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

Alaska Marine Lines' Lutak Dock RoRo Modification Project, Lutak Inlet, AK
(POA-2019-00108)

NMFS Consultation Number: AKRO-2019-01875

Action Agencies: *National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division (PR1), and the U.S. Corps of Engineers, Alaska District, Regulatory Division (Corps)*

Affected Species and Determinations:

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

Consultation Conducted By: National Marine Fisheries Service, Alaska Region

Issued By:

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Regional Administrator

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TABLE OF CONTENTS

ACCESSIBILITY OF THIS DOCUMENT ... 3
LIST OF TABLES ... 7
LIST OF FIGURES ... 8
TERMS AND ABBREVIATIONS ... 9
1. INTRODUCTION ... 10
1.1 BACKGROUND ... 10
1.2 CONSULTATION HISTORY ... 11
2. DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA ... 13
2.1 PROPOSED ACTION ... 13
2.1.1 Proposed Activities ... 13
2.1.2 Mitigation Measures ... 16
2.2 ACTION AREA ... 22
3. APPROACH TO THE ASSESSMENT ... 25
4. RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT ... 28
4.1 SPECIES NOT LIKELY TO BE ADVERSELY AFFECTED BY THE ACTION ... 28
4.1.1 Sperm Whales ... 28
4.2 CLIMATE CHANGE ... 30
4.3 STATUS OF LISTED SPECIES LIKELY TO BE ADVERSELY AFFECTED BY THE ACTION ... 34
4.3.1 Western DPS Steller Sea Lions ... 34
4.3.1.1 Population Structure and Status ... 34
4.3.1.2 Distribution ... 35
4.3.1.3 Occurrence in the Action Area ... 35
4.3.1.4 Reproduction and Growth ... 37
4.3.1.5 Feeding and Prey Selection ... 37
4.3.1.6 Diving and Social Behavior ... 38
4.3.1.7 Vocalization, Hearing, and Other Sensory Capabilities ... 38
4.3.1.8 Threats to the Species ... 39
4.3.1.9 Recovery Goals ... 41
4.3.1.10 Critical Habitat ... 41
4.3.2 Mexico DPS Humpback Whales ... 42
4.3.2.1 Population Structure and Status ... 42
4.3.2.2 Distribution ... 42
4.3.2.3 Occurrence in the Action Area ... 44
4.3.2.4 Reproduction and Growth ... 46
4.3.2.5 Feeding and Prey Selection ... 47
4.3.2.6 Diving Behavior ... 47
4.3.2.7 Vocalization and Hearing ... 47
4.3.2.8 Threats to the Species ... 48
4.3.2.9 Recovery Goals ... 50
4.3.2.10 Critical Habitat ... 50
5. ENVIRONMENTAL BASELINE ... 51
5.1 FACTORS AFFECTING SPECIES WITHIN THE ACTION AREA ... 51
5.1.1 Climate Change ... 52
5.1.2 Coastal Development ... 52

5.1.3 Pollutants and Discharges ... 52
5.1.4 Vessel Interactions ... 52
5.1.5 Natural and Anthropogenic Noise ... 54
5.1.6 Competition for Prey ... 55
5.1.7 Scientific Research ... 55

6. EFFECTS OF THE ACTION ... 57

6.1 PROJECT STRESSORS ... 57
6.1.1 Stressors Not Likely to Adversely Affect ESA-Listed Species ... 57
6.1.1.1 Vessel Strike ... 57
6.1.1.2 Habitat Alteration ... 58
6.1.1.3 Airborne Sounds from Pile Driving ... 60
6.1.1.4 Underwater Sounds from Tension Anchors ... 60
6.1.2 Stressors Likely to Adversely Affect ESA-Listed Species ... 61
6.1.2.1 Acoustic Thresholds ... 61
6.1.3 Summary of Effects ... 64
6.2 EXPOSURE ANALYSIS ... 65
6.2.1 Exposure to Noise from Pile Driving ... 65
6.2.1.1 Exposure Assumptions ... 65
6.2.1.2 Calculated Acoustic Impact Zones ... 66
6.2.1.3 Ensonified Area ... 67
6.2.1.4 Anticipated Densities and Exposures of Listed Species ... 72
6.2.2 Exposure to Vessel Noise ... 73
6.2.2.1 Results of Vessel Noise Exposure ... 73
6.3 RESPONSE ANALYSIS ... 74
6.3.1 Responses to Noise from Pile Driving ... 74
6.3.1.1 Temporary Threshold Shift ... 75
6.3.1.2 Permanent Threshold Shift ... 76
6.3.1.3 Non-Auditory Physiological Effects ... 76
6.3.1.4 Disturbance Reactions ... 76
6.3.1.5 Auditory Masking ... 78
6.3.2 Probable Responses to Noise from Pile Driving ... 78
6.3.2.1 Prey ... 79
6.3.3 Responses to Vessel Traffic ... 79

7. CUMULATIVE EFFECTS ... 81

7.1 TRANSPORTATION ... 81
7.2 COMMERCIAL FISHING ... 81
7.3 TOURISM ... 82
7.4 SUMMARY OF CUMULATIVE EFFECTS ... 82

8. INTEGRATION AND SYNTHESIS ... 83

8.1 WDPS STELLER SEA LION RISK ANALYSIS ... 83
8.2 MEXICO DPS HUMPBACK WHALE RISK ANALYSIS ... 84

9. CONCLUSION ... 86

10. INCIDENTAL TAKE STATEMENT ... 87

10.1 AMOUNT OR EXTENT OF TAKE ... 87
10.2 EFFECT OF THE TAKE ... 88
10.3 REASONABLE AND PRUDENT MEASURES (RPMS) ... 89

10.4 TERMS AND CONDITIONS 89
11. CONSERVATION RECOMMENDATIONS 92
12. REINITIATION OF CONSULTATION 93
13. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW 94
13.1 UTILITY 94
13.2 INTEGRITY 94
13.3 OBJECTIVITY 94
14. REFERENCES 95

LIST OF TABLES

TABLE 1: Calculated distances to Level A and B thresholds for humpback whales and Steller sea lions from pile driving/drilling activities for the Lutak Dock RoRo Modification Project (from SLR 2019) 23
TABLE 2: Listing status and critical habitat designation for marine mammals considered in this opinion 28
TABLE 3: Potential threats and impacts to wDPS Steller sea lion recovery (reproduced from Muto *et al.* 2019) 39
TABLE 4: 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) 42
TABLE 5: PTS Onset Acoustic Thresholds for Level A Harassment (NMFS 2018a) 63
TABLE 6: Underwater marine mammal hearing groups (NMFS 2018a) 63
TABLE 7: Parameters used in development of acoustic propagation calculations; assumes source levels referenced at 10m (from SLR 2019) 66
TABLE 8: Summary of calculated distances to Level A and B thresholds for humpback whales and Steller sea lions from various methods of pile driving/drilling activities for the Lutak Dock RoRo Modification Project (from SLR 2019) 67
TABLE 9: Ensonified areas (km2) by Pile Driving Method and Species 68
TABLE 10: Summary of instances of exposure associated with the proposed pile driving/removal and DTH hammering resulting in incidental take of ESA-listed species by Level A and Level B harassment 88

LIST OF FIGURES

FIGURE 1: General Vicinity of Lutak Dock Modification Project (SLR 2019) 12
FIGURE 2: Existing and Proposed Configurations of the RoRo Ramp on Lutak Dock 15
FIGURE 3: Vertical and Diagonal Piles with Pile Cap 16
FIGURE 4: Map depicting the location of the three project PSOs 18
FIGURE 5: Map of the Action Area and Level B Harassment Zones 24
FIGURE 6: Map of tagged sperm whale movements in Southeast Alaska (from SEASWAP 2020) 29
FIGURE 7: Algal toxins detected in 13 species of marine mammals from Southeast Alaska to the Arctic from 2004 to 2013 (reproduced from Lefebvre *et al.* 2016) 33
FIGURE 8: Map of Alaska showing the NMFS Steller sea lion survey regions, rookery, and haulout locations in Alaska, with line at 144°W depicting separation of the eDPS and wDPS (Fritz *et al.* 2016) 35
FIGURE 9: Average monthly Steller sea lion counts at Gran Point, 2002-2018 (reproduced from ECO49 2019, based upon Womble and Hastings unpubl. data) 36
FIGURE 10: Seasonal foraging ecology of Steller sea lions; reproduced with permission from (Womble *et al.* 2009) 38
FIGURE 11: Abundance by summer feeding areas (blue), and winter breeding areas (green), with 95% confidence limits in parentheses. Migratory destinations from feeding area to breeding area are indicated by arrows with width of arrow proportional to the percentage of whales moving into winter breeding area (Wade *et al.* 2016). 43
FIGURE 12: Seasonal distribution of humpback whales in Southeast Alaska, with each dot indicating a group sighting/encounter. (a) 1991, 1992, 1993, 2006 and 2007, representing five spring, five summer, and four fall surveys; (b) 1994-2005, representing four spring, nine summer, and eleven fall surveys (Reproduced from Dalheim *et al.* 2009) 45
FIGURE 13: Aerial view of the Lutak Dock. Approximate project footprint circled in red. 53
FIGURE 14: High Risk Areas for Vessel Strike in northern Southeast Alaska; used with permission from Neilson *et al.* 2012 54
FIGURE 15: Maps depicting the Level A and Level B ensonified areas by pile driving method per species: (a) Steller sea lions – Level A, (b) Humpbacks - Level A, (c) All species – Level B 69

TERMS AND ABBREVIATIONS

µPa	Micro Pascal
AKR	Alaska Region
AMHS	Alaska Marine Highway System
AML	Alaska Marine Lines, Inc.
BA	Biological Assessment
°C	Celsius
Corps	United States Army Corps of Engineers Alaska District, Regulatory Division
dB re 1µPa	Decibel referenced 1 microPascal
DPS	Distinct Population Segment
DTH	Down-the-hole (drilling)
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESCA	Endangered Species Conservation Act
°F	Fahrenheit
ft	Feet
GBNPP	Glacier Bay National Park and Preserve
GOA	Gulf of Alaska
Hz	Hertz
IHA	Incidental Harassment Authorization
ITS	Incidental Take Statement
km	Kilometers
km^2	Square Kilometers
m	Meter
mi	Mile
MHW	Mean high water
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NMFS AKR	National Marine Fisheries Service, Alaska Region
OHC	Ocean heat content
Opinion	Biological Opinion
PBF	Physical or Biological Features (of critical habitat)
PCE	Primary Constituent Element
PR1	NMFS Office of Protected Resources – Permits and Conservation Division
PSO	Protected Species Observers
PTS	Permanent Threshold Shift
rms	Root Mean Square
RoRo	Roll-on/roll-off steel cargo bridge
SEL	Sound exposure level
SPLASH	Structure of Populations, Levels of Abundance and Status of Humpback Whales
TTS	Temporary Threshold Shift
USFWS	United States Fish and Wildlife Service

1. INTRODUCTION

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

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

In this document, the action agencies are NMFS, Office of Protected Resources Permits and Conservation Division (PR1), which proposes to issue an incidental harassment authorization (IHA) permitting Marine Mammal Protection Act (MMPA) Level B take of western DPS Steller sea lions and Mexico DPS humpback whales, and the U.S. Army Corps of Engineers, Alaska District, Regulatory Division (Corps), which proposes to issue a Department of the Army permit to authorize removal and installation of structures in navigable waters of the United States. These authorizations are associated with Alaska Marine Lines' (AML) proposal to replace the existing degraded roll-on/roll-off steel cargo bridge (RoRo) ramp on the west side of the existing Lutak Dock, located approximately four miles (mi) north of Haines, Alaska, in Lutak Inlet (Figure 1), with a work window between mid-June and end of October 2020. The consulting agency for this proposal is NMFS's Alaska Region (AKR). This document represents NMFS AKR's biological opinion (opinion) on the effects of this proposal on endangered and threatened species and designated critical habitat.

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

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

1.1 Background

This opinion is based on information provided in the October 2019 IHA application (ECO49 2019), December 2019 biological assessment (BA; SLR 2019), and the proposed IHA (84 FR

65117). Other sources of information relied upon include updated project proposals, emails and telephone conversations between NMFS AKR, PR1, Corps, and AML's subcontractors. A complete record of this consultation is on file at NMFS AKR's Juneau office.

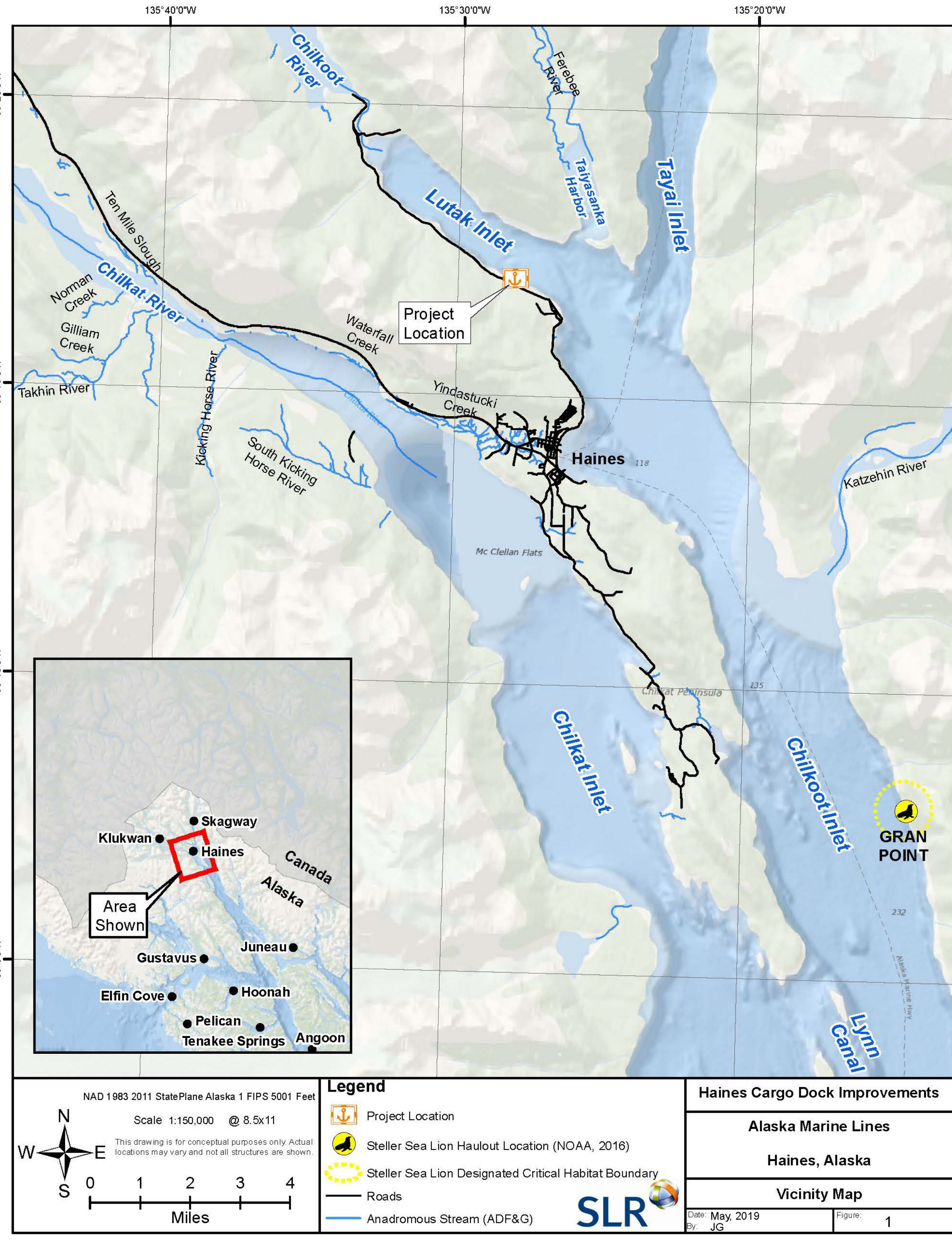
This opinion considers the effects of demolition of the existing RoRo on Lutak Dock, construction of a new RoRo, and the associated proposed issuance of an IHA. These actions have the potential to affect the endangered western distinct population segment (DPS) Steller sea lion (*Eumetopias jubatus*), the threatened Mexico DPS humpback whale (*Megaptera novaeangliae*), and the endangered sperm whale (*Physeter macrocephalus*). No designated critical habitat is located within the action area; the nearest designated critical habitat for Steller sea lions is at the Gran Point haulout, located 21.2 km (13.2 mi) south of the project area. Critical habitat for humpback whales has been proposed, but no final determination has been made. No critical habitat has been designated or proposed for sperm whales.

1.2 Consultation History

Beginning mid-December 2018, NMFS AKR engaged in technical assistance with the applicant (AML) and their subcontractors regarding this project. On July 9, 2019, PR1 received an IHA application from AML's subcontractors for the non-lethal take of marine mammals incidental to a dock modification construction project in Lutak Inlet of southeast Alaska between mid-June and the end of October 2020. NMFS AKR received a corresponding BA from AML's subcontractors on July 18, 2019. On August 26, 2019, the Corps notified NMFS AKR that they had designated Tom Mortensen Associates as their non-federal representative during the pre-consultation phase. The consultancies ECO49 Consulting, LLC (ECO49) and SLR International Corp. (SLR) were subcontracted by Tom Mortensen Associates. After various communications among the consultants, PR1 and NMFS AKR, a final, revised IHA application was submitted to PR1 October 18, 2019 (ECO49 2019), and the IHA application was deemed complete on October 23, 2019.

On November 1, 2019, PR1 and the Corps each submitted a request to initiate formal section 7 consultation to NMFS AKR given that they determined the proposed project may affect, and was likely to adversely affect, ESA-listed species. PR1's initiation package was deemed complete and NMFS AKR initiated consultation on November 26, 2019; the Corps' initiation package was deemed complete and NMFS AKR initiated consultation upon the receipt of a revised BA (SLR 2019) on December 23, 2019. Communications with the applicant's consultants (Tom Mortensen Assoc., ECO49, and SLR) continued into February with requests for clarification and more information regarding the project description. On February 16, NMFS AKR shared a copy of section 2 (*Description of the Proposed Action and Action Area*) of the draft biological opinion with PR1, the Corps, and the applicant's consultants. Final comments were received from the applicant's consultants on February 19, 2020.

FIGURE 1: General Vicinity of Lutak Dock Modification Project (SLR 2019)



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.

This opinion considers the effects of the Corps permitting AML's demolition, re-construction, and improvement of the existing RoRo ramp on the Lutak Dock in the northern end of Lynn Canal, near Haines, AK, as well as PR1's issuance of an IHA to take ESA-listed marine mammals by harassment under the MMPA incidental to the dock modification. The project will be authorized from June 15, 2020 through October 2020.

AML uses the Lutak Dock for docking tugs and the loading and unloading of barges. The multipurpose facility is also used by Alaska Marine Highway System (AMHS) ferries and Delta Western tugs and barges. The purpose of this proposed action is to replace the degraded RoRo ramp located on the west side of the existing Lutak Dock. The existing RoRo barge dock has been inspected and found to be well beyond its intended service life, and a new RoRo facility is required to ensure that the community of Haines has a method to receive supplies.

