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

Sun'aq Tribe Dock Project in Kodiak Inner Harbor, POA-1977-242

NMFS Consultation Number: AKRO-2018-00052

Action Agency: U.S. Army Corps of Engineers

Affected Species and Determinations:

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

Consultation Conducted By: National Marine Fisheries Service, Alaska Region

Issued By:

for James W. Balsiger, Ph.D.
Regional Administrator

Date: ___October 8, 2018____

https://doi.org/10.25923/dmse-2d25

Accessibility of this Document

Every effort has been made to make this document accessible to individuals of all abilities and compliant with Section 508 of the Rehabilitation Act. The complexity of this document may make access difficult for some. If you encounter information that you cannot access or use, please email us at Alaska.webmaster@noaa.gov or call us at 907-586-7228 so that we may assist you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

TERMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
AKR	Alaska Region (of NMFS)
CO_2	Carbon dioxide
dB	Decibel
DPS	Distinct population segment
eDPS	Eastern distinct population segment
ESA	Endangered Species Act
ft	Feet
HF	High frequency
hr	Hour
Hz	Hertz
ITS	Incidental take statement
kg	Kilogram
kHz	Kilohertz
km	Kilometer
kts	Knots
lbs	Pounds
L_E	Cumulative sound exposure level
LF	Low frequency
m	Meter
MF	Mid frequency
MMPA	Marine Mammal Protection Act
mph	Miles per hour
M/V	Motor vessel
NMFS	National Marine Fisheries Service
OW	Otariid pinnipeds
PBF	Physical or biological features
PCE	Primary constituent element
PK	Peak sound level
ppm	Parts per million
PR1	NMFS Office of Protected Resources – Permits and Conservation Division
PRD	Protected Resources Division
PSO	Protected species observer
PTS	Permanent threshold shift
PW	Phocid pinnipeds
RL	Received level
rms	Root mean square
RPA	Reasonable and prudent alternatives
SEL	Sound exposure level
SEL_{CUM}	Cumulative sound exposure level
SL	Source level
SPL_{RMS}	Sound pressure level at root mean square
SSV	Sound source verification
TL	Transmission loss
TTS	Temporary threshold shift
USACE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
wDPS	Western distinct population segment
WNP	Western North Pacific
ZOI	Zone of influence

1. INTRODUCTION

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

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

In this document, the action agency is the US Army Corps of Engineers (USACE), which proposes to authorize rebuilding the Sun'aq Tribe's dock in Kodiak's Inner Harbor, replacing the dilapidated current dock. We anticipate a second federal action agency for this project when the Sun'aq Tribe applies to the NMFS Office of Protected Resources, Permits and Conservation Division (PR1), for authorization of incidental take of marine mammals under the Marine Mammal Protection Act (MMPA) once the project receives an expected grant. The consulting agency for this proposal is NMFS's Alaska Region. This document represents NMFS's biological opinion (opinion) on the effects of this proposal on endangered and threatened species and designated critical habitat.

The opinion and incidental take statement were prepared by NMFS in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, et seq.), and implementing regulations at 50 CFR 402.

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

Updates to the regulations governing interagency consultation (50 CFR part 402) will become effective on October 28, 2019 [84 FR 44976; 84 FR 50333]. Because this consultation was pending and will be completed prior to that time, we are applying the previous regulations to the consultation. However, as the preamble to the final rule adopting the new regulations noted, "[t]his final rule does not lower or raise the bar on section 7 consultations, and it does not alter what is required or analyzed during a consultation. Instead, it improves clarity and consistency, streamlines consultations, and codifies existing practice." Thus, the updated regulations would not be expected to alter our analysis.

1.1 Background

This opinion considers the effects of removing the existing dilapidated dock and building a new dock in Kodiak's Inner Harbor for the Sun'aq Tribe. These actions have the potential to affect western DPS (wDPS) Steller sea lions (*Eumatopias jubatus*), endangered western North Pacific DPS humpback whales (*Megaptera novaeangliae*), and threatened Mexico DPS humpback whales. Additionally, these actions have the potential to affect critical habitat for Steller sea lions.

This opinion is based on information provided in: (a) the ESA Section 7 Biological Evaluation for the Sun'aq Tribe Dock (R&M Engineering-Ketchikan, Inc. 2018), (b) relevant literature, and (c) correspondence between NMFS Alaska Region, NMFS PR1 staff, project applicants, and the action agency. A complete record of this consultation is on file at NMFS's Anchorage, Alaska office.

1.2 Consultation History

On October 23, 2018, NMFS Alaska Region received a request for formal consultation and an accompanying Biological Evaluation from USACE regarding a dock to be rebuilt by the Sun'aq Tribe in the Kodiak Inner Harbor. The USACE determined the action is likely to adversely affect endangered wDPS Steller sea lions and endangered western North Pacific DPS and threatened Mexico DPS humpback whales. The USACE made a no-effect determination for fin whales, North Pacific right whales, and sperm whales.

Following discussion with USACE, NMFS received several answers to questions regarding the proposed activities and then initiated consultation on February 24, 2019. The due date for the consultation was extended to September 30, 2019, upon agreement with the applicant and action agency.

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).

Sun'aq Tribe's current dock is in need of replacement due to age, condition, and functionality. The facilities are not constructed to modern design standards. The overall project also includes building a new sea wall, which was erected through an emergency action because the abutting road was being undercut. Thus this opinion is for removal of the old dock and its subsequent replacement.

The Sun'aq Tribe proposes demolishing their dilapidated dock and constructing a new dock in its place in the Kodiak Inner Harbor (Figure 1). The old dock consists of a former barge, wood dock, and a concrete dock with 108 creosote wood pilings and 41 steel pilings. The dock was deemed not safe for occupancy without repair or replacement in 2016.

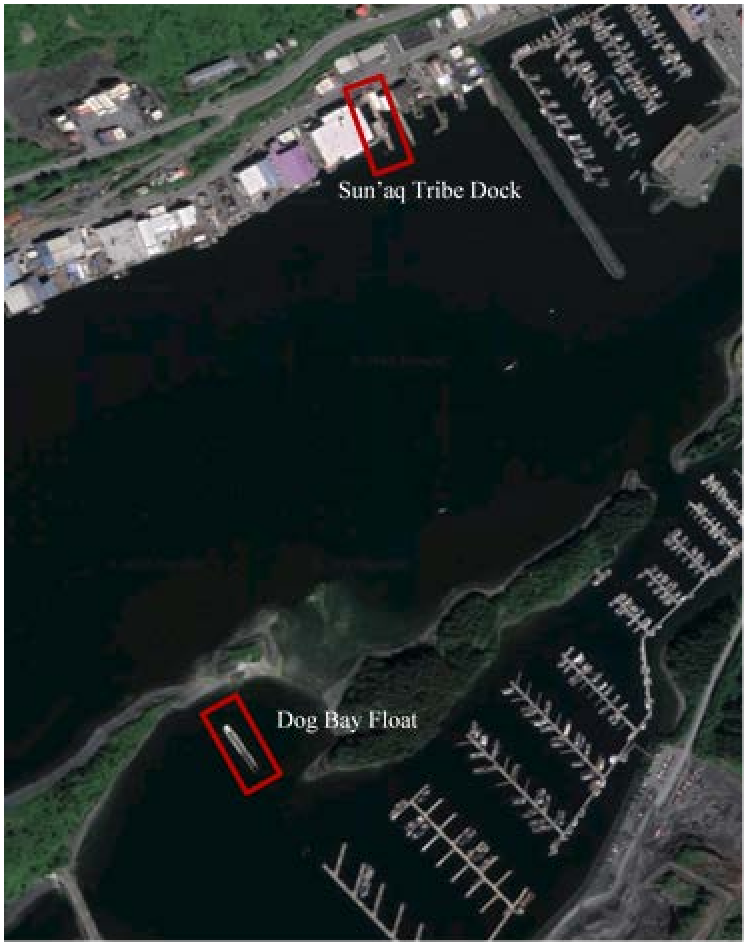

Figure 1. Kodiak Inner Harbor showing the Sun'aq Tribe's dock and the Dog Bay Float, a nearby manmade Steller sea lion haulout.

The new dock will include installation of 46 12-inch diameter steel piles, 17 pressure treated fender piles, and a wood float with concrete deck. Crane barges will be used to remove the old dock and pilings, then place the new pilings and cap beams. The concrete deck will be built using pre-cast panels set on steel beams starting from the closest to the farthest from land, after which they will be grouted in place and a topping slab will be poured. The wood float will be installed using pre-built floats constructed off-site, shipped fully assembled, and placed ready to splash and anchor.

The project is expected to occur from July 2021 through September 2021.

2.1.1 Proposed Activities

There are two main parts to this project: demolition of the current dock and construction of the new dock.

Demolition

Demolition will begin on the current dilapidated dock (Figure 2) on the seaward side of the project using a barge-mounted track excavator with buckets that pinch together to grab objects. The excavator will remove the concrete panels and steel and place them on an adjacent materials barge. The 149 pilings will be removed using a vibratory hammer to loosen then direct pull. A steel choker cable will be used to pull out piles that resist removal. However, there is little concern that the pilings will be difficult to remove due to their age and condition. Removed pilings will also be put onto the adjacent materials barge. All waste will be disposed of at the Borough landfill per Alaska Department of Environmental Conservation (ADEC) best management practices. The vibratory hammer is expected to be needed for 4-5 minutes per piling for a total of 12 operational hours occurring over a 4 day period.

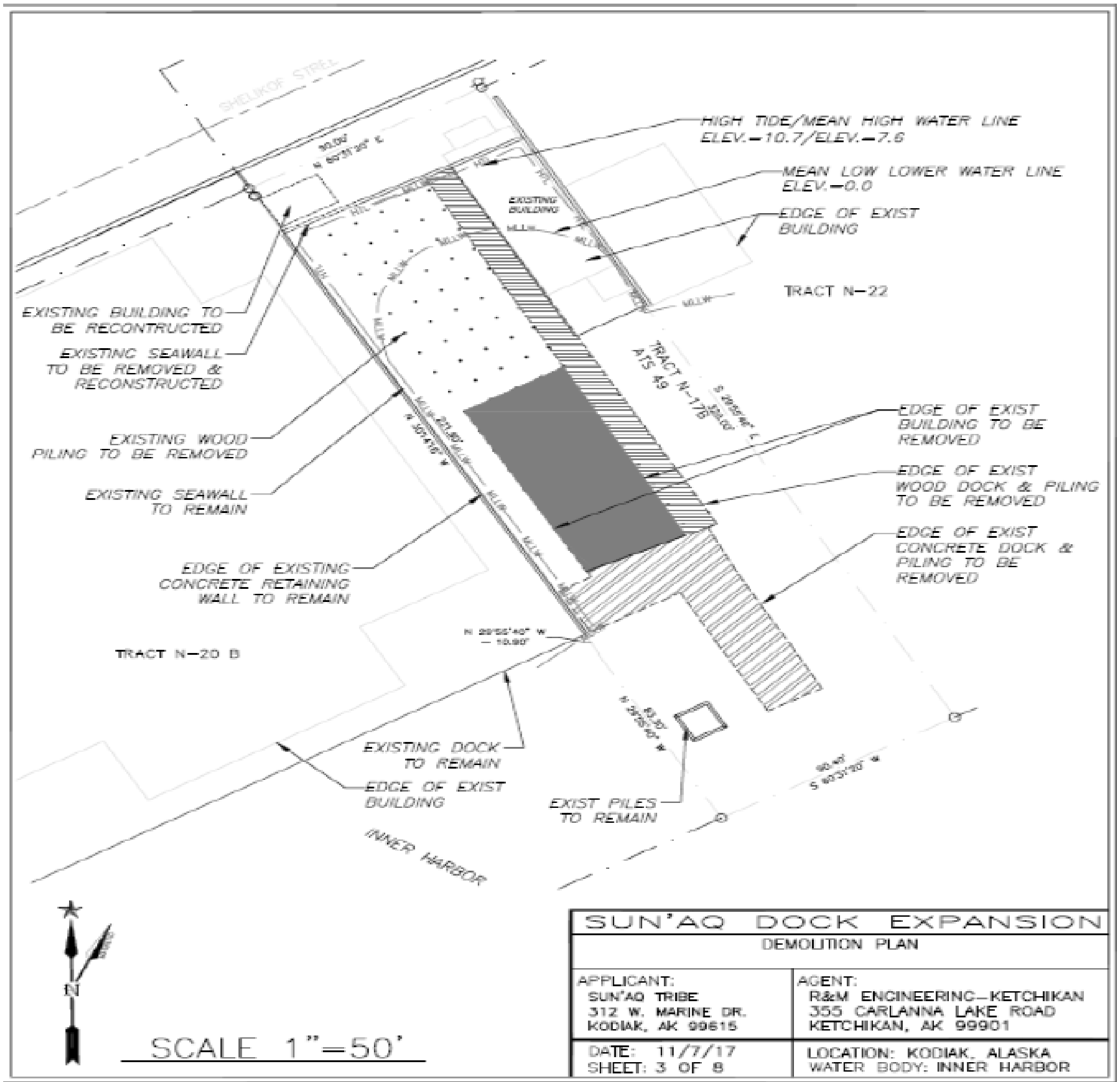

Figure 2. Demolition plan for the existing dock.

<u>Construction</u>

The new dock project (Figure 3) consists of building a concrete dock supported by 46 12-inch diameter steel piles driven through shallow overburden and socketed into bedrock. Seventeen pressure-treated wood fender piles will then be installed near the edge of the dock to support and protect boats tied to the dock. The wood fender piles will be driven into overburden and secured using a vibratory hammer. The Biological Evaluation estimates five hours total to fully install each wood pile during low portions of the tide cycle. The vibratory hammer will be used for five minutes per pile for a total of 1.4 hours over a period of 17 days, with the remaining of the five hours utilized to stand a pile in place and cut the set pile off at the correct dock elevation, as well as barge maneuvering.

The 12-inch diameter steel piles will be installed first by drilling a hole in the underlying bedrock using a down-hole drill and hammer. The down-hole drill and hammer first drills through the sediment, then uses a pulsing bit to break up bedrock to allow removal of fragments and insertion of the pile. Drill cuttings are expelled from the top of the pile as dust or mud. If overburden depths greater than 10 feet are encountered, the piles will be installed using a vibratory hammer to refusal and proofed with a double-acting impact hammer. Drilling through bedrock is anticipated to take 30 minutes per pile for a total of 23 hours over the course of 23 days. If the vibratory hammer and impact hammer method are used due to deeper overburden, the total hammer work for the 46 piles would be 20 minutes per pile for a total of 15 hours (16 minutes of vibratory pile driving per piling and 4 minutes impact hammer driving per piling). Assuming that each pile needs down-hole drilling, the impact and vibratory hammering will occur over the same 23 days. However, there is a potential for a shorter installation time and less use of down-hole drilling and the impact hammer.

After the pilings are installed, cap beams will be installed from the barge. The crane barge will then leave, and the pre-cast concrete panels will be installed starting from land. Panels will be set out as far as a crane can reach, then grouted in place and a topping slab will be poured to allow for higher loads. Work will move seaward as concrete cures and can support the construction equipment.

The wood floats will be constructed off-site. They will arrive fully assembled and ready to splash and anchor.

Of particular importance to ESA-listed species are the sound levels associated with the vibratory hammer, down-hole drilling, and impact hammer. The amount of time each activity is expected to occur can be found in Table 1, assuming that every pile requires down the hole drilling to overburden deeper than 10 feet. Additionally, a sound source verification study will be conducted during this project to assess the source levels using 12-inch pilings with a vibratory hammer, down the hole drilling, and impact hammer.

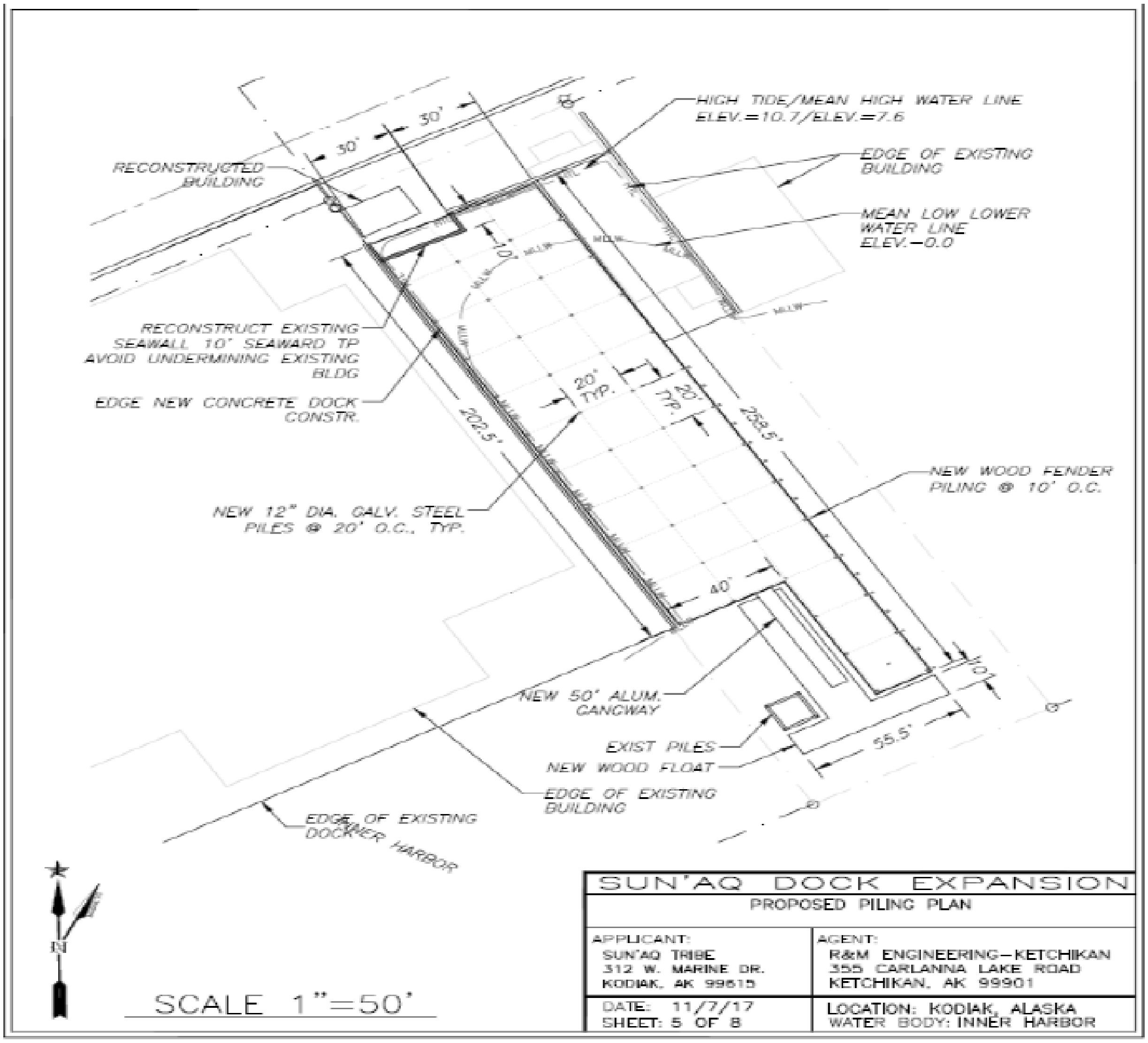

Figure 3. Proposed piling plan for the Sun'aq Tribe's dock expansion.

