whales from each of the four North Pacific DPSs in various feeding areas is summarized in Table 5 below (NMFS 2016a).

Table 5. Estimated proportion of humpback whales from each DPS in the North Pacific Ocean in various feeding areas. Adapted from Wade et al. (2016).

Summer Feeding Areas	North Pacific Distinct Population Segments			
	Western North Pacific DPS (endangered)[1]	Hawaii DPS (not listed)	Mexico DPS (threatened)	Central America DPS (endangered)[1]
Kamchatka	100%	0%	0%	0%
Aleutian I/Bering/Chukchi	4.4%	86.5%	11.3%	0%
Gulf of Alaska	0.5%	89%	10.5%	0%
Southeast Alaska / Northern BC	0%	93.9%	6.1%	0%
Southern BC / WA	0%	52.9%	41.9%	14.7%
OR/CA	0%	0%	89.6%	19.7%

[1] For the endangered DPSs, these percentages reflect the 95% confidence interval of the probability of occurrence in order to give the benefit of the doubt to the species and to reduce the chance of underestimating potential takes.

Whales from the WNP, Mexico, and Hawaii DPSs overlap on feeding grounds off Alaska, and are not visually distinguishable. All waters off the coast of Alaska may contain ESA-listed humpbacks. Central America DPS humpback whales do not occur in Alaska waters.

The Mexico DPS is comprised of approximately 3,264 (CV=0.06) animals (Wade et al. 2016) with an unknown population trend. The abundance of humpback whales has increased in Southeast Alaska, though a trend for the Southeast Alaska portion of the Mexico DPS cannot be estimated from the data because of differences in methods and areas covered (Muto et al. 2019).

4.2.1.2 Distribution

Humpback whales migrate seasonally between warmer, tropical or sub-tropical waters in winter months (where they reproduce and give birth to calves) and cooler, temperate or sub-Arctic waters in summer months (where they feed) (Figure 4). In their summer foraging areas and winter calving areas, humpback whales tend to occupy shallower, coastal waters; during their seasonal migration however, humpback whales disperse widely in deep, pelagic waters and tend to avoid shallower coastal waters (Winn and Reichley 1985).

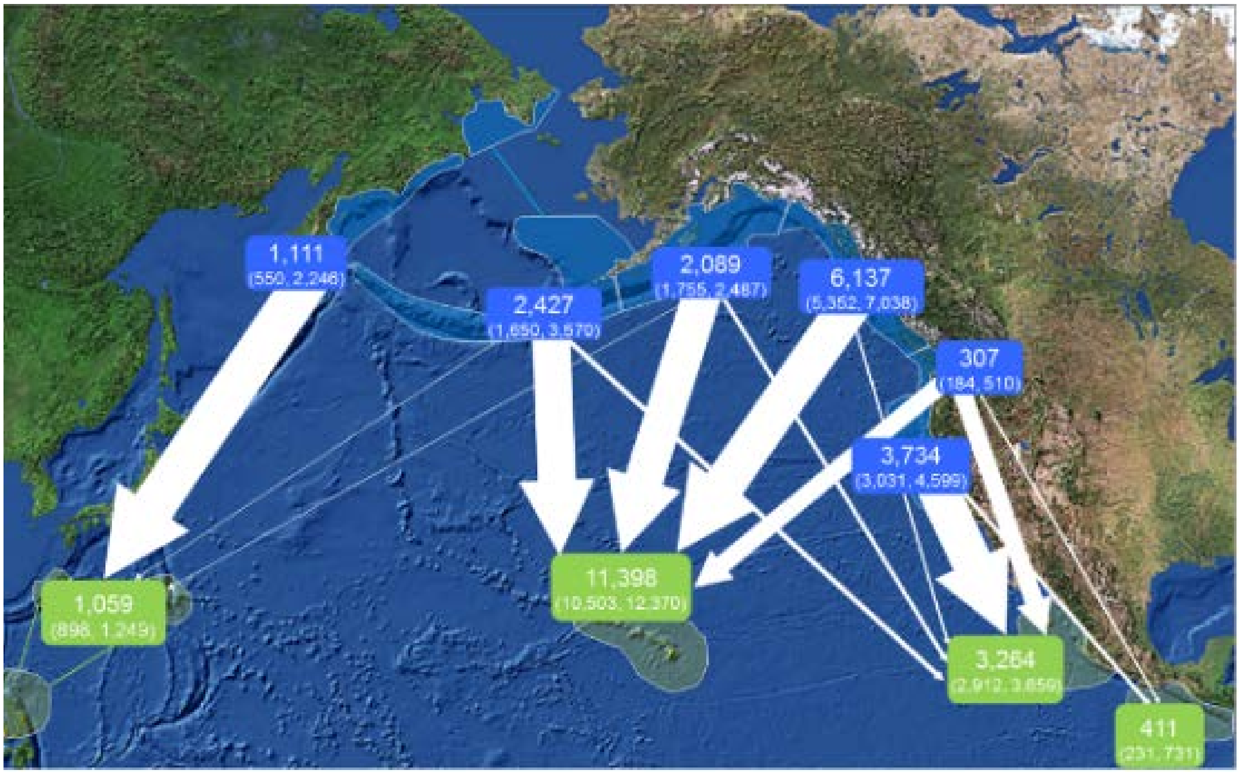

Figure 4. Abundance by summer feeding areas (blue), and winter breeding areas (green), with 95% confidence limits in parentheses. Migratory destinations from feeding area to breeding area are indicated by arrows with the width of the arrow proportional to the percentage of whales moving into the winter breeding area (Wade et al. 2016).

Humpback whale populations in Southeast Alaska have been steadily increasing in recent decades. Humpback whale abundance has increased by at least an estimated annually 6.8% in the North Pacific in the 39 years following the cessation of commercial whaling in the United States (Calambokidis et al. 2008). The annual rate of increase of humpback whale abundance in Southeast Alaska was estimated to be 10.6% from 1991-2007 (Dahlheim et al. 2009), and recent estimates of abundance for Southeast Alaska and northern British Columbia are between 3,000 and 6,137 humpback whales (Calambokidis et al. 2008, Wade et al. 2016, Muto et al. 2019). As previously mentioned, an estimated 94% of humpback whales in Southeast Alaska are from the Hawaii DPS (not listed) and 6% from the Mexico DPS (threatened) (Wade et al. 2016). We use 6% in this analysis to estimate the percentage of observed humpbacks that are from the Mexico DPS. WNP DPS humpback whales are not anticipated to occur in Southeast Alaska (Table 5).

Humpback whales are present in Southeast Alaska year round. Most Southeast Alaska humpback whales winter in low latitudes, but there is significant overlap in migratory departures and returns, and documentation of individuals overwintering in Southeast Alaska (Baker et al. 1985, Straley 1990, Moran et al. 2018). Humpback whales forage on fish and euphausieds throughout the summer in Southeast Alaska (Krieger and Wing 1984). Late fall and winter whale habitat in Southeast Alaska appears to correlate with areas that have over-wintering herring such as lower Lynn Canal, where the proposed action would occur (Baker et al. 1985, Straley 1990). In Lynn

Canal, peak densities of whales occur in early Fall, in preparation for schooling herring (Straley et al. 2018). Schools of euphasiids, herring, and other fish in the action area may provide foraging opportunities for whales.

4.2.1.3 Threats to the Species

Algal toxins

Harmful algal blooms are a potential stressor for humpback whales. Out of 13 stranded marine mammal species sampled in Alaska, domoic acid was detected in all species examined with humpback whales showing 38% prevalence. Saxitoxin was detected in 10 of the 13 species, with the highest prevalence in humpback whales (50%) and bowhead whales (32%) (Lefebvre et al. 2016). Domoic acid has caused marine mammal illness and mortality on the West Coast of the United States, and saxitoxin is a known cause of human illness and mortality in Alaska. Both are expected to increase in association with current climate trends (i.e., increasing water temperatures) (Lefebvre et al. 2016).

Entanglement

Humpback whales can be killed or injured in interactions with commercial fishing gear and other entanglements. A photography study of humpback whales in Southeast Alaska in 2003 and 2004 found at least 53% of individuals showed some kind of scarring from past entanglements (Neilson 2006).

The minimum estimate of the mean annual mortality and serious injury rate incidental to U.S. commercial fisheries for the Central North Pacific stock (CNP: which includes whales from the Hawaii DPS, Mexico DPS, and Western North Pacific DPS) in 2012-2016 is 9.9 humpback whales. This estimate is based on observer data from Alaska (0.2 in federal fisheries + 5.5 in the state-managed Southeast Alaska salmon drift gillnet fishery), observer data from Hawaii (0.9), and Marine Mammal Authorization Program (MMAP) fishermen self-reports and reports, in which the commercial fishery is confirmed, to the NMFS Alaska Region stranding network (Muto et al. 2019). During this same time period, an additional annual estimated rate of CNP humpback mortality or serious injury in Alaska included 0.4 whales per year entangled in recreational fishing gear, 0.5 entangled in subsistence fisheries, 1.4 entangled in unknown fishing gear (commercial, recreational, or subsistence), 2.6 entangled in marine debris, and 0.6 entangled in other gear (ship’s ground tackle, salmon net pen, mooring gear) (Muto et al. 2019). These estimates are based on confirmed reports and are certainly a minimum number of humpback whale mortality and serious injury (Muto et al. 2019).

Ship Strike

Ship strikes and other interactions with vessels unrelated to fisheries occur frequently with humpback whales. Between 2012-2016, the estimated mean morality rate to CNP humpback whales from ship strike was 2.5 animals per year (Muto et al. 2019). Neilson et al. (2012) summarized 108 large whale ship strikes in Alaska from 1978 to 2011, 25 of which are known to have resulted in the whale’s death. Eighty-six percent of these reports involved humpback whales. Most ship strikes of humpback whales in Alaska are reported from Southeast Alaska (Muto et al. 2019).

In 2017, there were eight reported vessel strikes to large whales in Alaska; six confirmed humpback whales, one unknown large whale, and one sperm whale. In 2018, there were nine reported vessel strikes to large whales in Alaska; seven humpback whales, one gray whale, and one fin whale (AKR Stranding Program Vessel Strike database; accessed by S. Wright on June 4, 2020). These reports are a minimum number of whale vessel strikes in Alaska, however, these incidents account for a very small fraction of the total humpback whale population (Laist et al. 2001).

Vessel collisions with humpback whales remain a significant management concern, given the increasing abundance of humpback whales foraging in Alaska, as well as the growing presence of marine traffic in Alaska's coastal waters. Based on these factors, injury and mortality of humpback whales as a result of vessel strike will continue into the future.

Anthropogenic Noise

Elevated levels of sound from anthropogenic sources (e.g., shipping, military sonars, coastal development) are a potential concern for humpback whales in the North Pacific, as well as the growth of the whale watching industry in Hawaii and Alaska (preferred habitats may be abandoned if disturbance levels are too high) (Muto et al. 2019). Abandonment of preferred habitats could lead to decreases in fitness if the whales do not have access to food or resting areas.

4.2.1.4 Reproduction and Growth

Humpback whales do not breed in Alaska. They give birth and presumably mate on low-latitude wintering grounds in January to March in the Northern Hemisphere. Average sexual maturity of humpback whales in the Northern Hemisphere is between 5-11 years old, and varies between and within populations (Clapham 1992, Robbins 2007, Bettridge et al. 2015). Calving rates are between one and five years of age in humpback whales in the Northern Hemisphere, although 2-3 years is most common (Steiger and Calambokidis 2000, Bettridge et al. 2015). Gestation is about 12 months, and calves probably are weaned by the end of their first year (Perry et al. 1999).

4.2.1.5 Feeding and Prey Selection

Humpback whales tend to feed on summer grounds and not on winter grounds. However, some opportunistic winter feeding has been observed at low latitudes (Perry et al. 1999). Humpback whales engulf large volumes of water and then filter small crustaceans and fish through their fringed baleen plates.

Humpback whales are relatively generalized in their feeding compared to some other baleen whales. In the Northern Hemisphere, known humpback whale prey includes: euphausiids (krill); copepods; juvenile salmonids; Arctic cod; sardines; capelin; anchovy; herring; walleye pollock; pteropods; and cephalopods (Perry et al. 1999, Bettridge et al. 2015, Moran et al. 2018). Feeding by humpback whales is observed most of the year in Lynn Canal, including the action area.

4.2.1.6 Diving and Social Behavior

In Hawaiian waters, humpback whales remain almost exclusively within the 1800 m isobath and usually within water depths less than 182 meters. Maximum diving depths are approximately 170 m (558 ft) (but usually <60 m [197 ft]), with a very deep dive (240 m [787 ft]) recorded off

Bermuda (Hamilton et al. 1997). Diving behavior varies by season, and average dive times are less than 5 minutes during the summer, and between 10-15 minutes (and sometimes more than 30 minutes) in winter months (Clapham and Mead 1999). Because most humpback whale prey is likely found above 300m, most humpback dives are probably relatively shallow.

Humpback whales appear to form small, unstable social groups during the breeding season (Clapham 1996). During the feeding season they form small groups that occasionally aggregate on concentrations of food. Feeding groups are sometimes stable for long periods of time. There is good evidence of some territoriality on feeding (Clapham 1994, Clapham 1996) and calving areas (Tyack 1981).