The new RoRo facility would be constructed in the same general location as the existing RoRo facility, but would be oriented to improve the current barge docking from barge-end loading/unloading to barge-side loading/unloading. The new ramp will connect to the existing loading area and will extend into deep water as needed for barge access (Figure 2). This change will increase the efficiency and safety of the cargo barge operations and will increase the safety of navigation and mooring at the existing AML commercial cargo dock facility.

2.1.1 Proposed Activities

The proposed action involves the following components: 1) removal of the existing structure; 2) construction of a causeway; and 3) construction of the new structure. The footprint of the project is approximately one acre (0.0016 square mile) around the project site. The entire project is anticipated to take no more than 25 days, with all activity occurring between mid-June and the end of October 2020.

1) Removal of Existing Structure: Prior to construction of the new RoRo structure, the existing RoRo structure, comprised of a steel cargo bridge with steel floats and associated berthing dolphins and piles, would be removed. The existing structure is supported by twelve 16-inch diameter steel piles, which would be removed, ideally via direct pull method. If that doesn't work, the piles will be removed by using a crane-mounted vibratory hammer located on a barge or land. If the hammer is on a barge, a tug boat would be used to position the barge. Should vibratory methods be insufficient to remove the piles, the piles would be cut at the mudline with an underwater shielded metal-arc cutter[1], or left in place. This phase of the project is expected to take four days, with removal of existing piles occurring in one day.

[1] Shielded metal-arc cutting is a process in which the metal is cut by the intense heat of the arc. The arc creates intense heat, 7,000°F to 11,000°F, concentrated in a very small area (US Navy 2002).

2) Construction of a Causeway: To facilitate the project, a causeway will be constructed below the new dock by filling 0.3 acres with approximately 4,000 cubic yards of gravel and 1,000 cubic yards of riprap below mean high water (MHW; Figure 2). There are no pile driving activities associated with this component of the project. This component is anticipated to take one week.

3) Construction of New RoRo Structure: The construction of a new 120-foot by 24-foot RoRo structure involves constructing a 40-foot wide by 40-foot long concrete abutment within the causeway; installing a 46-foot long by 15-foot wide steel float below MHW*;* driving or DTH drilling 13 vertical or diagonal steel pipe piles ranging in diameter from 24 inches to 36 inches; and installation of a 120-foot long by 24-foot wide steel bridge over navigable waters. Pile driving is the loudest noise-making activity associated with this phase of the project. This phase of the project is expected to take up to 14 days, with pile driving taking up to seven days.

The construction equipment needed for the work will travel to and from the project location at the Lutak Dock using the normal marine transit routes. All materials such as the piles, the steel float and the 120 ft x 24 ft steel bridge will be transported to the Lutak Dock project site by AML barges as cargo on their ongoing scheduled barge cargo service to Haines. The equipment would be mobilized and demobilized at Lutak Dock. Should the selected contractor (yet to be determined) decide to place the pile driving hammer on a barge instead of land, a tug will be employed to position the barge. Should the contractor decide to use a barge and tug, it is likely the marine route to and from the project site will follow normal marine transit routes. If required, the contractor's tug and barge would only need to travel to and from the project site a single time.

Of the 13 piles to be installed, three vertical 30-inch diameter piles will support the concrete abutment, four vertical 24-inch diameter piles will be used to construct two float strut dolphins, and six diagonal 36-inch diameter piles will be used for constructing two breasting dolphins (Figure 2). Piles will be driven into the marine sand and gravel to a depth of 40 feet or more below the mudline using a crane-mounted vibratory and/or impact hammer located on a barge. Vertical piles (i.e., king piles) and diagonal piles (i.e., batter piles) used for the dolphins are installed in groups of three, consisting of one vertical and two diagonal piles (Figure 3). After installation of the vertical pile, a pile cap with angled leaders is attached. This guides the two diagonal piles into the soil at the proper angle. The tips of the diagonal piles are cut at an angle which allows for a flat, horizontal surface for the hammer to strike when the pile is aligned in the leader of the pile cap. Thus, the same hammers (impact and vibratory) are used to drive both the vertical and diagonal piles. Once all three piles are installed, they are permanently welded together to the pile cap.

It may take up to 60 minutes of vibratory driving to set a single pile. If impact hammering is used, about 700 strikes would be needed to drive each of the piles to a sufficient depth, which would require about 15 minutes of hammering. Unless DTH drilling or auger drilling is required, it is estimated that about 3 hours (maximum) would be required to drive and proof each pile, which would be done the same day. Only one pile would be driven at a time; multiple piles would not be driven concurrently.

FIGURE 2: Existing and Proposed Configurations of the RoRo Ramp on Lutak Dock

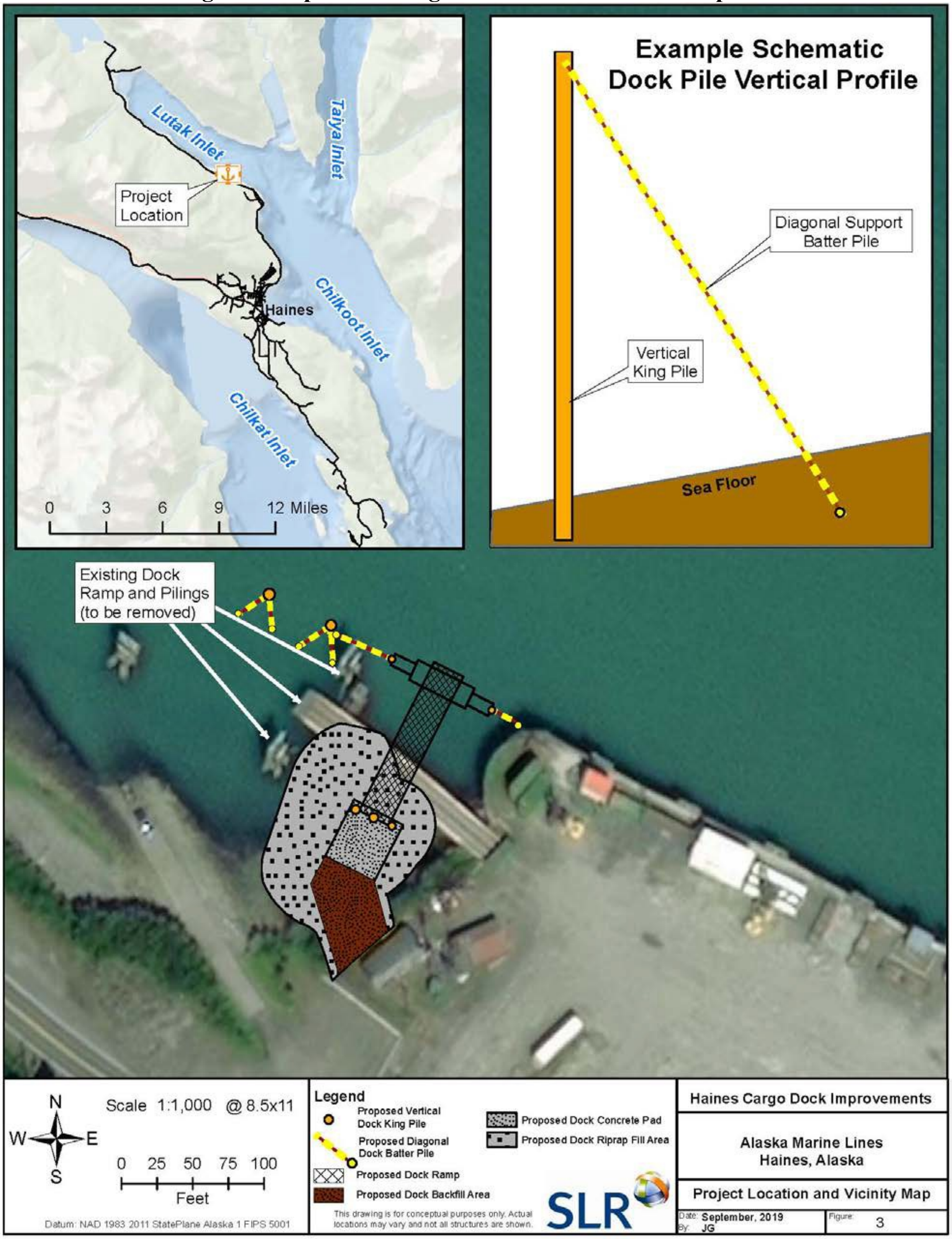


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FIGURE 3: Vertical and Diagonal Piles with Pile Cap

There is the potential that bedrock may be encountered before the full required pile depth is achieved. In such cases, piles would be installed using both vibratory and either DTH drilling or traditional auger drilling methods. Initially a vibratory hammer would be used to drive the sediment until bedrock is reached (~60 minutes). A DTH hammer (e.g., Numa) would be used to drill and socket the pile into bedrock. The DTH hammer uses a drill that operates below the pile and advances it along with the drilling action. This could take up to an additional 180 minutes. The other option would be to use a traditional auger drill to create the socket hole in bedrock and then install the pile with an impact hammer. Below the tip of the pile, a steel bar would be grouted into the hole and once set, a jack would be applied to the top of the bar and the tension rod would be locked off to plates at the top of the pile.

Under the best-case scenario, using solely vibratory and impact driving, five piles could be set in a single day. If DTH drilling is needed, it would be used the same day following vibratory driving, with the worst-case scenario being that only two piles could be set and drilled in one day. Therefore, the duration of drilling activity for the 13 piles could be as short as three days or as long as seven days. When taking into consideration that one day is required for removing the existing piles, the worst-case scenario is that pile driving/pulling and DTH drilling activities would require a total of eight days, all occurring from June 15, 2020 through October 2020.

2.1.2 Mitigation Measures

Best management practices (BMPs) and other conservation measures will be practiced during pile driving and construction activities to avoid or minimize potential adverse impacts to the aquatic environment. Mitigation measures to reduce total takes (e.g. seasonal operational windows, shutdown periods) would be employed throughout all construction in-water work at the dock. The following monitoring and mitigation measures were compiled based upon information provided in the BA, IHA application, and draft IHA.

Monitoring and Reporting

- Qualified protected species observers (PSOs), as defined in the IHA, will be used throughout all pile removal and drilling activities and will monitor Level-A and Level-B harassment zones. PSOs will scan the waters using binoculars, and/or spotting scopes, and will use a handheld GPS or range-finder device to verify the distance to each sighting from the project site. All PSOs will be trained in marine mammal identification and behaviors and are required to have no other project-related tasks while conducting monitoring.

- To minimize exposure of any marine mammal to Level A harassment, a 200 m shutdown zone will be implemented for all species. The shutdown zone is designed to minimize the potential for injury and would prevent Level A take for Steller sea lions.

- Three PSOs will be stationed around the project site (Figure 4) to monitor for marine mammals entering the disturbance zones during construction activities following the conditions stipulated by the IHA. One will be located at Lutak Dock where pile driving will occur to monitor the shutdown zone (200 m from dock). Two additional observers will be placed at vantage points near the edges of the Level A harassment zone for low frequency cetaceans during impact pile driving; one PSO will be near Tanani Point southeast of the project location, and one PSO will be northwest of the project location. The placement of PSOs allows for the outer edge of the largest Level A zone and a majority of the Level B zones to be monitored for all species.

- Since not all of the level B zone will be observable by PSOs, they will calculate take for the project by extrapolating the observable area to the total size of the Level B zone.

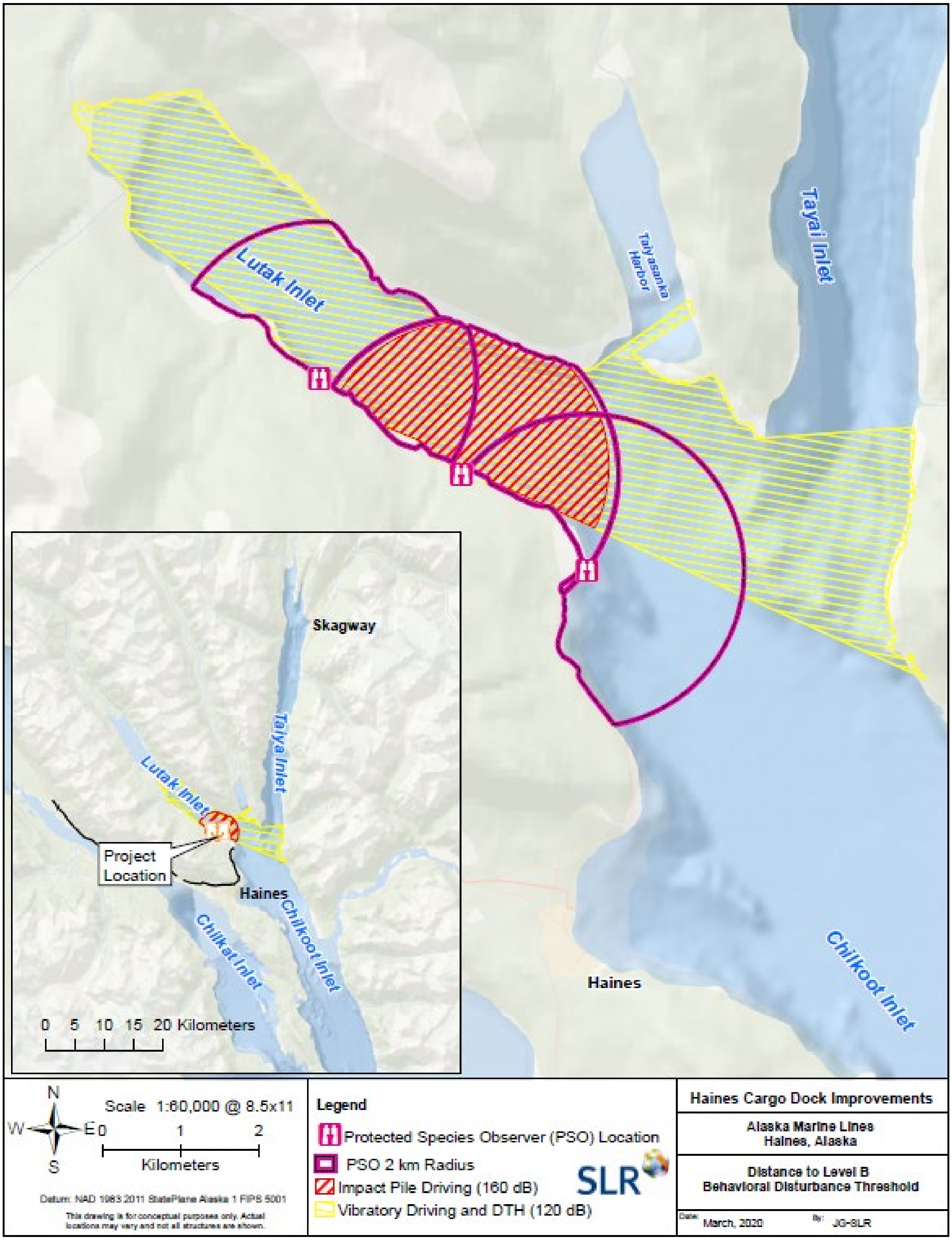
- Monitoring will be conducted 30 minutes before, during, and 30 minutes after pile driving and removal activities. Observers will record all incidents of marine mammal occurrence, regardless of distance from activity, and will document any behavioral reactions in concert with distance from piles being driven or removed. Pile driving activities include the time to install or remove a single pile or series of piles, as long as the time elapsed between uses of the pile driving equipment is no more than thirty minutes.

- PSOs will record animal behaviors for all marine mammals observed within the Level A and Level B zones.

- The presence of a marine mammal documented by a PSO within the Level B harassment zone during pile driving would constitute a Level B take. If any animal is observed approaching their respective Level A zone, the animal would have already been exposed to Level B thresholds and would be recorded as a Level B take.

- In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a prohibited manner, such as serious injury or mortality, the PSO on watch will immediately call for the cessation of the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected

FIGURE 4: Map depicting the location of the three project PSOs



Resources, NMFS, and NMFS Alaska Regional Office (Greg.Balogh@noaa.gov and Aleria.Jensen@noaa.gov). Activities will not resume until NMFS reviews the circumstances of the prohibited take.

- In the event that an injured or dead marine mammal is observed (where that injury or death is not related to project activities), AML will report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and the NMFS Alaska Stranding Hotline (1-877-925-7773) and/or by email to the Alaska Regional Stranding Coordinator (Mandy.Keogh@noaa.gov), following the protocols outlined in the IHA.

- A draft marine mammal monitoring report following criteria identified in the IHA is to be submitted to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, as well as NMFS Alaska Regional Office (Greg.Balogh@noaa.gov) within 90 days after the completion of construction. The "90-day" report will be subject to review and comment by NMFS. Any recommendations made by NMFS will be addressed in the final report prior to acceptance by NMFS.

- In addition to the requirements identified in the IHA for the "90-day" report, the PSOs will also develop and submit to NMFS AKR (Greg.Balogh@noaa.gov) a digital spreadsheet that specifies the date and start/stop times each pile was removed/installed; the method(s) used to remove/install each pile; the size of each pile; and any other information which may be useful in aiding the assessment of effects of different pile driving activities on ESA-listed species.

Pile Removal and Installation Mitigation

The mitigation measures proposed by AML during pile removal/driving or drilling activities are described below. These measures are intended to reduce impacts on marine mammals to the lowest extent practicable during in-water construction.

- Scheduled pile driving activities will not overlap with high densities of marine mammal prey that occur March 1 through May 31; therefore, marine mammal densities during the proposed construction window (mid-June through October) are reduced.

- Pile driving activities will only be conducted during daylight hours when it is possible to visually monitor for marine mammals. If poor environmental conditions restrict visibility (e.g., from excessive wind or fog, high Beaufort state) of the 200m shutdown zone, pile installation will be delayed.

- If possible, piles will be removed by using a direct pull method or by cutting piles off at the mudline instead of using a vibratory hammer. To the extent practicable, AML will drive all piles with a vibratory hammer (i.e., until a desired depth is achieved or to refusal) or use DTH drilling prior to using an impact hammer. In addition, the minimum hammer energy needed to safely install the piles will be used.

- To minimize disturbance and harm to marine mammals from pile driving noise, AML will implement a "soft-start" procedure to allow animals to leave the area prior to full sound exposure. Specifically, AML will use the soft-start technique at the beginning of impact pile driving each day, or if pile driving has ceased for more than 30 minutes. The requirement for a soft start for impact driving is to initiate sound with an initial set of three strikes from the impact hammer at reduced energy followed by a 1-minute waiting period, then two subsequent three strike sets.

- In-water pile driving activities will not commence, or in the case of a shutdown, re-commence, until the 200 m shutdown zone is free of marine mammals for at least 30 minutes, or an animal previously observed in the shutdown zone is confirmed to have moved outside of and is on a path away from the shutdown zone.