Table 1. Estimated number of hours and days required for pile extraction and installation, rounded to the nearest hour.

Pile Type	# Piles	Vibratory Hammer			Down-hole Drill			Impact Hammer		
		# Piles	Hours Required	# Days[1]	# Piles	Hours Required	# Days	# Piles	Hours Required	# Days
Pile Extraction	149	149	12	4	--	--		--	--	
12-inch Steel Installation	46	46	12	23	46	23	23	46	3	23
Wood Fender Installation	17	17	1.4	17	--	--		--	--	
Total Hours		--	29		--	23		--	3	
Total Hours with 25% Contingency		--	36		--	29		--	4	
Total Days[2]				44			23			23

[1] Number of days during which at least some of this activity will occur. Duration of activity per day ranges from 0.67 hours of vibratory hammering for pile installation to 3 hours for vibratory pile extraction.
[2] Down the hole drilling and impact hammering as well as the vibratory hammer for steel pile installation will occur on the same 23 days. Thus, it's 44 days of total activity.

2.1.2 Mitigation Measures

The proposed action includes the following mitigation measures.

General Construction Mitigation Measures

1. When possible, construction will be sequenced so that work on the portion of the Sun'aq dock closest to the seafood plant's processing dock will be carried out primarily when the plant is not in operation to minimize the number of Steller sea lions approaching the Level A harassment zone (sea lions often gather around the processing dock when discarded fish may be available to them).
2. Toxic or hazardous material specifications, inventories, separation, confinement, and handling will be determined, documented, and communicated to appropriate personnel.
3. If contaminated or hazardous materials are encountered during construction, all work in the vicinity of the contaminated site would be stopped until ADEC is contacted and a corrective action plan is approved by ADEC and implemented. Further, ADEC's Best Management Practices will be followed during creosote pile removal.
4. As recommended by the Alaska Department of Fish and Game, to minimize impacts to pink salmon fry and coho salmon smolts, the contractor will refrain from impact pile driving from May 1 through June 30 within the 12-hour period beginning daily at the start of civil dawn. If impact pile driving occurs from May 1 through June 30, it will occur in the evenings during daylight hours after the 12-hour period that begins at civil dawn.

Marine Mammal Monitoring

1. To minimize impacts of project activities on marine mammals, one or more protected species observers (PSOs), able to accurately identify and distinguish species of Alaska marine mammals, will be present before and during all in-water construction and demolition activities.

2. PSOs will work in shifts lasting no longer than 4 hours with at least a 1-hour break from marine mammal monitoring duties between shifts. PSOs will not perform PSO duties for more than 12 hours in a 24-hour period (to reduce fatigue). Note that during the 1-hour break for a PSO, a crew member can be assigned to be the observer as long as they do not have other duties at that time and they have received instructions and tools to allow them to make and record marine mammal observations.
3. PSOs must maintain verbal contact by radio or in person with construction personnel to immediately call for a halt to all in-water pile removal and installation operations to avoid marine mammal takes.
4. The PSO(s) will have the following to aid in determining the location of observed listed species, to take action if listed species enter the exclusion zone, and to record these events:
    a. Binoculars
    b. Range finder
    c. GPS
    d. Compass
    e. Two-way radio communication with construction foreman/superintendent
    f. A log book of all activities which will be made available to USACE and NMFS upon request
5. PSOs will have no other primary duties beyond watching for, acting on, and reporting events related to marine mammals.

Monitoring and Shutdown Zones

1. PSOs will monitor the relevant zones indicated for each activity listed in Table 2**.** For all activities other than down the hole drilling, these monitoring zones include the entire Level B take zone. Where requirements for immediate actions/responses are noted, the requirements do not apply if they would create an imminent and serious threat to a person. In that event, actions/responses will be taken as soon as possible. Additional mitigation measures for each activity are listed in subsections below.

Table 2. Monitoring and Shutdown Zones for Each Activity*

Activity	Monitoring Zone Radius (m)[1]	Shutdown Zone Radius (m)	
		Steller Sea Lion	Humpback Whale
Pile removal using vibratory hammer**	1000	15	15
Vibratory pile driving	1000	10	10
Impact pile driving	200	10	60
Down the hole drilling	2000***	10	60

[1]Animals that occur in this zone during the indicated activity are considered as having been "taken".
*All zones have been rounded up from the extent of the ensonified area with the potential to cause take, except for down the hole drilling. For specific Level A and Level B distances, please look at Table 8 and Table 9.
**Pile removal using choke and pull has no Level B harassment or monitoring zone associated with it. Sound associated with choke and pull does not rise to the level of harassment thus has no monitoring zone associated with it.
***2000 m is the monitoring zone radius for down the hole drilling, and the only monitoring zone that won't include the entire Level B take zone. However, if a marine mammal is seen outside the down the hole drilling monitoring zone, but within the Level B zone of 5054.8 m (i.e.. between 2000 m and 5054.8 m), it is still recorded as take. Enumeration of animals taken by this activity is based upon extrapolation of animals observed taken within 2000m radius of the activity as a ratio of the area of the monitoring versus Level B zone. Thus, for every animal in the 2000 m monitoring zone, the PSO must multiply by 6.4 ((Level B zone area / monitoring zone area) = 80.12 km^2 / 12.57 km^2).

2. PSOs will be positioned such that the entire monitoring zone as shown in Figure 9 and adjacent waters for each activity is visible (e.g., situated on a platform, elevated promontory, boat or aircraft). This location, with optimal viewing of the monitoring zones, will be verified prior to pile removal or driving start up procedures or initiation of other activities. Depending on the size of the monitoring zone, multiple PSOs and locations may be needed to adequately cover the monitoring zone.

3. Prior to commencing pile removal or driving, PSOs will scan waters within the pile installation or removal shutdown zones and confirm no listed marine mammals are observed to be present within the shutdown zones for 30 minutes prior to initiation of the in-water activity.
    a. If one or more listed marine mammals are observed within the shutdown zone, pile removal or driving will not begin until the marine mammals exit the shutdown zones of their own accord, and the zones have remained clear of marine mammals for 30 minutes immediately prior to activity.
    b. If no listed marine mammals are observed in the shutdown zones, soft-start procedures will be implemented immediately prior to impact pile driving activities.

1) For impact pile driving, a soft-start is comprised of an initial set of three strikes from the hammer at about 40 percent energy, followed by a 30-second waiting period, then two subsequent three-strike sets with associated 30-second waiting periods at the reduced energy.

Following this soft-start procedure, impact driving at operational power may commence provided marine mammals remain absent from the pile driving monitoring zone.

4. The PSOs will continuously monitor the shutdown and monitoring zones during pile extraction and driving, including down-the-hole drilling, and vibratory and impact pile driving/removal for the presence of marine mammals.

5. The PSO will continue to observe for 20 minutes after completion of pile installation or extraction.

6. In-water activities will take place between nautical dawn and twilight, and with a Beaufort Sea State of 4 or less, with adequate visibility to see the entire monitoring and shutdown zones and adjacent waters to effectively shut down activities prior to a marine mammal entering a shutdown zone.

7. If visibility degrades to where the PSO is unable to effectively monitor for the presence of marine mammals throughout the monitoring zone, the crew may continue to drive the section of pipe that was being driven to its target depth, but will not drive additional sections of piling. If pile driving is suspended (to weld on a new section, for example) when the entire monitoring zone is not in a condition conducive to monitoring by a PSO, the crew will not resume pile driving until the entire monitoring zone is visible

8. The PSO will order the pile removal or pile driving activities to immediately cease if one or more marine mammals appears likely to enter, or is observed within, the shutdown zone. The PSO on duty will immediately call or radio the operators and initiate a shutdown of pile removal or pile driving activities. If direct communication with the operators is not practical, the construction crew point of contact will relay the shutdown order to the equipment operators.

9. Following shutdowns of fewer than 30 minutes, pile driving, removal, or drilling may commence when the PSO provides assurance that listed marine mammals have not been seen in the shutdown zone throughout the period of shutdown. If the PSO was not monitoring the shutdown zone during that time, then the PSO must provide assurance that listed marine mammals have not been present in the shutdown zone for the 30 minutes (for cetaceans) or 15 minutes (for pinnipeds) immediately prior to the resumption of in-water operations.

10. Following a lapse of vibratory or impact hammering or drilling activities of more than 30 minutes (e.g. due to time spent positioning a new piling, low visibility conditions, shutdown due to presence of marine mammals, mechanical delays or other causes), the PSO will authorize resumption of activities (using soft-start procedures if applicable) only after the PSO provides assurance that listed marine mammals have not been present in the shutdown zone for at least 30 minutes (for cetaceans) or 15 minutes (for pinnipeds)

immediately prior to resumption of in-water operations.

11. If a marine mammal is observed within a shutdown zone (see Table 2) or may have been harassed, harmed, injured, or disturbed by project activities, PSOs will report that occurrence to NMFS using the contact specified in Summary of Agency Contact Information below (Table 3). Alternately, crew members may report incidences of harassment, harm, injury, or disturbance of marine mammals to a PSO who has been designated as the point of contact between crew members and NMFS.

Vessel Transit

1. Vessel operators will maintain a vigilant watch for marine mammals to avoid vessel strikes.
2. Vessels will not allow tow lines to remain in the water when not underway, and no trash or other debris will be thrown overboard, thereby reducing the potential for marine mammal entanglement.

Data Collection

1. PSOs will record observations on data forms or into electronic data sheets, electronic copies of which will be submitted to NMFS in a queryable digital spreadsheet format within 90 days of conclusion of project.

2. PSOs will use NMFS-approved Observation Records. Observation Records will be used to record the following:
    a. The date and start and stop time for each PSO shift;
    b. Date and time of each significant event (e.g., a marine mammal sighting, operation shutdown, reason for operation shutdown, change in weather)
    c. Weather parameters (e.g., percent cloud cover, percent glare, visibility) and sea state where the Beaufort Wind Force Scale will be used to determine sea-state (https://www.weather.gov/mfl/beaufort);
    d. Species, numbers, and, if possible, sex and age class of observed marine mammals, along with the date, time, and location of the observation;
    e. The predominant sound-producing activities occurring during each marine mammal sighting;
    f. Types of nearby commercial activities, including but not limited to the presence and number of vessels offloading at the seafood processing facility dock, the number and type of vessels transiting past, and the number and type of vessels refueling at the neighboring dock;
    g. Marine mammal behavior patterns observed, including bearing and direction of travel;
    h. Behavioral reactions of marine mammals just prior to, or during sound producing activities;
    i. Location of marine mammals, and distance from the predominant sound-producing activity or activities to marine mammals;
    j. Whether the presence of marine mammals necessitated the implementation of mitigation measures to avoid acoustic impact, and the duration of time that

normal operations were affected by the presence of marine mammals.

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

Unauthorized Take

1. If a listed marine mammal is determined by the PSO to have been disturbed, harassed, harmed, injured, or killed (e.g., a listed marine mammal(s) is injured or killed or is observed entering the exclusion/shutdown zone before operations can be shut down), it must be reported to NMFS within one business day (contact listed below; Table 3). These PSO records must include:
    a. Information that must be listed in the PSO report (see #24 above).
    b. Number of listed animals affected.
    c. The date and time of each event.
    d. The cause of the event (e.g., Steller sea lion approached within 5.3 m of an impact hammer while in operation).
    e. The time the animal(s) entered the monitoring zone, and, if known, the time it exited the zone.
    f. Mitigation measures implemented prior to and after the animal entered the monitoring zone.

Final Report

1. A final report will be submitted to NMFS within 90 calendar days of the completion of in-water construction work summarizing the data recorded as per Mitigation Measure 25 and submitted to Greg Balogh, NMFS PRD ANC supervisor, at greg.balogh@noaa.gov. The report will summarize all activities associated with the proposed action, and results of marine mammal monitoring conducted during the in-water project activities. The final technical report will include items from the list above as well as the following:
    a. Summaries of monitoring efforts including total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors that affect visibility and detectability of marine mammals.

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

    c. Species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover.

    d. Effects analyses of the project activities on listed marine mammals.

    e. Number of marine mammals observed (by species) during periods with and without project activities (and other variables that could affect detectability), such as:
        i. Initial marine mammal sighting distances versus project activity at time of sighting.
        ii. Observed marine mammal behaviors and movement types versus project

activity at time of sighting.

iii. Numbers of marine mammal sightings/individuals seen versus project activity at time of sighting.

iv. Distribution of marine mammals around the action area versus project activity at time of sighting.

Summary of Agency Contact Information

Table 3. Summary of NMFS Contact Information

Reason for Contact	Contact Information
Consultation Questions, North Pacific Right Whale Sightings & Reports, Final Reports & Data Submittal	Greg Balogh: greg.balogh@noaa.gov Sarah Pautzke: Sarah.Pautzke@noaa.gov
Report Submission	Greg Balogh: greg.balogh@noaa.gov
In the event that this contact information becomes obsolete	NMFS Anchorage Main Office: 907-271-5006

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 extends out 5054.8 m (2.7 nautical miles, 3.1 miles) from the Sun'aq Tribe's dock in the Kodiak Inner Harbor (Figure 1, Figure 9) where the sound is not obstructed by land and has attenuated to ambient levels (120 dB re 1 µPa (rms)) such that no project-specific noise is discernable. This is co-extensive with the Level B isopleth for down the hole drilling.

The assumption was made when determining the action area that a barge is available in Kodiak and will not need to be brought in from Anchorage, and thus the action area does not include any transit zones. However, should a barge need to be brought in, the potential impacts of transiting equipment are discussed in Section 6.2: Exposure Analysis. If equipment is brought in from elsewhere, we assume it would be transported by ships using established shipping lanes and therefore would not cause any measurable effects.

Figure 4. The action area extending 5054.8 m from the Sun'aq Dock project site in the Kodiak Inner Harbor.

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 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 for the conservation of a listed species. 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" (50 CFR 402.02).

The designation of critical habitat for Steller sea lions uses the term primary constituent element (PCE) or essential features. The current critical habitat regulations (81 FR 7414) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, 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 2.1 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 to the proposed action. If, in completing the last step in the analysis, NMFS determines that the action under consultation is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat, NMFS must identify a reasonable and prudent alternative (RPA) to the action.

4. RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT

Endangered western DPS Steller sea lions, endangered western North Pacific DPS humpback whales, and threatened Mexico DPS humpback whales are likely to be present in the action area (Table 4). The action area also includes critical habitat for Steller sea lions. This opinion considers the effects of the proposed action on these species and designated critical habitats.

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

Species	Status	Listing	Critical Habitat
Western DPS Steller Sea Lion (*Eumetopias jubatus*)	Endangered	NMFS 1997, 62 FR 24345	NMFS 1993, 58 FR 45269
Western North Pacific DPS Humpback Whale (*Megaptera novaeangliae*)	Endangered	NMFS 2016, 81 FR 62260	Not designated
Mexico DPS Humpback Whale (*Megaptera novaeangliae*)	Threatened	NMFS 2016, 81 FR 62260	Not designated

4.1 Species and Critical Habitat Not Likely to be Adversely Affected

We reviewed the species and critical habitats listed above and determined that Steller sea lion critical habitat is not likely to be adversely affected by the proposed action. This analysis is provided below.

4.1.1 Steller Sea Lion Critical Habitat

The 20-nautical mile aquatic zones surrounding rookeries and major haulout sites provide foraging habitats, prey resources, and refuge considered essential to the conservation of lactating female, juvenile, and non-breeding Steller sea lions (58 FR 45269; August 27, 1993). For this project, designated critical habitat includes the following areas as described at 50 CFR 226.202:

1. Terrestrial zones that extend 3,000 feet (0.9 km) landward from each major haulout and major rookery.
2. Air zones that extend 3,000 feet (0.9 km) above the terrestrial zone of each major haulout and major rookery in Alaska.
3. Aquatic zones that extend 20 nm (37 km) seaward of each major haulout and major rookery in Alaska that is west of 144^{o} W longitude.
4. Three special aquatic foraging areas: the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area, as specified at 50 CFR 226.202(c).

As detailed in Section 4.3.2 below, the action area overlaps with the 20-nautical mile critical habitat areas around two Steller sea lion major haulouts, located approximately 7 miles (11 km; Long Island haulout) and 14.5 miles (23 km; Kodiak/Cape Chiniak haulout) from the project footprint (Figure 5). The in-air and underwater sound generated by project activities will attenuate to sound levels below 120 dB at these haulouts, due to both distance from the source and the intervening geography. Additionally, sound impacts on prey species are not expected to extend beyond 490 m from the source.

Terrestrial Zones. Project activities are not located in a terrestrial zone that is 3,000 feet (0.9 km) landward from a major haulout or rookery, and any effects are extremely unlikely to occur in those areas. Therefore effects to the terrestrial zones are discountable.

Air Zones. Project activities are not located in an air zone that is 3,000 ft (0.9 km) above a major haulout or rookery and any effects are extremely unlikely to occur in those areas. Therefore, effects to the air zones are discountable.

Aquatic Zones. Although the action area overlaps with the aquatic zones of major haulouts located at Long Island and Cape Chiniak, the project is located within a well-developed harbor in which Steller sea lions are habituated to humans and vessel traffic. The rebuilding of the Sun'aq Tribe's dock within Kodiak's Inner Harbor will not increase the use of the harbor within a year because the dock is currently being used (it is not an additional new structure, but a replacement of an existing structure), but does extend the useful life of the dock such that vessel traffic will be maintained for a longer period of time. The effects of dock replacement in the harbor are expected to be minor given the previously disturbed condition of the area within the harbor, and habituation of Steller sea lions to the activities in the harbor, including construction and vessel movement. The old pilings will be removed per ADEC best management practices to reduce to possibility of creosote contaminants in the water, which could impact prey species. And based on the highly modified shore, which is not very suitable habitat for prey species, coupled with sound attenuating below 150 dB within 490 m from the project location, impact to prey species from sound is not anticipated. Further, land masses exist around the project site such that sound propagation is extremely limited to a narrow band along the coast (Figure 9) within critical habitat. Thus adverse effects to the aquatic zones of Steller sea lion critical habitat will be immeasurably small and are insignificant.