4.2.1.7 Vocalization and Hearing

As is the case for all large baleen whales, direct information about the hearing abilities of humpback whales is not available. NMFS categorizes humpback whales in the low-frequency cetacean functional hearing group, which likely hear frequencies between 7 Hz to 35 kHz (Southall et al. 2007, NMFS 2016b). Researchers studying *Mysticete* auditory apparatus morphology hypothesized that large *Mysticetes* have acute infrasonic hearing (Ketten 1997). Baleen whales have inner ears that appear to be specialized for low-frequency hearing.

Humpback whales produce a variety of vocalizations ranging from 20 Hz to 24 kHz (Thompson et al. 1986, Au et al. 2006). On wintering grounds, males sing complex songs that can last up to 20 minutes and may be heard up to 20 miles away (Clapham and Mattila 1990, Cato 1991). Source levels average 155 dB and range from 144 to 174 dB (Thompson et al. 1979).

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).

4.2.1.8 Proposed Critical Habitat

NMFS proposed to designate critical habitat for Mexico DPS humpback whales on October 9, 2019 (84 FR 54354). The proposed area includes most of the marine waters of Southeast Alaska, including the action area for the proposed Sentinel Island Moorage project. However, final designation of critical habitat for Mexico DPS humpback whales is not anticipated prior to the September 20, 2020 completion date for the proposed action. The applicant and action agencies have opted not to confer with NMFS for Mexico DPS humpback whale critical habitat under section 7(a)(4) of the ESA because they concluded that the action would be completed before critical habitat designation is finalized.

4.2.2 WDPS Steller Sea Lions

Steller sea lions range throughout the North Pacific Ocean from Japan, east to Alaska, and south to central California (Loughlin et al. 1984). Steller sea lions, the largest of the eared seals (*Otariidae*), has a worldwide population estimated at 124,543-146,547 animals (Muto et al. 2016). Historically, Steller sea lion abundance was significantly greater with an estimated worldwide population of 245,000 to 290,000 animals in the late 1970s (Loughlin et al. 1984).

Western DPS Steller sea lions in Alaska are estimated to number 54,267 (Muto et al. 2019). This is considered to be a minimum estimate because it has not been corrected to account for animals that were at sea during the surveys.

By 1990, the U.S. portion of the population had declined by about 80 percent relative to the 1950s. On April 5, 1990, NMFS issued an emergency interim rule to list the Steller sea lion as threatened (55 FR 12645). On November 26, 1990, NMFS issued the final rule to list Steller sea lions as a threatened species under the ESA (55 FR 49204).

NMFS reclassified Steller sea lions as two distinct population segments under the ESA in 1997 based on demographic and genetic differences—the western and eastern DPSs (62 FR 24345). At that time, the WDPS, which generally occurs from Japan around the Pacific Rim to Cape Suckling in Alaska (144° W) (Figure 5), was listed as endangered due to its continued decline and lack of recovery.

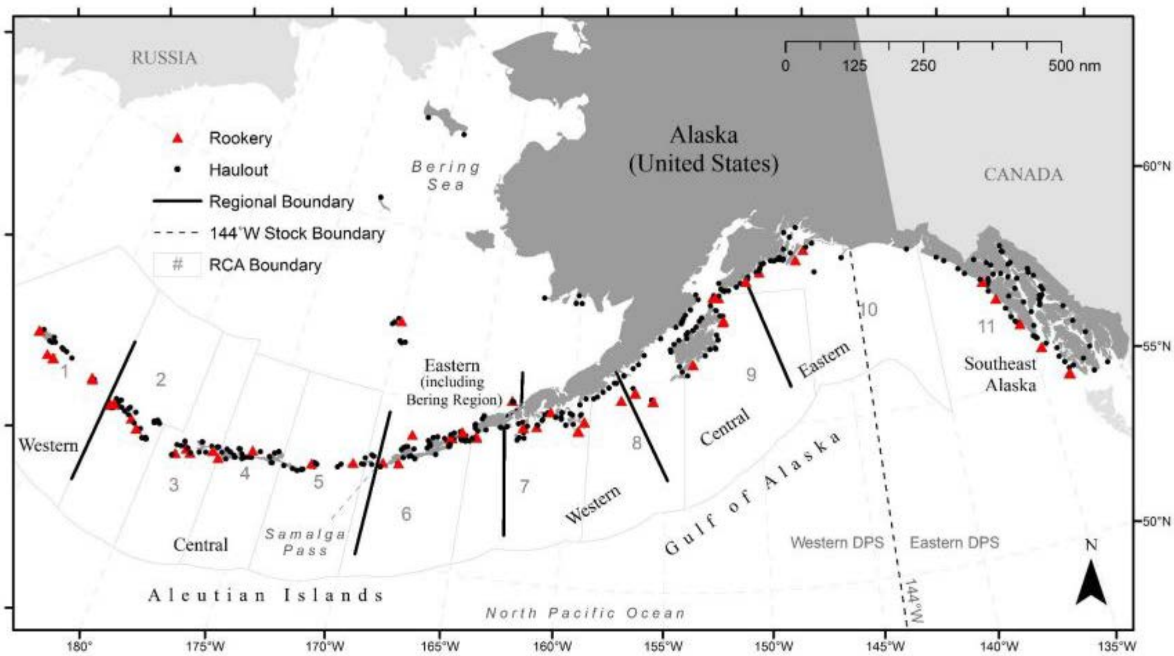

Figure 5. Map of Alaska showing the NMFS Steller sea lion survey regions, rookery, and haulout locations. The line (144° W) separating primary breeding rookeries of the eastern and western distinct population segments (EDPS vs WDPS) is also shown (Fritz et al. 2016).

The eastern Distinct Population Segment (EDPS), extending from Cape Suckling (144° W) east to British Columbia and south to California, remained in threatened status. A number of protective measures were implemented to aid recovery (NMFS 2013), and between the 1970s and 2002 the eastern DPS Steller sea lion population increased on average by 3.1% per year (Pitcher et al. 2007), which is one factor that led to NMFS's decision to delist the eastern DPS (78 FR 66140; November 4, 2013).

In Alaska, population decline spread and intensified east and west of the eastern Aleutians in the 1980s. Between 1991 and 2000, overall counts of Steller sea lions at trend sites decreased 40%, an average annual decline of 5.4% (Loughlin and York 2000). In the 1990s, counts decreased more at the western (western Aleutians: -65%) and eastern edges (eastern and central GOA: -56% and -42%, respectively) of the U.S. range than they did in the center (range of -24% to -6% from the central Aleutians through the western GOA (Fritz et al. 2008)). The decline continued in the WDPS until about 2002.

There is evidence that the WDPS Steller sea lions increased across much of their range between 2002 and 2017 (Sweeney et al. 2017). There are strong regional differences across the range in Alaska, with generally negative trends in abundance in the Aleutian Islands. However, the highest rates of increase occurred in the eastern portion of the range (Gulf of Alaska) (Muto et al. 2019), closest to the action area (Figure 5).

4.2.2.1 Distribution

Movement of Steller sea lions between the WDPS and EDPS may affect population dynamics and patterns of underlying genetic variation. Studies have confirmed movement of animals across the 144° W boundary (Fritz et al. 2013, Jemison et al. 2013, Hastings et al. 2020). WDPS Steller sea lions regularly temporarily cross to the east of the 144° W longitude boundary, and some WDPS females have given birth at White Sisters and Graves Rocks rookeries and have likely emigrated permanently (Jemison et al. 2013). The vast majority of these sightings have been in northern Southeast Alaska, north of Frederick Sound.

Within the action area, Steller sea lions are anticipated to be predominantly from the EDPS; however, WDPS animals occur there as well. The Benjamin Island haulout is within the action area, and the Little Island haulout is approximately 4.5 miles to the west of the proposed project location. These two haulouts are likely the predominant haulouts used by the Steller sea lions that are found transiting into and out of the action area. From 2000-2018, 280 unique branded individuals were documented at the Benjamin Island haulout. Of these, three individuals were from the WDPS and the remaining 277 were from the EDPS. During the same time period, 105 unique branded individuals were documented at the Little Island haulout. Of these, three individuals were from the WDPS and the remaining 102 were from the EDPS (personal communication, L. Jemison, ADF&G). Based on these data, modelling estimates that 1.4% of Steller sea lions observed in the action area (i.e., Lynn Canal), will be endangered WDPS animals (Hastings et al. 2020, NMFS 2020a)

4.2.2.2 Critical Habitat

NMFS designated critical habitat for Steller sea lions on August 27, 1993 (58 FR 45269). Steller sea lion critical habitat includes the following:

1. Alaska rookeries, haulouts, and associated areas identified at 50 CFR 226.202(a), including:
    - 1.1. Terrestrial zones that extend 914 m (3,000 ft) landward
    - 1.2. Air zones that extend 914 m (3,000 ft) above the terrestrial zone
    - 1.3. Aquatic zones that extend 914 m (3,000 ft) seaward from each major rookery and major haulout east of 144° W longitude
    - 1.4. Aquatic zones that extend 37 km (23 mi) seaward from each major rookery and major haulout west of 144° W longitude

2. Three special aquatic foraging areas identified at 50 CFR 226.202(c):
    2.1. Shelikof Strait
    2.2. Bogoslof
    2.3. Seguam Pass

The areas designated as critical habitat for the Steller sea lion were determined using the best information available at the time, including information on land use patterns, the extent of foraging trips, and the availability of prey items. Particular attention was paid to life history traits and the areas where animals haul out to rest, pup, nurse their pups, mate, and molt. The physical and biological habitat that supports reproduction, foraging, rest, and refuge is essential to the conservation of the Steller sea lion. For the Steller sea lion, PBFs for critical habitat include terrestrial, air, and aquatic areas.

Factors that influence the suitability of a particular area include substrate, exposure to wind and waves, the extent and type human activities and disturbance in the region, and proximity to prey resources.

Nearshore waters surrounding rookeries and haulouts are an integral component of the aquatic critical habitat of Steller sea lions. Animals must regularly transit this region as they go to, and return from, feeding trips. Waters surrounding rookeries and haulouts provide refuge to which animals may retreat when they are displaced by land-based disturbance.

Adequate food resources are a PBF of the Steller sea lion aquatic habitat, as is foraging habitat. Both of these are included in the aquatic critical habitat of this species.

The ensonified area associated with the project overlaps designated critical habitat at Benjamin Island (Figure 3, Figure 6). Transit routes and other potential stressors associated with the proposed action are not anticipated to occur in proximity to any other designated critical habitat sites except for the Benjamin Island haulout.

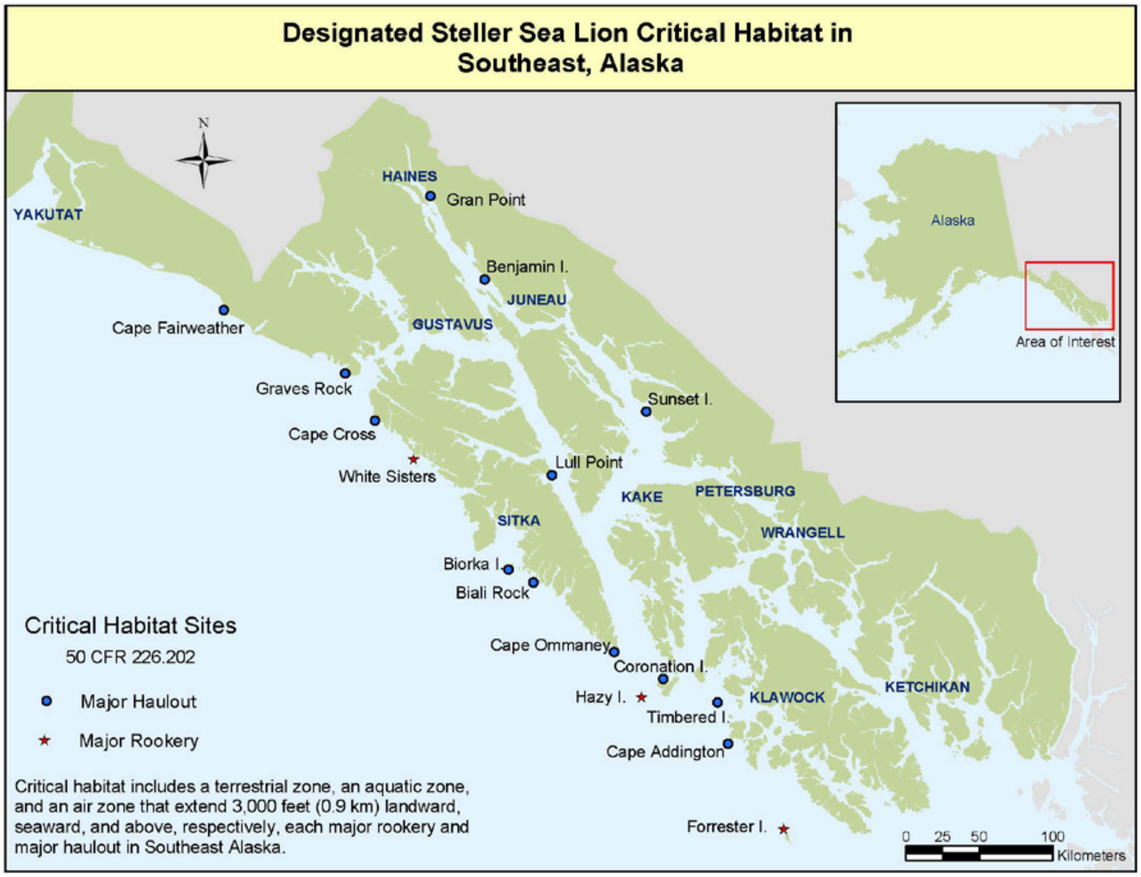

Figure 6. Designated critical habitat for Steller sea lions in Southeast Alaska.