- AML will discontinue all in-water work whenever an ESA-listed marine mammal for which take has not been authorized is likely to enter the Level A or Level B harassment zones. Work will not recommence until the animal is observed outside of the Level B zone or has not been seen within the Level B zone for at least 30 minutes.

- If unauthorized take occurs, AML will immediately cease all in-water work and will report the incident to: 1) the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, and 2) NMFS Alaska Regional Office (Greg.Balogh@noaa.gov and Aleria.Jensen@noaa.gov). Activities will not resume until NMFS and the action agency reinitiate formal consultation.

Vessel Strike Avoidance

- Project vessels will adhere to the Alaska Humpback Whale Approach Regulations when transiting to and from the project site (see 50 CFR §§ 216.18, 223.214, and 224.103(b)). These regulations require that all vessels:
  a. Not approach within 100 yards of a humpback whale, or cause a vessel or other object to approach within 100 yards of a humpback whale,
  b. Not place vessel in the path of oncoming humpback whales causing them to surface within 100 yards of vessel,
  c. Not disrupt the normal behavior or prior activity of a whale, and
  d. Operate at a slow, safe speed when near a humpback whale (safe speed is defined in regulation (see 33 CFR § 83.06)).

- Vessels will also follow the NMFS Marine Mammal Code of Conduct for other species of marine mammals which recommend maintaining a minimum distance of 100 yards; not encircling or trapping marine mammals between boats, or boats and shore; and putting engines in neutral if approached by a whale or other marine mammal to allow the animals(s) to pass.

- If a marine mammal comes within 10 meters of in-water operations other than pile-driving (which have a 200 m shutdown zone), operations will cease and vessels will reduce speed to the minimum level required to maintain steerage and safe working conditions.

General Construction Mitigation

AML will perform construction in accordance with the best guidance available (e.g., BMPs and mitigation measures) to avoid and minimize, to the greatest extent possible, impacts on the environment, ESA species, designated critical habitats, and species protected under the MMPA. Mitigation measures include:

- The dock will be maintained in a manner that does not introduce any pollutants or debris into the harbor or cause a migration barrier for fish.
- Fuels, lubricants, and other hazardous substances will not be stored below the ordinary highwater mark.
- The project will adhere to an appropriate spill response plan and spill response equipment will be maintained on-site to mitigate the risk of accidental discharge of petroleum hydrocarbons. Oil booms will be readily available for containment should any releases occur.
- The contractor will check for leaks daily on any equipment, hoses, and fuel storage that occur at the project site.
- All chemicals and petroleum products will be properly stored to prevent spills.
- No petroleum products, cement, chemicals, or other deleterious materials will be allowed to enter surface waters.
- Properly sized equipment will be used to drive piles.

2.2 Action Area

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

The action area for this project includes: (1) the area in which construction activities will take place, and (2) the maximum ensonified harassment area as a result of the pile removal and installation activities (see Table 1). No transit routes are included because Lutak Dock is the terminus of a commercially-used transit route, the construction equipment will be transported to/from Lutak Dock using AML's regularly scheduled cargo barges, and mobilization/demobilization of construction equipment will occur onsite. The action area encompasses 22.2 square kilometers (km^2), and includes Lutak Inlet and portions of Taiyasanka Harbor, Tayai Inlet, and Chilkoot Inlet (Figure 5).

Within this area, the sound source with the greatest propagation distance is anticipated to be associated with pile driving using a vibratory hammer or DTH drill, which can produce sounds at or above the Level B harassment zone, 120 dB re 1µPa (rms), out to a distance of 46.4 km (28.8 mi) from the sound source. The 120 dB isopleth was chosen because that is where we anticipate pile driving noise levels would approach ambient noise levels (i.e., the point where no measurable effect from the project would occur). While project noise may propagate beyond the

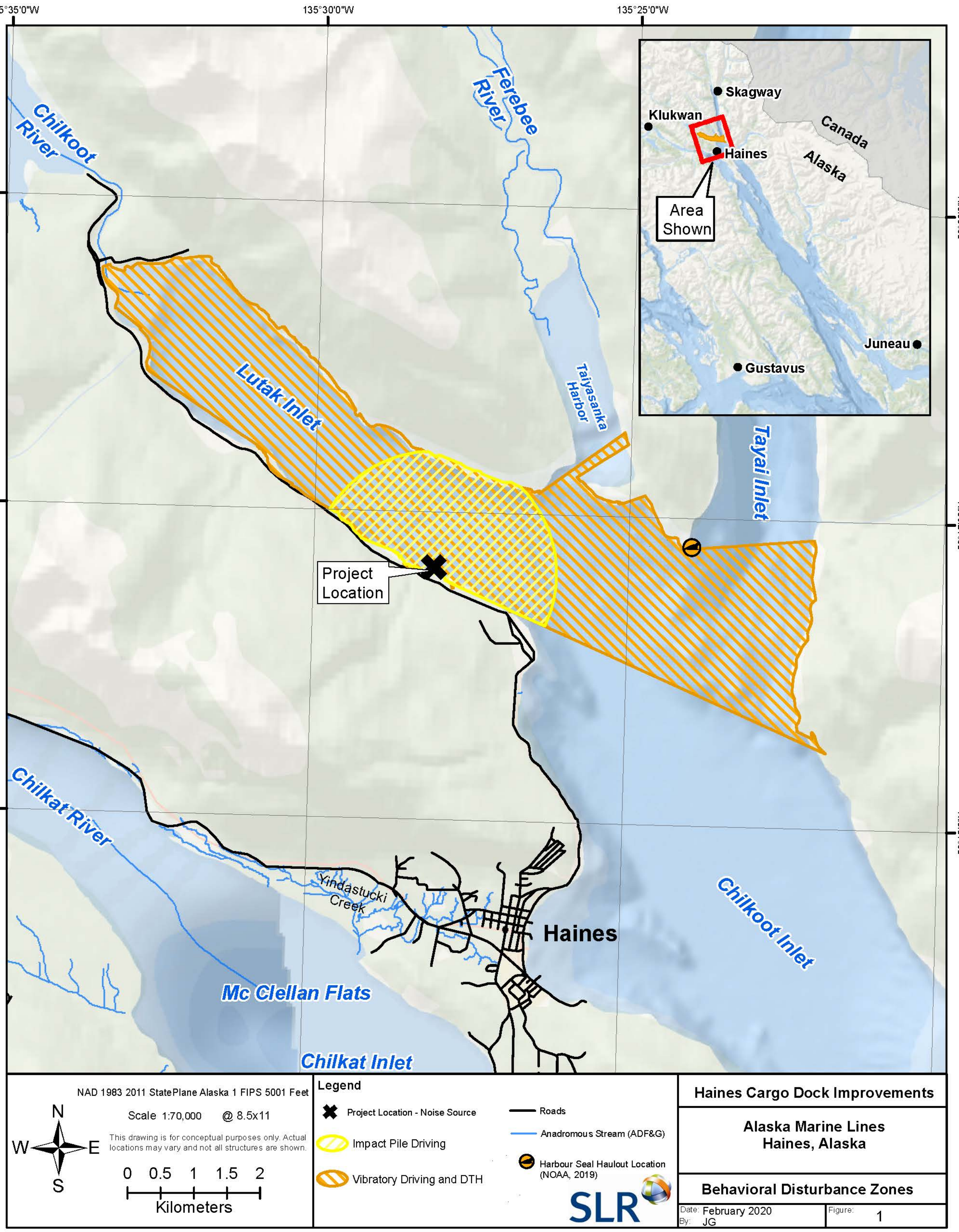
120 dB isopleth, we do not anticipate that marine mammals would respond in a biologically significant manner at these low levels and great distance from the source. Also, it is not expected that marine mammals will be exposed to sounds greater than 120 dB at much more than 6.5 km from the sound source due to the constraints of the surrounding lands.

TABLE 1: Calculated distances to Level A and B thresholds for humpback whales and Steller sea lions from pile driving/drilling activities for the Lutak Dock RoRo Modification Project (from SLR 2019)

Activity (source level @ 10m) [a]	**Distance to Level A – Permanent Threshold Shift**		**Distance to Level B – Behavioral Disturbance, all species**
	Humpback Whales	**Stellar Sea Lions**	
Vibratory Driving (175 dB re 1 µPa rms)	171 m (561 ft)	7 m (23ft)	46.4 km (28.8 mi) [b]
DTH Driving (171 dB re 1 µPa rms)	105 m (345 ft)	4 m (13 ft)	25.1 km (15.6 mi) [b]
Combination of Vibratory + DTH drilling [c]	200 m (656 ft)	9 m (30 ft)	46.4 km (28.8 mi) [b]
Impact Driving (194 dB re 1 µPa rms)	2.3 km (1.4 mi)	80 m (262 ft)	1.8 km (1.1 mi)

[a] Sound source levels for vibratory and impact pile driving based upon Caltrans 2015; DTS drilling based upon Denes *et al.* 2016.
[b] Lutak Inlet is smaller than this, therefore extent of actual impacts will be constrained by land.
[c] This scenario assumes a combination of vibratory pile driving (4 piles, 4 hours of active noise) and DTH drilling (2 piles, 6 additional hours active noise generation) on the same day.

FIGURE 5: Map of the Action Area and Level B Harassment Zones



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3. APPROACH TO THE ASSESSMENT

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

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

Under NMFS's regulations, the destruction or adverse modification of critical habitat "means a direct or indirect alteration that appreciably diminishes the value of critical habitat 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 2016 critical habitat regulations (81 FR 7414; February 11, 2016) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, 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 of this opinion is likely to jeopardize listed species or destroy or adversely modify critical habitat:

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

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action. This section describes the current status of each listed species and its critical habitat relative to the conditions needed for recovery. We determine the 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) appreciably diminish 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

Two species of marine mammals listed under the ESA under NMFS's jurisdiction may occur in the action area, the wDPS Steller sea lions and Mexico DPS humpback whales (Table 2). No designated critical habitat overlaps with the action area; the nearest designated critical habitat for Steller sea lions is 21.2 km (13.2 mi) southeast of the project area, at Gran Point, and while proposed, critical habitat for humpback whales has not been designated.

TABLE 2: Listing status and critical habitat designation for marine mammals considered in this opinion

Species	Status	Listing	Critical Habitat
Steller Sea Lion, Western DPS *Eumetopias jubatus*	Endangered	May 5, 1997 62 FR 24345	August 27, 1993 58 FR 45269
Humpback Whale, Mexico DPS *Megaptera novaeangliae*	Threatened	September 8, 2016 81 FR 62259	*Proposed:* October 9, 2019 84 FR 54354
Sperm Whale *Physeter macrocephalus*	Endangered	December 2, 1970 35 FR 18309	Not designated

4.1 Species Not Likely to be Adversely Affected by the Action

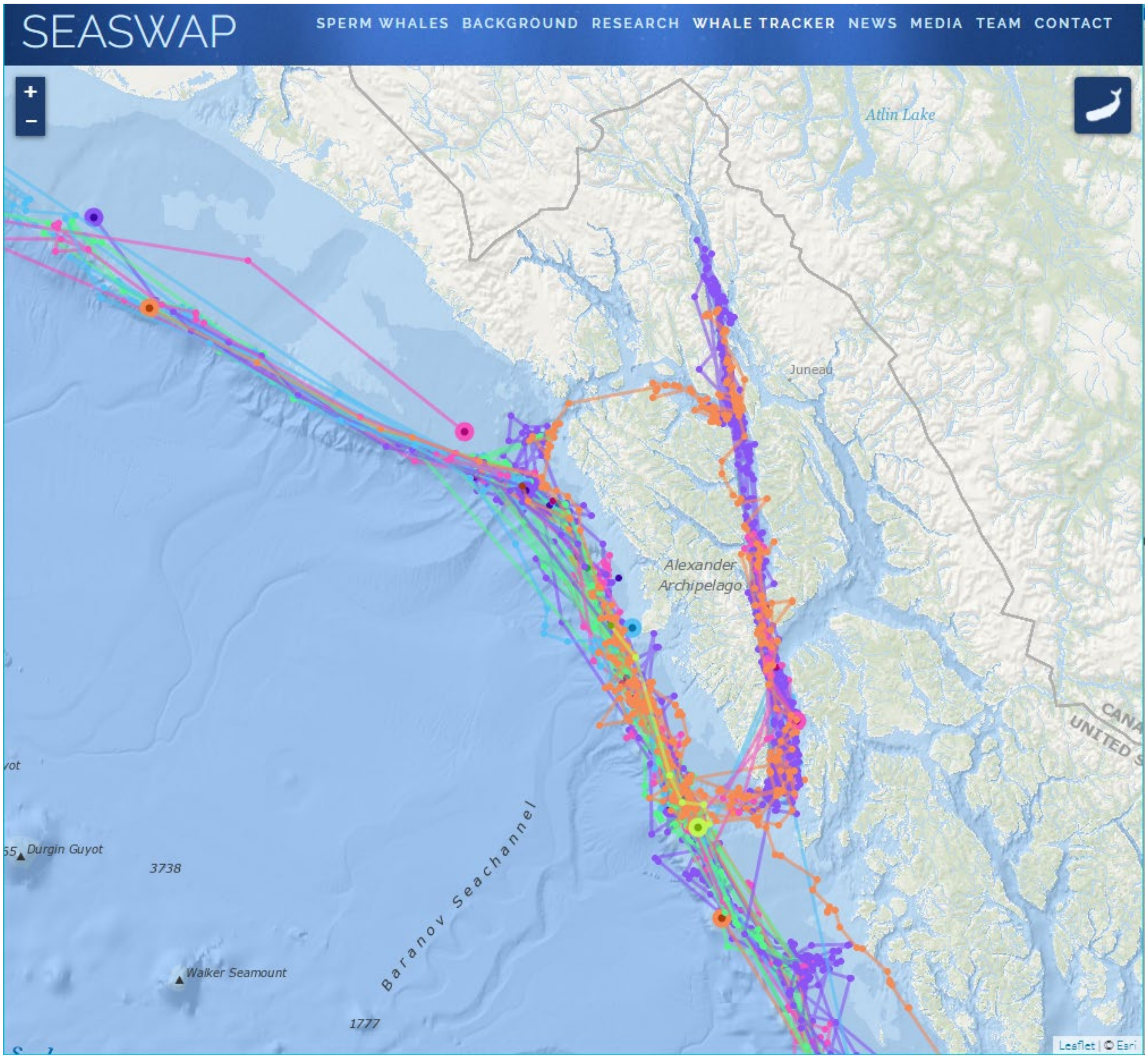
NMFS uses two criteria to identify those endangered or threatened species or critical habitat that are likely to be adversely affected. The first criterion is exposure or some reasonable expectation of a co-occurrence between one or more potential stressors associated with AML's proposed activities at Lutak Dock and a listed species or designated critical habitat. The second criterion is the probability of a response given exposure.

We applied these criteria to the species listed above and determined that sperm whales are not likely to be adversely affected by the proposed action.

4.1.1 Sperm Whales

Tagged sperm whales have been tracked within the Gulf of Alaska, with data suggesting heavy use of the outer coastal areas of Southeast Alaska. Of 31 sperm whales tagged in the Gulf of Alaska between 2007 and 2016, only two entered Lynn Canal, but neither traveled as far north as Chilkoot Inlet, the waterbody preceding Lutak Inlet (Figure 6; SEASWAP 2020). The animal which traveled closest to Lutak Dock did not approach within 20 mi of Lutak Dock, and made its closest approaches between October 31 and December 13, 2014. In the entirety of NMFS AKR stranding records (which has some reports dating back to 1904), there have only been three reports of sperm whales in Southeast Alaska: August 2003 at Prince of Wales Island, May 2005 at Baranof Island, and March 2019 in Lynn Canal, approximately 28 mi south of Lutak Inlet (NMFS AKR unpubl. stranding data).

FIGURE 6: Map of tagged sperm whale movements in Southeast Alaska (from SEASWAP 2020)



Tagging studies primarily show that sperm whales use the deep-water slope habitat extensively for foraging (Mathias *et al.* 2012). Interaction studies between sperm whales and the longline fishery have been focused along the continental slope of the eastern Gulf of Alaska in water depths between about 1,970 and 3,280 ft (600 and 1,000 m) (Straley *et al.* 2005, Straley *et al.* 2014). The shelf-edge/slope waters of the Gulf of Alaska are far outside of the action area.

Sperm whales have been recently observed in southern Lynn Canal, four in November 2018 and two in March 2019. On March 20, 2019, NMFS performed a necropsy on a sperm whale in Lynn Canal that died from trauma consistent with a ship strike.

It is possible this species may be encountered and potentially struck by a vessel during transit to/from Lutak Dock. However, it is extremely unlikely that vessels will strike sperm whales for the following reasons:

- Few, if any, sperm whales are likely to be encountered because they are generally found in deeper waters than those in which the transit route will occur.
- Project vessels will make only one trip to and from Lutak Dock necessary to transport the construction equipment.
- Construction equipment will be transferred to/from Lutak Dock on AML's regularly scheduled barge service (runs twice weekly to Haines), rather than on dedicated trips in addition to existing transits.
- The mitigation measures for vessel strike avoidance include adhering to NMFS's guidelines for maintaining a minimum distance of 100 yards from marine mammals. Barges are slow moving vessels, further reducing the potential for collisions.

While it is possible a sperm whale may be in the general area, it is highly unlikely that a sperm whale will be exposed to project-related noises for the following reasons:

- There have been no reports of sperm whales as far north up Lynn Canal as Lutak Inlet or the action area; all of the rare sightings have been over 20 miles away and given sperm whale preference for deep-water slope habitat, it is unlikely they will travel as far north up the inlet as the action area.
- The seasonal timing of the observations of sperm whales in Lynn Canal does not overlap with the proposed timing of project activities.
- In the highly unlikely event a sperm whale is present in the action area during the project window from mid-June to end of October, it would have to be in the action area during one of only 8 days when pile removal/driving activities occur in order to be potentially exposed.
- The only additional vessel noise which may be affiliated with the project is the noise associated with a barge and tug boats, should AML decide to place their pile driving equipment on a barge instead of shore. A sperm whale would have to be within the immediate vicinity of the dock for there to be harassment due to vessel noise. The mitigation measures include best practices for reducing vessel-related harassment.
- The mitigation measures require PSOs call an immediate shutdown of pile driving activities should a species that is not authorized to be taken (such as sperm whale) be observed approaching the harassment zones.

For these reasons, we conclude the stressors associated with the proposed action would either have no effect or immeasurably small effects on sperm whales. Sperm whales are not anticipated to overlap in time and space with project activities thus are not anticipated to be exposed to project-related noise, and the effects of ship strike are extremely unlikely to occur. Therefore, sperm whales are not likely to be adversely affected by this action.

4.2 Climate Change

One potential threat common to all of the species we discuss in this opinion is global climate change. In accordance with NMFS guidance on analyzing the effects of climate change (Sobeck 2016), NMFS assumes that climate conditions will be similar to the status quo throughout the length of the effects of this short duration project.