Aquatic Foraging Area. This project is near the Shelikof Strait special aquatic foraging area, but is not in it. The landmass of Kodiak Island occurs between the project site and the aquatic foraging area, thus the sound is not expected to reach that area. If sound does make it to Shelikof Strait, it is expected to be so attenuated that it will have no impact on Steller sea lions or their prey. Therefore we conclude that the adverse effects from sound associated with the project on the Shelikof Strait special aquatic foraging area are insignificant and discountable.

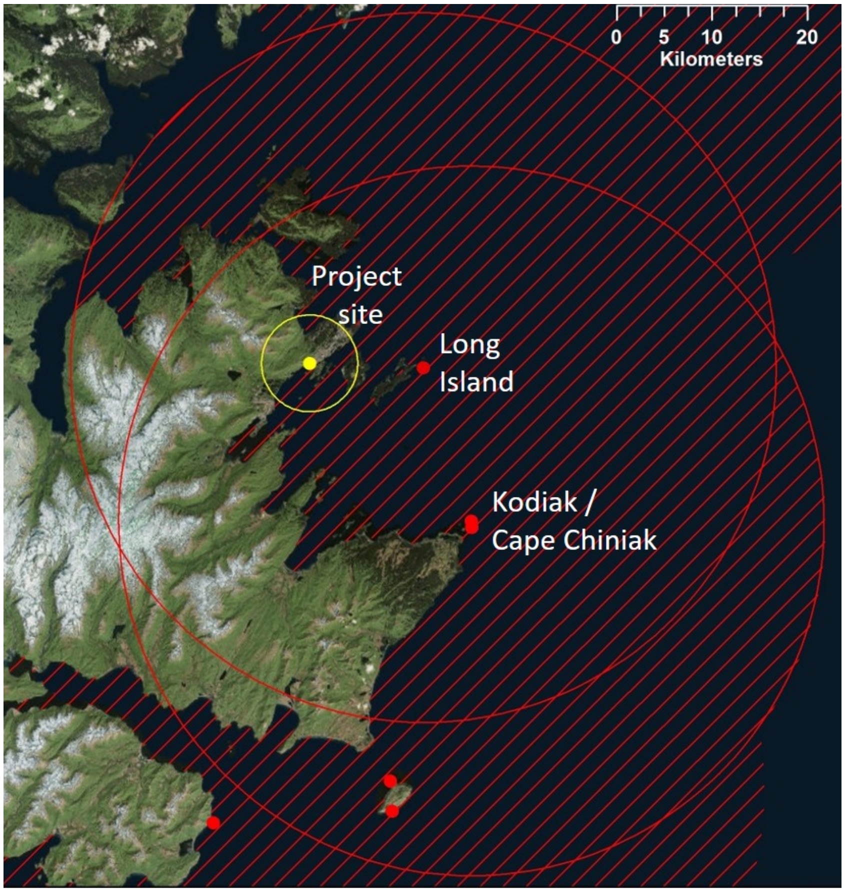

Figure 5. Sun'aq Dock project site and the two nearest Steller sea lion critical habitats. The circles represent the 20 nm radius of each, and the stripes extending beyond those circles are for critical habitat beyond 20 nm from the project site.

Studies have concluded that fish are less responsive to pile driving than marine mammals (Iafrate et al. 2016). However, for some young fish, the noise from pile driving can be fatal. The onset of tissue damage in Chinook salmon in a controlled laboratory simulation was observed at 177 and 180 dB re 1 μPa^2-s for 1920 and 960 strikes, respectively (Halvorsen et al. 2012). The effects of the pile driving on fish varies by species and impacts them through barotrauma. Two changes of gases in the body can lead to injury: 1) when free gas in the swim bladder or bubbles in the blood expand and contract during rapid pressure changes leading to tissue damage, or 2) when the solubility of gas in the blood changes with pressure. The swim bladder in most fish species is critical for buoyancy control, and changes in external pressure may cause rapid and substantial changes in the volume of the swim bladder (Halvorsen et al. 2011). Sounds produced by this project are insufficient to cause barotrauma to Steller sea lion prey resources beyond approximately 5.2 meters (17 feet) from the project site. We would expect other sounds and activities associated with this project to cause fish to swim away before they could be exposed to sound levels that could cause barotrauma within 5.2 m of the source. Effects on prey are extremely unlikely to occur given the small area affected, sound affects fish on a much smaller scale, and the lack of suitable prey habitat in the area, thus effects on prey are discountable

4.2 Climate Change

Environmental variability has a potentially high impact on the recovery of Steller sea lions (Muto et al. 2019), and can affect the stock structure of their prey (Fritz and Hinckley 2005). Since the 1950s the atmosphere and oceans have warmed, snow and sea ice have diminished, sea levels have risen, and concentrations of greenhouse gases have increased (IPCC 2013). While both natural and anthropogenic factors have influenced this warming, human influence has been the dominant cause of the observed warming since the mid-20th century (IPCC 2013) and the reduction in Arctic sea ice loss since 1979 (IPCC 2018). In marine ecosystems, shifts in temperature, ocean circulation, stratification, nutrient input, oxygen content, and ocean acidification are associated with climate change and increased atmospheric carbon dioxide (Doney et al. 2012), and these shifts have potentially far-reaching biological effects. The impacts of climate change are especially pronounced at high latitudes and in polar regions. Warming greater than the global annual average is being experienced in many land regions and seasons, including two to three times higher in the Arctic (IPCC 2018). Average temperatures have increased across Alaska at more than twice the rate of the rest of the United States.[1] In the past 60 years, average air temperatures across Alaska have increased by approximately 3˚F, and winter temperatures have increased by 6˚F (Chapin et al. 2014).

Increasing ocean temperature, decreasing seasonal ice cover and extent, and increasing freshwater content in Alaska's oceans are changing ocean currents and stratification, nutrient cycles, upwelling, food webs, species composition, primary and secondary productivity, species distributions, and predator-prey interactions (Doney et al. 2012). Annual Arctic sea ice extent has decreased from 1979-2012 at a rate likely between 3.5 and 4.1 percent (0.45 to 0.51 million km^2 per decade; IPCC 2018). The impacts of these changes and their interactions on listed species in Alaska are hard to predict. A recent occurrence of an especially warm water mass in the North Pacific Ocean, referred to as "the blob," is likely responsible for poor growth and survival of Pacific cod, an important prey species for endangered Steller sea lions.[2] The preliminary 2017 estimate of Pacific cod biomass is approximately 28% of the average biomass since 1984.

For 650,000 years or more, the average global atmospheric carbon dioxide (CO_2) concentration varied between 180 and 300 parts per million (ppm), but since the beginning of the industrial revolution in the late 1700s, atmospheric CO_2 concentrations have been increasing rapidly, primarily due to anthropogenic inputs (Fabry et al. 2008). The world's oceans have absorbed approximately one-third of the anthropogenic CO_2 released, which has curtailed the increase in atmospheric CO_2 concentrations (Sabine et al. 2004). Despite the oceans' role as large carbon sinks, in 2016, the mean monthly average atmospheric CO_2 level exceeded 400 ppm and continues to rise. As the oceans absorb more CO_2, the pH of seawater is reduced, referred to as ocean acidification. Ocean acidification reduces the saturation states (Ω) of certain biologically important calcium carbonate minerals like aragonite and calcite that many organisms use to form and maintain shells (Reisdorph and Mathis 2014). When seawater is supersaturated with these minerals (Ω>1), calcification (growth) of shells is favored. Likewise, when Ω<1, dissolution is favored (Feely et al. 2009). Ocean acidification due to increased CO_2 has resulted in a 0.1 pH

[1] United States Environmental Protection Agency, https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-alaska_.html, Accessed December 5, 2017.
[2] "Climate change preview? Pacific Ocean 'blob' appears to take toll on Alaska cod," *Seattle Times*, November 4, 2017.

unit decrease since the pre-industrial period (IPCC 2018).

High latitude oceans have naturally lower saturation states of calcium carbonate minerals than more temperate or tropical waters (Fabry et al. 2009; Jiang et al. 2015), making Alaska's oceans more susceptible to the effects of ocean acidification. Large inputs of low-alkalinity freshwater from glacial runoff and melting sea ice reduce the buffering capacity of seawater to changes in pH (Reisdorph and Mathis 2014). As a result, seasonal undersaturation of aragonite has been detected in the Bering Sea at sampling stations near the outflows of the Yukon and Kuskokwim rivers (Fabry et al. 2009), Glacier Bay (Reisdorph and Mathis 2014), and the Chukchi Sea (Fabry et al. 2009). By 2050, all of the Arctic Ocean is predicted to be undersaturated with respect to aragonite (Feely et al. 2009).

Changes in seawater chemistry as a result of ocean acidification could have severe consequences for calcifying organisms, particularly pteropods. These are zooplankton that form shells from aragonite, are abundant in high latitude surface waters, and form the base of many food webs (Orr et al. 2005). Pteropods are prey for many species of carnivorous zooplankton and are often considered an indicator species for ecosystem health. They are also prey for fishes including salmon, mackerel, herring, and cod; and baleen whales (Orr et al. 2005). Pacific cod, mentioned above, are a prey source for Steller sea lions. Under increasingly acidic conditions, pteropods may not be able to grow and maintain shells, and it is uncertain if they may be able to evolve quickly enough to adapt to changing ocean conditions (Fabry et al. 2009), which could affect the food chain to the Steller sea lion.

Ocean acidification may cause a variety of species- and ecosystem-level effects in high latitude ecosystems. Species-level effects may include reductions in the calcification rates of numerous planktonic and benthic species, alteration of physiological processes such as pH buffering, hypercapnia, ion transport, acid-base regulation, mortality, metabolic suppression, inhibited blood-oxygen binding, and reduced fitness and growth (Fabry et al. 2008). Ecosystem effects could include altered species compositions and distributions, trophic dynamics, rates of primary productivity, and carbon and nutrient cycling (Fabry et al. 2008). Additionally, as the ocean becomes more acidic, low frequency sounds (1-3 kHz and below) travel farther because the concentrations of certain ions that absorb acoustic waves decrease with decreasing pH (Brewer and Hester 2009).

Over such a short project duration, the effects of this action on climate change are expected to be *de minimis*. Over the long term, the utilization of the dock by fishing vessels would also be expected to not contribute to climate change because even if this dock was not upgraded, fishing vessels would still fish and offload their catch either at the existing dock or elsewhere. This small project will not cause any anticipated increase in fishing or dock use which could indirectly contribute to climate change through vessel exhaust and vehicle emissions.

4.3 Status of Listed Species

This opinion examines the status of each species that is likely to 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 50 CFR 402.02.

4.3.1 Western North Pacific DPS and Mexico DPS Humpback Whales

Population Structure and Status

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 recently conducted a global status review and 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 9 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 probability of encountering whales from each of the four North Pacific DPSs in various feeding areas is summarized in Table 5 below (NMFS 2016a). The probability of encountering a humpback whale in the Sun’aq Tribe dock action area from the non-listed Hawaii DPS is 89%, while the probability of encountering a threatened humpback whale from the Mexico DPS is only 10.5% and 0.5% for the WNP DPS.

Table 5. Probability of encountering humpback whales from each DPS in the North Pacific Ocean (columns) in various feeding areas (on left). Adapted from Wade et al. (2016). Purple shading indicates the location of this project's action area.

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.

The abundance estimate for humpback whales in the Gulf of Alaska is estimated to be 2,089 (CV= 0.09) animals which includes whales from the Hawaii DPS (89%), Mexico DPS (10.5%), and Western North Pacific DPS (0.5%) (NMFS 2016a, Wade et al. 2016).

Based on photo-identification work, humpback whales that forage off Aleutian Islands, Bering Sea, and potentially Chukchi Sea originate from the WNP, Hawaii, and Mexico breeding populations. The WNP DPS is endangered and is comprised of approximately 1,059 animals (CV=0.08) (Wade et al. 2016). The population trend for the WNP DPS is unknown. Humpback whales in the WNP remain rare in some parts of their former range, such as the coastal waters of Korea, and have shown little signs of recovery in those locations. The Hawaii DPS is not listed under the ESA and is comprised of 11,398 animals (CV=0.04). The growth rate of the Hawaii DPS was estimated to be between 5.5 and 6.0 percent. The Mexico DPS is threatened and is comprised of approximately 3,264 animals (CV=0.06) (Wade et al. 2016)[3] with an unknown population trend though likely to be in decline (81 FR 62260).

Whales from these three DPSs overlap on feeding grounds off Alaska, and are not visually distinguishable unless individuals previously have been identified by their breeding population. All waters off the coast of Alaska may contain ESA-listed humpbacks. Critical habitat has not been designated for the Western North Pacific or Mexico DPSs (NMFS 2016a).

---

[3] Estimates of abundance and migratory destination for north Pacific humpback whales in both summer feeding areas and winter mating and calving areas. Paper SC/66b/IA/21 presented to the International Whaling Commission Scientific Committee. Available at www.iwcoffice.org.

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) (see Figure 6). In their summer foraging areas and winter calving areas, humpback whales tend to occupy shallower, coastal waters; during their seasonal migrations; however, humpback whales disperse widely in deep, pelagic waters and tend to avoid shallower coastal waters (Winn and Reichley 1985).

Humpback whales generally begin their migration from Hawaii and Mexico in February, arriving in Alaska waters in April. These whales could be present during the latter part of the anticipated June-October time frame of the proposed project. Although the Gulf of Alaska waters surrounding Kodiak Island provide important feeding areas for humpback whales (Witteveen 2007; Calambokidis et al. 2001; Wade et al. 2016), NMFS has thus far not expected the species to be present in the relatively shallow and narrow Near Island Channel adjacent to the proposed project (NMFS 2013; NMFS 2015a). However, during marine mammal monitoring for the Kodiak ferry terminal project, a single humpback whale was seen transiting through the channel on March 15, 2016 (ABR 2016). Based on the analysis of Wade et al. (2016) there is an 89% probability that this whale belonged to the non-listed Hawaii DPS (Table 5). Although we still consider the presence of any humpback whale in Near Island Channel to be a rare event, its probability cannot be discounted. Further, should such an unlikely event occur, there is only a 10.5% probability that the animal would belong to the threatened Mexico DPS and a 0.5% probability it belongs to the endangered WNP DPS.

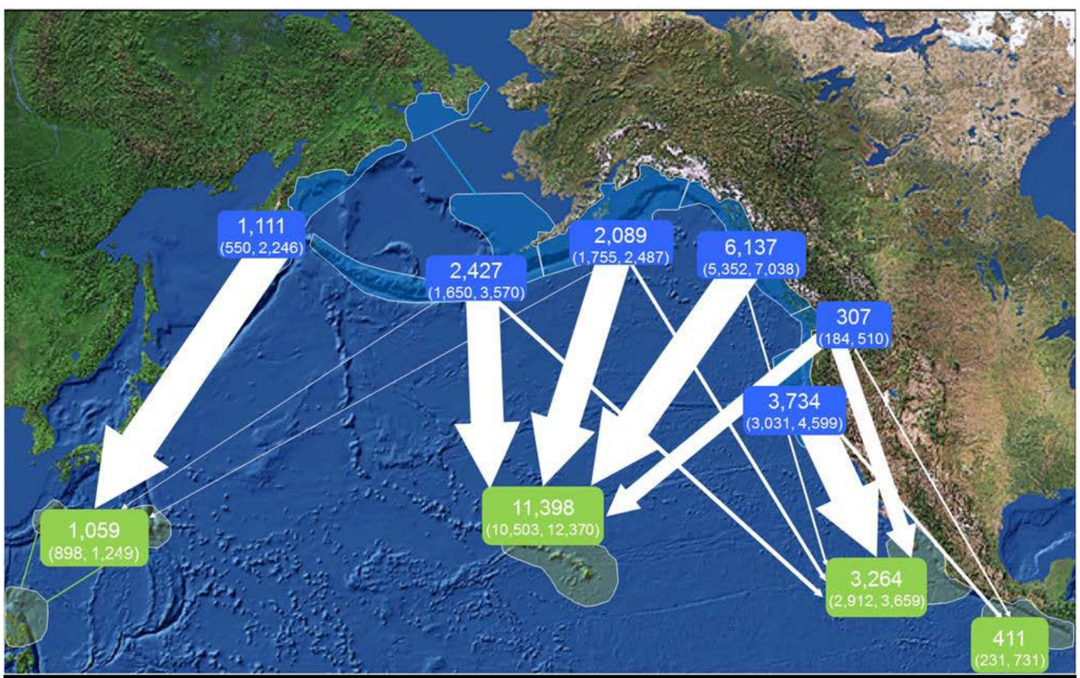

Figure 6. Abundance by summer feeding areas (blue), and winter breeding areas (green). 95% confidence limits are in parentheses. Migratory destinations from feeding area to breeding area are indicated by arrows with width of arrow proportional to the percentage of whales moving into winter breeding area (Wade et al. 2016).

Threats to the Species

NATURAL THREATS. There is limited information on natural phenomena that kill or injure humpback whales. Humpback whales are killed by orcas (Whitehead and Glass 1985, Dolphin 1987a, Florezgonzalez et al. 1994, Naessig and Lanyon 2004), and are probably killed by false killer whales and sharks. Calves remain protected near mothers or within a group and lone calves have been known to be protected by presumably unrelated adults when confronted with attack (Ford and Reeves 2008).

Out of 13 marine mammal species examined in Alaska, domoic acid was detected in all species examined, with humpback whale 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). The occurrence of the nematode *Crassicauda boopis* appears to increase the potential for kidney failure in humpback whales and may be preventing some populations from recovering (Lambertsen 1992).

Entrapments in ice have been documented in the spring ice pack in Newfoundland (Merdsoy et al. 1979), and up to 25 entrapped in the same event (Lien and Stenson 1986), and some mortalities have been reported. No humpback ice entrapments have been reported in the Chukchi Sea.

ANTHROPOGENIC THREATS. Three human activities are known to threaten humpback whales: whaling, entanglement (principally in in commercial fishing gear), and vessel strike. Historically, commercial whaling represented the greatest threat to every population of humpback whales and was ultimately responsible for listing humpback whales as an endangered species. From 1900 to 1965, nearly 30,000 whales were taken in modern whaling operations of the Pacific Ocean. Prior to that, an unknown number of humpback whales were taken (Perry et al. 1999). In 1965, the International Whaling Commission banned commercial hunting of humpback whales in the Pacific Ocean.

There are no reported takes of humpback whales from the WNP or Mexico DPS by subsistence hunters in Alaska or Russia for the 2008-2012 period (Allen and Angliss 2015) or from Alaska hunters from 2012-2016 (Muto et al. 2019). There are no current data concerning mortality and serious injury in Japanese, Russian, or international waters (Muto et al. 2019).