4.2.2.3 Threats to the Species

Brief descriptions of threats to Steller sea lions follow. More detailed information can be found in the Steller Sea Lion Recovery Plan (available at: https://www.fisheries.noaa.gov/action/notice-final-2008-revised-recovery-plan-steller-sea-lions), and the Stock Assessment Reports (available at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments).

Disease and Parasites

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked diseases and parasites as a low threat to the recovery of the WDPS.

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 2008). The Bering Sea and Gulf of Alaska (GOA) 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 2013a).

Fishing Gear and Marine Debris Entanglement

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked interactions with fishing gear and marine debris as a low threat to the recovery of the WDPS. Between 2013-2017, 455 Steller sea lions were reported to be killed or seriously injured by entanglement with commercial fisheries gear or marine debris (Delean et al. 2020). Seventy-nine of these reported sea lion serious injuries and mortalities were WDPS Steller sea lions entangled in the federal groundfish trawl fishery in Alaska, eight entangled in other types of fishery gear, fourteen entangled in marine debris, and four hooked in fishing gear (Delean et al. 2020). In Southeast Alaska and British Columbia, 386 Steller sea lions were observed by researchers over the period 2000-2007 to be entangled in marine debris or having ingested fishing gear (Raum-Suryan et al. 2009).

The estimated mean annual mortality and serious injury rate in U.S. commercial fisheries in 2012-2016 is 35 Steller sea lions from the WDPS (plus 1.2 in unknown fisheries). 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. 2019).

Nutritional Stress: Competition with Fisheries

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked competition with fisheries for prey as a potentially high threat to the recovery of the WDPS. Substantial scientific debate surrounds the question about the impact of potential competition between fisheries and Steller sea lions. Commercial fisheries target several important Steller sea lion prey species 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.

Subsistence Harvest

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked subsistence harvest as a low threat to the recovery of the WDPS. The most recent subsistence harvest data were collected by the Alaska Department of Fish and Game through 2008, by the Ecosystem Conservation Office of the Aleut Community of St. Paul (2012-2016), and by the Aleut Community of St. George Island (2012-2016). The mean annual subsistence take from the WDPS in Alaska over the 5-year period from 2004 through 2008, combined with the mean harvest over the 2012-2016 period from St. Paul and St. George, was 203 Steller sea lions/year (Muto et al. 2019).

Illegal Shooting

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked illegal shooting as a low threat to the recovery of the WDPS. Illegal shooting of sea lions is thought to have been a potentially significant source of mortality prior to the listing of sea lions as threatened under the ESA in 1990. The NMFS Alaska Stranding Program documents a small number of Steller sea lions with suspected or confirmed firearm injuries in Southeast Alaska every year.

A significant illegal shooting event occurred in Alaska in 2015. On November 6, 2018, two men were sentenced in federal court for harassing and killing Steller sea lions with shotguns. The sentencing was the result of a federal investigation after over 15 Steller Sea lions were found dead along the sand bars at the mouth of Copper River during the 2015 Copper River salmon gillnet season.

Mortality and Serious Injury from Research Activities
The Steller Sea Lion Recovery Plan (NMFS 2008) ranked effects from research activities as a low threat to the recovery of the WDPS. Mortalities may occur incidental to marine mammal research activities authorized under ESA and MMPA permits issued to a variety of government, academic, and other research organizations. Between 2012 and 2016, there were three mortalities (1 in 2015 and 2 in 2016) resulting from research on the WDPS of Steller sea lions, resulting in a mean annual mortality and serious injury rate of 0.6 for the WDPS (Muto et al. 2019).

Vessel Disturbance
Vessel traffic, in the form of sea lion research, tourism, and other marine vessel traffic, 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.

Risk of Vessel Strike
NMFS Alaska Region Stranding Program has records of at least four confirmed occurrences of Steller sea lions being struck by vessels in Southeast Alaska; three were near Sitka, one was south of Juneau. Vessel strike is not considered a major threat to the WDPS Steller sea lion.

Hazardous Materials Spills
The Steller Sea Lion Recovery Plan ranked the threat of toxic substances as medium (NMFS 2008). While there are numerous small hazardous materials spills in Alaska and near Juneau every year, the proponents of the proposed action have developed mitigation measures to lessen the risk of oil spills impacting Steller sea lions and their critical habitat as a result of this project.

Climate Change and Ocean Acidification
Marine ecosystems are susceptible to impacts from climate change and ocean acidification linked to increasing global anthropogenic CO_2 emissions. There is strong evidence that ocean pH is decreasing, ocean temperatures are increasing, and that this warming is accentuated in northern latitudes. Scientists are working to understand the impacts of these changes to marine ecosystems; however, the extent and timescale over which WDPS Steller sea lions may be affected by these changes is unknown.

Other Stressors
Sharks and killer whales are known natural predators of Steller sea lions. Toxicosis from domoic acid or saxitoxin related to harmful algal blooms is another potential stressor. Domoic acid and saxitoxin have been detected in stranded Steller sea lions in Alaska (2004-2013) (Lefebvre et al. 2016). Of 42 sampled stranded Steller sea lions, 27% tested positive for domoic acid and 10% tested positive for saxitoxin. Although domoic acid and saxitoxin toxicosis have not been documented in marine mammals in Alaska, domoic acid has caused 100s of California sea lions

to strand and die annually due to neurologic issues (Lefebvre et al. 2016)

4.2.2.4 Reproduction and Growth

Steller sea lions are colonial breeders. They have a polygynous mating system, in which only a small proportion of the sexually mature males father most of the pups in a given season. Adult males, known as bulls, arrive early on rookeries to establish breeding territories that they defend through the breeding season. Bulls become sexually mature between 3 and 8 years of age, but typically are not large enough to hold territory successfully until 9 or 10 years old. A mature male may go without eating for 1 to 2 months while he defends his territory. Not all males will successfully hold a breeding territory for one or more breeding seasons.

Females, known as cows, begin to arrive on rookeries in mid-May. Females typically birth their first pup at 4 to 6 years of age, usually giving birth to a single pup each year. However, they may not pup every year. Pupping occurs from about mid-May to mid-July and peaks in June. Females usually mate within 2 weeks after giving birth. Females stay with their pups for a few days after birth before beginning a regular routine of foraging at sea, nursing pups on land, then going back to forage. Female Steller sea lions use smell and distinct vocalizations to recognize and create strong social bonds with their newborn pups. While most pups likely wean before their first birthdays, some pups are nursed for as long as three years.

At birth, pups are about 3 feet in length and weigh 35 to 50 pounds. Pups have a thick, dark brown to black "lanugo" coat until 4 to 6 months old, when they molt to a lighter brown. By the end of their second year, pups are the same color as adults. Males can live to be up to 20 years old, while females can live to be approximately 30.

4.2.2.5 Feeding 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 pups, juveniles, and adult females with pups, and 2) much larger areas (greater than 20 km [12 mi]) where these and other Steller sea lions may range to find optimal foraging conditions once they are no longer tied to rookeries and haulout sites for nursing and reproduction. Large seasonal differences in foraging ranges have been observed associated with seasonal movements of prey (Merrick et al. 1997).

The seasonal ecology of Steller sea lions in Southeast Alaska has been studied by relating the distribution of sea lions to prey availability (Womble et al. 2005, Womble et al. 2009). Figure 7 depicts a likely seasonal foraging strategy for Steller sea lions in Southeast Alaska. This diagram suggests that seasonally aggregated high-energy prey species, such as eulachon and herring in late spring, and salmon in summer and fall, influence the seasonal distribution of Steller sea lions in some areas of Southeast Alaska. Similarly, the Southeast Alaska Pacific Herring Status Review (NMFS 2014) generalizes that sea lions forage on herring aggregations in winter, on spawning herring and eulachon in spring, and on various other species throughout the year.

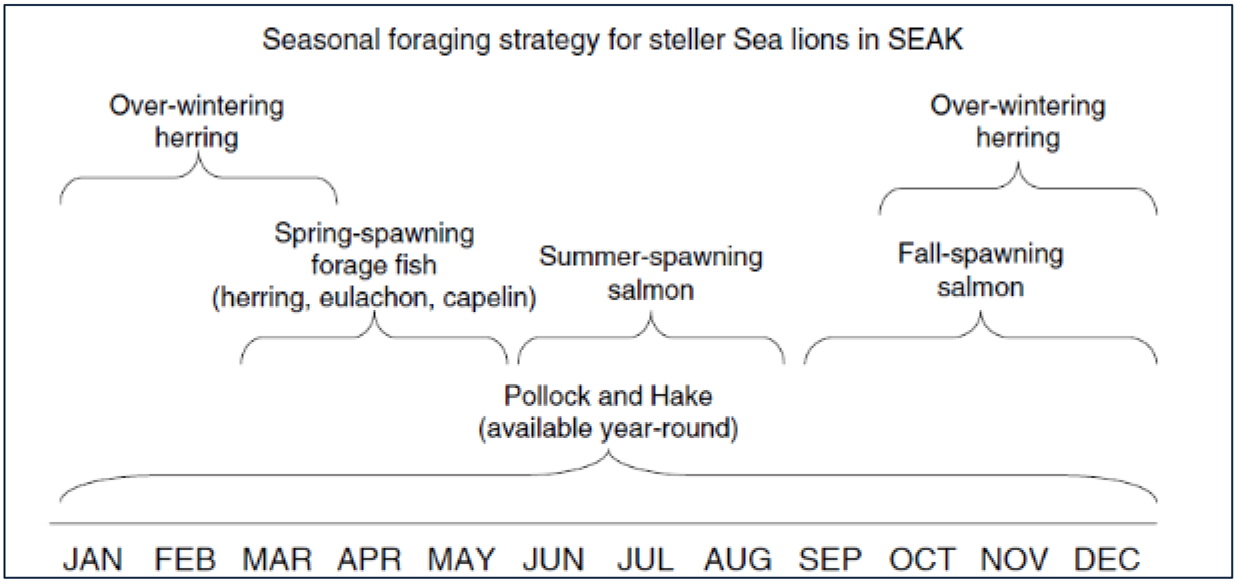

Figure 7. Diagram of the likely seasonal foraging ecology of Steller sea lions in Southeast Alaska. Reproduced with permission (Womble et al. 2009).

The action area and surrounding waters contain abundant sources of prey species, which draw Steller sea lions in to forage year round.

4.2.2.6 Diving and Social Behavior

Steller sea lions are very vocal marine mammals. Roaring males often bob their heads up and down when vocalizing. Adult males have been observed aggressively defending territories. Steller sea lions gather on haulouts year-round and rookeries during the breeding season and regularly travel as far as 250 miles to forage for seasonal prey. However, females with pups likely forage much closer to their rookery. Diving is generally to depths of 600 feet or less and diving duration is usually 2 minutes or less.

4.2.2.7 Vocalization and Hearing

The ability to detect sound and communicate underwater is important for a variety of Steller sea lion life functions, including reproduction and predator avoidance. NMFS categories Steller sea lions in the otariid functional hearing group which has an estimated auditory bandwidth of 60 Hz to 39 kHz in-water, and 75 Hz to 30 kHz on land (Southall et al. 2007, NMFS 2016b). Studies of Steller sea lion auditory sensitivities have found that this species detects sounds underwater between 1 to 25 kHz (Kastelein et al. 2005), and in the air between 0.25 to 30 kHz (Mulsow and Reichmuth 2010). Noise associated with the in-water activities associated with the proposed action is within the hearing range of Steller sea lions.

5. ENVIRONMENTAL BASELINE

The "environmental baseline" refers to "the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action 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 in 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). We also consider natural factors that contribute to the current status of the species, its habitat, and ecosystem in the action area.

5.1 Stressors on Mexico DPS Humpback Whales

Disturbance and risk of vessel strike from transiting vessels, competition for prey, effects from climate change, risk of entanglement, and the risk of oil spills (or other hazardous materials) could be sources of stress to humpback whales in the action area. A short description and summary of the effects of these stressors are presented below. More detailed analyses are available in the Humpback Whale Recovery Plan (NMFS 1991) and Status Review (Bettridge et al. 2015).

5.1.1 Vessel Disturbance and Strike

Vessel-based recreational activities, commercial fishing, shipping, whale-watching, the Alaska Marine Highway System (AMHS), and general transportation regularly occur within the action area. All of these sources of vessel traffic increase underwater noise and contribute to the risk of vessel-whale collisions.

Vessel strikes are a leading cause of mortality in large whales. Neilson et al. (2012) reported the following summary statements about humpback whale and vessel collisions in Southeast Alaska.

- Most vessels that strike whales are less than 49 feet long
- Most collisions occur at speeds over 13 knots
- Most collisions occur between May and September
- Calves and juveniles appear to be at higher risk of collisions than adult whales

Further, the authors used previous locations of whale strikes to produce a kernel density estimation. The high risk areas shown in red in Figure 8 are also popular whale-watching destinations (Neilson et al. 2012). A number of the risk factors listed above occur in the action area, and the action area is within one of the high risk areas in northern Southeast Alaska (Figure 8).