There is widespread consensus within the scientific community that atmospheric temperatures on earth are increasing and that this will continue for at least the next several decades (Watson and Albritton 2001, Oreskes 2004). There is also consensus within the scientific community that this warming trend will alter current weather patterns and patterns associated with climatic phenomena, including the timing and intensity of extreme events such as heat waves, floods, storms, and wet-dry cycles. Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level (Pachauri and Reisinger 2007).

The Intergovernmental Panel on Climate Change (IPCC) estimated that average global land and sea surface temperature has increased by 0.6°C (±0.2) since the mid-1800s, with most of the change occurring since 1976. This temperature increase is greater than what would be expected given the range of natural climatic variability recorded over the past 1,000 years (Crowley 2000). The IPCC reviewed computer simulations of the effect of greenhouse gas emissions on observed climate variations that have been recorded in the past and evaluated the influence of natural phenomena such as solar and volcanic activity. Based on their review, the IPCC concluded that natural phenomena are insufficient to explain the increasing trend in land and sea surface temperature, and that most of the warming observed over the last 50 years is likely to be attributable to human activities (Stocker *et al.* 2013).

Continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century (Watson and Albritton 2001). Climate change is projected to have substantial effects on individuals, populations, species, and the structure and function of marine, coastal, and terrestrial ecosystems in the foreseeable future (Houghton 2001, McCarthy 2001, Parry 2007). Climate change would result in increases in atmospheric temperatures, changes in sea surface temperatures, increased ocean acidity, changes in patterns of precipitation, and changes in sea level (Stocker *et al.* 2013).

According to NOAA's National Center for Environmental Information (NOAA NCEI 2019), the global annual temperature has increased at an average rate of 0.07°C (0.13°F) per decade since 1880 and over twice that rate (+0.18°C / +0.32°F) since 1981. In the 43 years since 1977, global land and ocean temperatures have been above the 20th century average every year. The five warmest years in the 1880–2019 record have all occurred since 2015, with nine of the ten warmest years occurring since 2005 (the tenth warmest year was in 1998). The year 2019 was the second warmest year in the 140-year record for both land and ocean temperatures, surpassed only by 2016 which was 0.04°C (0.07°F) hotter, and followed closely by 2015 which was only 0.02°C (0.04°F) cooler than 2019. In Alaska, 2019 was the hottest year on record. The year 2019 also saw the highest ocean heat content (OHC) for the upper 2000 meters in the 70-year record; the five highest OHC have all occurred in the last five years (2015–19), while the last ten years (2010–19) have the 10 highest OHC on record (NOAA NCEI 2019). Arctic sea ice in 2019 was the seventh smallest maximum extent and second smallest minimum extent on record. Since 2000, the Arctic (latitudes between 60º and 90º N) has been warming at more than twice the rate of lower latitudes (Jeffries *et al.* 2014) due to "Arctic amplification," a characteristic of the global climate system influenced by changes in sea ice extent, atmospheric and oceanic heat transports, cloud cover, black carbon, and many other factors (Serreze and Barry 2011).

Further, ocean acidity has increased by 26 percent since the beginning of the industrial era (IPCC 2013) and this rise has been linked to climate change (Foreman and Yamanaka 2011, GAO 2014, Murray *et al.* 2014, Okey *et al.* 2014, Secretariat of the Convention on Biological Diversity 2014, Andersson *et al.* 2015). Climate change is also expected to increase the frequency of extreme weather and climate events including, but not limited to, cyclones, heat waves, and droughts (IPCC 2014a). Climate change has the potential to impact species abundance, geographic distribution, migration patterns, timing of seasonal activities (IPCC 2014a), and species viability into the future. Climate change is also expected to result in the expansion of low oxygen zones in the marine environment (Gilly *et al.* 2013). Though predicting the precise consequences of climate change on highly mobile marine species, such as those considered in this opinion, is difficult (Simmonds and Isaac 2007), recent research has indicated a range of consequences already occurring.

Effects of climate change include increases in atmospheric temperatures, decreases in sea ice, and changes in sea surface temperatures, oceanic pH, patterns of precipitation, and sea level. Effects of climate change have impacted, are impacting, and will continue to impact marine species in the following ways (IPCC 2014b):

- Shifting abundances
- Changes in distribution
- Changes in timing of migration
- Changes in periodic life cycles of species

The effects of climate change on WDPS Steller sea lions and Mexico DPS humpback whales would likely include changes in the distribution of temperatures suitable for many stages of their life history, the distribution and abundance of prey, and the distribution and abundance of competitors or predators.

Climate change is likely to have its most pronounced effects on species whose populations are already in tenuous positions (Isaac 2009). Therefore, we expect the extinction risk of at least some ESA-listed species to rise with global warming. Marine species ranges are expected to shift as they align their distributions to match their physiological tolerances under changing environmental conditions (Doney *et al.* 2012).

For ESA-listed species that undergo long migrations, such as humpback whales, if either prey availability or habitat suitability is disrupted by changing ocean temperature regimes, the timing of migration can change or negatively impact population sustainability (Simmonds and Eliott 2009). Low reproductive success and body condition in humpback whales may have resulted from the 1997/1998 El Niño (Cerchio *et al.* 2005). In 2015, there was a large whale unusual mortality event (UME) which spanned the Gulf of Alaska and British Columbia, and involved 29 dead humpback whales. Although a definitive cause of the UME was not determined, anomalous ecological factors (i.e., the 2015 El Nino, Warm Water Blob and Pacific Coast Domoic Acid Bloom) were determined a contributory cause (Savage 2017).

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

As temperatures in the Arctic and subarctic waters are warming and sea ice is diminishing, there is an increased potential for harmful algal blooms that produce toxins to affect marine life (see Figure 7). Biotoxins like domoic acid and saxitoxin may pose a risk to marine mammals in Alaska. In addition, increased temperatures can increase Brucella infections. In the Lefebvre *et al.* (2016) study of marine mammal tissues across Alaska, 905 individuals from 13 species were sampled. Domoic acid was detected in all 13 species examined and had a 38% prevalence in humpback whales and a 27% prevalence in Steller sea lions. Additionally, a fetus from a Steller sea lion contained detectable concentrations of domoic acid documenting maternal toxin transfer. Saxitoxin was detected in 10 of the 13 species, with the highest prevalence in humpback whales (50%) and a 10% prevalence in Steller sea lions (Lefebvre *et al.* 2016).

FIGURE 7: Algal toxins detected in 13 species of marine mammals from Southeast Alaska to the Arctic from 2004 to 2013 (reproduced from Lefebvre *et al.* 2016)

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

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. The opinion also examines the condition of critical habitat throughout the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

This section consists of narratives for each of the endangered and/or threatened species that may be adversely affected by the proposed action. In each narrative, we present a summary of information on the population structure and distribution of each species to provide a foundation for the exposure analyses that appear later in this opinion. Then we summarize information on the threats to the species and the species' status given those threats to provide points of reference for the jeopardy determinations we make later in this opinion. That is, we rely on a species' status and trend to determine whether or not an action's effects are likely to increase the species' probability of becoming extinct.

4.3.1 Western DPS Steller Sea Lions

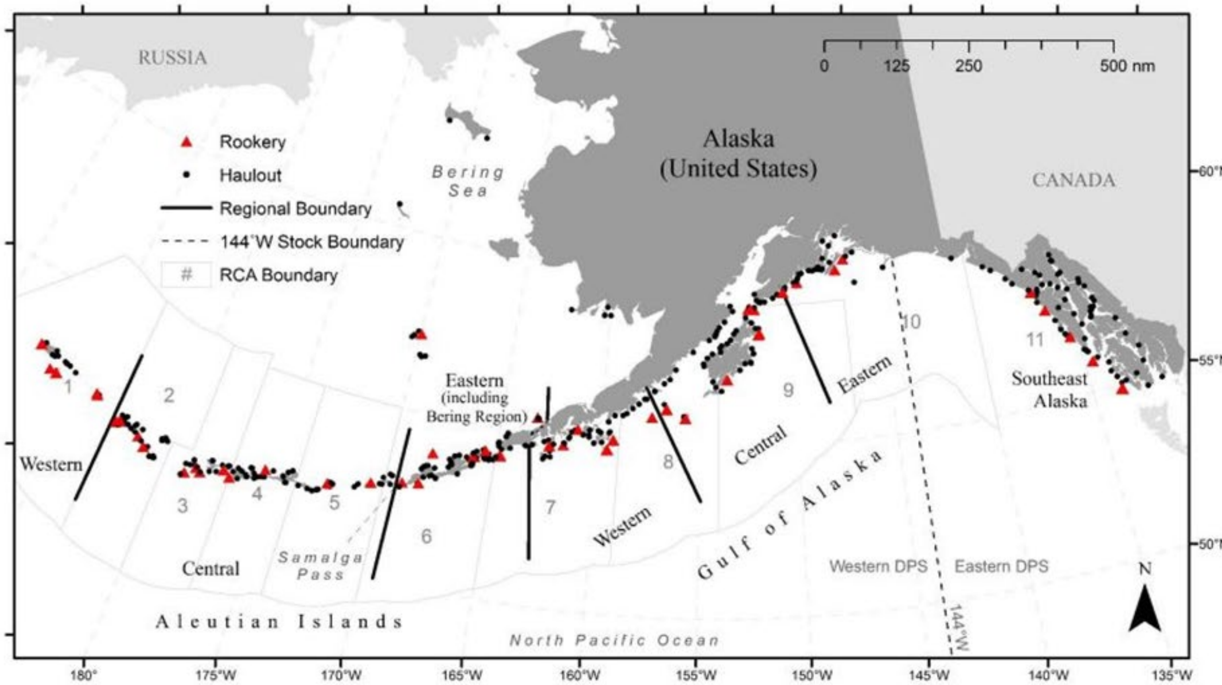
More detailed background information on the status of wDPS Steller sea lions can be found in the latest stock assessment report (Muto *et al.* 2019) and the recovery plan for Steller sea lions (NMFS 2008).

4.3.1.1 Population Structure and Status

On November 26, 1990, NMFS issued the final rule to list Steller sea lions as a threatened species under the ESA (55 FR 49204). In 1997, NMFS reclassified Steller sea lions as two DPSs based on genetic studies and other information (62 FR 24345; May 5, 1997; Figure 8). At that time, the eastern DPS was listed as threatened, and the western DPS was listed as endangered. On November 4, 2013, the eastern DPS was removed from the endangered species list (78 FR 66140). 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.

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

FIGURE 8: Map of Alaska showing the NMFS Steller sea lion survey regions, rookery, and haulout locations in Alaska, with line at 144°W depicting separation of the eDPS and wDPS (Fritz *et al.* 2016)



4.3.1.2 Distribution

Steller sea lions are distributed along the rim of the North Pacific Ocean from San Miguel Island (Channel Islands) off Southern California to northern Hokkaido, Japan (Loughlin *et al.* 1984, Nowak 2003). Their centers of abundance and distribution are in the Gulf of Alaska and the Aleutian Islands (NMFS 1992). Their distribution also extends northward from the western end of the Aleutian chain to sites along the eastern shore of the Kamchatka Peninsula. Additional information on Steller sea lion distribution can be found at https://www.fisheries.noaa.gov/species/steller-sea-lion, in the Steller Sea Lion Recovery Plan at https://www.fisheries.noaa.gov/resource/document/recovery-plan-steller-sea-lion-revision-eastern-and-western-distinct-population, and in the most recent stock assessment report at https://repository.library.noaa.gov/view/noaa/20606.

4.3.1.3 Occurrence in the Action Area

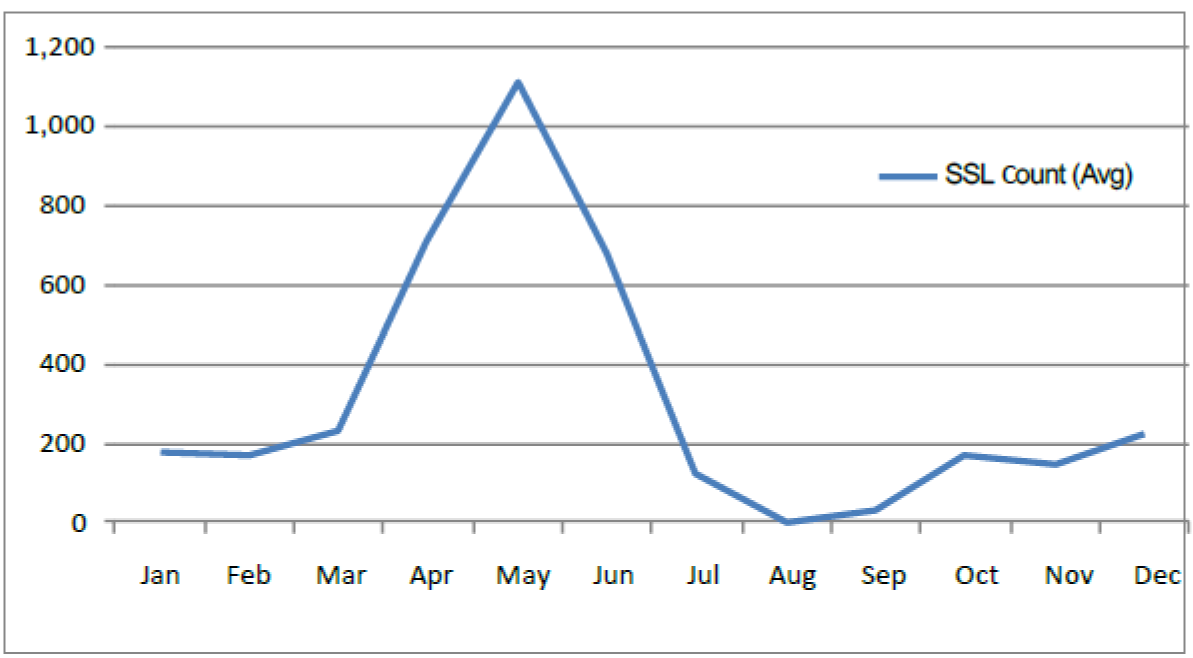
Steller sea lions seasonally follow dense aggregations of pre-spawning and spawning prey species throughout Lynn Canal and seasonally pass through the action area. In winter, Steller sea lions target herring in the lower portions of the Lynn Canal, followed by a gradual but predictable movement north towards and into Lutak Inlet, through the action area to the mouths of the Chilkoot River during spring (mid-April through mid-June) as they follow dense aggregations of eulachon. In early summer through fall, they follow multiple runs of salmon south throughout the Lynn Canal, prior to the return of adult herring aggregations in late fall through winter. Salmon increase in importance as prey for sea lions from late-October and

December in the Chilkat River.

Although there are no known Steller sea lion haulouts or rookeries within the action area, the nearest haulout at Gran Point (21.2 km south of the action area) is likely the predominant haulout used by the Steller sea lions that are found transiting into and out of the action area. Over a decade of research on seasonal foraging behavior of Steller sea lions shows that they move into the Gran Point area to forage during the spring fish runs, resulting in local seasonal increases in abundance (Womble *et al.* 2005, Womble and Sigler 2006, Womble *et al.* 2009). Gran Point is used most heavily from mid-April through mid-June, with counts significantly decreasing from mid-July throughout mid-October, with periods of one to five weeks in mid-summer where sea lions were absent from the haulout during surveys (Figure 9). Abundance at Gran Point gradually increases by early fall, with more than a hundred animals present by mid-October. Numbers from December through March are generally lower when individuals move further south in Lynn Canal to forage on over-wintering herring. During the period the project may occur (mid-June through October), the highest abundance of Steller sea lions at Gran Point occurs in June (average abundance in June across all years surveyed is 674.4 animals; see ECO49 2019).

Within the action area, Steller sea lions are anticipated to be predominantly from the eDPS, but a small number of wDPS Steller sea lions may occur. Based upon genetic analyses, Hastings *et al.* (2020) indicates that 1.4% of all non-pup Steller sea lions found in the Lynn Canal region (which encompasses the action area) had mitochondrial DNA haplotypes suggesting they were born in the wDPS region. Therefore, for the purposes of this opinion, NMFS AKR considers that 1.4% of the total Steller sea lions in the action area are from the endangered wDPS and the remaining 98.6% are from the delisted eDPS.

FIGURE 9: Averaged counts of Steller sea lions by months at Gran Point, 2001-2018 (reproduced from ECO49 2019, based upon Womble and Hastings unpubl. data)



4.3.1.4 Reproduction and Growth

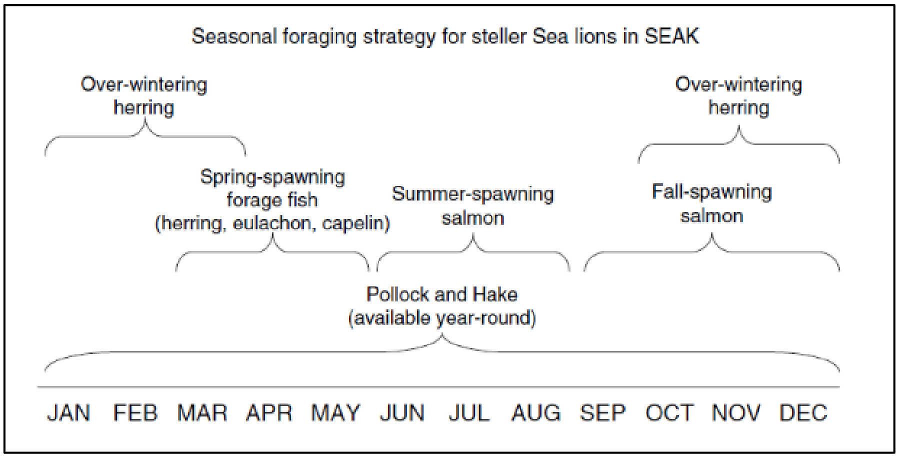
Female Steller sea lions reach sexual maturity and first breed between three and eight years of age and the average age of reproducing females (generation time) is about 10 years (Pitcher and Calkins 1981, Calkins and Pitcher 1982, York 1994). They give birth to a single pup from May through July and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

4.3.1.5 Feeding and Prey Selection

Steller sea lions are generalist predators that consume a variety of demersal, semi-demersal, and pelagic prey, indicating a potentially broad spectrum of foraging styles, probably based primarily on availability. Diet is likely strongly influenced by local and temporal changes in prey distribution and abundance (McKenzie and Wynne 2008, Sigler *et al.* 2009). For more information see our website (https://www.fisheries.noaa.gov/species/steller-sea-lion), the Steller Sea Lion Recovery Plan (https://www.fisheries.noaa.gov/resource/document/recovery-plan-steller-sea-lion-revision-eastern-and-western-distinct-population). Within the action area for this project aggregates of prey that are most likely to be exploited by sea lions include eulachon and herring. Most Steller sea lions leave Lutak Inlet shortly after the spring eulachon run and are scarce after the first week of June (SLR 2019).

Figure 10 depicts a likely seasonal foraging strategy for Steller sea lions in Southeast Alaska. These results suggest that seasonally aggregated high-energy prey species, such as eulachon and herring in late spring and salmon in summer and fall, influence the seasonal distribution of Steller sea lions. Similarly, the Status Review of Southeast Alaska Pacific Herring (NMFS 2014b) generalizes that sea lions forage on herring aggregations in winter, on spawning herring and eulachon in spring, and on various other species throughout the year. Herring fishery managers use the presence of sea lions on the spring spawning grounds as an indicator that spawning is imminent, even though herring have been in deeper adjacent waters for weeks prior to sea lion arrival (Kruse *et al.* 2000).