Brownell et al. (2000) compiled records of bycatch in Japanese and Korean commercial fisheries between 1993 and 2000. During the period 1995-99, there were six humpback whales indicated as "bycatch." In addition, two strandings were reported during this period. Furthermore, analysis of four samples from meat found in markets indicated that humpback whales were being sold. At this time, it is not known whether any or all strandings were caused by incidental interactions with commercial fisheries; similarly, it is not known whether the humpback whales identified in market samples were killed as a result of incidental interactions with commercial fisheries. It is also not known which fishery may be responsible for the bycatch. Regardless, these data indicate a minimum mortality level of 1.1/year (using bycatch data only) to 2.4/year (using bycatch, stranding, and market data) in the waters of Japan and Korea. Because many mortalities pass unreported, the actual rate in these areas is likely much higher. An analysis of entanglement rates from photographs collected for SPLASH found a minimum entanglement rate of 31% for humpback whales from the Asia breeding grounds (Cascadia Research 2003).

Humpback whales are also killed or injured during interactions with commercial fishing gear and other entanglements, although the evidence available suggests that these interactions may not have significant, adverse consequence for humpback whale populations. From 1979-2008, 1,209 whales were recorded entangled, 80% of which were humpback whales (Benjamins et al. 2012). Along the Pacific coast of Canada, 40 humpback whales have been reported as entangled since 1980, four of which are known to have died (Ford et al. 2009, COSEWIC 2011). From 2012-2016, 52 humpbacks were entangled, comprising the majority of the large whale serious injuries and mortalities for that time period (Helker et al. 2019).

A photograph-based study of humpback whales in southeastern Alaska in 2003 and 2004 found at least 53% of individuals showed some kind of scarring from entanglement (Neilson et al. 2005). Between 2008 and 2012, there were two mortalities of humpback whales in the Bering Sea/Aleutian Islands pollock trawl fishery, and one mortality in the Bering Sea/Aleutian Islands flatfish trawl (Allen and Angliss 2015). Average minimum annual mortality from observed fisheries was 0.60 humpbacks from this DPS (Allen and Angliss 2015).

Strandings of humpback whales entangled in fishing gear or with injuries caused by interactions with gear are another source of mortality data. However, very few stranding reports are received from areas west of Kodiak. The mean annual human-caused mortality and serious injury rate for 2008-2012 based on fishery and gear entanglements reported in the NMFS Alaska Regional Office stranding database is 0.3 (Allen and Angliss 2015). These events have not been attributed to a specific fishery listed on the List of Fisheries (76 FR 73912; 29 November 2011). The 2012-2016 estimated annual mortality rate due to interactions with all fisheries is 1.4 (0.8 for commercial fisheries + 0.4 in recreational fisheries + 0.2 in unknown fisheries; Muto et al. 2019).

Other sources of human-caused mortality and serious injury include reported collisions with vessels and entanglement in marine debris. The mean minimum annual human-caused mortality and serious injury rate for 2008-2012 for the WNP DPS based on vessel collisions (0.45) and entanglement in unknown marine debris/ gear (0.8) reported in the NMFS Alaska Regional Office stranding database is 1.25 (Allen and Angliss 2015).

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. From 2012-2016, there were 21 known vessel strikes of humpback whales (Helker et al. 2019). Based on these factors, injury and mortality of humpback whales as a result of vessel strike will likely continue into the future.

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 prey includes: euphausiids (krill); copepods; juvenile salmonids; Arctic cod; walleye pollock; pteropods; and cephalopods (Johnson and Wolman 1984, Perry et al. 1999). Foraging is confined primarily to higher latitudes (Stimpert et al. 2007), such as the action area.

Diving and Social Behavior

Average group size near Kodiak Island is 2-4 individuals, although larger groups are seen near Shuyak and Sitkalidak islands and groups of 20 or more have been documented (Wynne et al. 2005). Humpback whales observed in the Alaska Chukchi Sea have been single animals and one cow calf pair was observed in the U.S. Beaufort Sea (Hashagen et al. 2009).

Vocalization and Hearing

While there is no direct data on hearing in low-frequency cetaceans, the functional hearing range is anticipated to be between 7 Hz to 35 kHz (Watkins 1986, Au et al. 2006, Southall et al. 2007, Ciminello et al. 2012, NMFS 2016b). Baleen whales have inner ears that appear to be specialized for low-frequency hearing. In a study of the morphology of the mysticete auditory apparatus, Ketten (1997) hypothesized that large mysticetes have acute infrasonic hearing.

Humpback whales produce a wide variety of sounds ranging from 20 Hz to 10 kHz. During the breeding season males sing long, complex songs, with frequencies in the 20-5000 Hz range and intensities as high as 181 dB (Payne 1970, Winn et al. 1970, Thompson et al. 1986). Source levels average 155 dB and range from 144 to 174 dB (Thompson et al. 1979). The songs appear to have an effective range of approximately 10 to 20 km. Animals in mating groups produce a variety of sounds (Tyack 1981, Silber 1986a).

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).

In summary, humpback whales produce at least three kinds of sounds:

1. Complex songs with components ranging from at least 20 Hz–24 kHz with estimated source levels from 144– 174 dB; these are mostly sung by males on the breeding grounds (Winn et al. 1970, Richardson et al. 1995, Au et al. 2000, Frazer and Mercado 2000, Au et al. 2006);
2. Social sounds in the breeding areas that extend from 50Hz – more than 10 kHz with most energy below 3kHz (Tyack and Whitehead 1983, Richardson et al. 1995); and
3. Feeding area vocalizations that are less frequent, but tend to be 20 Hz–2 kHz with estimated sources levels in excess of 175 dB re 1 Pa at 1m (Thompson et al. 1986, Richardson et al. 1995).

4.3.2 Western DPS Steller Sea Lions

Description and Status

The family Otariidae, to which Steller sea lions belong, encompasses "eared" seals, including fur seals. Steller sea lions, the largest otariids, show marked sexual dimorphism with males 2-3 times larger than females. On average, adult males weigh 566 kg (1,248 lbs.) and adult females are much smaller, weighing on average 263 kg (580 lbs.; Fiscus 1961; Calkins and Pitcher 1982; Winship *et al*. 2001).

The Steller sea lion was listed as a threatened species under the ESA on November 26, 1990 (55 FR 49204). In 1997, NMFS reclassified Steller sea lions as two DPSs based on genetic studies and other information (62 FR 24345; May 7, 1997). At that time, the eastern DPS (which includes animals born east of Cape Suckling, Alaska, at 144°W longitude) was listed as threatened, and the western DPS (which includes animals breeding west of Cape Suckling, both in Alaska and Russia) was listed as endangered. On November 4, 2013, the eastern DPS was removed from the endangered species list (78 FR 66140). Information on Steller sea lion biology, threats, and habitat (including critical habitat) is available online at: https://www.fisheries.noaa.gov/species/steller-sea-lion and in the revised Steller Sea Lion Recovery Plan (NMFS 2008), which can be accessed at: https://repository.library.noaa.gov/view/noaa/15974.

As summarized most recently by Muto et al. (2018), the western stock of Steller sea lions decreased from an estimated 220,000-265,000 animals in the late 1970s to less than 50,000 in 2000. Factors that may have contributed to this decline include incidental take in fisheries, legal and illegal shooting, predation, exposure to contaminants, disease, and ocean regime shift/ climate change (NMFS 2008; Miller et al. 2005). The most recent comprehensive aerial photographic and land-based surveys of western Steller sea lions in Alaska estimated a total Alaska population (both pups and non-pups) of 53,303 (Muto et al. 2018). Although Steller sea lion abundance continues to decline in the western Aleutians, numbers are thought to be increasing in the eastern part of the western DPS range. The Central Gulf of Alaska Region, which includes the action area, has the second highest positive non-pup count and pup count (4.33 percent/year and 4.22 percent/year, 2003-2016) of any of the nine wDPS Steller sea lion sub-regions (Muto et al. 2018).

Range

Steller sea lions prefer the colder temperate to sub-arctic waters of the North Pacific Ocean. They range along the North Pacific Rim from northern Japan to California, with centers of abundance in the Gulf of Alaska and Aleutian Islands (Loughlin *et al.* 1984). Although Steller sea lions seasonally inhabit coastal waters of Japan in the winter, breeding rookeries outside of the U.S. are located only in Russia (Burkanov and Loughlin 2005). The eastern DPS includes sea lions born on rookeries from California north through Southeast Alaska; the western DPS includes those animals born on rookeries from Prince William Sound westward, with an eastern boundary set at 144oW (Figure 7). Steller sea lions are not known to migrate annually, but individuals may widely disperse outside of the breeding season (late-May to early-July) (Jemison *et al*. 2013; Allen and Angliss 2015). Most Steller sea lions in the action area for the proposed action are expected to be from the western DPS (Jemison *et al*. 2013).

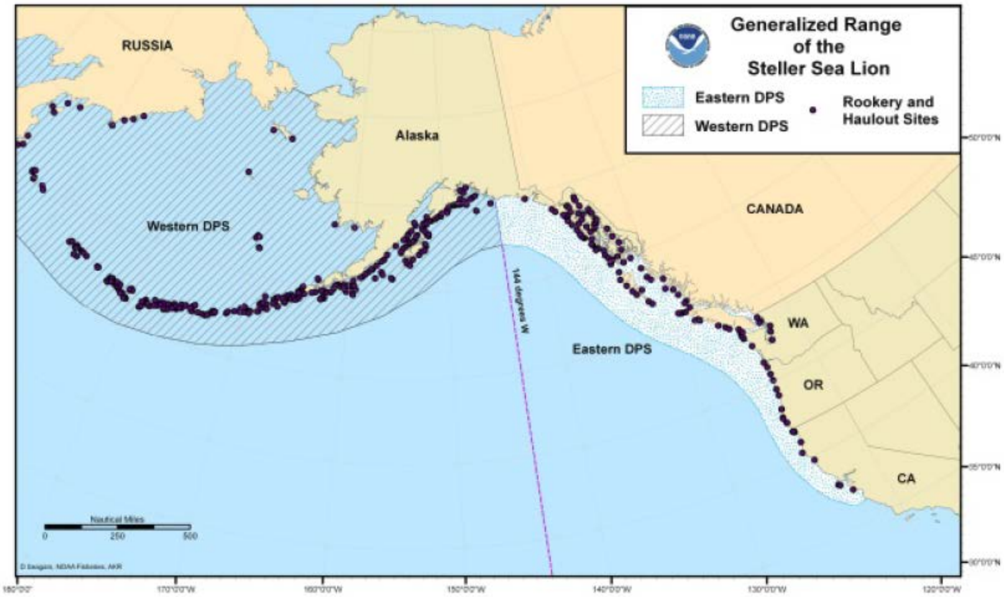

Figure 7. Generalized ranges of wDPS and eDPS Steller sea lions

Distribution in the Project Area

WDPS Steller sea lions frequent Kodiak Harbor and the action area. Many sea lions have become habituated to human activity in the Kodiak Harbor area and use Dog Bay float in St. Herman Harbor, about 792 m (2,600 ft) from the Sun'aq Tribe's dock in the Kodiak Inner Harbor (Figure 1). The Dog Bay float is a section from an old floating breakwater that was relocated in 2000 to be a dedicated sea lion haulout. Sea lions prefer this relatively undisturbed haulout, and it has proven effective in reducing sea lion-human conflicts in Kodiak's docks and harbors. Despite this innovative solution, Steller sea lion interactions still present problems, particularly for fishing vessels in and around Kodiak Harbor, which presumably is also an issue at the seafood processing plant dock next door to the Sun'aq Tribe's dock. Seafood processing facilities in Kodiak are regularly visited by sea lions looking for food. Sea lions in the Kodiak harbor area are habituated to fishing vessels and are skilled at gaining access to fish. It is likely that some of the same animals follow local vessels to the nearby fishing grounds and back to town.

Because Steller sea lions are common in the project area, which is similar to the action area for the Kodiak Ferry Terminal, they may be encountered daily (82 FR 10894, February 26, 2017). Based on numbers at the Dog Bay float and sea lion behavior, it is estimated that about 40 unique individual sea lions likely pass by the project site each day (82 FR 10894, February 26, 2017).

Bi-weekly census of Steller sea lions at the Dog Bay float conducted from November 2015 to June 2016 in association with the Kodiak Ferry Terminal project revealed maximum numbers (>100) from mid-March through mid-June, with 5,111 total observations from November 2015 to June 2016 (ABR 2016). The highest average hourly number of sea lions (11-15/hour) within the entire Kodiak Ferry Terminal observation area occurred from February through April 2016

(ABR 2016). July through October was outside the timeframe of the census conducted in association with the Kodiak Ferry Terminal, but presumably the numbers of Steller sea lions in the harbor pursuing fishing vessels would be higher during the months salmon fishing is occurring. This project is expected to begin in early July after the salmonid migration window and go for three months, through the primary salmon fishing season.

Hearing Ability

The ability to detect sound and communicate underwater is important for a variety of Steller sea lion life functions, including reproduction and predator avoidance. NMFS categorizes Steller sea lions in the otariid pinniped functional hearing group, with an applied frequency range between 60 Hz and 39 kHz in water (NMFS 2016). 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 air between 250 Hz and 30 kHz (Muslow and Reichmuth 2010; Reichmuth and Southall 2011). Sound signals from pile installation and extraction operations are anticipated to be within the hearing range of Steller sea lions.

Threats to the Species

NATURAL THREATS. Several threats and impacts to Steller sea lion recovery are documented in the Steller Sea Lion Recovery Plan (NMFS 2008). These include environmental variability, predation by killer whales, and disease and parasitism.

There are three ecotypes of killer whales in the North Pacific Ocean: resident killer whales who are known to be fish-eaters, transients that feed on marine mammals, and offshores that prey primarily on fishes including sharks (although there are few feeding observations available). The estimated number of transient killer whales throughout most of the range of the wDPS Steller sea lion was 251 for 2001-2003, and they were more abundant west of the Shumagin Islands. In the Gulf of Alaska, 22% of the marine mammal kills are sea lions by mammal-eating killer whales (Wade et al. 2007).

Sharks may be a predator of Steller sea lions. However, white sharks occur rarely if at all in the wDPS Steller sea lion range, the salmon shark is piscivorous, and a study on the Pacific sleeper shark revealed no sea lions in stomach contents (NMFS 2008).

Although sick individuals are found on rare occasions, investigators have not seen a large number of dead or dying Steller sea lions due to disease and parasitism. Disease and parasitism could be viral, bacterial, protozoan, or fungal. Disease could be by way of a contagious pathogen to a naïve population leading to a mass or unusual mortality event or by a pathogen resulting in reproductive loss (NMFS 2008). At this point, disease is not known to be a major factor in the population decline. Parasites include intestinal cestodes; trematodes in the intestine and bile duct of the liver; nematodes in the stomach, intestine, and lungs; acanthocephalans in the intestine, acarian mites in the nasopharynx and lungs; and an anopluran skin louse. Available evidence does not suggest the Steller sea lion population decline was a result of a parasite (NMFS 2008)

ANTHROPOGENIC THREATS. Steller sea lion responses to a disturbance likely depend on season and their stage in the reproductive cycle. Human activities known to threaten Steller sea lions include commercial fishing (including competition with fisheries), toxic substances, marine debris, subsistence harvest, and other causes such as entanglement, illegal shooting, authorized research (Muto et al. 2017), and toxic substances (NMFS 2008). The total estimated annual level of human-caused mortality and serious injury for the wDPS Steller sea lions from 2012-2016 is 247 sea lions: 35 Steller sea lions were taken in US fisheries, 1.2 in unknown fisheries, 2 were entangled in marine debris, 5.5 due to other causes (arrow strike, entangled in hatchery net, illegal shooting, MMPA-authorized research), and 203 in the Alaska Native subsistence harvest (Muto et al. 2019). On Kodiak Island in 2011, an estimated 20 adult sea lions were harvested (95 percent confidence interval between 15 and 28 animals; Muto et al. 2018).

Toxic substances can impact animals via acute toxicity caused by a major point source of pollution (e.g. oil spill or hazardous waste) causing acute mortality or moribund animals. Toxic substances can also impair animal populations through complex biochemical pathways that suppress immune functions and disrupt endocrine balances. There are many toxic substances, including organochlorines, heavy metals, and polycyclic aromatic hydrocarbons. With the exception of the 1989 Exxon Valdez oil spill, no events have been recorded that support acute toxicity leading to substantial mortality of Steller sea lions (NMFS 2008). However, additional research on the possible effects on reproduction from chronic exposure to relatively low concentrations of toxic substances and the potential for reactive metabolites to cause damage to target tissues must be understood to be able to relate observed toxin levels to population effects in the wDPS of Steller sea lions. Removal of the creosote pilings using ADEC best management practices reduces the contaminant load in the water that could potentially negatively affect Steller sea lion critical habitat.

With respect to vessel traffic, vessels that approach a rookery or haulout more quickly have a greater effect than vessels that approach slowly because slower-moving vessels are better observed by the sea lions. Steller sea lions may have become accustomed to repeated slow vessel approaches, resulting in minimal response (NMFS 2008).

5. ENVIRONMENTAL BASELINE

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 (50 CFR § 402.02).

Focusing on the impacts of activities specifically within the action area allows us to assess the prior experience and condition of the animals that will be exposed to effects from the actions under consultation. This focus is important because individuals of ESA-listed species may commonly exhibit, or be more susceptible to, adverse responses to stressors in some life history states, stages, or areas within their distributions than in others. These localized stress responses or baseline stress conditions may increase the severity of the adverse effects expected from proposed actions.

The project vicinity is an area of high human use and habitat alteration. Ongoing human activity in the action area that may impact marine mammals includes marine vessel activity, commercial fishing, entanglement, pollution, climate change, noise (e.g., aircraft, vessel, pile-driving, dredging, etc.), nearshore aquaculture, and coastal zone development.

5.1 Marine Vessel Activity

Ferries, fishing vessels and tenders, barges, tugboats, and other commercial and recreational vessels use the nearby channel to access harbors, fuel docks, processing plants, and other commercial facilities (NMFS 2015a). During peak fishing seasons (June – September), vessels in Kodiak raft up three and four deep to offload catch at the two shore-based fish processors, one immediately to the east and one a short distance farther east.

Although risk of ship 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).

Vessel strikes of humpback whales present a greater concern. An examination of all known ship strikes for large (baleen and sperm) whales from all shipping sources indicates vessel speed is a principal factor in whether a vessel strike results in death (Laist et al. 2001; Vanderlaan and Taggart 2007). In assessing records with known vessel speeds, Laist et al. (2001) found a direct relationship between the occurrence of a whale strike and the speed of the vessel involved in the collision. The authors concluded that most deaths occurred when a vessel was traveling in excess of 24.1 km/h (14.9 mph; 13 kts).