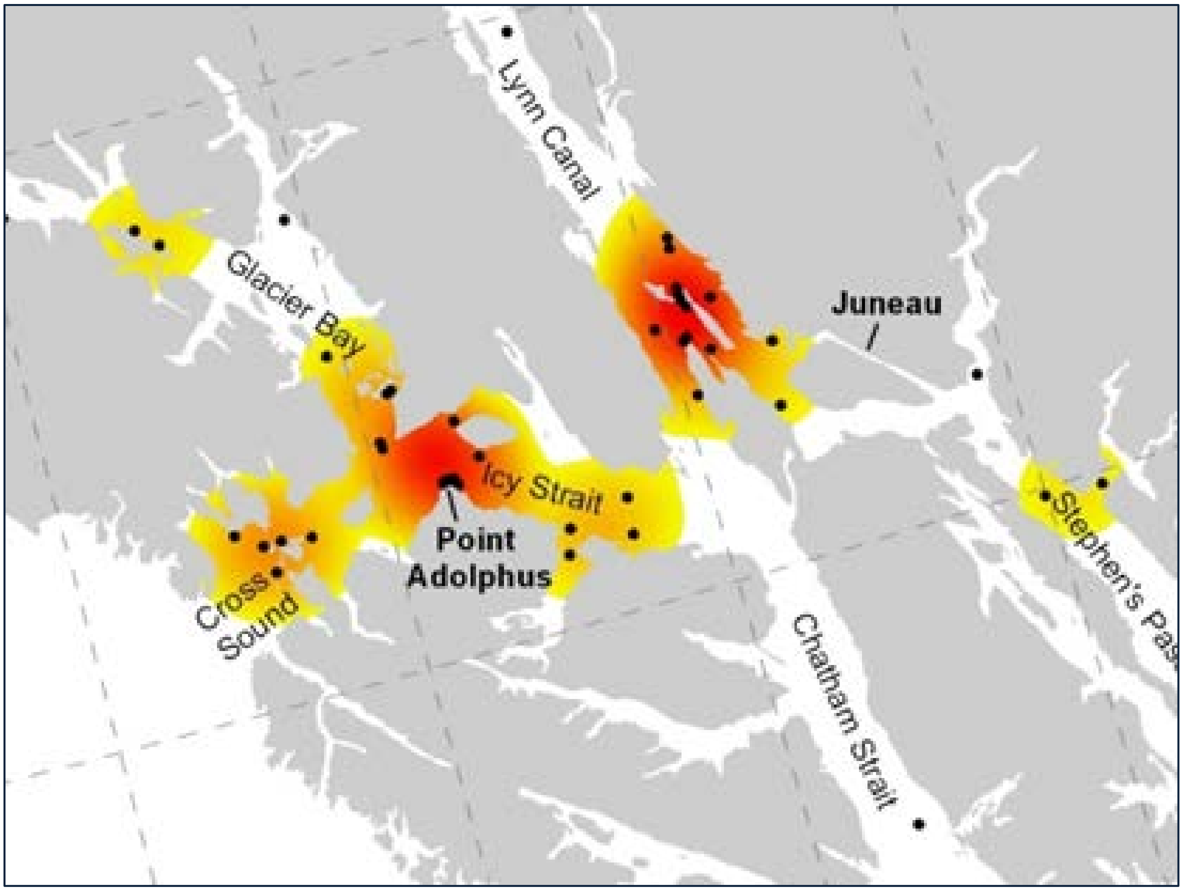

Figure 8. High risk areas for vessel strike in northern Southeast Alaska (Neilson et al. 2012).

NMFS implemented regulations to minimize harmful interactions between ships and humpback whales in Alaska (see 50 CFR §§ 216.18, 223.214, and 224.103(b)). These regulations require that all vessels:

a. Not approach within 100 yards of a humpback whale, or cause a vessel or other object to approach within 100 yards of a humpback whale,
b. Not place vessel in the path of oncoming humpback whales causing them to surface within 100 yards of vessel,
c. Not disrupt the normal behavior or prior activity of a whale, and
d. Operate vessel at a slow, safe speed when near a humpback whale. Safe speed is defined in regulation (see 33 CFR § 83.06).

Since 2011, cruise lines, pilots, NMFS, and National Park Service (NPS) biologists have worked together to produce weekly whale sightings maps to improve situational awareness for cruise ships and state ferries in Southeast Alaska. In 2016, NMFS and NPS launched Whale Alert, a voluntary program that receives and shares real-time whale sightings with controlled access to reduce the risk of ship strike and contribute to whale avoidance.

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

These regulations and guidelines all apply within the action area.

5.1.2 Competition for Prey

Competition for prey between humpback whales, other marine life, and humans may exist. Humpback whales feed on schooling fish, including species that are harvested by humans commercially or for personal use. Given the recent positive abundance trends for humpback whales discussed in Section 4.2.1.2 and the relatively small scale of the action area compared to commercial and personal use fishing grounds, NMFS expects any competition for prey in the action area to be minor.

5.1.3 Climate Change

Climate change has the potential to impact species abundance, geographic distribution, migration patterns, timing of seasonal activities (IPCC 2014), and species viability into the future. Climate change is also expected to result in the expansion of low oxygen zones in the marine environment (Gilly et al. 2013). Though predicting the precise consequences of climate change on highly mobile marine species, such as many of those considered in this opinion, is difficult (Simmonds and Isaac 2007), recent research has indicated a range of consequences already occurring.

The indirect effects of climate change include changes in the distribution and abundance of prey and the distribution and abundance of competitors or predators. For example, variations in the localized recruitment of herring in or near the action area caused by climate change could change the distribution and localized abundance of humpback whales. Warmer waters favor productivity of some species of forage fish, but the impact on recruitment of important prey fish 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 (NMFS 2008).

5.1.4 Entanglement

Entanglement of cetaceans in fishing gear and other human-made material is a major threat to their survival worldwide. Other materials also pose entanglement risks including marine debris, mooring lines, anchor lines, and underwater cables. While in many instances marine mammals may be able to disentangle themselves (Jensen et al. 2009), other entanglements result in lethal and sublethal trauma to marine mammals including drowning, injury, reduced foraging, reduced fitness, and increased energy expenditure (van der Hoop et al. 2017).

Entangled marine mammals may drown or starve due to being restricted by gear, suffer physical trauma and systemic infections, or be hit by vessels due to an inability to avoid them. Entanglement can include many different gear interaction scenarios, but the following have occurred with humpback whales:

- Gear loosely wrapped around the marine mammal's body that moves or shifts freely with the marine mammal's movement and does not indent the skin can result in disfigurement.

- Gear that encircles any body part and has sufficient tension to either indent the skin or to not shift with marine mammal's movement causes lacerations, partial or complete fin amputation, organ damage, or muscle damage, and interferes with mobility, feeding, and breathing. Chronic tissue damage from lines under pressure can compromise a whale's physiology. Fecal samples from entangled whales had extremely high levels of cortisol, and immune system stress hormone (Rolland et al. 2005). Extended periods of pituitary release of cortisol can exhaust the immune system, making a whale susceptible to disease and infection.

The NMFS Alaska Marine Mammal Stranding Network database has records of 199 large whale entanglements between 1990 and 2016. Of these, 67% were humpback whales. Most humpbacks get entangled with gear between the beginning of June and the beginning of September, when they are on their nearshore foraging grounds in Alaska waters. Between 1990 and 2016, 29% of humpback entanglements in Alaska were with pot gear and 37% with gillnet gear. Longline gear comprised only 1–2% of all recorded humpback fishing gear interactions. Most confirmed large whale entanglements in Alaska occur in Southeast Alaska. For example, in 2018 of 10 confirmed large whale entanglement reports (nine of which were humpbacks, one was not identified to species), seven occurred in Southeast Alaska. Humpbacks have been reported as entangled in the action area in or near the action area in recent years.

5.1.5 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 and permitted 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 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, particularly high fuel capacity ships or barges transporting fuel.

5.2 Stressors on WDPS Steller Sea Lions

Disturbance or injury from vessel transit, competition for prey, effects from climate change, risk of entanglement, and the risk of oil spills (or other hazardous materials) could be sources of stress to Steller sea lions in the action area. Short descriptions and summaries of the effects of these stressors are presented below. A more detailed analysis is available in the Steller Sea Lion Recovery Plan (NMFS 2008).

5.2.1 Vessel Disturbance and Strike

Vessel-based recreational activities, commercial and charter fishing, shipping, and general transportation, including the AMHS ferry, occur within the action area regularly. All of these activities increase ambient in-air and underwater noise and pose risk of vessel collisions with marine mammals. NMFS provides a voluntary framework for vessel operators to follow a code of conduct to reduce marine mammal interactions including:

- remain at least 100 yards from marine mammals,

- time spent observing individual(s) should be limited to 30 minutes, and
- vessels should leave the vicinity if they observe Steller sea lion behaviors such as these:
  - Increased movements away from the disturbance, hurried entry into the water by many animals, or herd movement towards the water; or
  - Increased vocalization, aggressive behavior by many animals towards the disturbance, or several individuals raising their heads simultaneously.

These guidelines can be viewed at: https://www.fisheries.noaa.gov/topic/marine-life-viewing-guidelines.

There are documented occurrences of Steller sea lions being struck by vessels in Southeast Alaska (see Section 4.2.2.3), and fast moving vessels in the action area have the potential to seriously injure or kill Steller sea lions by striking them. However, reported vessel strikes are uncommon.

5.2.2 Competition for Prey

Competition for prey species could exist between Steller sea lions and other marine life and Steller sea lions and commercial fishing. The Steller Sea Lion Recovery Plan (NMFS 2008) noted there are commercial fisheries that target key Steller sea lion prey, including Pacific cod, salmon, and herring in the eastern portion of their range. It was recognized that in some regions, fishery management measures appear to have reduced this potential competition (e.g., no-trawl zones and gear restrictions on various fisheries in Southeast Alaska) and in others a very broad distribution of prey and a lack of seasonal overlap between fisheries and prey preference by sea lions may minimize competition as well. Given the recent abundance trends discussed above in Section 4.2.2 and the relatively small scale of the action area compared to nearby fishing grounds, NMFS expects any competition for prey in the action area to be minor.

5.2.3 Climate Change

The Steller Sea Lion Recovery Plan ranks environmental variability as a potentially high threat to recovery of the western DPS (NMFS 2008). The Bering Sea and Gulf of Alaska are subjected to large-scale forcing mechanisms that can lead to basin-wide shifts in the marine ecosystem resulting in significant changes to physical and biological characteristics, including sea surface temperature, salinity, and sea ice extent and amount. Physical forcing affects food availability and can change the structure of trophic relationships by impacting climate conditions that influence reproduction, survival, distribution, and predator-prey relationships at all trophic levels in or near the action area. Populations of Steller sea lions in the Gulf of Alaska and Bering Sea have experienced large fluctuations due to environmental and anthropogenic forcing (Mueter et al. 2009). 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 (Mueter et al. 2009, IPCC 2013a).

The effects of climate change to the marine ecosystems of the Gulf of Alaska, including Lynn Canal, and how they are affecting and may continue to affect Steller sea lions are uncertain. Warmer waters could favor productivity of some species of forage fish, but the impact on recruitment of important prey fish of Steller sea lions is unpredictable. Recruitment of large year-classes of gadids (e.g., pollock) and herring has occurred more often in warm than cool years, but the distribution and recruitment of other fish (e.g., osmerids) could be negatively affected (NMFS 2008).

5.2.4 Entanglement

Although the Steller Sea Lion Recovery Plan (NMFS 2008) ranked interactions with fishing gear and marine debris as a low threat to the recovery of the WDPS, the extent of this threat may not be fully known because some entangled sea lions may be unable to swim to shore once entangled, may die at sea, and may not be available to count (Loughlin and Nelson Jr. 1986, Raum-Suryan et al. 2009). The main cause of reported human-marine mammal interaction serious injury and mortality to in Alaska between 2013-2017 was entanglement/entrapment, and Steller sea lions were the most common species of human-caused mortality and serious injury (Delean et al. 2020). There were 105 cases of serious injury and mortality to WDPS Steller sea lions from interactions with fishing gear and marine debris, and 350 EDPS Steller sea lion cases. While the bulk of the cases are attributed to the EDPS because they occurred east of 144° W, EDPS and WDPS animals overlap in Southeast Alaska and the action area, and some of these takes may have been WDPS animals. Raum-Suryan et al. (2009) observed a minimum of 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 minimum estimated mortality rate of WDPS Steller sea lions incidental to all U.S. commercial fisheries (averaged from reports in 2012-2016) is 35 sea lions per year, based on fishery observer data (35) and stranding data (0.2) where fishery observer data were not available. Several fisheries that are known to interact with the WDPS have not been observed reaching the minimum estimated mortality rate (Muto et al. 2019).

5.2.5 Pollution

The risk of oil spills or other hazardous materials to WDPS Steller sea lions is similar to humpback whales. For more information, please see Section 5.1.5 above.

6. EFFECTS OF THE ACTION

Per 50 CFR 402.02, "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." This Opinion relies on the best scientific and commercial information available. We try to note areas of uncertainty, or situations where data are 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 (in other words, minimizing the conclusion that adverse effects are not likely when such effects are, in fact, likely to occur).

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

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

6.1 Project Stressors

Based on our review of the Biological Assessment; the IHA application (February 2020); 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 Sentinel Island Moorage Float proposed construction action may cause these primary stressors:

1. in-water sound fields produced by impulsive noise sources such as impact pile driving;
2. in-water sound fields produced by continuous noise sources such as vibratory pile driving, down-the-hole drilling, and vessel noise;
3. in-air sound fields produced by impulsive noise sources such as impact pile driving;
4. risk of vessels striking marine mammals;
5. risk of entangling whales in anchoring or other equipment lines;
6. seafloor disturbance from drilling and pile driving; and
7. indirect effects such as increased risk of vessel strike and disturbance from future visitors to the lighthouse.