FIGURE 10: Seasonal foraging ecology of Steller sea lions; reproduced with permission from (Womble *et al.* 2009)



4.3.1.6 Diving and Social Behavior

Diving activity is highly variable in Steller sea lion by sex and season. Diving is generally to depths of 600 feet or less and diving duration is usually 2 minutes or less. During the breeding season, when both males and females occupy rookeries, adult breeding males rarely, if ever, leave the beach (Loughlin 2002). Adult males have been observed aggressively defending territories. However, females tend to feed at night on one to two day trips and return to nurse pups (NRC 2003). Female foraging trips during winter are longer (130 km) and dives are deeper (frequently greater than 250 m). Summer foraging dives, however, are closer to shore (about 16 km) and shallower (100-250 m; Merrick and Loughlin 1997, Loughlin 2002). As pups mature and start foraging for themselves, they develop greater diving ability until roughly 10 years of age (Pitcher *et al.* 2005). Juveniles usually make shallow dives of 70 to 140 m over 1 to 2 minutes, but much deeper dives in excess of 300 m are known (Merrick and Loughlin 1997, Rehberg *et al.* 2001, Loughlin *et al.* 2003). Young animals also tend to stay in shallower water less than 100 m deep and within 20 km from shore (Fadely *et al.* 2005).

4.3.1.7 Vocalization, Hearing, and Other Sensory Capabilities

Steller sea lions are very vocal marine mammals. The ability to detect sound and communicate underwater is important for a variety of Steller sea lion life functions, including reproduction and predator avoidance. Males and females apparently have different hearing sensitivities, with males hearing best at 1 to 16 kHz (best sensitivity at the low end of the range) and females hearing from 16 to 25 kHz (best hearing at the upper end of the range) (Kastelein *et al.* 2005).

To facilitate the acoustic and effects analyses, marine mammals were divided into functional hearing groups (based on their hearing range), and the same criteria and thresholds were used for all species within a group. NMFS categorizes Steller sea lions in the otariid pinniped functional hearing group, with a generalized hearing range between 60 Hz and 39 kHz in water (NMFS 2018a). Steller sea lions have similar hearing thresholds in-air and underwater to other otariids. In-air hearing ranges from 0.250-30 kHz, with their best hearing sensitivity at 5-14.1 kHz (Mulsow and Reichmuth 2010). An underwater audiogram shows the typical mammalian U-shape. Higher hearing thresholds, indicating poorer sensitivity, were observed for signals below 16 kHz and above 25 kHz (Kastelein *et al.* 2005).

4.3.1.8 Threats to the Species

Brief descriptions of potential threats to Steller sea lions are presented in the following sections. Table 3 identifies the threats to wDPS Steller sea lions and identifies their impact on the species' recovery. More detailed information can be found in the 2008 Steller Sea Lion Recovery Plan (available at: https://www.fisheries.noaa.gov/resource/document/recovery-plan-steller-sea-lion-revision-eastern-and-western-distinct-population), the 2018 Alaska Stock Assessment Reports (available at: https://repository.library.noaa.gov/view/noaa/20606), and the Alaska Groundfish Biological Opinion (NMFS 2014a).

Natural Threats

Environmental Variability

The Steller Sea Lion Recovery Plan ranks environmental variability as a potentially high threat to recovery of the wDPS (NMFS 2008). The Bering Sea and Gulf of Alaska are subjected to large-scale forcing mechanisms that can lead to basin-wide shifts in the marine ecosystem

TABLE 3: Potential threats and impacts to wDPS Steller sea lion recovery (reproduced from Muto *et al.* 2019)

Threat	Impact on Recovery	Level of Uncertainty	Reference Examples
Environmental variability	Potentially high	High	Trites and Donnelly 2003, Fritz and Hinckley 2005
Competition with fisheries	Potentially high	High	Fritz and Ferrero 1998, Hennen 2004, Fritz and Brown 2005, Dillingham et al. 2006
Predation by killer whales	Potentially high	High	Springer et al. 2003, Williams et al. 2004, DeMaster et al. 2006, Trites et al. 2007
Toxic substances	Medium	High	Calkins et al. 1994, Lee et al. 1996, Albers and Loughlin 2003, Rea et al. 2013
Incidental take by fisheries	Low	High	Wynne et al. 1992, Nikulin and Burkanov 2000, Perez 2006
Subsistence harvest	Low	Low	Haynes and Mishler 1991, Loughlin and York 2000, Wolfe et al. 2005
Illegal shooting	Low	Medium	Loughlin and York 2000, NMFS 2001
Entanglement in marine debris	Low	Medium	Calkins 1985
Disease and parasitism	Low	Medium	Burek et al. 2005
Disturbance from vessel traffic and tourism	Low	Medium	Kucey and Trites 2006
Disturbance or mortality due to research activities	Low	Low	Calkins and Pitcher 1982, Loughlin and York 2000, Kucey 2005, Kucey and Trites 2006, Atkinson et al. 2008, Wilson et al. 2012

resulting in significant changes to physical and biological characteristics, including sea surface temperature, salinity, and sea ice extent and amount. Physical forcing affects food availability and can change the structure of trophic relationships by impacting climate conditions that influence reproduction, survival, distribution, and predator-prey relationships at all trophic levels (Wiese *et al.* 2012).

Predation

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked predation by killer whales as a potentially high threat to the recovery of the wDPS. Steller sea lions represented 33% (Heise *et al.* 2003) and 5% (NMFS 2013a) of the remains found in deceased killer whale stomachs in the

GOA, depending on the specific study results. Maniscalco *et al.* (2007) estimated that 11 percent of the Steller sea lion pups born 2000-2005 at the Chiswell Island rookery (in the Kenai Fjords area) were preyed upon by killer whales. Horning and Mellish (2012) estimated that over half of juvenile Steller sea lions in the Kenai Fjords/Prince William Sound region are consumed by predators before age 4 yr. Steller sea lions may also be attacked by sharks (Horning and Mellish 2012), though little evidence exists to indicate that sharks prey on Steller sea lions. The Steller Sea Lion Recovery Plan did not rank shark predation as a threat to the recovery of the wDPS.

Disease and Parasites

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked diseases and parasites as a low threat to the recovery of the WPDS. Steller sea lions have tested positive for several pathogens (Burek *et al.* 2005), but disease levels are unknown (FOC 2008). Lefebvre *et al.* (2016) reports both saxitoxin and domoic acid have been documented in Steller sea lion tissues in Alaska (see Figure 7). Similarly, parasites in this species are common, but mortality resulting from infestation is unknown.

Anthropogenic Threats

Competition with Fisheries

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked competition with fisheries for prey as a potentially high threat to the recovery of the wDPS. Substantial scientific debate surrounds the question about the impact of potential competition between fisheries and Steller sea lions. It is generally well accepted that commercial fisheries target several important Steller sea lion prey species (NRC 2003) including salmon species, Pacific cod, Atka mackerel, pollock, and others. These fisheries could be reducing sea lion prey biomass and quality at regional and/or local spatial and temporal scales such that sea lion survival and reproduction are reduced. NMFS (2014a) analyzed this threat in detail.

Toxic Substances

The Steller Sea Lion Recovery Plan ranked the threat of toxic substances as medium, but contaminants leading to Steller sea lion mortality have not been identified (NMFS 2008). Steller sea lion tissues have been documented to contain PAH contaminants; organochlorines, including PCBs and DDT (and their metabolites) (Barron *et al.* 2003, Hoshino *et al.* 2006); and heavy metals, including mercury, zinc, copper, metallothionien, and butyltin (Noda *et al.* 1995, Kim *et al.* 1996, Castellini 1999, Beckmen *et al.* 2002, Holmes *et al.* 2008, NMFS 2008). Sea lions which died as a result of the *Exxon Valdez* oil spill contained particularly high levels of PAH contaminants, and subsequently, premature birth rates increased and pup survival decreased (Calkins *et al.* 1994, Loughlin *et al.* 1996). Wang *et al.* (2011) found PCB levels in the kidneys of some adult males high enough that reproductive and immune function may have been compromised.

Illegal Shooting

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked illegal shooting as a low threat. In recent years, illegal shooting seems to have become more prevalent, especially in the Copper River Delta region, notably beginning in 2015 (NMFS 2016b, NMFS 2018b). There were no cases of illegal shooting successfully prosecuted between 1998 and 2017, however, in 2018, a Cordova-based fishing boat captain and one crewmember were convicted of illegal take of marine mammals, and admitted to shooting and killing multiple Steller sea lions in 2015 (NOAA

Office of Law Enforcement, Alaska). From 2000-2016, the NMFS Alaska Stranding Response Program documents 60 Steller sea lions statewide with suspected or confirmed firearm injures, and in 2019, there were 11 reports of confirmed or suspected firearm injuries to Steller sea lions (Savage 2020).

Other
The Steller Sea Lion Recovery Plan (NMFS 2008) ranked five other anthropogenic threats as having low impact to the recovery of wDPS Steller sea lions. These include incidental take by fisheries; subsistence harvests; entanglements in fishing gear and marine debris; disturbance from vessel traffic and tourism; and disturbance or mortality due to research activities. More information about the other low threats is available in the Steller Sea Lion Recovery Plan (NMFS 2008), the Stock Assessment Reports (Muto *et al*. 2019), and the references provided in Table 3.

4.3.1.9 Recovery Goals

In the 2008 recovery plan, NMFS outlined a strategy to meet its goal of promoting the recovery of the wDPS and its ecosystem to a level that would warrant delisting (NMFS 2008). The highest priority goal set by NMFS is to continue to improve estimates of population abundance, trends, distribution, health, and essential habitat characteristics through monitoring and research and to identify key threats to the population. In addition to identifying individual threats, research needs to expand our understanding of how multiple interrelated threats combine to create long-term cumulative impacts on the wDPS. Given the correlation between implementation of fishery management practices and the stabilizing (or slightly increasing) trend in the wDPS, a second priority in the recovery plan is to maintain the current or similar fishery conservation measures (NMFS 2008).

4.3.1.10 Critical Habitat

On August 27, 1993, NMFS designated critical habitat for Steller sea lions based on the location of terrestrial rookery and haulout sites, spatial extent of foraging trips, and availability of prey items (58 FR 45269). Designated critical habitat is listed in 50 CFR § 226.202, and includes 1) a terrestrial zone that extends 3,000 ft (0.9 km) landward from the baseline or base point of each major rookery and major haulout; 2) an air zone that extends 3,000 ft (0.9 km) above the terrestrial zone of each major rookery and major haulout, measured vertically from sea level; 3) an aquatic zone that extends 3,000 ft (0.9 km) seaward in state and federally managed waters from the baseline or basepoint of each major rookery and major haulout in Alaska that is east of 144° W longitude; 4) an aquatic zone that extends 20 nm (37 km) seaward in state and federally managed waters from the baseline or basepoint of each major rookery and major haulout in Alaska that is west of 144° W longitude; and 5) three special aquatic foraging areas in Alaska: the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area.

There are designated haulouts and rookeries in northern Southeast Alaska, but no designated critical habitat exists within the action area. The closest designated critical habitat to the action area is the Gran Point haulout, which is approximately 13 miles south of the project area. Therefore, the action will have no effect on critical habitat.

4.3.2 Mexico DPS Humpback Whales

4.3.2.1 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 and one is threatened, and the remaining 9 are not listed under the ESA (81 FR 62260; September 8, 2016). The Mexico DPS is threatened, and is comprised of approximately 3,264 (CV=0.06) animals (Wade *et al.* 2016) with an unknown population trend, though likely to be in decline (81 FR 62260).

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, 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 4 (NMFS 2016a, Wade *et al.* 2016).

Whales from the Western North Pacific, Mexico, and Hawaii DPSs overlap on feeding grounds off Alaska, and are not visually distinguishable without photo identification linking a specific whale to its breeding ground. In the action area, the vast majority of humpback whales (94%) are likely to be from the recovered Hawaii DPS and about 6% are likely to be from the threatened Mexico DPS.

4.3.2.2 Distribution

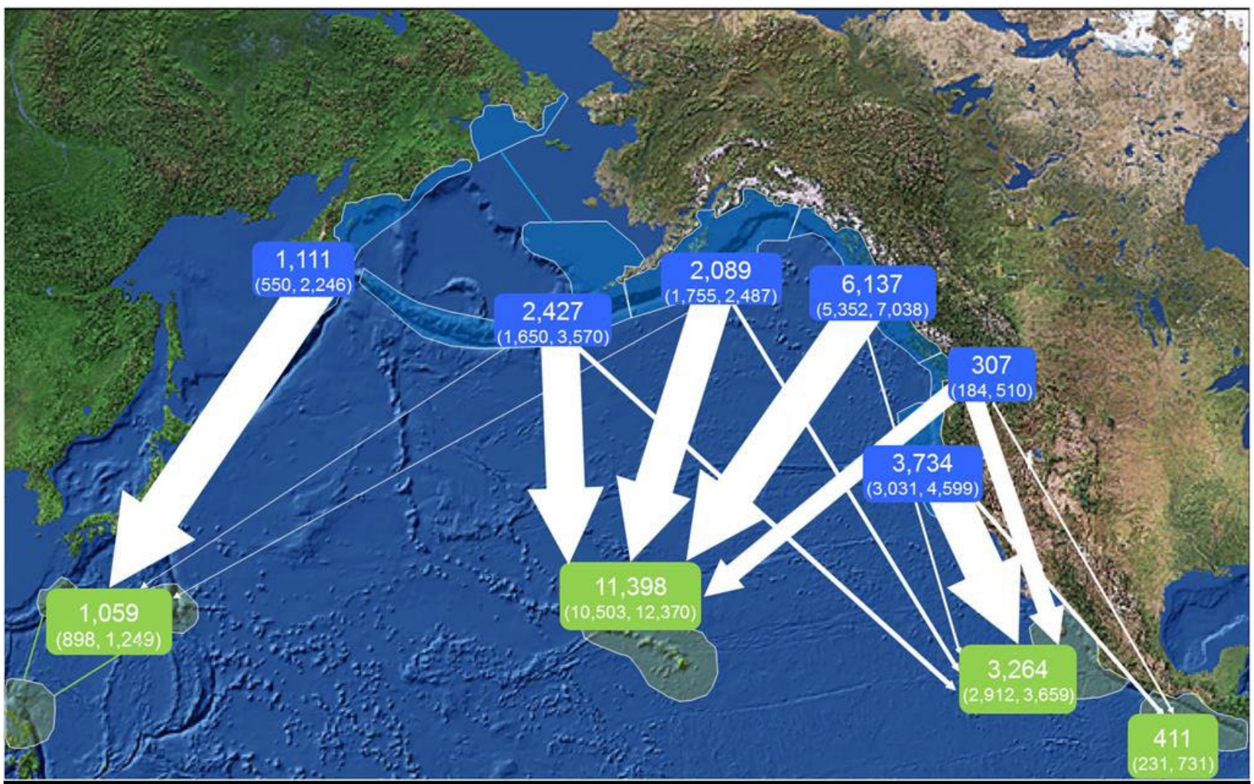
Humpback whales migrate seasonally between warmer, tropical or sub-tropical waters in winter months where they breed and give birth to calves, and cooler, temperate or sub-Arctic waters in summer months where they feed (see Figure 11). In their summer foraging areas and winter calving areas, humpback 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).

TABLE 4: 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)

	North Pacific Distinct Population Segments

Summer Feeding Areas	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.				

FIGURE 11: Abundance by summer feeding areas (blue), and winter breeding areas (green), with 95% confidence limits in parentheses. Migratory destinations from feeding area to breeding area are indicated by arrows with width of arrow proportional to the percentage of whales moving into winter breeding area (Wade *et al.* 2016).



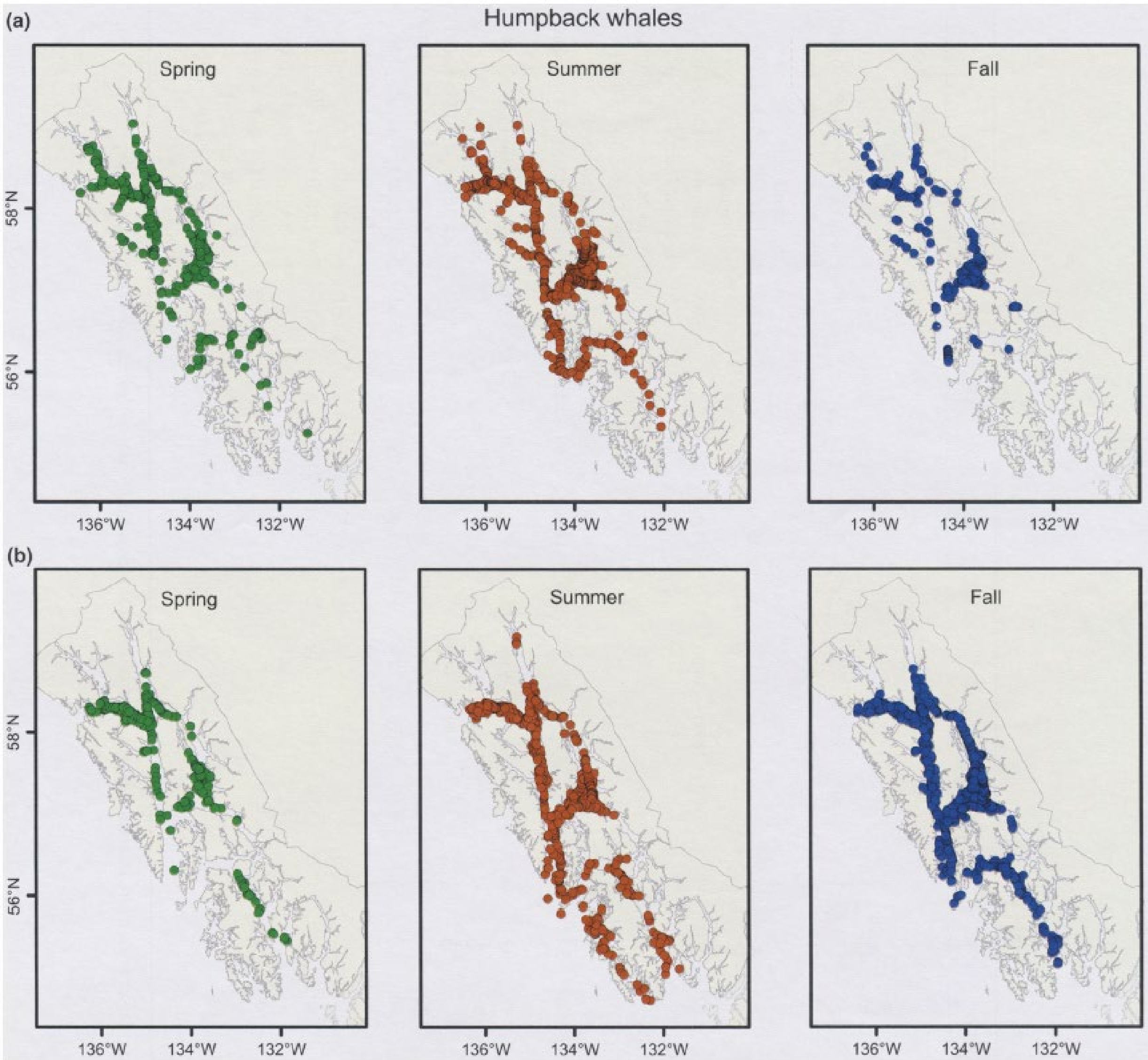
Mexico DPS humpback whales breed along the Pacific coast of mainland Mexico, the Baja California Peninsula, and the Revillagigedo Islands. They are primarily distributed in feeding grounds from northern British Columbia/Southeast Alaska, the Gulf of Alaska, and in the Bering Sea, but may be found in between Washington and Russia (Muto *et al.* 2019).