Neilson et al. (2012) summarized 108 reported whale-vessel collisions in Alaska from 1978 to 2011. Most strikes (86 percent) involved humpback whales. Small vessel strikes were most common (<15 m, 60 percent), but medium (15–79 m, 27 percent) and large (≥80 m, 13 percent) vessels also struck humpback whales. Most strikes (91 percent) occurred in May through September, and there were no reports from December or January. The majority of strikes (76 percent) were reported in southeastern Alaska. From 2012 to 2016, 21 humpbacks incurred mortality or serious injury from vessel strikes (Helker et al. 2019). NMFS has records of five whale-vessel interactions in the Kodiak vicinity from 2000 to 2015. The only documented lethal strike was from the Alaska ferry, Kennicott, on July 26, 2014. All five incidences occurred from June to August.

Most vessels in the Near Island Channel travel at relatively low speeds when they approach docking areas or to avoid obstacles. Should a barge need to be brought in from another port to support this project, it will be brought along a standard shipping route and will only contribute one trip to the overall high levels of shipping that routinely occur between Kodiak Harbor and other ports.

5.2 Commercial Fishing

Mortality and serious injury of the Western U.S. stock of Steller sea lions from 2011 to 2015 was primarily caused by federal groundfish trawl fisheries (n = 66; Helker et al. 2017); interactions with other types of fishery gear (n = 10) also caused serious injury and mortality. Humpback whales are also subject to interactions with fishing gear that cause mortality or serious injury. That information is reported in section 5.3, as it is associated with fishing gear entanglement.

5.3 Entanglement

Mortality and serious injury due to entanglement can occur to protected species. Entanglements of humpback whales (n = 52) comprised the majority of the large whale injuries and mortalities in Alaska from 2012-2016) (Helker et al. 2019). These include entanglement by salmon purse seine gear, Kodiak dungeness crab pot fishery gear, Kodiak Island commercial salmon set gillnet gear, and shrimp pots.

Entanglement is also an issue for the Steller sea lion. Ninety-four incidents of Steller sea lion entanglement occurred between 2012 and 2016, which includes fishery-related entanglement and marine debris (Helker et al. 2019). Mortality and serious injury to nine wDPS Steller sea lions was caused by constricting entanglement from marine debris (Helker et al. 2019).

5.4 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 State of Alaska Department of Environmental Conservation (ADEC). Pollution may also occur from unintentional discharges and spills.

Within the action area, there are three ADEC-permitted seafood processing discharges. These and other facilities, including the City, operate under ADEC Multi-Sector General Permit for storm water discharges. These require implementation of a Stormwater Pollution Prevention Plan (ADEC 2016). While these and other un-permitted sources have the potential to carry pollutants into the action area, there is no evidence of adverse effects to marine mammals in the Near Island Channel, which represents a very small fraction of the species' ranges.

5.5 Climate and Ocean Regime Change

As described in Section 4.2, climate change may impact marine mammals through changes in the distribution of temperatures suitable for rearing young, the distribution and abundance of prey, and the distribution and abundance of competitors or predators.

Changes in ocean climate are hypothesized to have affected the quantity, quality, and accessibility of prey, which in turn may have affected populations of marine mammals, including humpback whales and sea lions. Shifts in ocean climate are the most parsimonious underlying explanation for the broad suite of ecosystem changes that have been observed in the North Pacific Ocean in recent decades (Trites *et al*. 2007; Miller *et al.* 2005).

5.6 In-Water Sound

The Sun'aq Tribe dock project area is subject to sound from many anthropogenic sources, including marine vessels, marine fueling facilities, cargo loading and offloading operations, shore-based processing plants, maintenance dredging, aircraft, shoreline and dock construction, and land vehicles. The project area is frequented by fishing vessels and tenders; the M/V *Tustumena* and other ferries; barges and tugboats; and other commercial and recreational vessels. These vessels use the channel to access harbors and city docks, fuel docks, processing plants where fish catches are offloaded, and other commercial facilities. Immediately east and west of the project area are industries that service vessels. The Kodiak ferry terminal and transient float are just east of the project location. Pier 1 and Pier 2, both in the immediate project vicinity, provides docking for large vessels. The project is just outside the narrow channel separating Near Island from Kodiak Island. The channel is a primary route for local vessel traffic to access Gulf of Alaska waters and is in the flight path of the Kodiak airport.

In 2015, NMFS completed a formal consultation on improvements and repairs to the Kodiak Ferry Dock and Terminal (NMFS 2015a). In association with this project, ambient underwater sound was measured in Near Island Channel, just east of the Sun’aq Tribe’s dock, in March 2016. Measurements recorded highly variable sound pressure levels, ranging from approximately 80 to 140 dB re 1 μPa (Warner and Austin 2016). However, an author of the study confirmed that for the majority of the time, ambient sound levels in Near Island Channel were well below the NMFS acoustic threshold of 120 dB re 1 μPa for Level B harassment associated with continuous sound (M. Austin, pers. comm. October 2016 *in* AKR-2016-9596). Median background sound levels in Kodiak were measured to be 100.1 dB (Warner and Austin 2016).

5.7 Nearshore Aquaculture

Aquaculture is an emerging industry in Alaska, both in the number and size of farms. In Chiniak Bay, there are 2 existing farms, 1 hatchery, and 2 proposed farms. Two existing farms and the hatchery are within the action area of this proposed Sun’aq Tribe dock project. Both farms and the hatchery rear kelp and seaweed species (bull kelp, dragon kelp, dulse, nori, ribbon kelp, sugar kelp, three ribbed kelp, kombu, sea lettuce, bullwhip kelp, and dark sea lettuce; C. Pring-Hamm, ADF&G, April 2019, personal communication). The hatchery is located on land at the NOAA Kodiak Lab. At this time, due to very little waste input and no waste coming from rearing of fish, there is likely little impact to humpback whales or sea lions.

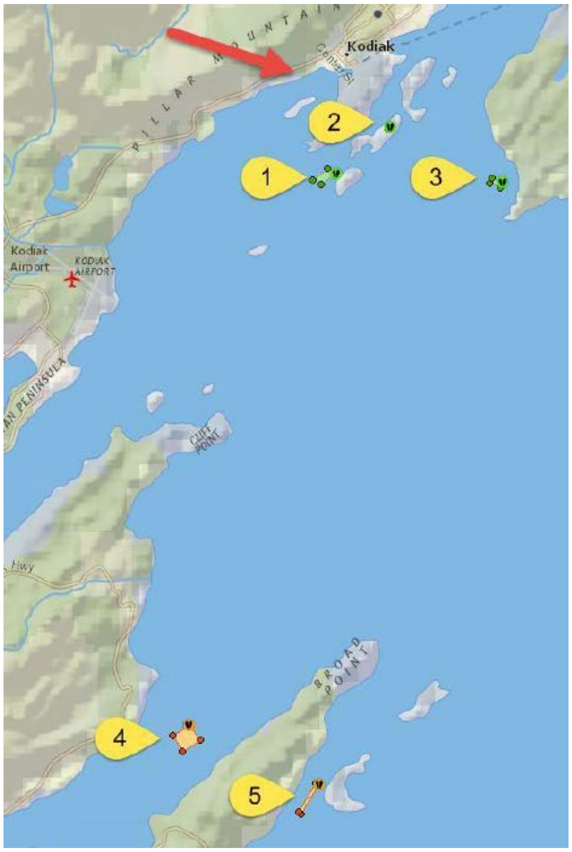

Figure 8. Map of current and proposed aquaculture farms.
Red arrow is the Sun'aq Tribe's project location. 1 and 3 are existing farms, 2 is the hatchery, 4 and 5 are proposed farms under review by ADF&G (B. Mulligan, ADF&G, personal communication).

5.8 Coastal Zone Development

Coastal zone development results in the loss and alteration of nearshore marine mammal habitat and changes in habitat quality. The shoreline in the immediate project area is highly developed. As mentioned above, impervious surfaces directly abut the shoreline adjacent to the dock, and there is no natural shoreline in the project area. As mentioned in Section 4.3.2, the Dog Bay Float provides an artificial near-shore resting area for Steller sea lions, which seem to have adapted remarkably well to human alterations of the natural coastline. Coastal development around the project site does not significantly affect habitat for large whales, due to their preference for deeper waters.

6. EFFECTS OF THE ACTION

"Effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. NMFS has not identified any interrelated or interdependent activities associated with the proposed action.

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

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

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

6.1 Project Stressors

Stressors are any physical, chemical or biological entity that can induce an adverse response. Based on our review of the data available, the proposed demolishing and dock reconstruction activities and future use of the dock may cause these primary stressors:

1. Sound field produced by impulsive sound sources including impact hammer pile driving and sound fields produced by continuous sound sources including vibratory pile driving and extraction, and down-hole drilling;
2. Risk of vessels striking marine mammals;
3. Seafloor disturbance from pile driving, extraction, and drilling activities;
4. Reduced prey availability from increased dock footprint; and
5. Pollution from unauthorized spills.

Below we discuss each stressor's potential to affect ESA-listed species.

6.1.1 Acoustic Thresholds

Since 1997, NMFS has used generic sound exposure thresholds to determine whether an activity produces underwater and in-air sounds that might result in impacts to marine mammals (70 FR 1871). NMFS recently 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) (81 FR 51693). 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[4], expressed in root mean square[5] (rms), from broadband sounds that cause behavioral disturbance, and referred

[4] 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.

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

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 $L_{E,LF,24h}$: 185 dB	$L_{E,LF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,LF,24h}$: 155 dB	$L_{E,LF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	$L_{pk,flat}$: 218 dB $L_{E,LF,24h}$: 185 dB	$L_{E,LF,24h}$: 201 dB
Otariid Pinnipends (OW) (Underwater)	$L_{pk,flat}$: 232 dB $L_{E,LF,24h}$: 203 dB	$L_{E,LF,24h}$: 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^2s. 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.

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

- 100 dB re 20µPa_{rms} for non-harbor seal pinnipeds

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].

While the ESA does not define "harass," NMFS issued guidance interpreting the term "harass" under the ESA as a means to: "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016). For the purposes of this consultation, any action that amounts to incidental harassment under the MMPA—whether Level A or Level B—constitutes an incidental "take" under the ESA and must be authorized by the ITS (see Section 10). There are four steps for an assessment of potential harassment:

1. Whether an animal is likely to be exposed to a stressor or disturbance (i.e., an annoyance).
2. The nature of that exposure in term of magnitude, frequency, duration, etc. Included in this may be type and scale as well as considerations of the geographic area of exposures (e.g., is the annoyance within a biologically important location for the species, such as a foraging area, spawning/breeding area, or nursery area?).
3. The expected response of the exposed animal to a stressors or disturbance (e.g., startle, flight, alteration [including abandonment] of important behaviors); and;
4. Whether the nature and duration or intensity of that response is a significant disruption of those behavior pattern which include, but are not limited to, breeding, feeding, or sheltering, resting or migrating.

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

6.1.2 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 discountable or insignificant and, therefore, are not likely to result in take of listed species.

<u>Vibratory and Impact Pile Driving Airborne Sound</u>
Airborne sound could affect hauled-out Steller sea lions. However, sound generated during vibratory pile driving would reach the in-air threshold (100 dB) at approximately 13 feet (ft) (4 meters (m)). Sound generated by impact hammer and down-hole drilling operations will reach the in-air threshold (100 dB) at approximately 39 ft (12 m). Because of the small radius within which in-air disturbance can occur, and the lack of suitable haul-out locations within this area, the probability that hauled-out Steller sea lions will be disturbed by in-air sounds associated with pile driving is very small, and adverse effects are extremely unlikely to occur. Therefore, during impact pile driving, temporary in-air disturbance would be limited to sea lions swimming on the surface near the dock (approximately 39 ft or 4 m). At this distance, any animal swimming would very likely have been taken by the in-water sound as it approached the work site; therefore, in-air disturbance is generally not considered for pinnipeds swimming near the project site. Further, we expect that proposed mitigation would prevent a take from occurring due to in-air sound. For these reasons, effects from in-air sound are considered discountable.

Vessel Strike

From 1978-2011, there were 108 confirmed whale-vessel collisions in Alaska; roughly five were in Kodiak (Neilson et al. 2012). The majority of vessel strikes impacting humpback whales are in Southeast Alaska (roughly 80 of the 93 humpbacks struck). Vessel speed is an important factor in predicting whale-vessel collisions. Of vessel strikes in which speed was known, many involved vessels transiting at high speeds (≥12 knots; 37 whales, or 49 percent), several involved vessels traveling at 1-11 knots (n=23, or 31 percent), and the rest were anchored or drifting vessels. During construction activities, vessel speed will be very low (i.e., 2 km/hr [1 knot] or less), and the maximum transit speed for tug and barge vessels proposed for use is 18.5 km/hr (8-10 knots). NMFS's guidelines for approaching marine mammals recommend that vessels not approach within 100 yards. There is one barge and tug associated with construction, and operations will not increase vessel traffic as the barge and tug are currently in use in Kodiak. Sea lions in the area are habituated to ship traffic and unlikely to change their behavior in response to the one tug and barge associated with this project. Finally, construction will only last about 90 days. Vessel speed at the construction site will be very slow, and only one round-trip transit within Kodiak is expected. All of these factors limit the risk of strike. Extending the useful life of dock maintains current vessel traffic for a longer period of time. However, vessel traffic in the future is anticipated to be commensurate with current levels, so the potential for vessel strikes is not increased. The probability of a vessel strike is very small, and thus adverse effects to wDPS Steller sea lions, Mexico DPS humpback whales, and WNP DPS humpback whales are extremely unlikely to occur. Therefore we conclude that the adverse effects from vessel strikes are discountable.

Disturbance of the Seafloor

Listed species may encounter increased turbidity from construction activities. Short-term turbidity increases would likely occur during in-water construction work of pile removal and pile driving. The physical resuspension of sediments could produce localized turbidity plumes that could last from a few minutes to several hours. Turbidity associated with pile installation is expected to be localized to about a 25 ft radius around the pile (Everitt et al. 1980). However, there is low silt content in the sediments within the construction footprint (NMFS 2015a), minimizing the degree of resuspension and turbidity due to project-related effects. Because of the relatively small work area, any increase in turbidity would be limited to the immediate vicinity of the project site and adjacent portion of the bay.

The probability of cetaceans encountering ephemeral sediment plumes within Kodiak's Inner Harbor is very small; whales are extremely rare visitors to these waters. Thus adverse effects to cetaceans are extremely unlikely to occur. Therefore we conclude that the adverse effects due to sediment plumes on listed humpback whales are discountable.

There is little potential for pinnipeds to be affected by increased turbidity during construction operations (feeding and navigation are not expected to be affected, and sediments will not be ingested). Any pinnipeds exposed to increased turbidity would be only briefly exposed in an extremely limited geographic area. Any adverse effects from such exposure will be immeasurably small. Therefore we conclude that adverse effects due to increased turbidity on wDPS Steller sea lions are insignificant.

Reduced Prey Availability

Reconstruction of the Sun'aq Tribe dock will result in an increase in footprint of 600 ft^2 because the 60 ft replacement seawall was constructed 10 ft from the original wall to prevent construction from undermining the existing building. Given the small modifications to the existing structure, in addition to the limited natural shoreline in the immediate vicinity, reduction in habitat productivity for benthic invertebrate or other prey resources will be immeasurably small. Therefore, we consider effects to ESA-listed whales and pinnipeds from reduced prey availability to be insignificant.

Exposure to Pollution or Contaminants from Unauthorized Spills

A Spill Prevention, Control, and Countermeasure Plan, Hazardous Material Control Plan, Water Quality Control Plan, ADEC best management practices, and other best management practices will be implemented during construction to prevent contaminants from entering the water column. Plans will be in place and materials will be available for spill prevention and cleanup activities at the construction site will limit potential contamination. Additionally, any small spill is expected to dissipate rapidly. The probability of a small spill occurring as a result of this project is very small, and adverse effects are extremely unlikely to occur. In addition, the impact of any small spills that do occur will be very minor due to the volatility of refined petroleum products and on-site clean-up materials. Extending the useful life of dock maintains the current potential for small spills associated with vessels for a longer period of time. However, vessel traffic in the future is anticipated to be commensurate with current levels, so the potential for small spills is not increased. Thus any adverse effects to ESA-listed species will be immeasurably small. Therefore we conclude that the adverse effects from a small spill on ESA-listed species are insignificant and discountable.

Summary of Stressors Not Likely to Adversely Affect ESA-listed Species

In conclusion, based on review of available information, we determined effects from vessel strike are extremely unlikely to occur. We concluded the effects to ESA-listed whales and pinnipeds will be discountable.

We determined disturbance of seafloor, and effects of reduced prey availability are not likely to have measurable impact; therefore, we concluded effects to ESA-listed whales and pinnipeds will be insignificant. We determined that exposure to pollution or contaminants from unauthorized spills are highly unlikely and are not likely to have a measurable impact. Therefore we concluded effects to ESA-listed whales and pinnipeds will be insignificant and discountable.

6.2 Exposure Analysis

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

As discussed in Section 2.1.2 above, mitigation measures should avoid or minimize exposure of humpback whales and Steller sea lions to stressors. The specific mitigation measures are referenced throughout the text below.

Exposure to Sound Sources

The potential for harassment or injury is estimated for each species by determining the likelihood that a listed marine mammal would be present within a Level A or Level B Zone of Influence (ZOI) during active pile driving/removal or down-hole drilling activities as described in Table 1 and reviewed below.

- Removal of 149 existing piles through vibratory extraction (12 hours total, assume 3 hours per day, 4 days of activity)
- Down-hole drilling in preparation for the installation of 46 12-inch steel piles (23 hours total; one and a half hours of drilling per day, 23 days total)
- Installation of 46 12-inch steel piles though vibratory hammer (12 hours total; 0.67 hours of hammering per day, 23 days total) and impact hammer (3 hours total, 2 piles per day, 23 days).
- Installation of 17 wood fenders through vibratory hammer (5 hours, 3 days)

Assumptions

<u>Acoustic Analysis Assumptions</u>
To assess the acoustic footprint of the proposed activities, we rely on literature values of sound source levels and sound propagation characteristics for similar-sized pile extraction and installation operations that occurred in similar environments to the proposed activities. These literature values derive from either modeled or measured source levels and sound propagation. Several conservative assumptions were applied to this analysis so that the results would not underestimate potential effects on marine mammals, including:

- All distances to thresholds represent the maximum sound levels over all depths
- Source levels from 24-inch pile driving sound source verification study conducted 500 meters from the current site were used (Denes et al. 2016)

The reported radii for 24-hr SEL (Level A) thresholds are based on the assumption that marine mammals remain stationary or at a constant exposure range during the entire 24-hr period, which is an extremely unlikely scenario. These estimated distances for Level A represent an unlikely worst-case scenario.