Most of the analysis and discussion of effects to WDPS Steller sea lions and Mexico DPS humpback whales from this action will focus on exposure to in-water impulsive and continuous noise sources because these stressors will likely have the most direct and far-reaching impacts on listed species.

6.1.1 Stressors Not Likely to Adversely Affect ESA-listed Species

Based on a review of available information, we determined which of the possible stressors may occur, but for which the likely effects are improbable or minimal.

6.1.1.1 In-Air noise

NMFS uses the following threshold for in-air sound pressure levels from broadband sounds that cause Level B behavioral disturbance (section 3(18)(A)(ii) of the MMPA):

- 100 dB re 20µPa$_{rms}$ for non-harbor seal pinnipeds

While WDPS Steller sea lions may be exposed to in-air noise from the pile driving activities, a standard sound attenuation model suggests that sound generated from impact pile driving would attenuate to the 100db rms criterion within 158 feet from the pile, and in-air noise from vibratory driving would fall below 100 db rms threshold altogether (ADOT&PF 2017). Since 100 dB is below the level that could harm Steller sea lions, this in-air noise impact is expected to be minimal. The Benjamin Island Steller sea lion haulout is over 0.75 miles from the proposed construction activity, and any WDPS Steller sea lions exposed to the in-air sound of the project would only be exposed after swimming into the action area. Any WDPS Steller sea lion close enough to the sound source to be considered a 'take' from in-air noise associated with pile driving or down-the-hole drilling would already have been accounted for by in-water take, or avoided due to the proposed mitigation measures. Thus, any effects from in-air noise on WDPS Steller sea lions is likely minimal.

6.1.1.2 Vessel strike and noise

The possibility of vessel strike associated with the proposed action is extremely unlikely. Tug towing operations for construction occur at relatively low speed limits (5 knots), and the maximum transit speed for tug and barge is anticipated to be 8–10 knots. Once vessels get to the construction site, they will be anchored. Skiffs will transport workers from shore to the work site. Due to the common presence of commercial and recreational vessels in the action area and the relatively small number of vessel transits during this short duration project, the use of slow-moving tugboats and barges and skiff transits associated with construction of the project is not anticipated to measureably affect ESA-listed species.

Although risk of vessel strike has not been identified as a significant concern for Steller sea lions (Loughlin and York 2000), the Recovery Plan for this species states that Steller sea lions may be more susceptible to ship strike mortality or injury in harbors or in areas where animals are concentrated (e.g., near rookeries or haulouts) (NMFS 2008). Since 2000, there have been four reported vessel strikes of Steller sea lions within Southeast Alaska.

Although the water near Sentinel Island has high volumes of vessel traffic, the likelihood of a vessel strike as a result of the proposed action is low. Although skiffs used to transport workers to the construction site will likely operate above 13 knots, the project duration is short, and mitigation measures are in place to reduce the risk of ship strike (e.g., marine mammal avoidance measures). Additionally, any marine mammal exposure to vessel noise associated with the proposed action will be minimal due to the mitigation measures and short duration of the project. All vessels will be required to observe the Alaska humpback whale approach regulations (100 yards), which will further reduce the likelihood of interactions. Barge and tug use associated with the proposed action will be low risk for vessel strike due to the low speeds and implementation of avoidance measures.

In general, the association in space and time of project-related vessels and humpback whales and Steller sea lions is highly unlikely because 1) vessel traffic associated with the proposed action will be minimal, and 2) the duration of operations is short. In addition, NMFS's regulations for approaching humpback whales require that vessels not approach within 100 yards. All of these factors limit the risk of strike and minimize vessel noise near marine mammals. We conclude the probability of strike occurring is extremely unlikely and therefore effects are highly improbable.

6.1.1.3 Disturbance to seafloor

During down-the-hole drilling and pile installation, a temporary and localized increase in turbidity and sedimentation near the seafloor is possible in the immediate area surrounding each pile. The substrate is primarily bedrock at the site, but rock drilling and pounding will generate some sedimentation and turbidity.

Considering local currents, tidal action, and implementation of best management practices, any potential water quality exceedances would likely be temporary and highly localized. The local tides and currents are expected to disperse suspended sediments from pile driving to near background levels in a few hours. Therefore, the impact from increased turbidity levels would be negligible to humpback whales and Steller sea lions and would not cause a noticeable disruption of behavioral patterns. Therefore, we conclude that the effects from this stressor are so small that they are not measurable.

6.1.1.4 Risk of entanglement

A small number of anchor, towing, and moorage lines will be put in the water column as part of the work associated with the proposed action. There is a precedent for humpback whales becoming entangled in anchor and mooring in Southeast Alaska near the action area, particularly when the lines are novel, or new to the whales. However, due to the short duration of this project, in-water noise associated with the project that will let the whales and sea lions know there is new activity occurring in the area, and the small number of lines associated with the project, the risk of entanglement is low and effects are thus extremely unlikely.

6.1.1.5 Indirect effects of increased risk of vessel strike and disturbance from future visitors to the lighthouse

The new moorage float is specifically intended to serve increased future visitor use of the Sentinel Island Lighthouse. However, accommodations at the lighthouse are limited and the total number of daily visitors is not anticipated to number above 50 per day. Juneau-area humpback whales and Steller sea lions already experience relatively high levels of vessel activity from the existing whale-watching and charter industries. An increase to the overall vessel traffic near humpback whales and Steller sea lions could contribute increased noise, harassment, displacement, pollution, etc. However, this very small incremental increase in vessel traffic is not likely to result in measurable impacts to the species. In addition, we anticipate that vessel operators would follow the humpback whale no-approach regulations as described above.

6.1.2 Stressors Likely to Adversely Affect ESA-listed Species

The following stressors are likely to adversely affect Mexico DPS humpback whales and WDPS

Steller sea lions: underwater noise from pile driving and down-the-hole drilling. These stressors will be analyzed below in the *Exposure Analysis.*

6.1.2.1 Acoustic thresholds

As discussed in Section 2, *Description of the Proposed Action*, GCHS intends to conduct construction activities that would introduce acoustic disturbance.

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). NMFS developed comprehensive guidance on sound levels likely to cause injury to marine mammals through onset of permanent and temporary thresholds shifts (PTS and TTS; Level A harassment), also known as permanent or temporary hearing loss (81 FR 51694) (Table 6). 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[3], expressed in root mean square[4] (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):

- impulsive sound: 160 dB re 1 μPa$_{rms}$
- continuous sound: 120 dB re 1μPa$_{rms}$

Under the PTS/TTS Technical Guidance, NMFS uses the following thresholds for underwater sounds that cause injury, referred to as Level A harassment under section 3(18)(A)(i) of the MMPA (NMFS 2016b). 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:

Table 6. PTS onset acoustic thresholds for Level A harassment (NMFS 2016b).

Hearing Group	**PTS Onset Acoustic Thresholds* (Received Level)**	
	Impulsive	**Non-impulsive**
Low-Frequency (LF) Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB

[3] 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.

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

Hearing Group	PTS Onset Acoustic Thresholds* (Received Level)	
	Impulsive	Non-impulsive
Otariid Pinnipeds (OW) (Underwater)	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB
* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered. Note: Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1µPa^{2}s. The subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.		

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 USC § 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).

As described below, we anticipate that exposures to listed marine mammals from noise associated with the proposed action may result in disturbance and potential injury. Due to the use of mitigation measures discussed in detail in Section 2.1.2 above, it is unlikely that PTS could occur from pile installation activities. GCHS is not requesting authorization of Level A takes for Steller sea lions or humpback whales; they are only requesting Level B take authorization.

6.2 Exposure Analysis

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

As discussed in Section 2.1.2 above, GCHS and PR1 proposed mitigation measures as part of the proposed action that should avoid or minimize exposure of Mexico DPS humpback whales and WDPS Steller sea lions to stressors. The monitoring zones shown in Table 3 enable PSOs to be aware of and communicate the presence of marine mammals in the action area outside the shutdown zone and prepare for a potential cease of activity should an animal approach the shutdown zone. For pile driving and down-the-hole drilling, the shutdown zone will be monitored for a minimum of 30 minutes prior to in-water activity. If a marine mammal is sighted within the shutdown zone, in-water activity will be delayed until the zone is clear of marine mammals.

6.2.1 Exposure to noise from pile driving and down-the-hole drilling activities

Mexico DPS humpback whales and WDPS Steller sea lions may be present within the waters of the action area during the time that the in-water work is being conducted and could be exposed to temporarily elevated underwater noise levels resulting in harassment.

Temporarily elevated underwater noise during pile driving activities (including vibratory pile driving, down-the-hole drilling, and impact pile driving) has the potential to result in Level B (behavioral) harassment of marine mammals. Level A harassment (resulting in injury) is not expected to occur as a result of the proposed in-water activities because shutdown zones will be implemented (Table 3) and the marine mammal monitoring plan in the *Mitigation Measures* will reduce the potential for exposure to levels of underwater noise above the injury threshold established by NMFS.

For this analysis we estimated take 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.

<u>Down-the-Hole (DTH) Drilling</u>

The closest known measurements of down-hole drilling similar to this project are from the Kodiak ferry terminal reconstruction project (Denes et al. 2016). The median sound source level was calculated to be 166.2 dB at 33 ft (10 m), which was used with the NMFS practical spreading loss model to calculate the Level B harassment isopleths. This sound source verification (SSV) is for 24-in steel piles, and will be applied to this project.

The practical spreading model was used by the applicant to generate the Level B harassment zones for piling and drilling activities. Practical spreading, a form of transmission loss, is described in detail below.

Pile driving and drilling generate underwater noise that can potentially result in disturbance to marine mammals in the project area. Transmission loss (TL) is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater TL is:

$$TL = B * \log10(R_1/R_2)$$, where
R_1 = the distance of the modeled SPL from the driven pile, and
R_2 = the distance from the driven pile of the initial measurement.

This formula neglects loss due to scattering and absorption, which is assumed to be zero here. The degree to which underwater sound propagates away from a sound source is dependent on a variety of factors, most notably the bathymetry and presence or absence of reflective or absorptive conditions including in-water structures and sediments. Spherical spreading occurs in a perfectly unobstructed (free-field) environment not limited by depth or water surface, resulting in a 6 dB reduction in sound level for each doubling of distance from the source (20*log[range]). Cylindrical spreading occurs in an environment in which sound propagation is bounded by the water surface and sea bottom, resulting in a reduction of 3 dB in sound level for each doubling of distance from the source (10*log[range]). A practical spreading value of 15 is often used under conditions where water increases with depth as the receiver moves away from the shoreline, resulting in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions.

Using the practical spreading loss model, underwater noise will fall below the behavioral effects threshold of 120 dB rms for marine mammals at a maximum radial distance of 12.1 km for DTH drilling for 24-in steel piles.

<u>Vibratory Pile Driving</u>
For vibratory pile driving we determined a source level of 162 dB (RMS SPL) at 10m was most appropriate. The closest known measurements of sound levels for vibratory pile installation of 24-inch steel piles are from the U.S. Navy Proxy Sound Source Study for projects in Puget Sound (Navy 2015). To be conservative, since DTH drilling and vibratory pile driving would occur on the same day, the applicant used the higher of the vibratory and DTH source levels (162 dB ssSEL for level A and 166.2dB RMS for level B harassment) for both Level A and Level B calculations, and assumed all drilling/driving time in a day was at this higher level.

<u>Impact Pile Driving</u>
For impact pile driving of 24-inch piles, sound measurements were used from the literature review in Appendix H of the AKDOT&PF study (Yurk et al. 2015) for 24-inch piles driven in the Columbia River with a diesel impact hammer (190 dB RMS, 205 dB Peak, 175 dB SS SEL). We assumed no more than two piles per day with DTH drilling as the duration per pile was assumed to be 6 hours. For impact pile driving activities we also assumed no more than 2 piles per day and 250 strikes per pile. In all cases we used a propagation loss coefficient of 15 logR as most appropriate for these stationary, in-shore sources.

Underwater noise will fall below the behavioral effect threshold of 160 dB rms for marine mammals at a maximum radial distance of 1 km for impact pile driving. Thus, the Level B harassment zones are established (Table 8) for each of these sound sources. Beyond these distances, NMFS anticipates no behavioral disturbance to listed marine mammals.

6.2.1.1 Distances to Level A and Level B Sound Thresholds

Using the best available science, NMFS has developed acoustic thresholds that identify the received level of underwater sound above which exposed marine mammals would be reasonably expected to be behaviorally harassed or experience TTS (equated to Level B harassment) or to incur PTS of some degree (equated to Level A harassment).

Level B Harassment

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

GCHS's proposed construction activity for the Sentinel Island Moorage Float includes the use of continuous (vibratory pile driving and down-the-hole drilling) and possible impulsive (impact pile driving) sources, and therefore the 120 and 160 dB re 1 μPa rms thresholds for Level B behavioral harassment are applicable.

Level A Harassment

NMFS's Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NMFS 2016b) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups based on hearing sensitivity as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). GCHS's proposed activity includes the use of non-impulsive (vibratory pile driving and down-the-hole (DTH) drilling) and possible impulsive (impact pile driving) sources. The Level A thresholds for the onset of PTS are provided in Table 6 and are applicable here.

Calculating the ensonified area

This section describes the operational and environmental parameters of the activity that allow NMFS to estimate the area ensonified above the acoustic thresholds.