North Pacific humpback whales in the Gulf of Alaska may be experiencing nutritional stress from reaching or exceeding carrying capacity, resulting in some humpbacks skipping the annual migration to the breeding grounds to stay in Alaska overwinter and spend more time feeding (Straley *et al.* 2018).

4.3.2.3 Occurrence in the Action Area

Humpback whales are present in Lynn Canal in all months of the year. Dalheim *et al.* (2009) conducted cetacean surveys of Southeast Alaska spring through fall periodically between 1991 and 2007, and found humpback whales throughout all major waterways across all three seasons (Figure 12). Humpbacks were consistently seen at several locations in Lynn Canal, including areas in northern Lynn Canal across the seasons, but not as far north as Lutak Inlet, and no humpback whales were documented within the action area (the survey area included the mouth

FIGURE 12: Seasonal distribution of humpback whales in Southeast Alaska, with each dot indicating a group sighting/encounter. (a) 1991, 1992, 1993, 2006 and 2007, representing five spring, five summer, and four fall surveys; (b) 1994-2005, representing four spring, nine summer, and eleven fall surveys (Reproduced from Dalheim *et al.* 2009)



of Lutak Inlet, but may not have gone into Lutak Inlet) (Dalheim *et al.* 2009). Humpback whales generally are only found in upper Lynn Canal during mid- to late spring (mid-May through June) and vacate the area by July to follow the large aggregations of forage fish in lower Lynn Canal. Straley *et al.* (2018) conducted a study documenting fall and overwintering use in three areas of the Gulf of Alaska: Prince William Sound, Lynn Canal, and Sitka Sound. The Lynn Canal study area encompassed 500 km^2 of the waters of southern Lynn Canal and the adjacent waters of northern Stephens Passage, and encompassed 100% of the whale presence seasonally (Straley *et al.* 2018), suggesting that southern Lynn Canal is preferred habitat over northern Lynn Canal where the proposed construction activity will occur. In the two-year fall/winter study, whales peaked in Lynn Canal in September one year, then in October the subsequent year, both times prior to the arrival of dense aggregations of herring, which was the preferred prey of humpbacks observed feeding in Lynn Canal between September and March, followed by krill (Straley *et al.* 2018). In recent years a few whales have been observed at the entrance to Taiya Inlet throughout the fall months (NMFS 2019) and at the mouth of Lutak Inlet (K. Hastings, ADF&G *pers. comm.* to ECO49).

Most Southeast Alaska humpback whales winter in low latitudes, but some individuals skip annual migration south to breeding locations and instead overwinter in Alaska, following herring into deeper waters to continue foraging (Liddle 2015, Straley *et al.* 2018). Late fall and winter whale habitat in Southeast Alaska appears to correlate with areas that have over-wintering herring (such as lower Lynn Canal, Tenakee Inlet, Whale Bay, Ketchikan, and Sitka Sound), none of which are in the action area (Baker *et al.* 1985, Straley 1990, Straley *et al.* 2018). Interestingly, as more herring move into Lynn Canal, the less humpbacks feed on herring, suggesting a more favorable food source elsewhere (NMFS 2019b).

Humpback whales occur in Chilkoot Inlet, upper Lynn Canal, and have been observed infrequently near the mouth of Lutak Inlet during the spring eulachon and herring runs. The whales typically leave the area by July to feed on aggregations of herring in lower Lynn Canal. Systematic whale surveys are not undertaken in the Lynn Canal area and the most reliable seasonal data in the action area are from charter boat vessels and near-daily passages of the Lynn Canal between Juneau and Haines/Skagway by the AMHS ferries (SLR 2019). Humpback whales are observed daily in the southern Lynn Canal during late-spring through summer by the ferry system, with sightings becoming less frequent further north into the Upper Lynn Canal.

Sightings of individual whales at the mouth of Lutak Inlet have been observed in late-spring, sometimes fairly close to the Lutak Dock, especially during the spring eulachon and herring pre-spawning aggregations. Following the spring feeding aggregations, a few individuals are observed on and off throughout the summer in northern Lynn Canal (MOS 2016), inside or near the action area, but most whales move further south, by the end of July, towards Juneau, or Frederick Sound, and are absent from the action area. In recent years a few whales have been observed at the entrance to Taiya Inlet throughout the fall months (NMFS 2019a) and at the mouth of Lutak Inlet (K. Hastings, ADF&G, *pers. comm.* to ECO49).

Given their widespread range and their opportunistic foraging strategies, humpback whales may be in the project vicinity during the proposed project activities. As previously mentioned, humpback whales in Southeast Alaska are 94% comprised of the Hawaii DPS (not listed) and 6% of the Mexico DPS (threatened; Wade *et al.* 2016). Given Wade *et al.* (2016), we use 6% in this analysis to approximate the percentage of humpbacks observed in the action area that are from the Mexico DPS.

4.3.2.4 Reproduction and Growth

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

4.3.2.5 Feeding and Prey Selection

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; herring; Arctic cod; walleye pollock; pteropods; and cephalopods (Johnson and Wolman 1984, Perry *et al.* 1999, Straley *et al.* 2018). In Lynn Canal, humpbacks primarily feed on herring, but have also been observed feeding on euphasiids and capelin (Straley *et al.* 2018, NMFS 2019b).

4.3.2.6 Diving Behavior

Dives appear to be closely correlated with the depths of prey patches, which vary from location to location. In the north Pacific (southeast Alaska), most dives were of fairly short duration (<4 min) with the deepest dive to 148 m (Dolphin 1987).

4.3.2.7 Vocalization and Hearing

Humpback whales may react to and be harassed by in-water noise. NMFS categorizes humpback whales in the low-frequency cetacean functional hearing group, with a generalized hearing range between 7 Hz and 35 kHz (NMFS 2018a). 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 1986b).

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

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

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 to 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).

4.3.2.8 Threats to the Species

Brief descriptions of natural and anthropogenic threats to humpback whales follow. More detailed information can be found in the Humpback Whale Recovery Plan (NMFS 1991; https://www.fisheries.noaa.gov/resource/document/final-recovery-plan-humpback-whale-megaptera-novaeangliae), NMFS Stock Assessment Reports (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-species-stock#cetaceans---large-whales), Global Status Review (Fleming and Jackson 2011; https://repository.library.noaa.gov/view/noaa/4489), and the ESA Status Review (Bettridge *et al.* 2015; https://repository.library.noaa.gov/view/noaa/4883).

Natural Threats

Predation

Natural sources and rates of mortality of humpback whales are not well known. The most common predator of humpback whales is the killer whale (Jefferson *et al.* 1991). Most observations of humpback whales under attack from killer whales reported vigorous defensive behavior and tight grouping where more than one humpback whale was present (Ford and Reeves 2008). 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). There is also evidence of shark predation on calves and entangled whales (Mazzuca *et al.* 1998). Shark bite marks on stranded whales may often represent post-mortem feeding rather than predation, i.e., scavenging on carcasses (Long and Jones 1996).

Disease and Parasites

Humpback whales can carry the giant nematode *Crassicauda boopis*, which appears to increase the potential for kidney failure in humpback whales and may be preventing some populations from recovering (Lambertsen 1992). Parasites and biotoxins from red-tide blooms are other potential causes of mortality (Perry *et al.* 1999). 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%) (see Figure 7; Lefebvre *et al.* 2016).

Ice Entrapment

Entrapments in ice have been documented in the spring ice pack in Newfoundland *(Merdsoy et al.* 1979), with up to 25 humpbacks entrapped in the same event (Lien and Stenson 1986), and some mortalities have been reported; however no humpback ice entrapments have been reported in Southeast Alaska.

Anthropogenic Threats

Vessel Strikes and Disturbance

Vessel strikes (Fleming and Jackson 2011) are listed as one of the main threats and sources of anthropogenic impacts to humpback whales in Alaska. Ship strikes on humpback whales are typically identified by evidence of massive blunt trauma (fractures of heavy bones and/or hemorrhaging) in stranded whales, propeller wounds (deep slashes or cuts into the blubber), and fluke/fin amputations on stranded or live whales (NMFS 2011). Neilson *et al.* (2012) summarized 108 large whale ship-strike events in Alaska from 1978 to 2011, 25 of which are known to have resulted in the whale's death; 86% of those reports involved humpback whales. Most ship strikes of humpback whales are reported from Southeast Alaska (Helker *et al.* 2019). In 2019, five humpbacks were reported stranded in Alaska with evidence of injury from vessel strikes (Savage 2020).

Fishery Interactions including Entanglements

Fishing gear entanglement (Fleming and Jackson 2011, Bettridge *et al.* 2015) is also listed as one of the main threats and sources of anthropogenic impacts to humpback whales in Alaska. Entanglement may result in only minor injury or may potentially significantly affect individual health, reproduction, or survival (NMFS 2011). Every year, humpback whales are reported entangled in fishing gear in Alaska, particularly pot gear and gill net gear. Other gear interactions with humpback whales in Alaska have occurred with purse seine fisheries, anchoring systems and mooring lines, and marine debris. From 2012 to 2016, there were 52 entanglements of humpback whales in Alaska, which comprised the majority of all large whale serious injuries and mortalities in Alaska (Helker *et al.* 2019). In 2019, nine entangled humpback whales were reported to the Alaska Marine Mammal Stranding Program (Savage 2020).

Subsistence, Illegal Whaling, or Resumed Legal Whaling

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

Pollution

Humpback whales can accumulate lipophilic compounds (e.g., halogenated hydrocarbons) and pesticides (e.g. DDT) in their blubber, as a result either of feeding on contaminated prey (bioaccumulation) or inhalation in areas of high contaminant concentrations (e.g. regions of atmospheric deposition; Barrie *et al.* 1992, Wania and Mackay 1993). Organochlorines, including PCB and DDT, have been identified from humpback whale blubber (Gauthier *et al.* 1997). Overall levels of PCB concentrations in North Pacific humpback whales are on par with other baleen whales, which are generally lower than odontocete cetaceans (Elfes *et al.* 2010). Although the health effects of different doses of contaminants are currently unknown for humpback whales (Krahn *et al.* 2004), available information does not suggest contaminant levels in humpback whales are having a significant impact on their persistence (Elfes *et al.* 2010).

Acoustic Disturbance

Low-frequency sound comprises a significant portion of ocean noise and stems from a variety of sources including shipping, research, naval activities, and oil and gas exploration (Weilgart 2007). Betteidge *et al.* 2015 identified underwater noise from human activity as a threat and suggested that exposure is likely chronic and at relatively high levels, caveating that overall population-level effects of exposure to underwater noise are not well-established. It does not appear that humpback whales are often involved in strandings related to noise events. There is one record of two humpback whales found dead with extensive damage to the temporal bones near the site of a 5,000-kg explosion, which likely produced shock waves that were responsible for the injuries (Ketton 1995). Other detrimental effects of anthropogenic noise include masking and temporary threshold shifts (TTS).

4.3.2.9 Recovery Goals

The 1991 Final Recovery Plan for the Humpback Whale identifies the following four recovery goals for the species.

- Maintain and enhance habitats used by humpback whales currently or historically
- Identify and reduce direct human-related injury and mortality
- Measure and monitor key population parameters
- Improve administration and coordination of recovery program for humpback whales

4.3.2.10 Critical Habitat

NMFS proposed critical habitat for Mexico DPS humpback whales on October 9, 2019 (84 FR 54354), however, critical habitat for humpback whales is yet to be designated.

5. ENVIRONMENTAL BASELINE

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

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

5.1 Factors Affecting Species within the Action Area

A number of human activities have contributed to the current status of populations of ESA-listed species in the action area. The factors that have likely had the greatest impact are discussed in the sections below. For more information on all factors affecting the ESA-listed species considered in depth in this opinion, please refer to the following documents:

- 2018 Alaska Marine Mammal Stock Assessments (Muto *et al.* 2019), available at https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region,

- Recovery Plan for the Steller Sea Lion, Eastern and Western Distinct Population Segments (*Eumetopias jubatus*) (NMFS 2008), available at https://www.fisheries.noaa.gov/resource/document/recovery-plan-steller-sea-lion-revision-eastern-and-western-distinct-population, and

- Status Review of the Humpback Whale (*Megaptera novaeangliae*) (Bettridge *et al.* 2015), available at https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.

The project vicinity is an area of moderately high human use and some habitat alteration. The primary ongoing human activity in the action area likely to impact marine mammals includes climate change, coastal zone development, pollution, marine vessel activity, and noise (e.g., vessel, pile-driving, equipment, etc.).

5.1.1 Climate Change

The effects of climate changes to the marine ecosystems of the Gulf of Alaska, including northern Lynn Canal, and how they may affect marine mammals are uncertain. The effects of climate change would result from changes in the distribution of temperatures suitable for the distribution and abundance of prey and the distribution and abundance of competitors or predators. For example, variations in the localized recruitment of herring in or near the action area caused by climate change could change the distribution and localized abundance of humpback whales. However, we have no information to indicate that this has happened to date.

The Steller Sea Lion Recovery Plan ranks environmental variability as a potentially high threat to recovery of the western DPS (NMFS 2008). The Bering Sea and Gulf of Alaska are subjected to large-scale forcing mechanisms that can lead to basin-wide shifts in the marine ecosystem resulting in significant changes to physical and biological characteristics, including sea surface temperature, salinity, and sea ice extent and amount. Physical forcing affects food availability and can change the structure of trophic relationships by impacting climate conditions that influence reproduction, survival, distribution, and predator-prey relationships at all trophic levels. Warmer waters could favor productivity of some species of forage fish, but the impact on recruitment of important prey fish of Steller sea lions is unpredictable. Recruitment of large year-classes of gadids (e.g., pollock) and herring has occurred more often in warm than cool years, but the distribution and recruitment of other fish (e.g., osmerids) could be negatively affected (NMFS 2008). Populations of Steller sea lions in the Gulf of Alaska and Bering Sea have experienced large fluctuations due to environmental and anthropogenic forcing (Mueter *et al.* 2009). As we work to understand how these mechanisms affect various trophic levels in the marine ecosystem, we must consider the additional effects of global warming, which are expected to be most significant at northern latitudes (Mueter *et al.* 2009, IPCC 2013)

5.1.2 Coastal Development

Coastal development can result in the loss and alteration of nearshore marine mammal habitat and changes in habitat quality. Increased development may prevent marine mammals from reaching or using important feeding, breeding, and resting areas, or may affect the quality of the habitat for marine mammal prey species. The Lutak Dock is a multiuse, deep water port originally constructed in 1953. Modifications, repairs and partial replacements to the dock have been incrementally occurring since 2003 in order to maintain the dock's working condition. As such, the shoreline in the immediate project area is highly developed (Figure 13).

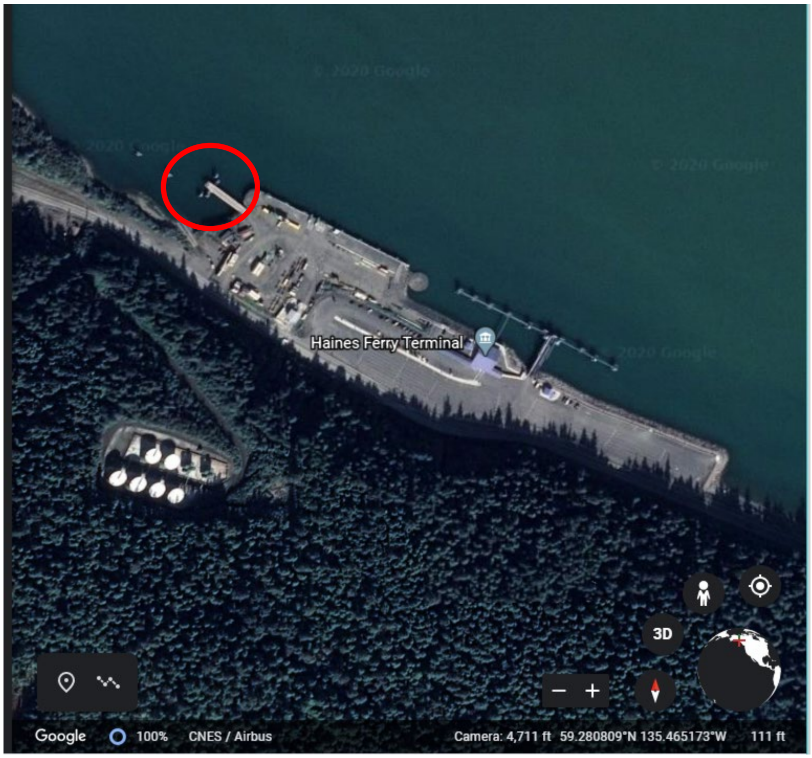
5.1.3 Pollutants and Discharges

Previous development and discharges in portions of the action area are the source of multiple pollutants that may be bioavailable (i.e., may be taken up and absorbed by animals) to ESA-listed species or their prey items (NMFS 2013b). As a port facility, there is the potential for accidental discharges or spills, permitted discharges, and stormwater runoff.

5.1.4 Vessel Interactions

Vessel-based recreational activities, commercial fishing, shipping, whale-watching, and general transportation occur within the action area regularly. All of these sources of vessel traffic

FIGURE 13: Aerial view of the Lutak Dock. Approximate project footprint circled in red.