<u>Approach to Estimating Exposure to Major Sound Sources</u>
For this analysis we estimated take by considering: 1) acoustic thresholds above which the best

available science indicates marine mammals will be behaviorally harassed or incur some degree of permanent hearing impairment; 2) the area or volume of water that will be ensonified above these levels in a day; 3) the density or occurrence of marine mammals within these ensonified areas; and 4) the number of days of activities.

Distances to Level A and Level B Sound Thresholds

Denes et al. (2016) recorded underwater sound pressures at four sites while steel piles were installed by vibratory and impact pile driving at Alaska Marine Highway System ferry terminals. The four sites were Kake, Auke Bay, Kodiak and Ketchikan. At Kodiak, sound pressures were measured during down-hole drilling, vibratory pile driving, and impact hammer pile driving for 24 inch steel piles. The current project proposes to use 12 inch steel piles so we can expect lower source levels than those measured at the Kodiak ferry terminal (Denes et al. 2016). Beuhler et al. (2015) present measured sound pressure levels for pile driving operations in California. Table 7 summarizes the sound pressure levels measured for 12 to 13 inch steel pipe or piles from this study.

Table 7. Summary of measured sound source levels for 12-13 inch steel piles from Beuhler et al. (2015).

Diameter (inches)	Location	Water Depth (m)	SPL_{RMS} at 10 m	SPL_{RMS} at 1 m
Impact Hammer				
12	El Cerrito, CA	2	177	197
12	El Cerrito, CA	1	172	192
12	Sausalito, CA	2	165	185
Vibratory Hammer				
13	Arcata, CA	5.5	155	175
13	Arcata, CA	4.5	155	175

We can assume that the sediment and bedrock composition at the project site will be similar to that of the Kodiak ferry terminal. To account for the smaller diameter pile, we use the mean source level values rather than the 90th percentile SL values for impact driving, vibratory driving and down-hole drilling from Denes et al. (2016, see Table 56 in that report). A comparison with the measured values for 12 to 13 inch piles from Beuhler et al. (2015; Table 7) suggests that these values should result in conservative estimates of distances to behavioral thresholds.

We use the following equation to estimate the distance to behavioral thresholds:

$$RL = SL - TL * log_{10}(R)$$

Where RL, or received level, is the threshold of concern (120 dB for vibratory driving, 160 dB for impact driving). The source level (SL) is the SPL_{RMS} at 1 meter from the source, and R is the distance to the threshold. Results are presented in Table 8, Table 9, and Figure 9. The transmission loss coefficient (TL) defines the rate of sound loss over distance and values of 15 (practical propagation) to 20 (spherical propagation) are typical. Denes et al. (2016) estimated these values as the slope of the relationships between measured sound pressure levels and distance. Only mean values were reported and no information on error or confidence intervals are given. The estimated transmission loss coefficents for Kodiak were 20.3 for impact driving, 21.9 for vibratory driving, and 18.9 for down hole drilling. We used the spherical transmission loss coefficient (20) for impact and vibratory pile driving and 18.9 for down the hole drilling. There is limited information on sound levels from vibratory extraction of piles. Laughlin (2011) reports a mean SPL_{RMS} value of 150 dB re 1 μPa at 16 m from the piles for 3 12-inch wood piles extracted simultaneously with a vibratory hammer. This translates to 174 dB re 1 μPa at 1 m and we use this value for this portion of the project.

For the injury thresholds, we use the Excel spreadsheet that accompanies the NMFS technical guidance for Level A thresholds (NMFS 2018). We used the source levels in Table 8 for these computations, additional inputs for the spreadsheet were:

- Vibratory hammer
  - 20 minutes per pile, 2 piles per day
  - Weighting factor adjustment of 2.5 kHz
  - Transmission loss coefficient of 20
- Impact hammer
  - 10 strikes per pile, 2 piles per day
  - Weighting factor adjustment of 2.0 kHz
  - Transmission loss coefficient of 20
- Down the hole drilling
  - 1.5 hours of drilling per day
  - Weighting factor adjustment of 2.0 kHz
  - Transmission loss coefficient of 18.9

Results are presented in Table 10.

Table 8. Distances to Level B underwater disturbance thresholds for the pile driving activities proposed in this document.

Sound Source	Source Level dB RMS re 1 μPa at 1 m	Transmission Loss Coefficient	Disturbance Isopleths (m)	
			Impulsive 160 dB	Non-Impulsive 120 dB
Impact pile driving	203.8	20	154.9	NA
Vibratory pile driving	178.9	20	NA	881.0
Down-hole drilling	190	18.9	NA	5054.8
Vibratory pile extraction	174	20	NA	501.2

Table 9. Comparison of Level B zones versus monitoring zones.

Activity	Level B Zone	Monitoring Zone Radius
Pile removal	501.2 m (1644 ft)	1000 m (3281 ft)
Vibratory pile driving	881 m (2890 ft)	1000 m (3281 ft)
Impact pile driving	154.9 m (508 ft)	200 m (656 ft)
Down the hole drilling	5054.8 m (16,584 ft)	2000 m (6562 ft)

Level B zones were rounded up (or down in the case of down the hole drilling) for ease of monitoring by a PSO (Table 9). For more information on monitoring and extrapolations, see Mitigation Measures in Section 2.2.1.

Figure 9. Visual depiction of the disturbance thresholds listed in Table 8.
Yellow is impact hammering, green is vibratory hammering, vibratory down-hole drilling threshold is outlined in red, and blue is the monitoring zone for down-hole drilling.

Table 10. Distances to Level A underwater thresholds for injury for the pile driving activities proposed in this document.

Sound Source	**Source Level dB RMS re 1 µPa at 1 m**	**Transmission loss coefficient**	**Injury (Level A) Isopleths (m; SEL_{cum})**			
			Steller Sea Lions (Otariid pinnipeds)		**Humpback Whales (Low Frequency Cetaceans)**	
			Impulsive	**Non-Impulsive**	**Impulsive**	**Non-Impulsive**
			203 dB	**219 dB**	**183 dB**	**199 dB**
Vibratory Pile Extraction	152.4	20	NA	1.2	NA	12.4
Impact Pile Driving	203.8	20	4.3	NA	49	NA
Vibratory Pile Driving	178.9	20	NA	4.8	NA	0.5
Down-hole drilling	190	18.9	NA	4.4	NA	58.3

Potential exposure of Steller sea lions to in-water sound at the project site

As noted above in Section 4.3.2 (Distribution in the Project Area), there have been numerous counts of Steller sea lions in this area over the past few years. Aerial surveys from 2004 through 2006 indicated peak winter (October–April) counts at the Dog Bay float ranging from 27 to 33 animals per day (approximately 825 m from the project area, Figure 1; Wynne et al. 2011). However, ABR (2016) found that maximal weekly counts of sea lions at Dog Bay float were only loosely correlated with the weekly average of sea lion observations per hour within the construction area for the Kodiak Ferry Terminal and dock improvements construction project (approximately 500 m from the current project area).

The number of sea lions in Near Island Channel varies depending on the season and presence of commercial fishing vessels unloading their catch. HDR biologists visiting the Kodiak Ferry Terminal project site in February 2015 observed zero to about 25 Steller sea lions at one time in the Kodiak Ferry Terminal Project area (FHWA and DOT&PF 2015). Steller sea lion counts from November 2015 to June 2016 during Kodiak Ferry Terminal project activities averaged 33 individuals per day (ABR 2016). It has been estimated that about 40 "resident" sea lions pass by the project site each day (K.Wynne, pers. comm. to S. Speckman June 1, 2015 as cited in NMFS 2017).

The predicted distances to the in-air sound disturbance threshold for hauled-out pinnipeds (100 dB rms) will not extend more than 12 m from any type of pile being driven or extracted. Because there are no natural or artificial haulouts within this distance, surrounding docks are elevated high above the surface of the water and therefore inaccessible to Steller sea lions, and when feasible, the applicant plans to not work when the next-door facility is unloading fish (mitigation measure #1), no in-air disturbance to hauled-out individuals is anticipated as a result of the Sun'aq Tribe Dock Replacement Project.

The shut-down zones indicated in Table 2 will be thoroughly monitored, and, as indicated in Mitigation Measures 10-20, shut down procedures will be implemented (construction activities suspended) if a marine mammal is observed likely to enter the shutdown zone. Therefore, NMFS does not anticipate, and does not propose to authorize, any Level A harassment of Steller sea lions.

Exposure of Steller sea lions to disturbance-level sound associated with the pile driving operations of the Sun'aq Tribe dock replacement project was estimated by conservatively assuming that on any given day, approximately 40 unique individual Steller sea lions may be present at some time within the Level B disturbance zones during active pile extraction or installation.

To determine the exposure estimate, we estimate that 40 sea lions/day will be exposed over the 4 days of pile removal, 17 days of pile installation, and 23 days of steel pile installation, which is 1,760 potential exposures to sounds at or exceeding Level B thresholds during the Sun'aq Tribe Dock replacement project. Because the same individuals may be exposed to project-related noise multiple times, both within and among days, this calculation likely overestimates the number of individual sea lions exposed to Level B sound.

Potential exposure of humpback whales to pile-installation and extraction in Near Island Channel

As noted above in Section 8.3.1, humpback whales occur in nearshore waters around Kodiak Island, but are rarely seen in the action area. Based on the amount of vessel traffic in the narrow and shallow Near Island Channel, humpback whales were considered unlikely to be in the action area of the Kodiak Ferry Terminal project, and no incidental take was authorized (NMFS 2015). However, during the 110 days of marine mammal monitoring for that project, one humpback whale was observed in Near Island Channel in March 2016 (not during construction activities, so no shutdown was implemented) (ABR 2016). NMFS (2017) determined that humpbacks may also be present in the channel between Woody Island and Near Island Channel, however we do not anticipate project-related ensonified water in this area (Figure 9). NMFS (2017), following NMFS 2015b, estimated that at most, one individual humpback whale could be present in the area on half of the 110 days of in-water construction for the Kodiak transient float replacement project. For the current project, it is unlikely that any whales would enter waters ensonified by the vibratory hammer (Figure 9), and if they did, they would be readily observed by the PSO and operations would be suspended. Therefore only the down-hole drilling operations are likely to impact whales. The project-related ensonified waters for this part of the construction project are primarily adjacent to the shore; however, it is possible that a whale transiting between Near Island and Woody Island could enter the ensonified area and may not be detected by PSOs (Figure 9). Using the estimate from the Kodiak transient float replacement project of one humpback whale for half the project days, over the 44 days of the Sun'aq Dock replacement project, we estimate 22 humpback whales (from both listed and non-listed DPSs) will occur within waters ensonified by project activities at levels capable of harassing marine mammals. As explained in Section 4.3.1 of this Opinion, we assume that of these 22 estimated individuals, 20 (89% of total) would be from the non-listed Hawaii DPS, and 2 (10.5% of total) would be from the threatened Mexico DPS. Finally, 0.11 (rounded to zero; 0.5% of total) would be from the endangered WNP DPS. Given that such a small percent of WNP DPS humpback whales are in the Gulf of Alaska (Table 5), the ensonified area is not frequented by whales, and the small number of total whales we expect to be exposed to the ensonified area even assuming the maximum amount of possible in-water work, we do not expect any WNP DPS humpback whales will be exposed to the ensonified area. Thus we conclude that two humpback whales from a listed DPS is likely to be exposed to underwater sound that may cause harassment.

The shut-down zones indicated in Table 2 will be thoroughly monitored, and, as indicated in the mitigation measures (Section 2.1.2, Monitoring and Shutdown Zones), shut down procedures will be implemented (construction activities suspended) if a marine mammal is observed likely to enter the shutdown zone. Therefore, NMFS does not anticipate, and does not propose to authorize, any project-related Level A harassment of humpback whales.

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.

Responses of WDPS Steller Sea Lions to Pile Extraction and Installation

In-Air Sound

As discussed in Section 6.1.2 *Stressors not likely to adversely affect ESA-listed species*, no in-air disturbance of hauled-out Steller sea lions is anticipated to result from the Sun'aq Tribe Dock Replacement Project due to the short distance that such sounds will be above ambient sound levels [12 m (39 ft)] the lack of any sea lion haulouts within this distance, and the extremely low probability that wDPS Steller sea lions will approach within 12 m of active in-air sound sources of this intensity.

Underwater Sound

It is difficult to estimate the behavioral responses, if any, that wDPS Steller sea lions in the action area may exhibit in response to underwater sounds generated by project activities. Some Steller sea lions may find sounds produced by the project activities to be more annoying than do other sea lions, and these animals may depart the area or change from one behavioral state to another, while other Steller sea lions may exhibit no apparent behavioral changes at all (a common observation made by PSOs during the nearby Kodiak Ferry Terminal project). As discussed in previous sections, it appears that wDPS Steller sea lions in Kodiak Harbor have become habituated to the presence of, and sound associated with, shipping and fishing vessels and activities (Figure 10, Figure 11).

Figure 10. Steller sea lions hauled out on the Dog Bay float in St. Herman Harbor across from the project location.

Figure 11. Steller sea lions on and near a vessel delivering fish to a processing facility in Near Island Channel, near the project location.

The sounds produced during this project's activities are among the sources (pile-drivers and drills) they have been exposed to recently for the Kodiak transient dock and the ferry terminal expansions. We do not expect wDPS Steller sea lions to exhibit readily observable behavioral reactions to project activities based on acclimation to these and other ongoing industrial activities in the harbor. Thus we do not expect project activities to have an observable impact on feeding, breeding, or resting opportunities.

During monitoring completed for the Kodiak Ferry Terminal and Dock Improvements Project, only 4% of Steller sea lions observed in the Level B exposure area (51 of 1,281) exhibited behaviors associated with disturbance, and five of these observations appeared to be reactions to passing vessels or killer whales, rather than construction activity (ABR 2016). If Steller sea lions behave similarly for the Sun'aq Tribe Dock replacement project, then only 4%, or 70, of the

1,760 sea lions estimated to occur within the Level B zone of the project area during construction activities may exhibit detectable signs of disturbance (e.g., alert, fleeing, disorientation, or swimming away from the construction site). The soft start (ramp-up) procedures described in mitigation measure 12.B (Monitoring and Shutdown Zones) should further decrease project impacts to Steller sea lions because upon hearing the ramp up sounds, the Steller sea lions should avoid the area. The largest wDPS Steller sea lion Level A zone for this project is 4.8 m; an easily observable shutdown zone of 10 m will make it extremely unlikely that wDPS Steller sea lions are exposed to injury-level project-related sounds.

However, not all adverse responses are observable. Steller sea lions may exhibit a generalized stress response (elevated levels of hormones such as cortisol and corticosterone) to anthropogenic noise in their environment (ONR 2009; Rosen and Kumagai 2008). Little is known about long-term effects of stress on individuals and populations in marine mammals. Prolonged exposure to stress may result in immune system suppression, reproductive failure, accelerated aging, and slowed growth. Adrenal exhaustion has been observed in chronically stressed marine mammals (Clark et al. 2006). The estimated 44 days of pile extraction and installation will be staggered over a 3-month period, depending on weather and logistical constraints. These temporal breaks should allow wDPS Steller sea lions to recover from anticipated sound impacts that could occur during construction activities.

Responses of Humpback Whales to Pile Installation and Removal

As discussed previously, humpback whale presence in Near Island Channel is expected to be very low. Project-related ensonified waters for this project are primarily adjacent to the shallow shore, which is water that a humpback would rarely enter. But, it is possible for a whale to transit to the west of Woody Island within the ensonified area (Figure 9). Thus, it is likely that one listed humpback may be exposed to pile driving (specifically, down the hole drilling), but the exposure is expected to be short in duration and limited in its spatial extent. The annoyance will not occur in an area typically utilized by humpback whales because the affected area it is shallower and would constrict a whale's movements due to the close proximity of islands. In the event of a Level B disturbance, the most likely response of humpback whales to noise disturbance would be to avoid the area where pile installation and extraction sound is occurring (Malme et al. 1988; Richardson et al. 1995). A whale passing through the area of above-ambient sound southwest of Woody Island may exhibit a short-term change in movement or feeding behavior resulting in take through harassment. We therefore expect two such instances of take of a Mexico DPS humpback whale, and no take of Western North Pacific DPS humpback whales due to the small numbers of likely humpback takes overall and the very small fraction of local humpbacks that are likely to be from the Western North Pacific DPS.

NMFS does not propose to authorize Level A take for humpback whales due to their expected rarity in the action area and the included measures to avoid exposure to harmful levels of sound through implementation of Level A shutdown zones (Table 2).

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.

To date, the chronic noise of the Near Island Channel has not prevented Steller sea lions from using this area. Significant increases in the baseline activity and sound levels are not predicted within the action area in the foreseeable future.

Reasonably foreseeable future activities within and immediately adjacent to the Kodiak Inner Harbor would likely involve the placement of fill, dredging, or structures in the harbor, requiring authorization from the US Army Corps of Engineers and consultation pursuant to section 7 of the ESA. Therefore, such activities do not meet the ESA definition of cumulative effects and are not addressed here.

The State of Alaska has identified only aquaculture as an activity occurring within the Sun'aq Dock action area. To date, all three facilities in operation are only culturing seaweed; one of the three facilities in operation is located on land. Two other facilities are slated for permitting in 2019 (ADF&G 2019). The effects of these activities are discussed in Section 5.7 Nearshore Aquaculture.

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 10) to the environmental baseline (Section 9) 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 8).

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 Steller sea lion risk analysis

The survival and recovery of wDPS Steller sea lions within the action area may be affected by climate change, anthropogenic noise, marine vessel activity (strikes), pollution, and other coastal development activities. Despite these pressures, available trend information indicates that the number of wDPS Steller sea lions is increasing east of Samalga Pass, which includes the action area for this project.

The exposure and response analyses above lead us to conclude that endangered wDPS Steller sea lion individuals are likely to be exposed to sound levels exceeding the MMPA Level B acoustic threshold for harassment by the pile extraction and installation components of the proposed action, particularly from down hole drilling. No individuals are expected to be harmed (Level A exposure) from project activities.

We concluded in the Effects of the Action (Section 6 of this Opinion) that wDPS Steller sea lions may be harassed by the proposed activities. We anticipate that up to 1,760 exposures of wDPS Steller sea lions to Level B sounds (i.e., >160 dB from impact pile driving, and >120 dB from vibratory pile extraction/driving or down-hole drilling) will occur as a part of the proposed action. We expect that these takes will be experienced by much fewer than 1,760 individual Steller sea lions because some (perhaps many) individuals from the local resident group will be repeatedly exposed to sound in excess of 160 dB (for impulsive sources) or 120 dB (for non-impulsive sources).