When the NMFS Technical Guidance (NMFS 2016b) was published, in recognition of the fact that ensonified area/volume could be more technically challenging to predict because of the duration component in the new thresholds, NMFS developed a User Spreadsheet that includes tools to help predict a simple isopleth that can be used in conjunction with marine mammal density or occurrence to help predict takes. Because of some of the assumptions included in the methods used for these tools, it's anticipated that isopleths produced are typically going to be overestimates to some degree. However, these tools offer the best way to predict appropriate isopleths when more sophisticated 3D modeling methods are not available. For stationary sources, the NMFS User Spreadsheet predicts the closest distance at which, if a marine mammal remained at that distance the whole duration of the activity, it would not incur PTS. When using the subset of variables from the NMF User Spreadsheet shown in Table 7, the calculated isopleths are detailed in Table 8.

Table 7. NMFS user spreadsheet inputs. Calculated values specific to the Sentinel Island Moorage Float proposed action.

	Vibratory pile driving/DTH drilling - continuous	**DTH drilling - impulsive**	**Impact pile driving**
Spreadsheet Tab Used	A.1) Vibratory pile driving	E.1-2) Impact pile driving	E.1) Impact pile driving
Source Level	166.2 dB RMS	154 dB SS SEL	175 dB SS SEL
Weighting Factor Adjustment (kHz)	2.5	2	2
a) Number of strikes per pile	N/A	10,000	250
a) Activity Duration (h:min) within 24-h period	12:00	N/A	N/A
Propagation (xLogR)	15	15	15
Distance of source level measurement (meters)	10	10	10
Number of piles per day	2	2	2

Table 8. NMFS user spreadsheet generated outputs. Level A and Level B calculations specific to the Sentinel Island Moorage Float proposed action.

Activity	**PTS (Level A) Isopleth**	
	Low-Frequency Cetaceans (Humpback whales)	**Steller sea lions**
Vibratory driving/DTH drilling: continuous	80 m (263 ft)	4 m (13 ft)
DTH drilling: impulsive	137 m (447 ft)	6 m (17 ft)
Impact pile driving: impulsive	184 m (605 ft)	8 m (25 ft)
	Level B Behavioral Harassment Isopleth All species	
Vibratory driving/DTH drilling: continuous	12.1 km (7.5 miles)	
DTH drilling: impulsive	N/A	
Impact pile driving: impulsive	1 km (3280 feet)	

6.2.2 Estimating marine mammal occurrence

Information about the presence, density, or group dynamics of marine mammals informs the take calculations in Section 10. Reliable, consistent densities are not available for Lynn Canal. Generalized densities for the North Pacific would not be applicable given the high variability in occurrence and density at specific inlets and harbors. Therefore, we used information about presence, group size, and dive durations to derive take estimates.

Whale researchers, resource managers, and whale watching guides track the presence of individual humpback whales in the Juneau area by unique fluke patterns (Krieger and Wing 1986, Teerlink 2017). Based on fluke photographs taken between 2006 and 2014, 179 individual humpback whales were identified from the Juneau area (Teerlink 2017). Surveys in Lynn Canal, near the action area, from September 15-October 14, 2007 and 2008, observed 55 humpback whales; 30 whales were unique in 2007, and 22 were unique in 2008 (Straley et al. 2018).

Based on these local surveys and known numbers of humpback whales in and near the action area in past years, and Dahlheim et al. (2009), we estimate that up to eight humpback whales will be exposed to underwater noise each day. Up to six days of in-water activity will occur, so the total number of humpback whales expected to be exposed to Level B harassment noise is 48 (8 x 6 = 48). The proportion of these whales that are anticipated to be from the threatened Mexico DPS is 6.1% (Table 5) (Wade et al. 2016). This proportion results in 2.928 ESA-listed whales (6.1% of 48), which we will round up to three for our exposure estimate.

Based on local information (pers. comm. L. Jemison) and periodic counts of the Benjamin Island Steller sea lion haulout by the Alaska Department of Fish and Game (Table 9), we estimate that up to 248 Steller sea lions will enter the Level B ensonified zone for the proposed action daily.

Table 9. Steller sea lion counts conducted of the Benjamin Island haulout by ADF&G from late-July to early-September (unpublished data provided for this consultation pers. comm. L. Jemison, ADF&G).

Date	Location	Count
7/16/2005	Benjamin Island	560
7/17/2006	Benjamin Island	0
7/22/2007	Benjamin Island	0
8/15/2012	Benjamin Island	0
9/10/2012	Benjamin Island	0
8/9/2013	Benjamin Island	40
9/24/2013	Benjamin Island	144
8/30/2014	Benjamin Island	0
9/1/2015	Benjamin Island	0
9/28/2016	Benjamin Island	0
8/2/2017	Benjamin Island	0
8/29/2017	Benjamin Island	0
9/12/2017	Benjamin Island	0

We based the daily Steller sea lion estimate on the three ADF&G counts in which animals were observed on the Benjamin Island haulout from mid-July to mid-September, anticipating that it is possible that animals will be hauled out during the proposed action: [(560+40+144)/3] = 248. This daily estimate is multiplied by six to calculate the estimated take for the entire six days of in-water activities for the proposed action: 6 x 248 = 1,488. We use the estimated proportion of WDPS Steller sea lions for Lynn Canal (1.4%) (Hastings et al. 2020) to calculate the anticipated take of the endangered WDPS: 1.4% x 1,488 = 20.83. We round this up to 21 Level B harassment takes of WDPS Steller sea lion during the course of the proposed action.

6.3 Response Analysis

As discussed in the *Approach to the Assessment* section of this Opinion, response analyses determine how listed species 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.

6.3.1 Responses to major noise sources

Loud underwater noise can result in physical effects on the marine environment that can affect marine organisms. Possible responses by Mexico DPS humpback whales and WDPS Steller sea lions to the impulsive and continuous sound produced by the impact and vibratory pile driving and DTH drilling include:

- Behavioral responses
    - Auditory interference (masking)
    - Tolerance or Habituation
    - Change in dive, respiration, or feeding behavior
    - Change in vocalizations
    - Avoidance or Displacement
    - Vigilance

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

Anthropogenic sounds cover a broad range of frequencies and sound levels and can have a range of highly variable impacts on marine life, from none or minor to potentially severe responses, depending on received levels, duration of exposure, behavioral context, and various other factors. The potential effects of underwater sound from active acoustic sources can potentially result in one or more of the following: temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, and masking (Richardson et al. 1995, Nowacek et al. 2007, Southall et al. 2007). The degree of effect is intrinsically related to the signal characteristics, received level, distance from the source, and duration of the sound exposure. In general, sudden, high level sounds can cause hearing loss, as can longer exposures to lower level sounds. Temporary or permanent loss of hearing will occur almost exclusively for noise within an animal's hearing range.

Richardson et al. (1995) described zones of increasing intensity of effect that might be expected to occur, in relation to distance from a source and assuming that the signal is within an animal's hearing range. The first zone is the area within which the acoustic signal would be audible (potentially perceived) to the animal, but not strong enough to elicit any overt behavioral or physiological response. The next zone corresponds with the area where the signal is audible to the animal and of sufficient intensity to elicit behavioral or physiological responsiveness. Third is a zone within which, for signals of high intensity, the received level is sufficient to potentially cause discomfort or tissue damage to auditory or other systems. Overlaying these zones to a certain extent is the area within which masking (i.e., when a sound interferes with or masks the ability of an animal to detect a signal of interest that is above the absolute hearing threshold) may occur; the masking zone may be highly variable in size.

The effects of pile installation and DTH drilling on marine mammals are dependent on several factors, including the type and depth of the animal; the pile size and type, and the intensity and duration of the in-water sound; the substrate; the standoff distance between the pile and the animal; and the sound propagation properties of the environment. Impacts to marine mammals from pile driving and DTH drilling activities are expected to result primarily from acoustic pathways. As such, the degree of effect is intrinsically related to the frequency, received level, and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The further away from the source, the less intense the exposure should be. The substrate and depth of the habitat affect the sound propagation properties of the environment.

6.3.1.1 Behavioral Responses

Behavioral disturbance may include a variety of effects, including subtle changes in behavior (e.g., minor or brief avoidance of an area or changes in vocalizations), and more sustained and/or potentially severe reactions (e.g. displacement from or abandonment of high-quality habitat). Behavioral responses to sound are highly variable and context-specific and any reactions depend on numerous intrinsic and extrinsic factors (e.g., species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day), as well as the interplay between factors (Southall et al. 2007). Behavioral reactions can vary not only among individuals but also within an individual, depending on previous experience with a sound source, context, and numerous other factors (Ellison et al. 2012), and can vary depending on characteristics associated with the sound source (e.g., whether it is moving or stationary, number of sources, distance from the source). Please see Appendices B-C of Southall et al. (2007) for a review of studies involving marine mammal behavioral responses to sound.

Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel (24-hour) cycle. Disruption of such functions resulting from reactions to stressors such as sound exposure are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall et al. 2007). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered particularly severe unless it could directly affect reproduction or survival (Southall et al. 2007). Note that there is a difference between multi-day substantive behavioral reactions and multi-day anthropogenic activities. For example, just because an activity lasts for multiple days does not necessarily mean that individual animals are either exposed to activity-related stressors for multiple days or exposed in a manner resulting in sustained multi-day substantive behavioral responses.

Auditory Masking

Sound can disrupt behavior through masking, or interfering with, an animal's ability to detect, recognize, or discriminate between acoustic signals of interest (e.g., those used for intraspecific communication and social interactions, prey detection, predator avoidance, navigation) (Richardson et al. 1995). Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher intensity, and may occur whether the sound is natural (e.g., snapping shrimp, wind, waves, precipitation) or anthropogenic (e.g., shipping, sonar, seismic exploration) in origin. The ability of a noise source to mask biologically important sounds depends on the characteristics of both the noise source and the signal of interest (e.g., signal-to-noise ratio, temporal variability, direction) in relation to each other and to an animal's hearing abilities (e.g., sensitivity, frequency range, critical ratios, frequency discrimination, directional discrimination, age, or TTS hearing loss), and existing ambient noise and propagation conditions.

Under certain circumstances, marine mammals experiencing significant masking could also be impaired from maximizing their fitness in survival and reproduction. Therefore, when the coincident (masking) sound is man-made, it may be considered harassment when disrupting or altering critical behaviors. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

For the pile driving and DTH drilling sound generated from the proposed construction activities, sound will consist of low frequency impulsive and continuous noise depending on if they are using an impact or vibratory hammer or are drilling. Lower frequency anthropogenic sounds are more likely to affect detection of communication calls and other potentially important natural sounds such as surf and prey noise. This could affect communication signals used by low frequency mysticetes when they occur near the noise 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). However, marine mammals are thought to be able to compensate for masking to a degree by adjusting their acoustic behavior by shifting call frequencies, and/or increasing call volume and vocalization rates. For example, humpback whales were shown to alter their calling behavior in response to cruise ships and other vessel activity in Glacier Bay, including increasing the volume of their calls, and reducing their overall calling (Fournet et al. 2018). In addition, the sound localization abilities of marine mammals suggest that, if signal and noise come from different directions, masking would not be as severe as the usual types of masking studies might suggest (Richardson et al. 1995).

Masking affects both senders and receivers of acoustic signals and can potentially have long-term chronic effects on marine mammals at the population level as well as at the individual level. Low-frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, with most of the increase from commercial shipping (Hildebrand 2009). All anthropogenic sound sources, but especially chronic and lower-frequency signals (e.g., from vessel traffic), contribute to elevated ambient sound levels, thus intensifying masking.

Noise from pile driving and DTH drilling activity is relatively short-term. It is possible that pile driving and DTH drilling noise resulting from this proposed action may mask acoustic signals important to western DPS Steller sea lions and Mexico DPS humpback whales, but the short-term duration, limited affected area, and pauses between operations would limit the impacts from masking. Any masking event that could rise to Level B harassment under the MMPA is included within the zones of behavioral harassment estimated in Table 8 which have been taken into account in the exposure analysis.

Habituation

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. It is important to note that habituation is appropriately considered as a "progressive reduction in response to stimuli that are perceived as neither aversive nor beneficial," rather than as, more generally, moderation in response to human disturbance (Bejder et al. 2009). 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. As noted, behavioral state may affect the type of response. 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 have showed pronounced behavioral reactions, including avoidance of loud sound sources (Schlundt et al. 2000). Observed responses of wild marine mammals to loud, intermittent sound sources (typically seismic airguns or acoustic harassment devices) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Richardson et al. 1995).

This information indicates marine mammal tolerance or avoidance of underwater sounds. We anticipate that some humpback whales and Steller sea lions exposed to low frequency underwater sounds from construction activities in the action area may tolerate construction and/or demolition noise and show no apparent response, while others may depart the action area temporarily. More information is needed in order to determine if the learned processes of habituation or sensitization are occurring over time as animals experience repeated exposures.

Change in dive, respiration, or feeding behavior

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

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

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

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

Based on this analysis, we would expect Mexico DPS humpback whales and WDPS Steller sea lions to continue foraging in the face of moderate levels of disturbance. For example, humpback whales, which only feed during part of the year and must satisfy their annual energetic needs during the foraging season, may continue foraging in the face of disturbance in the action area. Similarly, a humpback cow accompanied by her calf is less likely to flee or abandon an area at the cost of her calf's survival. We also expect that these animals could resume foraging close by if the in-water noise associated with the proposed action causes them to avoid the action area. Steller sea lions could temporarily move to the haulout at Little Island, 4.5 miles west of Benjamin Island, and forage in the marine waters near the action area. It is likely some change in dive, respiration, or feeding behavior of WDPS Steller sea lions and Mexico DPS humpback whales may occur in the action area, but we do not expect much change in these behaviors. Any change in behavior that could rise to Level B harassment under the MMPA is included within the zones of behavioral harassment estimated in Table 8 and which have been taken into account in the exposure analysis.