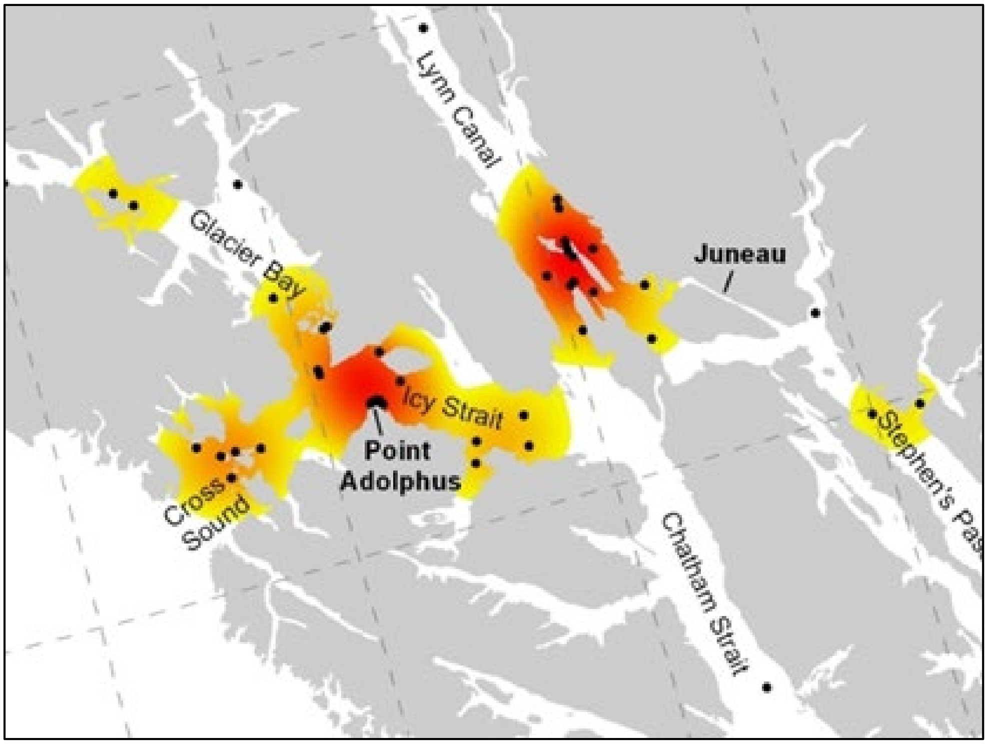
increase underwater noise and contribute to the risk of vessel-whale collisions. Ship strikes and other interactions with vessels unrelated to fisheries occur frequently with humpback whales. Neilson *et al.* (2012) summarized 108 large whale ship-strike events in Alaska from 1978 to 2011, 25 of which are known to have resulted in the whale's death. Eighty-six percent of these reports involved humpback whales. The minimum mean annual mortality and serious injury rate due to ship strikes reported in Alaska is 2.7 Central North Pacific humpback whales per year between 2010 and 2014. Most vessel collisions with humpbacks are reported from Southeast Alaska (Muto *et al.* 2019).

Neilson *et al.* (2012) also reported the following summary statements about humpback whale and vessel collisions in Southeast Alaska.

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

Further, the authors used previous locations of whale strikes to produce this kernel density estimation. The high-risk areas shown in red in Figure 14 are also popular whale-watching destinations (Neilson *et al.* 2012). The action area is not identified as an area of high risk in this analysis.

FIGURE 14: High Risk Areas for Vessel Strike in northern Southeast Alaska; used with permission from Neilson *et al.* 2012



There are three documented occurrences of Steller sea lions being struck by vessels in Southeast Alaska; all were near Sitka (NMFS AKR unpubl. stranding data). Vessel strike has not been documented in the action area and is not considered a major threat to Steller sea lions.

Information about regulations, guidelines, and programs related to vessel interactions with marine mammals is available at: https://www.fisheries.noaa.gov/alaska/marine-life-viewing-guidelines/alaska-marine-mammal-viewing-guidelines-and-regulations.

5.1.5 Natural and Anthropogenic Noise

The Lutak Dock is multipurpose facility that is currently used by Alaska Marine Lines for tugs and the loading and unloading of barges, as well as Alaska Marine Highway System ferries and Delta Western tugs and barges. As such, the action area is subject to noise from many anthropogenic sources, including marine vessels, shore-based heavy equipment for loading/unloading of cargo, shoreline and dock construction and repairs, and land vehicles.

Because responses to anthropogenic noise vary among species and individuals within species, it is difficult to determine long-term effects. Clark *et al.* (2009) identified increasing levels of anthropogenic noise as a habitat concern for whales because of its potential effect on their ability to communicate (i.e., masking). Some research (Parks 2003, McDonald *et al.* 2006, Parks 2009) suggests marine mammals compensate for masking by changing the frequency, source level, redundancy, and timing of their calls. However, the long-term implications of these adjustments, if any, are currently unknown.

NMFS has conducted numerous ESA section 7 consultations related to construction activities in Southeast Alaska waters. Many of the consultations have authorized the take (by harassment) of humpback whales and Steller sea lions from sounds produced during pile driving, drilling, and vessel operations. Anticipated impacts by harassment from noise associated with construction activities generally include changes in behavioral state from low energy states (i.e., foraging, resting, and milling) to high energy states (i.e., traveling and avoidance).

5.1.6 Competition for Prey

Competition for prey species could exist between Steller sea lions, humpback whales, other marine life and humans. Humpback whales feed on schooling fish, including species that are harvested by humans commercially or for personal use. In the Gulf of Alaska, where humpback whale numbers are growing and some Pacific herring stocks have remained depressed despite cessation of commercial fishing, it is hypothesized that predation by humpbacks on herring might be impeding herring recovery, thus there are areas where there may be direct competition for herring between humpback whales and fisheries (Straley *et al.* 2018). While herring biomass in Lynn Canal is depressed and below minimum biomass to sustain a commercial fishery, humpback whales peak earlier in the fall before herring completely move into the area, thus there is less potential that humpbacks are influencing herring populations in the canal (Straley *et al.* 2018).

Given the recent abundance trends discussed above and the remoteness and small scale of the action area compared to commercial and personal use fishing grounds, NMFS expects any competition for prey in the action area to be minimal.

5.1.7 Scientific Research

Scientific research is permitted for humpback whales and Steller sea lions in the action area, as listed in NMFS' Authorizations and Permits for Protected Species (APPS) website (NMFS 2020). NMFS issues scientific research permits that are valid for five years for ESA-listed species. When permits expire, researchers often apply for a new permit to continue their research. Additionally, applications for new permits are issued on an on-going basis; therefore, the number of active research permits is subject to change in the period during which this opinion is valid.

As of February 2020, there were 18 active research permits authorizing take (directed or incidental) of Steller sea lions in Alaska listed in APPS. Only one permit includes hands-on activities in Southeast Alaska, and potentially the action area. In addition to monitoring activities, it authorizes capture and sampling work to support health, condition, foraging ecology and contaminant investigations for both the eDPS and wDPS Steller sea lions. This permit supports the continuation of Alaska Department of Fish and Game's (ADF&G) long-term Steller sea lion research program, with most field work taking place May-August. These research activities have the potential to occur during the same time as construction activities at Lutak Dock.

As of February 2020, there were 21 active research permits authorizing takes of Mexico and Hawaii DPS humpback whales in Alaska waters listed in APPS. Most research projects identified their work would occur generically in the Southeast region, although some did have core areas identified (e.g., Juneau; Glacier Bay/Icy Strait) which suggests they will not overlap the action area. There was only one permit that clearly identified that work may occur in Lynn Canal, but it wasn't clear if the work would occur as far north in Lynn Canal as the action area. With the exception of one permit where humpback whales may be incidentally taken as a result of research on killer whales, all 14 research projects in Southeast Alaska generally included the same type of activities targeted at humpback whales. All projects involved at least some of the following, whereas some included all of the following research activities.

- Counting/surveying
- Opportunistic collection of sloughed skin and remains
- Behavioral and monitoring observations
- Various types of photography and videography, including underwater cameras and aerial drones
- Skin and blubber biopsy sampling
- Fecal sampling
- Sampling exhaled air via a pole or unmanned aerial vehicle
- Suction-cup, dart/barb, satellite, and dorsal fin/ridge tagging
- Thermal imaging

These research activities require close vessel approach. The permits also include incidental harassment takes to cover such activities as tagging, where the research vessel may come within 91 m (300 ft) of other whales while in pursuit of a target whale. These activities may cause stress to individual whales and cause behavioral responses, but harassment is not expected to rise to the level where injury or mortality is expected to occur. Activities associated with these permits could occur in the action area, possibly at the same time as the proposed project activities.

5.2 Environmental Baseline Summary

Historically, overexploitation of large whales caused declines in abundance to the point of near-extinction. There is no commercial whaling of humpback whales currently. Mexico DPS humpback whale abundance trend is unknown.

The relationship between sound and marine mammal response to sound is the topic of extensive scientific research and public inquiry. Most observations report only short-term behavioral responses that include cessation of feeding, resting, or social interactions because study design precludes detection of difficult-to-detect long-term effects, if any exist. However, behavioral response could take the form of habitat abandonment, which could have implications at the population level.

Humpback whales and wDPS Steller sea lions in the action area appear to be increasing in population size – or, at least, their population sizes do not appear to be declining – despite their continued exposure to the effects of the activities discussed in the *Environmental Baseline*. While we do not have trend information for the Mexico DPS of humpback whales, they also do not appear to be declining as a result of the current stress regime.

6. EFFECTS OF THE ACTION

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

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

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

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

6.1 Project Stressors

During the course of this consultation, we identified the following potential stressors from the proposed activities:

- Vessel strike;
- Habitat alteration;
- Sounds from:
    - Vessels;
    - Pile driving and extraction; and
    - Down-the-hole drilling.

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

6.1.1 Stressors Not Likely to Adversely Affect ESA-Listed Species

Based on a review of available information, we determined which of the possible stressors may occur, but for which we expect the likely effects to wDPS Steller sea lions and Mexico DPS humpback whales to be undetectable or improbable.

6.1.1.1 Vessel Strike

In Southeast Alaska, there have been 22 reports of humpback whale strike strikes and two reports of Steller sea lion vessel strikes since 2000 (NMFS AKR unpubl. stranding data). No ship strikes involving humpback whales or Steller sea lions have been documented near the action area.

The possibility of a project vessel striking a wDPS Steller sea lion or a Mexico DPS humpback whale is extremely unlikely, as only one trip will be required to transport construction equipment to/from Lutak Dock, and the equipment will be transported on a regularly scheduled cargo shipment to the dock following standard shipping routes (M. Turner, SLR International Corp. *pers. comm*. to M. Migura, NMFS AKR). If the pile driving equipment cannot be used from shore, it will be stationed on a barge, which will be maneuvered using tug boats already onsite. Normal shipping routes already avoid Steller sea lion critical habitat, and per the mitigation measures, all vessels will adhere to the humpback whale vessel approach regulations and will avoid approaching within 100 yards of any marine mammal.

The types and levels of vessel traffic in the action area are not expected to change as a result of this project. We conclude the probability of strike occurring is extremely unlikely, and therefore effects to wDPS Steller sea lions and Mexico DPS humpback whales from this project-related stressor are improbable.

6.1.1.2 Habitat Alteration

Components of the project that will alter in-water habitat include pile driving/removal and the placement of fill. These activities will result in both temporary changes to water quality as a result of the physical resuspension of sediments producing localized turbidity plumes, and physical loss of habitat from fill and installation of 13 new piles.

Water Quality

Lutak Inlet is a glacial scoured fjord, with bedrock covered in a thick layer of homogeneous sediment consisting of dark gray, silty gravel material, as well as cobbles and boulders. There is some level of natural turbidity resulting from glacial sources. Construction-related turbidity increases would be short-term, likely lasting from a few minutes to several hours. However, turbidity may be increased above background levels within the immediate vicinity of construction activities and could exceed turbidity criteria for state water quality standards (18 AAC 70). In general, turbidity associated with pile installation is expected to be localized to about a 25 ft radius around the pile (Everitt *et al.* 1980). Humpback whales are not expected to come close enough to the Lutak Dock to encounter increased turbidity from construction activities, and it is likely that Steller sea lions would avoid the short-term, localized areas of turbidity. Because of local currents and tidal action, any potential water quality exceedances are expected to be temporary and highly localized.

Contaminated sediments are not expected at the project site but any that do occur would be tightly bound to the sediment matrix. 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 inlet. There is little potential for pinnipeds or cetaceans to be exposed to increased turbidity resulting from construction operations. Therefore, exposure of marine mammals to re-suspended contaminants is expected to be negligible.

Increased turbidity caused by construction activities also has the potential to adversely affect forage fish and juvenile salmonid migratory routes in the project area. Both herring and salmon form a significant prey base for wDPS Steller sea lions, and herring is a primary prey of Mexico DPS humpback whales when they are in southeast Alaska. Juvenile salmon have been shown to avoid areas of unacceptably high turbidities (e.g., Servizi 1988), although they may seek out areas of moderate turbidity (10 to 80 nephelometric turbidity units [NTU]), presumably as cover against predation (Cyrus and Blaber 1987a and 1987b). Feeding efficiency of juveniles is also impaired by turbidities in excess of 70 NTU, well below sublethal stress levels (Bisson and Bilby 1982). Reduced preference by adult salmon homing to spawning areas has been demonstrated where turbidities exceed 30 NTU (20 milligrams per liter [mg/L] suspended sediments). However, Chinook salmon exposed to 650 mg/L of suspended volcanic ash were still able to find their natal water (Whitman *et al.* 1982). Turbidity from the proposed action is expected to be temporary and highly localized (< 25 feet from the pile activity). Therefore, project-related elevated turbidity is unlikely to directly affect juvenile or adult salmonids that may be present during pile driving activities.

Similarly, in a feeding study with Pacific herring larvae, fish were exposed to suspensions of estuarine sediment and Mount Saint Helens volcanic ash at concentrations ranging from zero to 8,000 mg/L (Boehlert and Morgan 1985). In all experiments, maximum feeding incidence and intensity occurred at levels of suspension of either 500 or 1,000 mg/L, with values significantly greater than controls (0 mg/L). Feeding decreased at greater concentrations. The suspensions may have enhanced feeding by providing visual contrast of prey items on the small perceptive scale used by the larvae. Larval residence in turbid environments such as estuaries may also serve to reduce predation from larger, visual planktivores, while searching ability in the small larval perceptive field is not decreased (Boehlert and Morgan 1985).

Based on the data discussed above and the mitigation measures, it is unlikely that the short-term and localized increase in turbidities generated by the proposed actions would measurably affect juvenile or adult salmonids and herring that may be present in the project area. Furthermore, foraging Steller sea lions and humpback whales within the action area would not be measurably impacted by elevated turbidities, given the highly localized and temporary nature of any project effects.

Short-term effects on listed marine mammal species may occur if petroleum or other contaminants accidentally spill into Lutak Inlet or Lynn Canal from machinery or vessels during terminal construction activities. Assuming normal construction and vessel activities, discharges of petroleum hydrocarbons are expected to be small and are not expected to result in high concentrations of contamination within the surface waters. Best Management Practices (BMPs) will be implemented to minimize the risk of fuel spills and other potential sources of contamination. On-site containment equipment will be readily available prior to any construction activities, and per the mitigation measures, equipment will be inspected daily. Spill prevention and spill response procedures will be maintained throughout construction activities. Therefore, any adverse effects on wDPS Steller sea lions and Mexico DPS humpback whales from accidental spills or discharges would be short-term, small in scale, and are considered unlikely to occur.

The impact from increased turbidity or contaminant levels on marine mammals or their key prey species in the area would be negligible and would not cause a significant disruption of behavioral patterns that would rise to the level of harassment. We conclude the effects of changes in water quality associated with the proposed project on wDPS Steller sea lions and Mexico DPS humpback whales would be undetectable.

Habitat Loss

The proposed RoRo modifications will result in permanent habitat loss of approximately one acre as a result of placement of fill and installation of piles, as well as habitat modification resulting from installation of an overwater structure (the RoRo ramp). These activities will occur in the same location as the existing dock, but are not in an area of importance or use by Steller sea lions or humpback whales.

The increase in overwater shading may affect the localized behavior of juvenile salmon that could be preyed upon by Steller sea lions. Expected responses may include pausing, school dispersal, and directional changes resulting in potential increases in predation as fish disperse away from the nearshore. Most of the literature indicates that the change in light intensity between open areas and shading provided by the overwater structure is a primary contributor of behavioral effects. However, there is little empirical evidence to indicate that these behavioral responses result in decreases in fitness or population (Nightingale and Simenstad 2001).

The addition of 13 piles to the intertidal and subtidal zones will eliminate a small area of benthic habitat which juvenile salmon use for feeding and rearing in the nearshore. The piles will eliminate 70 square feet of bottom and provide a substantially greater area for epibenthic and macrovegetation attachment.

These factors make it unlikely that the proposed increase in overwater coverage and the reduction in benthic habitat will have detectable effects on prey availability or benthic habitat for Steller sea lions or humpback whales. Given this, we conclude any effects from project-related habitat loss to wDPS Steller sea lions and Mexico DPS humpback whales will be undetectable.

6.1.1.3 Airborne Sounds from Pile Driving

Airborne noises could affect hauled out pinnipeds. However, noise generated during vibratory pile driving would attenuate to the acceptable threshold for Steller sea lions (100 dB) at approximately 33 ft (10 m) and in-air noise generated during impact driving would decline to this threshold at approximately 56 ft (17 m) (PND Engineers 2018).

There are no known Steller sea lion haulout sites within the in-air disturbance zone. Therefore, during pile driving, temporary in-air harassment would be limited to sea lions swimming on the surface through the immediate action area near the dock. Any animal swimming close to the dock would already have been exposed to in-water noise levels exceeding the take threshold. Further, we expect that the proposed mitigation would either prevent a take from occurring at these distances or prevent serious injury due to the implementation of shutdown zones (see Section 2.1.2). For these reasons, effects to wDPS Steller sea lions from in-air noise are considered extremely unlikely and any exposure would occur at levels likely to have immeasurably small effects.

6.1.1.4 Underwater Sounds from Tension Anchors

During pile driving, if bedrock is encountered before the full required pile depth is achieved, piles would be socketed into the bedrock using concrete, and tension anchors may be installed in the vertical pile for additional support. If tension anchors are required, a small rotary drill would be used to complete an approximately 5-in. diameter hole extending about 30 to 40 ft (1 to12 m) into bedrock below the tip of the pile. A steel bar would be grouted into this hole. Once the grout sets, a jack would be applied to the top of the bar and the tensioned rod would be locked off to plates at the top of the pile.

Noise associated with drilling a 5-in diameter hole extending about 30-40 ft into bedrock below the tip of the pile is anticipated to be contained entirely within the piling and is not anticipated to reach or exceed the 120 dB threshold for non-impulsive noise sources. Given the small size of the anchoring drill, the installation method within a pile, and the low anticipated sound source level, the effects of tension anchor installation noise are considered undetectable since they are not anticipated to reach the level at which harassment could occur.

6.1.2 Stressors Likely to Adversely Affect ESA-Listed Species

The following sections analyze the stressors likely to adversely affect wDPS Steller sea lions and Mexico DPS humpback whales. The following analysis and discussion focus on effects from exposure to impulsive and non-impulsive noise sources from pile driving/removal, DTH drilling, and vessels because these stressors will have the most direct impacts on listed species. In this analysis, we used sound exposure modeling provided by SLR International Corporation (SLR 2019) to inform our representation of the sound field produced by these stressors, and the NMFS acoustic thresholds (NMFS 2018a) to evaluate the effects of those sound fields above the ambient sound levels.

First, we present a brief explanation of the sound measurements used in the discussions of acoustic effects in this opinion.