Steller sea lions in the action area are likely often exposed to Level B sounds from continuous sound sources in Kodiak Harbor, such as marine vessel traffic. They continue to return to the area to haul out and seek food from fishing vessels and processing facilities. Level B sounds from the proposed action, which will occur for an estimated 23 days over a period of 3 months, are not expected to result in reductions in the likelihood of the survival or recovery of the wDPS Steller sea lion in the wild by reducing its numbers, reproduction, or distribution.

As indicated in Section 4.3.2 of this Opinion, the most recent comprehensive surveys estimate a total population of 53,303 wDPS Steller sea lions in Alaska (Muto et al. 2019). Additionally, the central Gulf of Alaska Region, which includes the action area, has the second highest positive non-pup count and pup count (4.33% per year and 4.22% per year, 2000-2015) of any of the nine wDPS Steller sea lion sub-regions (Muto et al. 2019). We conclude that harassment of up to 920 wDPS Steller sea lions that frequent the project area will result in minimal risk to the species. Many of these instances of take are expected to be repeated takes of the same habituated individuals that frequent the harbor. Thus, while harassment of wDPS Steller sea lions is likely, the Sun'aq Tribe's dock replacement project is not likely to result in appreciable reductions in the likelihood of the survival or recovery of the wDPS Steller sea lion in the wild by reducing its numbers, reproduction, or distribution.

8.2 Steller sea lion critical habitat risk analysis

As discussed in Section 4.1.1 Steller Sea Lion Critical Habitat, 20-mile aquatic zones surrounding rookeries and major haulout sites provide foraging habitats, prey resources, and refuge considered essential to the conservation of lactating female, juvenile, and non-breeding Steller sea lions (58 FR 45269; August 27, 1993). The action area for the Sun'aq Tribe dock replacement project is fully contained within Steller sea lion critical habitat associated with the 20-nautical mile radii around two major haulouts, located approximately 7 miles (11 km; Long Island haulout) and 14.5 miles (23 km; Kodiak/Cape Chiniak haulout) from the project footprint (Figure 5). However, the impacts of noise associated with this action on prey species is spatially limited to an area that is unsuitable as prey habitat such that the impacts to prey would be extremely unlikely to occur and additionally, prey are anticipated to leave the area due to other project activities such as barge positioning and in-water pile positioning prior to activities that could cause barotrauma (i.e. impact hammering). The only area that could have effects (barotrauma) on PBFs is the immediate vicinity of the project and the effects will be discountable and insignificant due to the reasons mentioned above.

8.3 Humpback whale risk analysis

During 110 days of monitoring from November 2015 to June 2016, a single humpback whale was observed in Near Island Channel on March 15, 2016, and this individual was transiting the channel, not stopping to rest or feed. Further, there is a probability of 89% that this whale was a member of the non-listed Hawaii humpback DPS (Wade et al. 2016). Humpback whales typically avoid this narrow, shallow, and heavily trafficked channel, whether or not construction activities are occurring in it. We anticipate that two individual threatened Mexico DPS humpback whales may be exposed to Level B sound levels associated with this project. Thus, the Sun'aq Tribe's dock replacement project is not likely to result in appreciable reductions in the likelihood of the survival or recovery of Mexico DPS humpback whales in the wild by reducing their numbers, reproduction, or distribution. Also, we anticipate that no endangered WNP DPS humpback whale will be exposed to Level B sound levels associated with this project. Thus, the Sun'aq Tribe's dock replacement project is not likely to result in appreciable reductions in the likelihood of the survival or recovery of the WNP DPS humpback whales in the wild by reducing their numbers, reproduction, or distribution.

9. CONCLUSION

After reviewing the current status of the potentially affected 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, Mexico DPS humpback whales, or WNP DPS humpback whales, nor to destroy or adversely modify designated 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. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of 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)(i) and (ii)).

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

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

The terms and conditions described below are nondiscretionary. USACE has a continuing duty to regulate the activities covered by this ITS. In order to monitor the impact of incidental take, USACE must monitor the progress of the action and its impact on the species as specified in the ITS (50 CFR 402.14(i)(3)). If USACE (1) fails 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) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

For this consultation, we anticipate that take will be by behavioral harassment only. Level A injurious take is neither anticipated nor authorized.

10.1 Amount or Extent of Take

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

As indicated in Section 6.2 above, the maximum amount of Level B sound exposure (interpreted for the purposes of this Opinion as incidental take by harassment) that is anticipated to occur during the Sun'aq Dock replacement project is:

- wDPS Steller sea lion – 1,760 individuals
- Mexico DPS humpback whale – 2 individuals

The anticipated temporal extent of take is from July 1 through September 30 during the year of construction.

To determine the exposure estimate, we estimate that 40 sea lions/day will be exposed over the 44 days of activity, which is 1,760 Steller sea lions that may be exposed to sounds at or exceeding Level B thresholds during the Sun'aq Tribe dock replacement project. Of the 1,760 Steller sea lions taken, many instances of take are expected to be repeated takes of the same individuals from the local resident group.

The project-related ensonified waters for the construction project are primarily near the shore; however, it is possible that a whale transiting between Near Island and Woody Island could enter the ensonified area and may not be detected by PSOs. Using the estimate from the Kodiak transient float replacement project of one humpback whale per project day, over the 44 days of the Sun'aq Dock replacement project, we estimate 22 humpback whales will be present, potentially not detected, and exposed to disturbance thresholds. As explained in Section 4.3.1 of this Opinion, we assume that of these 22 estimated individuals, 89%, or 20, would be from the non-listed Hawaii DPS, and 10.5%, or 2, would be from the threatened Mexico DPS.

Reinitiation of consultation is triggered if any Level A take occurs or more than the authorized number of Level B takes occur. This will be monitored by the PSOs and reported to the contact in the mitigation measures above.

10.2 Effect of the Take

The only take authorized for the Sun'aq Tribe's dock replacement project is take by acoustic harassment. No serious injuries or mortalities are anticipated nor authorized by this ITS. This Opinion assumes that exposure to major sound sources might disrupt one or more behavioral patterns that are essential to an individual animal's life history. Some responses, such as elevated levels of stress hormones, with no overt behavioral reaction, may not be observable. Although the biological significance of those behavioral responses remains unknown, this opinion has assumed that exposure to pile extraction and driving might disrupt one or more behavioral patterns that are essential to an individual animal's life history. However, as indicated in Sections 6 through 8 above, any such behavioral disruptions are not expected to affect the reproduction, survival, or recovery of wDPS Steller sea lions or Mexico DPS humpback whales.

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 jeopardize the continued existence of the wDPS Steller sea lion or the Mexico DPS humpback whale or destroy or adversely modify Steller sea lion critical habitat.

10.3 Reasonable and Prudent Measures (RPMs)

"Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR § 402.02).

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 wDPS Steller sea lions and Mexico DPS humpback whales resulting from the proposed action.

> RPM #1: The USACE must require the Sun'aq Tribe to conduct operations in a manner that will minimize impacts to wDPS Steller sea lions and Mexico DPS humpback whales that occur within or in the vicinity of the project action area.
>
> RPM #2: The USACE must require the Sun'aq Tribe to implement a comprehensive monitoring and reporting program to ensure that wDPS Steller sea lions and Mexico DPS humpback whales are not taken in numbers or in a manner not anticipated by this Opinion.

The Corps will ensure implementation of all project mitigation measures listed in this Opinion (see Section 2.1.2).

10.4 Terms and Conditions

"Terms and conditions" implement the reasonable and prudent measures (50 CFR 402.14). 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, the USACE 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. The USACE has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14).

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 implement RPM #1:

1. The USACE must condition its permit to require the permittee to obtain a Marine Mammal Protection Act Incidental Harassment Authorization (IHA) and to comply with all measures described therein as a means to minimize take of threatened and endangered marine mammal species.

To implement RPM #2:

1. In addition to any final 90-day report provided by the applicant to meet requirements in the IHA, monthly PSO reports are also required. Below we provide details about what must be included in the reports.
    a) The reporting period for each monthly PSO report will be the entire calendar month, and reports will be submitted by close of business on the 5th business day of the month following the end of the reporting period (e.g., a monthly report covering July 1 through 31, 2021, will be submitted to NMFS Alaska Region by close of business [i.e., 5:00 pm, AKDT] on August 6, 2021).
    b) Completed marine mammal observation records, in electronic format, will be provided to NMFS Alaska Region in monthly reports.
    c) Observer report data will include the following for each listed marine mammal observation (or "sighting event" if repeated sightings are made of the same animal[s]):
        1) Species, date, and time for each sighting event
        2) Number of animals per sighting event and number of adults/juveniles/calves/pups per sighting event
        3) Primary, and, if observed, secondary behaviors of the marine mammals in each sighting event
        4) Geographic coordinates for the observed animals, with the position recorded by using the most precise coordinates practicable (coordinates must be recorded in decimal degrees, or similar standard, and defined coordinate system)

5) Time and description of most recent project activity prior to marine mammal observation

6) Environmental conditions as they existed during each sighting event, including, but not limited to:

   - Beaufort Sea State
   - Weather conditions
   - Visibility (km/mi)
   - Lighting conditions
   - Percentage of ice cover

d) Observer report data will also include the following for each take of a marine mammal that occurs in the manner and extent as described in Section 2.1.2 of this opinion:

1) All information listed under Item 2b, above

2) The distance marine mammals were spotted from operations and associated sound isopleth for active sound source, and cause of take (e.g. Steller sea lion within the Level B 160 dB isopleth approximately XX meter from pile installation)

3) Time the animal(s) entered the zone, and, if known, the time it exited the zone

4) Any mitigation measures implemented prior to and after the animal entered the zone

5) An estimate of the number (by species) of:

(i) pinnipeds that have been exposed to the installation or extraction of piles (extrapolated from visual observation) at received levels greater than or equal to 120 dB re 1 µPa (rms) for vibratory and down the hole drilling, or at received levels greater than or equal to 160 dB re 1 µPa (rms) for impact pile driving, with a discussion of any specific behaviors those individuals exhibited; and

(ii) cetaceans that have been exposed to installation or extraction of piles (extrapolated from visual observation) at received levels greater than or equal to 120 dB re 1 µPa (rms) for vibratory and down the hole drilling, or at received levels greater than or equal to 160 dB re 1 µPa (rms) for impact pile driving with a discussion of any specific behaviors those individuals exhibited.

2) A draft report will be submitted to Greg Balogh at greg.balogh@noaa.gov within 90 calendar days of the completion of all project activities that require marine mammal monitoring. A final report will be prepared and submitted to NMFS within 30 days following receipt of comments from NMFS on the draft report. To the extent practicable, the PSOs will record behavioral observations that may make it possible to determine if the same or different individuals are being "taken" as a result of project activities over the course of a single day.

a) The report must document:

1) Days of observation;

2) Length of observation periods;

3) Locations of observation stations used each day;

4) Numbers, species, dates, group sizes, and locations of marine mammals observed;
5) Type of work taking place while marine mammals were observed;
6) Descriptions of the type and duration of any sound-generating work occurring and soft start (ramp-up) procedures used while marine mammals were being observed;
7) Distances to marine mammal sightings, including closest approach to construction activities;
8) Descriptions of any observable marine mammal behavior in the Level A and Level B zones;
9) Details of all shutdown events, including when work was stopped and resumed, and whether they were due to presence of marine mammals in the Level A zones, inability to clear the hazard area due to low visibility, or other reasons;
10) Actions performed to minimize impacts to marine mammals; and
11) Refined take estimates based on the numbers of Steller sea lions and humpback whales observed during the course of pile installation and removal activities.

The report must include tables, text, and maps documenting details of marine mammal observations. Full documentation of monitoring methods, an electronic copy of the observation data spreadsheet, and a summary of results will also be included in the report. An example of a spreadsheet that could be used is available from NMFS AKR upon request.

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).

Additional research on the sound attenuation of steel 12-inch piling installation, particularly the use of down the hole drilling, is important to determining level A and B zones for marine mammals. NMFS suggests the Sun'aq Tribe consider including an SSV study as part of their project.

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

12. REINITIATION OF CONSULTATION

As provided in 50 CFR 402.16(a), 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.

13. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

13.1 Utility

This document records the results of an interagency consultation. The information presented in this document is useful to USACE and NMFS 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/resources/all-publications. The format and name adhere to conventional standards for style.

13.2 Integrity

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

13.3 Objectivity

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

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

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

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

14. REFERENCES

ABR. 2016. Protected Species Monitoring at the Kodiak Ferry Terminal & Dock Improvements Project, Kodiak, Alaska, 201502016. Project No. 68938/0003109.Prepared for R & M Consultants, Inc. Anchorage, AK. 51+ pp.

Alaska Department of Environmental Conservation (ADEC). 2016. Water Permit Search Website. http://dec.alaska.gov/Applications/Water/WaterPermitSearch/Search.aspx

Allen, A., and R. P. Angliss. 2015. Alaska marine mammal stock assessments, 2014. U.S. Dep. Commer., NOAA Tech Memo. NMFS-AFSC-301, 304 p. http://dx.doi.org/10.7289/V5NS0RTS.

Au, W. W. L., A. A. Pack, M. O. Lammers, L. M. Herman, M. H. Deakos, and K. Andrews. 2006. Acoustic properties of humpback whale songs. Journal of the Acoustical Society of America **120**:1103-1110.

Au, W. W. L., A. N. Popper, and R. R. Fay. 2000. Hearing by whales and dolphins. Springer-Verlag, New York, NY.

Benjamins, S., W. Ledwell, J. Huntington, and A. R. Davidson. 2012. Assessing changes in numbers and distribution of large whale entanglements in Newfoundland and Labrador, Canada. Marine Mammal Science **28**:579-601.

Brownell, R. L., T. Kasuya, W. P. Perrin, C. S. Baker, Cipriano, Urban, D. P. DeMaster, M. R. Brown, and P. J. Clapham. 2000. Unknown status of the western North Pacific humpback whale population: a new conservation concern. Page 5.

Buehler, D., P.E.R. Oestman, J. Reyff, K. Pommerenck, and B. Mitchell. 2015. Technical guidance for assessment and mitigation of the hydroacoustic effects of pile driving on fish. Division of Environmental Analysis, California Department of Transportation, 532 pp.

Burkanov, V., and T. R. Loughlin. 2005. Distribution and abundance of Steller sea lions on the Asian coast, 1720's–2005. Mar. Fish. Rev. 67(2):1-62.

Calambokidis, J., G.H Steiger, J.M Straley, L.M. Herman, S. Cerchio, D.R. Salden, J. Urbán R., J.K. Jacobsen, O. von Ziegesar, K.C. Balcomb, C.M. Gabriele, M.E. Dahlheim, S. Uchida, G. Ellis, Y. Miyamura, P. Ladrón de Guevara P., M. Yamaguchi, F. Sato, S.A.Mizroch, L. Schlender, K. Rasmussen, J. Barlow and T.J. Quinn II. 2001. Movements and population structure of humpback whales in the North Pacific. Mar. Mamm. Sci. 17(4): 769-794.

Calkins, D.G., and K.W. Pitcher 1982. Population assessment, ecology, and trophic relationships of Steller sea lions in the Gulf of Alaska. Pages 447-546 In: Environmental assessment of the Alaska continental shelf. U.S. DOC and U.S. DOI. Final Reports of Principal Investigators, Volume 19.

Cascadia Research. 2003. Status of Humpback Whales and Human Impacts. Final Programmatic Report Submitted to: National Fish and Wildlife Foundation 2003-0170-019.

Ciminello, C., R. Deavenport, T. Fetherston, K. Fulkerson, P. Hulton, D. Jarvis, B. Neales, J. Thibodeaux, J. Benda-Joubert, and A. Farak. 2012. Determination of Acoustic Effects on Marine Mammals and Sea Turtles for the Atlantic Fleet Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement. NUWC-NPT Technical Report 12,071. Newport, Rhode Island: Naval Undersea Warfare Center Division.

Clark, L.S., D.F. Cowan, and D.C. Pfeiffer. 2006. Morphological changes in the Atlantic bottlenose dolphin (*Tursiops truncatus*) adrenal gland associated with chronic stress. Journal of Comparative Pathology 135:208-216.

COSEWIC. 2011. COSEWIC assessment and status report on the humpback whale *Megaptera novaeangliae* North Pacific population in Canada. COSEWIC Committee on the Status of Endangered Wildlife in Canada.

D'Vincent, C. G., R. M. Nilson, and R. E. Hanna. 1985. Vocalization and coordinated feeding behavior of the humpback whale in southeastern Alaska. Scientific Reports of the Whales Research Institute **36**:41–47.

Denes, S. L., G.J. Warner, M.E. Austin, and A.O. MacGillivray. 2016. Hydroacoustic Pile Driving Noise Study – Comprehensive Report. Document 001285, Version 2.0. Technical report by JASCO Applied Sciences for Alaska Department of Transportation & Public Facilities.

Dolphin, W. F. 1987a. Observations of humpback whale, Megaptera novaeangliae and killer whale, Orcinus orca, interactions in Alaska: Comparison with terrestrial predator-prey relationships. Canadian Field-Naturalist **101**:70-75.

Doney, S. C., M. Ruckelshaus, J. E. Duffy, J. P. Barry, F. Chan, C. A. English, H. M. Galindo, J.M. Grebmeier, A. B. Hollowed, N. Knowlton, J. Polovina, N. N. Rabalais, W. J. Sydeman, and L. D. Talley. 2012. Climate change impacts on marine ecosystems. *in* C. A. Carlson, andS. J. Giovannoni, eds. Ann. Rev. Mar. Sci. 4: 11-37.

Everitt, R., C. Fiscus, and R. DeLong. 1980. Northern Puget Sound marine mammals. Interagency Energy. Environment R & D Program Report, US EPA, EPA-600/7-80-139. US EPA, Washington, DC.

FHWA and DOT&PF (Federal Highways Administration and Department of Transportation & Public Facilities). 2015. Revised Endangered Species Act Section 7 Biological Assessment for listed species and critical habitats under the jurisdiction of the National Marine Fisheries Service: Kodiak Ferry Terminal and Dock Improvements Project. State Project #68938. Federal Highways Administration Alaska Division, pp. 89. Juneau, Alaska.

Fiscus, C.H. 1961. Growth in Steller sea lion. Journal of Mammalogy 42(2):218-223.

Florezgonzalez, L., J. J. Capella, and H. C. Rosenbaum. 1994. Attack of killer whales (*Orcinus orca*) on humpback whales (*Megaptera novaeangliae*) on a South American Pacific breeding ground. Marine Mammal Science **10**:218-222.