Change in vocalizations

Marine mammals vocalize for different purposes and across multiple modes, such as whistling, echolocation click production, calling, roaring, and singing. Changes in vocalization behavior in response to anthropogenic noise can occur for any of these modes and may result from a need to compete with an increase in background noise or may reflect increased vigilance or a startle response. In some cases, animals may cease sound production during production of aversive signals (Bowles et al. 1994).

In addition to these behavioral responses, whales alter their vocal communications when exposed to anthropogenic sounds. Communication is an important component of the daily activity of animals and ultimately contributes to their survival and reproductive success. Animals communicate to find food, acquire mates, assess other members of their species, evade predators, and defend resources. Human activities that impair an animal's ability to communicate effectively might have significant effects on the survival and reproductive performance of animals experiencing the impairment.

At the same time, most animals that vocalize have evolved with an ability to make adjustments to their vocalizations to increase the signal-to-noise ratio, active space, and recognition of their vocalizations in the face of temporary changes in background noise. For example, blue whales stopped vocalizing and feeding, and moved out of an area in response to simulated mid-frequency military sonar (Goldbogen et al. 2013). Humpback whales were observed to call louder and less often in Glacier Bay in response to cruise ship and other vessel noise (Fournet et al. 2018). Humpback whales have also been observed to increase the length of their songs in the presence of potentially masking signals (Miller et al. 2000, Fristrup et al. 2003). Change in humpback vocalization may happen within the action area, but to a minimal extent due to the short duration of the project. Steller sea lions vocalize more often on terrestrial haulouts rather than in the water, which is where they will be exposed to noise from the proposed action. We do not anticipate that the proposed action will significantly alter Steller sea lion vocalizations.

Avoidance or displacement

Avoidance is the displacement of an individual from an area or migration path because of the presence of a sound or other stressors, and is one of the most obvious manifestations of disturbance in marine mammals (Richardson et al. 1995). Whales are known to move away from preferred migratory routes and feeding and calving areas in order to avoid noise from seismic surveys (Weller et al. 2002, Quakenbush et al. 2012). Avoidance may be short-term, with animals returning to the area once the noise has ceased (Bowles et al. 1994). Longer-term displacement is possible, however, which may lead to changes in abundance or distribution patterns of the affected species in the affected region if habituation to the presence of the sound does not occur (Blackwell et al. 2004).

A flight response is a dramatic change in normal movement to a directed and rapid movement away from the perceived location of a sound source. The flight response differs from other avoidance responses in the intensity of the response (e.g., directed movement, rate of travel). Pinnipeds will evacuate terrestrial sites in a hurried flight response due to human disturbance (Lewis and Mathews 2000), potentially leading to injury, and certainly resulting in harassment. The result of a flight response could range from brief, temporary exertion and displacement from the area where the signal provokes flight to, in extreme cases, marine mammal strandings (England et al. 2001). However, it should be noted that response to a perceived predator does not necessarily invoke flight (Ford and Reeves 2008), and whether individuals are solitary or in groups may influence the response.

Avoidance is one of many behavioral responses whales and Steller sea lions exhibit when exposed to pile driving and DTH drilling noise. Evasive behavior to escape exposure or continued exposure to a sound that is painful, noxious, or that they perceive as threatening, is another potential response. We assume this behavior would be accompanied by acute stress physiology; increased vigilance, which would alter their time budget (that is, during the time they are vigilant, they are not engaged in other behavior); and continued pre-disturbance behavior with the physiological consequences of continued exposure. Avoidance behavior is expected to occur with the Steller sea lions and humpback whales in the action area. Any avoidance that could rise to Level B harassment under the MMPA is included within the zones of behavioral harassment estimated in Table 8 and which have been taken into account in the exposure analysis.

Vigilance

Behavioral disturbance can also impact marine mammals in more subtle ways. Increased vigilance may result in costs related to diversion of energy (i.e., when a response consists of increased vigilance, it may come at the cost of decreased attention to other critical behaviors such as foraging or resting). In addition, chronic disturbance can cause population declines through decreased individual fitness (e.g., decline in body condition) and subsequent reduction in reproductive success, survival, or both (New et al. 2014). We anticipate that some humpback whales and Steller sea lions will demonstrate vigilance in response to the in-water work of the proposed action. This behavior will enable the animals to determine if the sound could be a threat. Any change in behavior that could rise to Level B harassment under the MMPA is included within the zones of behavioral harassment estimated in Table 8 and which have been taken into account in the exposure analysis.

Humpback whales and Steller sea lions have the potential to exhibit each of these behavioral responses (auditory interference (masking); tolerance or habituation; change in dive, respiration, or feeding behavior; change in vocalizations; avoidance or displacement; increased vigilance) due to project activities in the action area. However, the relatively short duration and sporadic nature of the in-water work, and implementation of mitigation measures will reduce the likelihood of chronic or long-term effects.

6.3.2 Anticipated Effects on Habitat

The proposed activities at the project area would not result in permanent negative impacts to habitats used directly by marine mammals, but may have potential short-term impacts to food sources, such as forage fish, and may affect acoustic habitat. Steller sea lions and humpback whales likely occur in the action area year round depending on food availability. While humpback whales and Steller sea lions feed in Lynn Canal and the action area, this is a small portion of their overall feeding area. The small portion of the area affected by the construction noise, in conjunction with the short temporal scale of construction activity, make it unlikely the effects of the construction will significantly alter the foraging habitat of humpback whales or Steller sea lions in Southeast Alaska. Therefore, the main impact issue associated with the proposed action would be temporarily elevated sound levels and the associated direct effects on marine mammals, as discussed previously in this document. The primary potential acoustic impacts to marine mammal habitat are associated with elevated sound levels produced by pile installation (pile driving and DTH drilling).

Short-term turbidity increases would likely occur during in-water construction work, including pile driving and DTH drilling. The physical resuspension of sediments could produce localized turbidity plumes that could last from a few minutes to several hours. In general, turbidity associated with pile installation is expected to be localized to about a 25 ft radius around the pile. Contaminated sediments are not expected at the project site because the substrate is nearly exclusively bedrock. Because of the relatively small work area, any increase in turbidity would be limited to the immediate vicinity of the project site. There is little potential for pinnipeds or cetaceans to be exposed to increased turbidity during construction operations.

Considering local currents, tidal action, and implementation of mitigation measures, any potential water quality exceedances would likely be temporary and highly localized. The local tides and currents would disperse suspended sediments from pile driving and drilling operations at a moderate to rapid rate depending on tidal stage.

6.3.3 In-water Construction Effects on Potential Prey (Fish)

Construction activities would produce continuous (i.e., vibratory pile driving and DTH drilling) and impulsive (impact pile driving) sounds. Fish react to 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 impulsive sounds such as pile driving on fish, although several are based on studies in support of large, multiyear bridge construction projects (Scholik and Yan 2001, Popper and Hastings 2009). Sound pulses at received levels of 160 dB may cause subtle changes in fish behavior. Sound pressure levels (SPLs) of 180 dB may cause noticeable changes in behavior (Pearson et al. 1992). SPLs of sufficient strength have been known to cause injury to fish and fish mortality.

The most likely impact to fish from pile driving and DTH drilling activities in the action area would be temporary behavioral avoidance of the area. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution, and behavior is anticipated. In general, impacts to humpback whale and Steller sea lion prey species are expected to be minor and temporary due to the short timeframe for the project.

6.3.4 Effects on Potential Fish Foraging Habitat

The area likely impacted by the project is relatively small compared to the available habitat in Lynn Canal. Avoidance by potential prey of the immediate area due to the temporary loss of this foraging habitat is possible. The duration of fish avoidance of this area after construction activity stops is unknown, but a rapid return to normal recruitment, distribution, and behavior is anticipated. Any behavioral avoidance by fish of the disturbed area would still leave significantly large areas of fish and marine mammal foraging habitat in the nearby vicinity in Lynn Canal.

Given the short daily duration of sound associated with individual construction activities and the relatively small areas being affected, the proposed action is not likely to have a permanent, adverse effect on any fish habitat, or populations of fish species. In addition, consideration was given in the design of the dock and float to provide barrier-free movement to fish, in order to reduce potential impacts. Thus, any impacts to marine mammal habitat are not expected to cause significant or long-term consequences for individual marine mammals or their populations.

6.3.5 Responses to vessel traffic and noise

Mexico DPS humpback whales and WDPS Steller sea lions are anticipated to occur in the action area and are anticipated to overlap with noise associated with vessel transit. We assume that some individuals are likely to be exposed and respond to this continuous noise source.

Materials and equipment would be transported to the project site by barge. While work is conducted in the water, anchored barges will be used to stage construction materials and equipment. Vessel speed, course changes, and sounds associated with their engines may be stressors to listed humpback whales and Steller sea lions.

We anticipate low-level exposure of short-term duration to listed marine mammals from vessel noise. If animals do respond, they may exhibit slight deflection from the noise source, engage in low-level avoidance behavior, short-term vigilance behavior, or experience short-term masking (and change their vocalizations in response), but these behaviors are not likely to result in adverse consequences for the whales and sea lions. The nature and duration of response is not anticipated to be a significant disruption of important behavioral patterns such as feeding or resting. Due to the short overall duration of the proposed action, and the periodic nature of the in-water work, avoidance of the area is not likely to measurably affect humpback whales or Steller sea lions**.**

The small number of vessels involved in the action, the short duration of exposure due to the transitory nature, and vessels following the Alaska Humpback Whale Approach Regulations and marine mammal code of conduct should prevent close approaches and additional harassment of Steller sea lions and humpback whales. Vessels should be able to remain over half a mile from the Steller sea lion haulout on Benajmin Island. The impact of vessel traffic on Mexico DPS humpback whales and WDPS Steller sea lions is not anticipated to reach the level of harassment under the ESA.

6.3.6 Steller sea lion critical habitat effects

Potential impacts to the PBFs of designated Steller sea lion critical habitat on Benjamin Island have been largely addressed above. The terrestrial component of the critical habitat will not be impacted via increased in-air sound, vessel approach (no project vessels within half a mile), or human disturbance (no land-based activity on Benjamin Island for the proposed action). The aquatic component will be exposed to measureable noise, but not at levels that will impact the PBFs of the habitat. Exposure of Steller sea lions to the in-water noise is addressed above. Fish that are Steller sea lion prey within 3,000 feet of the haulout (the extent of critical habitat) will not be exposed to in-water sound at a harmful level. Any exposure will not result in more than short-term effects. Therefore, NMFS does not anticipate measureable affects from the proposed action on Steller sea lion critical habitat.

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.

Climate change, as well as some continuing and future non-Federal activities expected to contribute to climate change, are reasonably certain to occur 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 5.0).

Commercial boat-based whale watching is typically a private activity that occurs in the action area during the construction window for the proposed action, but due to significant cancellations in cruise ships sailings in 2020, whale watching tours will likely be reduced significantly from previous years. In future years, we anticipate that commercial boat-based whale watching activity will occur in the action area near Sentinel Island. However, it will likely take a number of years for commercial whale watching in Juneau to return to pre-2020 numbers, and peak numbers of whale watching boats from recent years did not appear to limit humpback whale recovery, as indicated by continued increases in whale abundance.

There are currently no other known or anticipated state or private activities reasonably certain to occur in the action area that may affect listed species and are not subject to section 7 consultation. 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) and we expect those activities discussed to be on-going with similar intensity. For example, we expect fisheries, harvest, noise, pollutants and discharges, scientific research, and ship strike will continue into the future. While the proposed project is designed to enable more visitors to access Sentinel Island, it is not anticipated to result in a major increase in marine traffic in the action area. We expect moratoria on commercial whaling and bans on commercial sealing will remain in place, aiding in the recovery of ESA-listed whales and pinnipeds.

8. INTEGRATION AND SYNTHESIS

The Integration and Synthesis section is the final step of NMFS's assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 6) to the environmental baseline (Section 5) and the cumulative effects (Section 7) to formulate the agency's biological Opinion as to whether the proposed action is likely to: (1) result in appreciable reductions in the likelihood of 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 potential reductions in the value of designated critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species (Section 4).

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

8.1 WDPS Steller Sea Lion Risk Analysis

The Steller Sea Lion Recovery Plan (NMFS 2008) lists recovery criteria that should be accomplished in order to downlist the WDPS from endangered to threatened and to delist the WDPS. More details and exact specifications can be found in the plan, but these criteria generally include an increased population size, requirements that any two adjacent sub-regions cannot be declining significantly, reducing the threats to sea lion foraging habitat, reducing intentional killing and overutilization, and others. WDPS Steller sea lion response from the proposed activities will not impede progress towards these recovery criteria due to the low anticipated level of harassment, no anticipated injury or mortality, and no significant effects to habitat.

Effects to sea lions and critical habitat from exposure to in-air noise, vessel noise from transit, disturbance to the seafloor, potential for vessel strike, and potential for entanglement are likely to be negligible due to the small marginal increase in such stressors relative to the environmental baseline, mitigation measures in place to reduce approach distances, and the transitory nature of vessels and construction activities. Adverse effects from vessel strike are very unlikely because of the few additional vessels introduced by the action (including construction and future tourism) and the unlikelihood of these type of interactions.

Steller sea lion probable responses to this project (pile driving and DTH drilling activities) after implementation of the mitigations measures in Section 2.1.2 include brief startle reactions or short-term behavioral modifications, such as those listed in Section 6.3.1.1. These reactions and behavioral changes are expected to subside quickly when the exposures cease. The primary mechanism by which these behavioral changes could affect the fitness of individual animals is through the animals' energy budget, time budget, or both (see Section 6.3.1.1). The individual and cumulative energy costs of the behavioral responses are not likely to appreciably reduce the energy budgets of affected Steller sea lions. Their probable exposure to noise sources is not likely to reduce their fitness because project-related noise is relatively short-term, in a limited affected area, and pauses between operations.

Most adult Steller sea lions occupy rookeries during the pupping and breeding season, which extends from late May to early July. The endangered WDPS Steller sea lion population is increasing, particularly in the eastern portion of their range, closest to the action area. NMFS does not anticipate any effects from this action on the reproductive success of Steller sea lions. As a result, the probable responses to this project are not likely to reduce the current or expected future reproductive success of WDPS Steller sea lions or reduce the rates at which they grow, mature, or become reproductively active.

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 potentially high level threat to this DPS, and may remain so. Subsistence hunting occurs at fairly low levels for this DPS. Illegal shooting is also a continuing threat, but it probably does not occur at levels that are preventing recovery. Ship strikes do not seem to be a significant concern for this species due to its maneuverability and agility in water. Climate change will likely continue to indirectly affect Steller sea lions through changes in prey availability. Despite exposure to construction activities and ferry and vessel operations for decades in Southeast Alaska, and continued climate change impacts, the increase in the number of WDPS Steller sea lions suggests that the stress regime these sea lions are exposed to has not prevented them from increasing their numbers and expanding their use of the action area.

Therefore, exposures associated with the proposed action are not likely to reduce the abundance, reproduction rates, or growth rates (or significantly increase variance in one or more of these rates) of the populations those individuals represent. While a single individual may be exposed multiple times during the project, 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. Cumulative effects of future state or private activities in the action area are likely to affect Steller sea lions at a level comparable to present. The current and recent population trends for WDPS Steller sea lions indicate that these levels of activity are not hindering population growth.

The terrestrial component of the critical habitat will not be impacted via increased in-air sound, vessel approach (no project vessels within half a mile), or human disturbance (no land-based activity on Benjamin Island for the proposed action). The aquatic component will be exposed to measureable noise, but not at levels that will impact the PBFs of the habitat. Exposure of Steller sea lions to the in-water noise is addressed above. Fish that are Steller sea lion prey within 3,000 feet of the haulout (the extent of critical habitat) will not be exposed to in-water sound at a harmful level.

As a result of all of the above factors, this project is not likely to appreciably reduce WDPS Steller sea lions' likelihood of surviving or recovering in the wild. Additionally, the project is not likely to measurably impact Steller sea lion critical habitat.

8.2 Mexico DPS Humpback Whale Risk Analysis

Our consideration of probable exposures and responses of ESA-listed whales to construction activities associated with the proposed action is designed to help us assess whether those activities are likely to increase the extinction risks or jeopardize the continued existence of Mexico DPS humpback whales.

Effects from exposure to in-air noise, vessel noise from transit, disturbance to the seafloor, potential for vessel strike, and potential for entanglement are likely to be negligible due to the small marginal increase in such stressors relative to the environmental baseline, mitigation measures in place to reduce approach distances, and the transitory nature of vessels and construction activities. Adverse effects from vessel strike are very unlikely because of the few additional vessels introduced by the action (including construction and future visitors) and the unlikelihood of these type of interactions.

Humpback whales' probable response to the proposed action includes brief startle reactions or short-term behavioral modification such as those listed in Section 6.3.1.1. These reactions and behavioral changes are expected to subside quickly when the exposures cease. The primary mechanism by which the behavioral changes we have discussed 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 an ability to store substantial amounts of energy, which enables them to survive for months on stored energy during migration and while in their wintering areas, and their feeding strategy allows them to acquire energy at high rates. The individual and cumulative energy costs of the behavioral responses discussed are not likely to reduce the energy budgets of humpback whales, and their probable exposure to noise sources is not likely to reduce their fitness due to the short duration of the project and implementation of the proposed mitigation measures.

As discussed in the *Description of the 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 months, but migrate to Mexican waters for breeding and calving in winter months. As a result, the probable responses to the proposed action 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. Noise from the proposed action could discourage Mexico DPS whales from feeding in the action area during some construction activities, but any such effects would be brief and the affected whales would likely find other comparable foraging opportunities in the vicinity. Although climate change has the potential to impact humpback whales through reduced prey abundance or availability, the rapidly increasing numbers of humpback whales in Southeast Alaska suggest that climate change is not negating population growth.

Therefore, these exposures are not likely to reduce the abundance, reproduction rates, or growth rates (or significantly increase variance in one or more of these rates) of the populations those individuals represent. The short duration of sound generation and 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. 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 strongest evidence supporting the conclusion that the proposed action will likely have minimal impact on Mexico DPS humpback whales is the estimated annual growth rate of the humpback whale populations in the North Pacific (5-7%). While there is no accurate estimate of the maximum productivity rate for humpback whales, it is assumed to be 7% (Muto et al. 2019). Despite exposure to pile driving operations for decades, humpback whale entanglements in fishing gear and other marine debris, a small number of serious injuries and mortalities caused by vessel strike, this increase in the number of listed whales suggests that the stress regime these whales are exposed to has not prevented them from increasing their numbers.

As a result of all the above factors, this project is not likely to appreciably reduce Mexico DPS humpback whales' likelihood of surviving or recovering in the wild.

9. CONCLUSION

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS's biological Opinion that the proposed action is not likely to jeopardize the continued existence of WDPS Steller sea lions (*Eumetopias jubatus*) or Mexico DPS humpback whales (*Megaptera novaeangliae*).

With respect to Steller sea lion critical habitat, all potential effects from the action are either highly improbable or immeasurably small, and therefore the proposed action is not likely to adversely affect Steller sea lion critical habitat.

10. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA prohibits the take of endangered species unless there is a special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct (16 USC § 1532(19)). “Incidental take” is defined as take that results from, but is not the purpose of, carrying out an otherwise lawful activity (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)). For this consultation, USACE and PR1 anticipate that any take will be by harassment only.

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 ITS 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. This ITS is valid only for the activities described in this Opinion, and which have been authorized under section 101(a)(5) of the MMPA. Absent such authorization, this ITS is inoperative.

The terms and conditions described below are nondiscretionary. USACE and PR1 have a continuing duty to regulate the activities covered by this ITS. In order to monitor the impact of incidental take, USACE and PR1 must monitor and report the progress of the action and its impact on the species as specified in the ITS (50 CFR 402.14(i)(3)). If USACE or PR1 (1) fail to require the authorization holder to adhere to the terms and conditions of the ITS through enforceable terms that are added to the authorization, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

10.1 Amount or Extent of Take

Section 7 regulations require NMFS to estimate the number of individuals that may be taken by proposed actions or use 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)).

10.1.1 WDPS Steller Sea Lions

Based on the distances to Level A and Level B sound thresholds calculated in Section 6.2.1.1, and the estimate of marine mammal occurrence calculated in Section 6.2.2 of the *Exposure Analysis* for the proposed activities, we expect a maximum of 21 WDPS Steller sea lions may be behaviorally harassed by noise from pile driving and DTH drilling activities.

Assuming 248 Steller sea lion incidental takes per day, this daily estimate is multiplied by six to calculate the estimated take for the entire six days of in-water activities for the proposed action: 6 x 248 = 1,488. We use the estimated proportion of WDPS Steller sea lions for Lynn Canal (1.4%) (Hastings et al. 2020) to calculate the anticipated take of the endangered WDPS: 1.4% x 1,488 = 20.83. We round this up to 21 Level B harassment takes of WDPS Steller sea lion during the course of the proposed action. We are reasonably certain these takes will occur.

10.1.2 Mexico DPS Humpback Whales

Based on the distances to Level A and Level B sound thresholds calculated in Section 6.2.1.1, and the estimate of marine mammal occurrence calculated in Section 6.2.2 of the *Exposure Analysis* for the proposed activities, we expect a maximum of three Mexico DPS humpback whales may be behaviorally harassed by noise from pile driving and DTH drilling activities.

Based on humpback whale fluke identification and population estimates near Juneau (Krieger and Wing 1986, Teerlink 2017, Straley et al. 2018) and Dahlheim et al. (2009), we estimate that up to eight humpback whales will be exposed to underwater noise each day. Up to six days of in-water activity will occur, so the total number of humpback whales expected to be exposed to Level B harassment noise is 48. The proportion of these whales that are anticipated to be from the threatened Mexico DPS is 6.1% (Table 5) (Wade et al. 2016). This proportion results in 2.928 ESA-listed whales (6.1% of 48), which we will round up to three for our exposure estimate. We are reasonably certain these takes will occur.

10.2 Effect of the Take

The only takes authorized during the proposed action are takes by acoustic harassment. No serious injuries or mortalities are anticipated or authorized as part of this proposed action. This consultation has assumed that exposure to major noise sources might disrupt one or more behavioral patterns that are essential to an individual animal's life history. However, any behavioral responses of these whales and pinnipeds to major noise sources and any associated disruptions are not expected to affect the reproduction, survival, or recovery of these species.

In Section 9 of this Opinion, NMFS determined that the level of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to Mexico DPS humpback whales or Western DPS Steller sea lions.

10.3 Reasonable and Prudent Measures (RPMs)

"Reasonable and prudent measures" are those actions necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take. (50 CFR 402.02). These are nondiscretionary measures.

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

1. USACE and PR1 must implement a monitoring program that includes all items described in the mitigation measures section of this Opinion (Section 2.1.2) and allows NMFS AKR to evaluate the exposure estimates contained in this Opinion and that underlie this ITS.
2. USACE and PR1 must submit a final report to NMFS AKR that evaluates the mitigation measures and the results of the monitoring program.
3. Vessels and personnel associated with the proposed action construction activity must remain at least 2,500 feet away from the Steller sea lion haulout on Benjamin Island.

10.4 Terms and Conditions

"Terms and conditions" implement the reasonable and prudent measures (50 CFR 402.14(i)(2)). These must be carried out for the exemption in section 7(o)(2) to apply.

In order to be exempt from the prohibitions of section 9 of the ESA, USACE and PR1 must comply with the following terms and conditions, which implement the RPMs described above and the mitigation measures set forth in Section 2.1.2 of this Opinion. USACE and PR1 have 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).

Partial compliance with these terms and conditions may result in more take than anticipated, and may invalidate this take exemption. 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, USACE, NMFS PR1, or their authorization holder must undertake the following:

A. The monitoring zones must be fully observed by qualified PSOs during all in-water work in order to document observed incidents of harassment as described in the mitigation measures associated with this action.
B. If take of Steller sea lions or humpback whales approaches the number of takes authorized in the ITS, USACE will notify NMFS by email, attn: Sadie.Wright@noaa.gov and discuss the need for reinitiation of consultation.

To carry out RPM #2, USACE, NMFS PR1, or their authorization holder must undertake the following:

A. Adhere to all monitoring and reporting requirements as detailed in the IHA issued by NMFS under section 101(a)(5) of the MMPA.

B. Submit a project specific report within 90 days of the conclusion of the project that analyzes and summarizes interactions with humpback whales and Steller sea lions during this project to the Protected Resources Division, NMFS by email to Sadie.Wright@noaa.gov. This report must contain the following information:

- Date and time that monitored activity begins or ends;
- Construction activities occurring during each observation period;
- Weather parameters (e.g., percent cover, visibility);
- Water conditions (e.g., sea state, tide state);
- Species, numbers, and, if possible, sex and age class of marine mammals;
- Description of any observable marine mammal behavior patterns, including bearing and direction of travel and distance from construction activity;
- Distance from construction activities to marine mammals and distance from the marine mammals to the observation point;
- Locations of all marine mammal observations; and
- Other human activity in the area.

To carry out RPM #3, USACE, NMFS PR1, or their authorization holder must undertake the following:

A. Ensure that all vessel operators and construction personnel are informed of and understand the project-related 2,500 foot no-entry zone for the Benjamin Island Steller sea lion haulout.

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 the 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 project, NMFS AKR recommends:

1. GCHS should install signs at the Sentinel Island Lighthouse providing education and outreach to visitors regarding the Benjamin Island Steller sea lion haulout. GCHS should collaborate with NMFS AKR Protected Resources Division to develop language that describes the status of Steller sea lions, designated critical habitat, and the importance of providing this species with an undisturbed haulout where they can rest, forage, and transit between other haulouts.
2. GCHS should provide visitors to the Sentinel Island Lighthouse with outreach materials regarding potential marine mammal stressors and existing NMFS Alaska Region conservation programs (e.g., Lose the Loop, Do Not Feed, Whale Strike Avoidance, Alaska Marine Mammal Stranding Network, Recreational Boater Campaign). NMFS can provide brochures to GCHS to distribute to visitors to the lighthouse.
3. 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

In order to keep NMFS's Protected Resources Division informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, USACE and NMFS PR1 should notify NMFS of any conservation recommendations they implement in their final action.

12. REINITIATION OF CONSULTATION

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

The taking of Mexico DPS humpback whales and WDPS Steller sea lions will be by incidental harassment only. The taking by serious injury or death is prohibited and will result in the modification, suspension, or revocation of the ITS.

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.

Utility

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

This consultation will be posted on the NMFS Alaska Region website: https://www.fisheries.noaa.gov/alaska/consultations/section-7-biological-opinions-issued-alaska-region

The format and name adhere to conventional standards for style.

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.

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 *References* 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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