Ford, J. K. B., A. L. Rambeau, R. M. Abernethy, M. D. Boogaards, L. M. Nichol, and L. D. Spaven. 2009. An assessment of the potential for recovery of humpback whales off the Pacific Coast of Canada.

Ford, J. K. B., and R. R. Reeves. 2008. Fight or flight: antipredator strategies of baleen whales. Mammal Review **38**:50-86.

Frame, D.J. and D.S. Stone. 2013. Assessment of the first consensus prediction on climate change. Nature Climate Change. 3:357–359.

Frazer, L. N., and E. Mercado. 2000. A sonar model for humpback whale song. Ieee Journal of Oceanic Engineering **25**:160-182.

Halvorsen MB, Casper BM, Woodley CM, Carlson TJ, Popper AN. 2011. Predicting and mitigating hydroacoustic impacts on fish from pile installations. NCHRP Research Results Digest 363, Project 25–28, National Cooperative Highway Research Program: Transportation Research Board, National Academy of Sciences, Washington, D.C. 1–26. NCHRP website. Accessed 2012 November 12.

Halvorsen MB, Casper BM, Woodley CM, Carlson TJ, Popper AN. 2012. Threshold for Onset of Injury in Chinook Salmon from Exposure to Impulsive Pile Driving Sounds. PLOS ONE 7: e38968 10.1371/journal.pone.0038968

Hashagen, K. A., G. A. Green, and B. Adams. 2009. Observations of humpback whales, *Megaptera novaeangliae*, in the Beaufort Sea, Alaska. Northwestern Naturalist **90**:160-162.

Helker, V. T., M. M. Muto, K. Savage, S. Teerlink, L. A. Jemison,K.Wilkinson, and J. Jannot. 2017. Human-caused mortality and injury of NMFS-managed Alaska marine mammal stocks, 2011-2015. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-354,112 p.

Helker, V. T., M. M. Muto, K. Savage, S. Teerlink, L. A. Jemison, K.Wilkinson, and J. Jannot. 2019. Human-caused mortality and injury of NMFS-managed Alaska marine mammal stocks, 2012-2016. U.S. Dep. Commerc., NOAA Tech. Memo. NMFS-AFSC-392, 71 p.

Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. vander Linden, X. Dai, K. Maskell and C.A. Johnson. 2001. Climate Change 2001: The Scientific Basis.Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change Published for the Intergovernmental Panel on Climate Change. Cambridge University Press. http://www.grida.no/climate/ipcc_tar/wg1/pdf/WG1_TAR-Front.pdf

Iafrate, J., S.L. Watwood, E.A. Reyier, D.M. Scheidt, G.A. Dossot, and S.E. Crocker. Effects of pile driving on the residency and movement of tagged reef fish. PLOS One 11(11): e0163638.

IPCC (Inter-Governmental Panel on Climate Change). 1990. *Climate Change: The IPCC Scientific Assessment*. J.T. Houghton, G. J. Jenkins, & J. J. Ephraums, eds. Cambridge Univ. Press. https://www.ipcc.ch/publications_and_data/publications_ipcc_first_assessment_1990_wg1.shtml

IPCC 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change T.F. Stocker, D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley, eds. Cambridge University Press. 1535 pp. http://www.ipcc.ch/report/ar5/wg1/

Allen, M.R., O.P. Dube, W. Solecki, F. Aragón-Durand, W. Cramer, S. Humphreys, M. Kainuma, J. Kala, N. Mahowald, Y. Mulugetta, R. Perez, M. Wairiu, and K. Zickfeld, 2018: Framing and Context. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.

Jemison, L. A., G. W. Pendleton, L. W. Fritz, K. K. Hastings, J. M. Maniscalco, A. W. Trites, and T. S. Gelatt. 2013. Inter-population movements of Steller sea lions in Alaska with implications for population separation. PLoS ONE **8**:e70167.

Johnson, J. H., and A. A. Wolman. 1984. The Humpback Whale, *Megaptera novaeangliae*. Marine Fisheries Review **46**:300-337.

Kastelein, R.A., R. van Schie, W. Verboom, and D. Haan. 2005. Underwater hearing sensitivity of a male and a female Steller sea lion (*Eumetopias jubatus*) J. Acous. Soc. Amer. 118:1820-1829.

Ketten, D. R. 1997. Structure and function in whale ears. Bioacoustics-the International Journal of Animal Sound and Its Recording **8**:103-135.

Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet, and M. Podesta. 2001. Collisions between ships and whales. Marine Mammal Sci. 17(1): 35-75.

Learmonth, J. A., C. D. Macleod, M. B. Santos, G. J. Pierce, H. Q. P. Crick, and R. A. Robinson. 2006. Potential effects of climate change on marine mammals. Oceanography and Marine Biology: An Annual Review **44**:431-464.

Lambertsen, R. H. 1992. Crassicaudosis: a parasitic disease threatening the health and population recovery of large baleen whales. Rev. Sci. Technol., Off. Int. Epizoot. **11**:1131-1141.

Laughlin, J. 2011. Port Townsend Dolphin Timber Pile Removal – Vibratory Pile Monitoring Technical Memorandum. Washington State Department of Transportation.

Loughlin, T.R., D.J. Rugh, and C.H. Fiscus. 1984. Northern Sea Lion Distribution and Abundance. Journal of Wildlife Management 48(3):729-740.

Loughlin, T. R., and A. E. York. 2000. An accounting of the sources of Steller sea lion, *Eumetopias jubatus*, mortality. Marine Fisheries Review 62:40-45.

Lefebvre, K. A., L. Quakenbush, E. Frame, K. B. Huntington, G. Sheffield, R. Stimmelmayr, A. Bryan, P. Kendrick, H. Ziel, T. Goldstein, J. A. Snyder, T. Gelatt, F. Gulland, B. Dickerson, and V. Gill. 2016. Prevalence of algal toxins in Alaskan marine mammals foraging in a changing arctic and subarctic environment. Harmful Algae **55**:13-24.

Lien, J., and G. B. Stenson. 1986. Blue whale ice strandings in the Gulf of St, Lawrence (1878-1986).

Malme, C. L., B. Wursig, J. E. Bird, and P. Tyack. 1988. Observations of feeding gray whale responses to controlled industrial noise exposure. In: Sackinger, W. M. et al. (Eds) Port and Ocean Engineering Under Arctic Conditions. Volume II. University of Alaska, Fairbanks, AK Geophys. Inst.

Merdsoy, B., J. Lien, and A. Storey. 1979. An Extralimital Record of a Narwhal (*Monodon monoceros*) in Hall's Bay, Newfoundland. Canadian Field-Naturalist **93**:303-304.

Miller, A. J., A. W. Trites, and H. D. G. Maschner, 2005: Ocean climate changes and the Steller sea lion decline. Antarct. Res. USA, 19, 54–63.

Muslow, J. and C. Reichmuth. 2010. Psychophysical and electrophysiological aerial audiograms of a Steller sea lion (Eumetopias jubatus). Journal of the Acoustical Society of America 127:2692-2701.

Muto, M.M., V. T. Helker, R. P. Angliss, P. L. Boveng, J. M. Breiwick, M. F. Cameron, P. J. Clapham, S. P. Dahle, M. E. Dahlheim, B. S. Fadely, M. C. Ferguson, L. W. Fritz, R. C. Hobbs, Y. V. Ivashchenko, A. S. Kennedy, J. M. London, S. A. Mizroch,R. R. Ream, E. L. Richmond, K. E. W. Shelden, K. L. Sweeney, R. G. Towell, P. R. Wade, J. M. Waite, and A. N. Zerbini. 2019. Alaska marine mammal stock assessments, 2018. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-393, 399 p.

NASA. 2016. Scientific consensus: Earth's climate is warming. http://climate.nasa.gov/scientific-consensus/

Naessig, P. J., and J. M. Lanyon. 2004. Levels and probable origin of predatory scarring on humpback whales (*Megaptera novaeangliae*) in east Australian waters. Wildlife Research **31**:163-170.

Neilson, J., C. Gabriele, J. Straley, S. Hills, and J. Robbins. 2005. Humpback whale entanglement rates in southeast Alaska. Pages 203-204 Sixteenth Biennial Conference on the Biology of Marine Mammals, San Diego, California.

Neilson, J.L., C.M. Gabriele, A.S. Jensen, K. Jackson, and J.M. Straley. 2012. Summary of reported whale-vessel collisions in Alaskan waters. Journal of Marine Biology 2012: Article ID 106282, 18 pp.

NMFS. 2008. Recovery Plan for the Steller Sea Lion (*Eumetopias jubatus*). Revision. National Marine Fisheries Service, Silver Spring, Maryland.

NMFS. 2013. Concurrence Letter-Proposed DOT Kodiak Ferry Dock Reconstruction. PCTS# AKR-2013-9277. July 29, 2013.

NMFS. 2015a. Biological Opinion, Kodiak Ferry Dock and Terminal Improvements. NMFS Alaska Region AKR-2015-9446, July 31, 2015. 61 pp. https://alaskafisheries.noaa.gov/sites/default/files/biop-kodiak-ferry-terminal0715.pdf

NMFS 2015b. Finding of no significant impact for the issuance of an Incidental Harassment Authorization to the Alaska Department of Transportation and Public Facilities for the take of marine mammals incidental to a Kodiak Ferry Terminal and dock improvement project. http://www.nmfs.noaa.gov/pr/permits/incidental/construction/alaskadotkodiak_2015iha_fonsi.pdf https://alaskafisheries.noaa.gov/sites/default/files/biop-kodiak-ferry-terminal0715.pdf

NMFS. 2016a. Occurrence of Distinct Population Segments (DPSs) of Humpback Whales off Alaska. National Marine Fisheries Service, Alaska Region. Revised December 12, 2016.

NMFS. 2016b. Interim Guidance on the Endangered Species Act Term "Harass." Signed October 21, 2016, Donna S. Weiting.

NMFS 2017. Biological Opinion – Kodiak Transient Float Construction. NMFS Consultation Number: AKR-2016-9596.

NMFS. 2018. 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.

NPS (National Park Service) 2016. Conserving Pinnipeds in Pacific Ocean Parks in response to climate change. https://www.nps.gov/articles/park-science-vol-28-no-2-summer-2011.htm

NRC (National Research Council) 2012. Climate Change: Evidence, Impacts, and Choices: Anserrs to common questions about the science of climate change. https://www.nap.edu/read/14673/chapter/1.

Oreskes, N. 2004. The Scientific Consensus on Climate Change. Science. 306 (5702): 1686.

ONR (Office of Naval Research) 2009. Final Workshop Proceedings for Effects of Stress on Marine Mammals Exposed to Sound Arlington, VA, 4-5 November 2009. http://www.onr.navy.mil/Science-Technology/Departments/Code-32/All-Programs/Atmosphere-Research 322/~/media/Files/32/ONR_StressWorkshop_FINAL.ashx

Payne, R. S. 1970. Songs of the humpback whale. Capitol Records, Hollywood, CA.

Perry, S. L., D. P. DeMaster, and G. K. Silber. 1999. The Great Whales: History and Status of Six Species Listed as Endangered Under the U.S. Endangered Species Act of 1973: a special issue of the Marine Fisheries Review. Marine Fisheries Review **61**:1-74.

Reichmuth, C. and B.L. Southall. 2011. Underwater hearing in California sea lions (Zalophus californianus): Expansion and interpretation of existing data. Marine Mammal Science 28:358-393.

Richardson, W. J., C. R. Greene, Jr., C. I. Malme, and D. H. Thomson. 1995. Marine mammals and noise. Academic Press, Inc., San Diego, CA.

Rosen, D. A. S., and Kumagai, S. (2008). Hormone changes indicate that winter is a critical period for food shortages in Steller sea lions. Journal of Comparative Physiology B, 178, 573–583.

Sharpe, F. A., and L. M. Dill. 1997. The behavior of Pacific herring schools in response to artificial humpback whale bubbles. Canadian Journal of Zoology-Revue Canadienne De Zoologie **75**:725-730.

Silber, G. K. 1986a. The relationship of social vocalizations to surface behavior and aggression in the Hawaiian humpback whale (Megaptera novaeangliae). Canadian Journal of Zoology **64**:2075-2080.

Smith, S. C., and H. Whitehead. 1993. Variation in the feeding success and behavior of Galapagos sperm whales (Physeter macrocephalus) as they relate to oceanographic conditions. Canadian Journal of Zoology 71: 1991-1996.

Southall, B. L., A. E. Bowles, W. T. Ellison, J. J. Finneran, R. L. Gentry, C. R. Greene, Jr., D. Kastak, D. R. Ketten, J. H. Miller, P. E. Nachtigall, W. J. Richardson, J. A. Thomas, and P. L. Tyack. 2007. Marine mammal noise exposure criteria: initial scientific recommendations. Aquatic Mammals **33**:411-521.

Stimpert, A. K., D. N. Wiley, W. W. L. Au, M. P. Johnson, and R. Arsenault. 2007. 'Megapclicks': Acoustic click trains and buzzes produced during night-time foraging of humpback whales (Megaptera novaeangliae). Biology Letters **3**:467-470.

Thompson, P. O., W. C. Cummings, and S. J. Ha. 1986. Sounds, source levels, and associated behavior of humpback whales, Southeast Alaska. Journal of the Acoustical Society of America **80**:735-740.

Thompson, T. J., H. E. Winn, and P. J. Perkins. 1979. Mysticete sounds. Pages 403-431 *in* H. E. Winn and B. L. Olla, editors. Behavior of Marine Animals: Current Perspectives in Research Vol. 3: Cetaceans. Plenum Press, New York, NY.

Trites, A. W., A. J. Miller, H. D. G. Maschner, M. A. Alexander, S. J. Bograd, J. A. Calder, A. Capotondi, K. O. Coyle, E. Di Lorenzo, B. P. Finney, E. J. Gregr, C. E. Grosch, S. R. Hare, G. L. Hunt, J. Jahncke, N. B. Kachel, H.-J. Kim, C. Ladd, N. J. Mantua, C. Marzban, W. Maslowski, R. Mendelssohn, D. J. Neilson, S. R. Okkonen, J. E. Overland, K. L. Reedy-Maschner, T. C. Royer, F. B. Schwing, J. X. L. Wang and A. J. Winship. 2007. Bottom-up forcing and the decline of Steller sea lions (Eumetopias jubatus) in Alaska: Assessing the ocean climate hypothesis. Fisheries Oceanography 16: 46-67. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.552.2934&rep=rep1&type=pdf

Tyack, P., and H. Whitehead. 1983. Male competition in large groups of wintering humpback whales. Behaviour **83**:132-154.

Tyack, P. L. 1981. Interactions between singing Hawaiian humpback whales and conspecifics nearby. Behavioral Ecology and Sociobiology **8**:105-116.

Vanderlaan, A.S. and C.T. Taggart. 2007. Vessel collisions with whales: The probability of lethal injury based on vessel speed. Marine Mammal Science 23(1): 144-156.

Wade, P., V.N Burkanov, M.E. Dalheim, N.A. Friday, L.W. Fritz, T. R. Loughlin, S.A. Mizroch, M.M. Muto, D. W. Rice, L. G. Barrett-Lennard, N.A. Black, A.M. Burdin, J. Calambokidis, S. Cerchio, J.K.B. Ford, J.K. Jacobsen, C.O. Matkin, D. Matkin, A.V.

Mehta, R.J. Small, J.M. Straley, S.M. McCluskey, G. R. Van Blaricom, P.J. Clapham. 2007. Killer whales and marine mammal trends in the North Pacific – a reexamination of evidence for sequential megafauna collapse and the prey-switching hypothesis. Marine Mammal Science 23:766-802.

Wade, P. R., T. J. Quinn II, J. Barlow, C. S. Baker, A. M. Burdin, J. Calambokidis, P. J. Clapham, E. Falcone, J. K. B. Ford, C. M. Gabriele, R. Leduc, D. K. Mattila, L. Rojas-Bracho, J. Straley, B. L. Taylor, J. Urbán R., D. Weller, B. H. Witteveen, and M. Yamaguchi. 2016. Estimates of abundance and migratory destination for North Pacific humpback whales in both summer feeding areas and winter mating and calving areas. Paper SC/66b/IA21 submitted to the Scientific Committee of the International Whaling Commission, June 2016, Bled, Slovenia.

Warner, G. and M. Austin. 2016. *Alaska DOT Hydroacoustic Pile Driving Noise Study: Kodiak Monitoring Results and Comparison with IHA Threshold Distances*. JASCO Document 01211, Version 1.0. Technical report by JASCO Applied Sciences for Alaska Department of Transportation and Public Facilities.

Watkins, W. A. 1986. Whale reactions to human activities in Cape Cod waters. Marine Mammal Science **2**:251-262.

Whitehead, H. 1997. Sea surface temperature and the abundance of sperm whale calves off the Galapagos Islands: implications for the effects of global warming. Reports of the international Whaling Commission 47: 941-944.

Whitehead, H., and C. Glass. 1985. Orcas (killer whales) attack humpback whales. (Orcinus orca). Journal of Mammalogy **66**:183-185.

Wieting, D. 2016. Interim Guidance on the Endangered Species Act Term "Harass". National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD. October 21, 2016.

Winn, H. E., P. J. Perkins, and T. C. Poulter. 1970. Sounds of the humpback whale. Pages 39-52 7th Annual Conference on Biological Sonar and Diving Mammals, Stanford Research Institute, Menlo Park.

Winn, H. E., and N. E. Reichley. 1985. Humpback whale Megaptera novaeangliae (Borowski, 1781). Handbook of marine mammals **3**:241-273.

Winship, A.J., A.W. Trites, and D.G. Calkins. 2001. Growth in body size of the Steller sea lion. Journal of Mammalogy 82:500-519.

Witteveen, B.H., K.M. Wynne and T.J. Quinn II. 2007. A Feeding Aggregation of Humpback Whales *Megaptera Novaeangliae* near Kodiak Island, Alaska: Historical and Current Abundance Estimation. AK Fish. Res. Bull 12(2): 187-196. https://seagrant.uaf.edu/map/gap/marine-mammals/publications/witteveen07afrb.pdf

Wynne, K.M. and B. Witteveen. 2005. Opportunistic Aerial Sightings of Large Whales within Steller Sea Lion Critical Habitat in the Kodiak Archipelago. Pp. 105-119 IN: Gulf Apex Predator-prey Study (GAP). K.M. Wynne, R. Foy and L. Buck eds. Final Report FY2001-2003, NOAA Grant NA16FX1270. 241 pp. https://seagrant.uaf.edu/map/gap/reports/GAP_01.pdf

Wynne, K.W., R. Foy, and L. Buck. 2011. Gulf Apex Predator-prey Study (GAP): FY2004-06 Standardized Comprehensive Report NOAA Federal Program http://seagrant.uaf.edu/map/gap/reports/GAP-04-06_Final.pdf