6.1.2.1 Acoustic Thresholds

As discussed in Section 2, *Description of the Proposed Action*, AML intends to conduct construction activities that would introduce sounds to the environment.

Since 1997, NMFS has used generic sound exposure thresholds to determine whether an activity produces underwater and in-air sounds that might result in impacts to marine mammals (70 FR 1871. 1872; January 11, 2005). NMFS recently developed comprehensive guidance on sound levels likely to cause injury to marine mammals through onset of permanent and temporary thresholds shifts (PTS; Level A harassment) (83 FR 28824; June 21, 2018). 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[2], expressed in root mean square[3] (rms), from broadband sounds that cause behavioral disturbance, and referred to as Level B harassment under section 3(18)(A)(ii) of the Marine Mammal Protection Act (MMPA):

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[2] 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.

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

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

Under the PTS Technical Guidance, NMFS uses the following thresholds (Table 5) for underwater sounds that cause injury, referred to as Level A harassment under section 3(18)(A)(i) of the MMPA (16 U.S.C § 1362(18)(A)(i)) (NMFS 2018a). Different thresholds and auditory weighting functions are provided for different marine mammal hearing groups, which are defined in the Technical Guidance (NMFS 2018a). The generalized hearing range for each hearing group is in Table 6. These acoustic thresholds are presented using dual metrics of cumulative sound exposure level (L_E) and peak sound level (PK) for impulsive sounds and L_E for non-impulsive sounds. Level A harassment radii can be calculated using the optional user spreadsheet[4] associated with NMFS Acoustic Guidance, or through modeling.

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 20µParms for non-harbor seal pinnipeds

Hearing Group	**PTS Onset Acoustic Thresholds*** **(Received Level)**	
	Impulsive	**Non-impulsive**
Low-Frequency (LF) Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB

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

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

TABLE 5: PTS Onset Acoustic Thresholds for Level A Harassment (NMFS 2018a)

TABLE 6: Underwater marine mammal hearing groups (NMFS 2018a)

Hearing Group	ESA-listed Marine Mammals In the Project Area	Generalized Hearing Range[1]
Low-frequency (LF) cetaceans *(Baleen whales)*	Mexico DPS humpback whale	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans *(dolphins, toothed whales, beaked whales)*	None	150 Hz to 160 kHz
High-frequency (HF) cetaceans *(true porpoises)*	None	275 Hz to 160 kHz
Phocid pinnipeds (PW) *(true seals)*	None	50 Hz to 86 kHz
Otariid pinnipeds (OW) *(sea lions and fur seals)*	wDPS Steller sea lion	60 Hz to 39 kHz
[1]Respresents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges are typically not a broad. Generalized hearing range chosen based on ~65 db threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall *et al.* 2007) and PW pinniped (approximation).		

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

While the ESA does not define "harass," NMFS issued guidance interpreting the term "harass" under the ESA as to: "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016). For purposes of this consultation, we consider any exposure to Level A or Level B behavioral disturbance sound thresholds to constitute harassment under the ESA.

As described below, we anticipate that exposures to ESA-listed marine mammals from noise associated with the proposed action may result in disturbance or temporary displacement (Level B harassment). With the addition of mitigation measures including shutting down pile driving activities if any marine mammal is observed within 200 m, no mortalities or permanent impairment to hearing (Level A harassment) are anticipated for either wDPS Steller sea lions or Mexico DPS humpback whales.

6.1.3 Summary of Effects

NMFS determined that the effects on wDPS Steller sea lions and Mexico DPS humpback whales from vessel strikes, habitat alteration, airborne sounds from pile driving, and underwater sounds from installing tension anchors may occur, but the associated effects are expected to be too small to detect or so unlikely to occur as to be improbable. NMFS anticipates that increased exposure to sound levels above ambient noise from pile driving/removal and DTH drilling activities is likely to adversely affect wDPS Steller sea lions and Mexico DPS humpback whales. These stressors are discussed further in the *Exposure Analysis*.

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.

6.2.1 Exposure to Noise from Pile Driving

For the analysis of exposure to noise from pile driving activities, 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 temporary or 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) and the number of days of activities.

The potential for incidental take 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 DTH hammering.

WDPS Steller sea lions and Mexico DPS humpback whales may be present within the waters of the action area during the time that in-water work is being conducted, and could potentially be exposed to elevated underwater and/or in-air noise levels. Elevated underwater noise during vibratory and impact pile driving has the potential to result in Level B (behavioral) harassment or Level A (injurious) harassment of marine mammals.

6.2.1.1 Exposure Assumptions

- No more than eight days of pile driving and extraction activity will occur over the course of 25 days between mid-June 2020 and end of October 2020.

- Because pile driving and removal produce similar sound profiles and levels (MacGillivray *et al.* 2015), vibratory pile driving sound estimates will be used as a proxy for vibratory pile removal sound levels.

- Calculated Level A and B zones are based only on 36-inch piles, but will be monitored for all pile sizes. Thus, the zones are overestimated for 24-inch and 30-inch piles.

- The reported radii for 24-hr sound exposure level (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 exposure represent an unlikely worst-case scenario as animals would be expected to move away from the noise source before the exposure would result in a meaningful impact that might affect the individual or population.

- Animals occurring within the Level A and Level B ensonified zones are considered to be in each zone simultaneously, but would only be counted as one Level A take.

- Exposures are based on total number of days that pile driving could occur and that animals might occur in the ensonified action area.
- One day equates to any length of time that piles are driven whether it is a partial day or a 24-hour period.
- All listed marine mammals occurring in the Level A and Level B ensonified zones are assumed to be incidentally taken.
- An individual animal can only be counted as taken once during a 24-hour period.
- For animals that may occur in groups, each individual in the group would be considered taken.
- Exposures to sound levels at or above the relevant thresholds equate to take.
- The percentage of Steller sea lions which may be found in the action area from the wDPS is estimated at 1.4% (Hastings *et al.* 2020).
- The percentage of humpback whales which may be found in the action area from the Mexico DPS is estimated at 6.1% (Wade *et al.* 2016; NMFS 2016a).
- Individual wDPS Steller sea lions taken are expected to be a mix of solitary adult males and females. NMFS does not anticipate exposure of WDPS Steller sea lion pups, as there are no rookeries within the action area.

6.2.1.2 Calculated Acoustic Impact Zones

SLR International Corporation estimated the acoustic footprint of impact and vibratory pile driving and DTH drilling associated with this project based on the outputs from the User Spreadsheet companion to NMFS (2018a).

Since the objective of the study was a precautionary investigation into the potential effects of noise generated by the Lutak Dock Modification Project, the assumptions tended to be conservative. For example, it was assumed that all piles used in the project were 36-inch piles (the largest pile size in the project), even though only six of the 13 piles to be driven are 36-inch piles (SLR 2019). This means that the impact zones for the 24-inch and 30-inch piles will be overestimated, providing more protection to marine mammals when those smaller piles are installed. Table 7 provides a summary of sound source levels and the parameters used in the user spreadsheet to calculate the impact zones. Copies of the User Spreadsheets created for this project can be found in appendix A of SLR (2019) or ECO49 (2019).

Based upon the calculations, the Level B harassment zone was estimated at 46.4 km (28.8 mi) from the sound source for continuous sounds made by vibratory pile driving/removal and DTH drilling; for impact pile driving, the Level B harassment zone extends 1.8 km (1.1 mi) (Table 8). The Level A zones vary by functional hearing group and by the type of hammer/drill being used (Table 8). For wDPS Steller sea lions and Mexico DPS humpback whales, these zones ranged from 4 m to 2.3 km.

TABLE 7: Parameters used in development of acoustic propagation calculations; assumes source levels referenced at 10m (from SLR 2019)

	Vibratory pile driving or extracting	DTH Drilling/Driving	Impact pile driving
Source Level	175 dB (RMS SPL)	171 dB (RMS SPL)	210dB (PK SPL) 183 dB (Single Strike SEL) 193 dB (RMS SPL)
Source Level Reference	Caltrans (2015)	Denes et al (2016)	Caltrans (2015)
Maximum number of piles within 24-h period	5	2	5
Active noise duration/number of strikes to drive a single pile	60 minutes	180 minutes	700 strikes

TABLE 8: Summary of calculated distances to Level A and B thresholds for humpback whales and Steller sea lions from various methods of pile driving/drilling activities for the Lutak Dock RoRo Modification Project (from SLR 2019)

Source	PTS Onset Isopleth – Cumulative [a]		Behavioral Disturbance Isopleth, all species
	Humpback Whales	Stellar Sea Lions	
Vibratory Driving	171 m (561 ft)	7 m (23 ft)	46.4 km (28.8 mi) [c]
DTH Driving	105 m (345 ft)	4 m (13 ft)	25.1 km (15.6 mi) [c]
Combination of Vibratory + DTH drilling [b]	200 m (656 ft)	9 m (30 ft)	46.4 km (28.8 mi) [c]
Impact Driving	2.3 km (1.4 mi)	80 m (262 ft)	1.8 km (1.1 mi)
	PTS Onset Isopleth – Peak [a]		
	3 m (10 ft)	n/a	

[a] For PTS, acoustic thresholds are presented as dual metric acoustic thresholds using cumulative sound exposure level over 24 hours (SEL_{cum} with reference value of 1 μPa2s) and peak sound pressure (PK with reference value of 1 μPa) metrics for impulsive sounds. As dual metrics, NMFS considers onset of PTS to have occurred when either one of the two metrics is exceeded. For non-impulsive sounds, thresholds are provided using the SEL_{cum} metric. From NMFS 2018.
[b] This scenario assumes a combination of vibratory pile driving (4 piles, 4 hours of active noise) and DTH drilling (2 piles, 6 additional hours active noise generation) on the same day.
[c] Lutak Inlet is smaller than this, therefore extent of actual impacts will be constrained by land.

6.2.1.3 Ensonified Area

The 120 dB isopleth for vibratory pile driving was chosen as the boundary of the action area because: 1) that is where we anticipate pile driving noise levels would approach ambient noise levels (i.e., the point where no measurable effect from the project would occur); and 2) vibratory pile driving produced the largest ensonified area out to the 120 dB. While project noise may propagate beyond the 120 dB isopleth, we do not anticipate that marine mammals would respond in a biologically significant manner at these low levels and great distance from the source.

The project site is at the mouth of Lutak Inlet, which is only 1 mile wide. The narrowness of the inlet and the configuration of the surrounding land masses greatly reduce the true size of several calculated impact zones as compared to the values presented in Table 8. Thus, the local geography and topography in Lutak Inlet and northern Lynn Canal play a significant role in the transmission loss of sound (i.e., the rate at which sound dissipates in the water). As a result, the maximum ensonified area is calculated at 22.2 km^2 for Level B harassment from vibratory driving and DTH hammer, and is the value use for the action area. The ensonified areas for each species by activity are displayed in Table 9, and Figure 15.

TABLE 9: Ensonified areas (km2) by Pile Driving Method and Species

Species – Harassment Type	Method	Area Ensonified (km^2)
Steller Sea Lion – Level A	Vibratory	0.000
	DTH	0.000
	Vibratory + DTH	0.000
	Impact	0.020
Humpback Whale – Level A	Vibratory	0.056
	DTH	0.025
	Vibratory + DTH	0.074
	Impact	6.899
All Species – Level B	Vibratory and/or DTH	22.164
	Impact	5.179

FIGURE 15: Maps depicting the Level A and Level B ensonified areas by pile driving method per species: (a) Steller sea lions – Level A, (b) Humpbacks - Level A, (c) All species – Level B

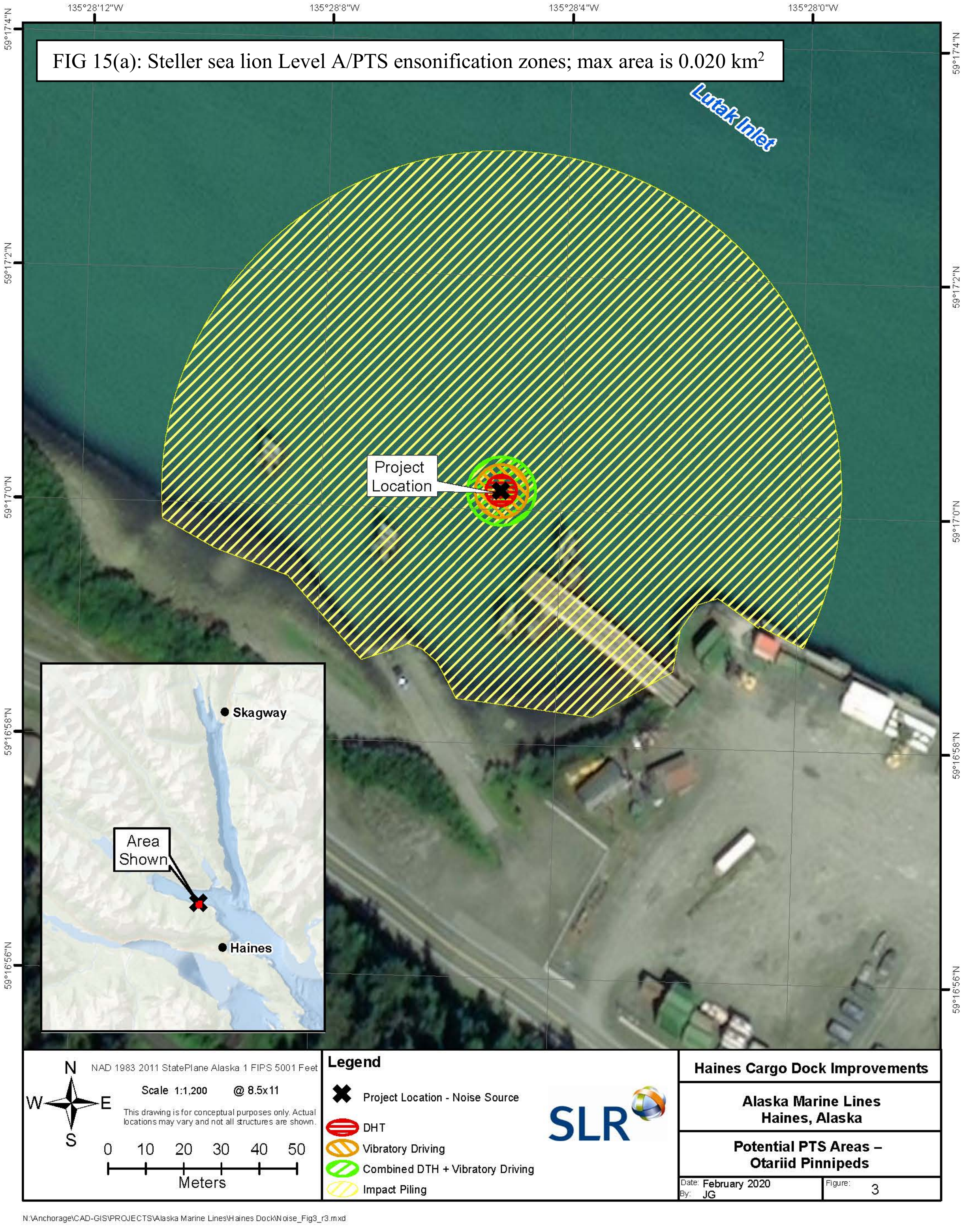


FIG 15(b): Humpback whale Level A/PTS ensonification zones; max area is 6.899 km^2

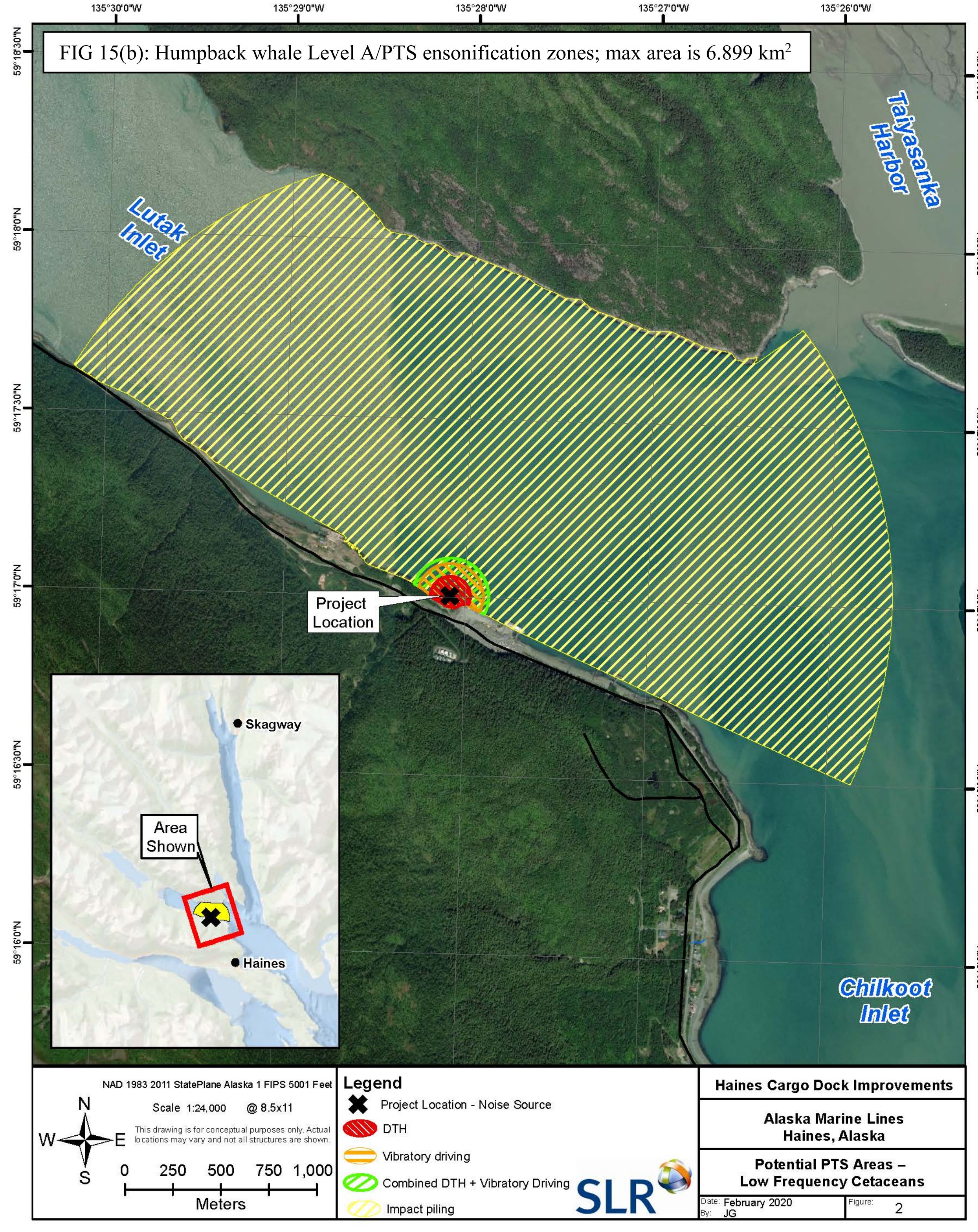
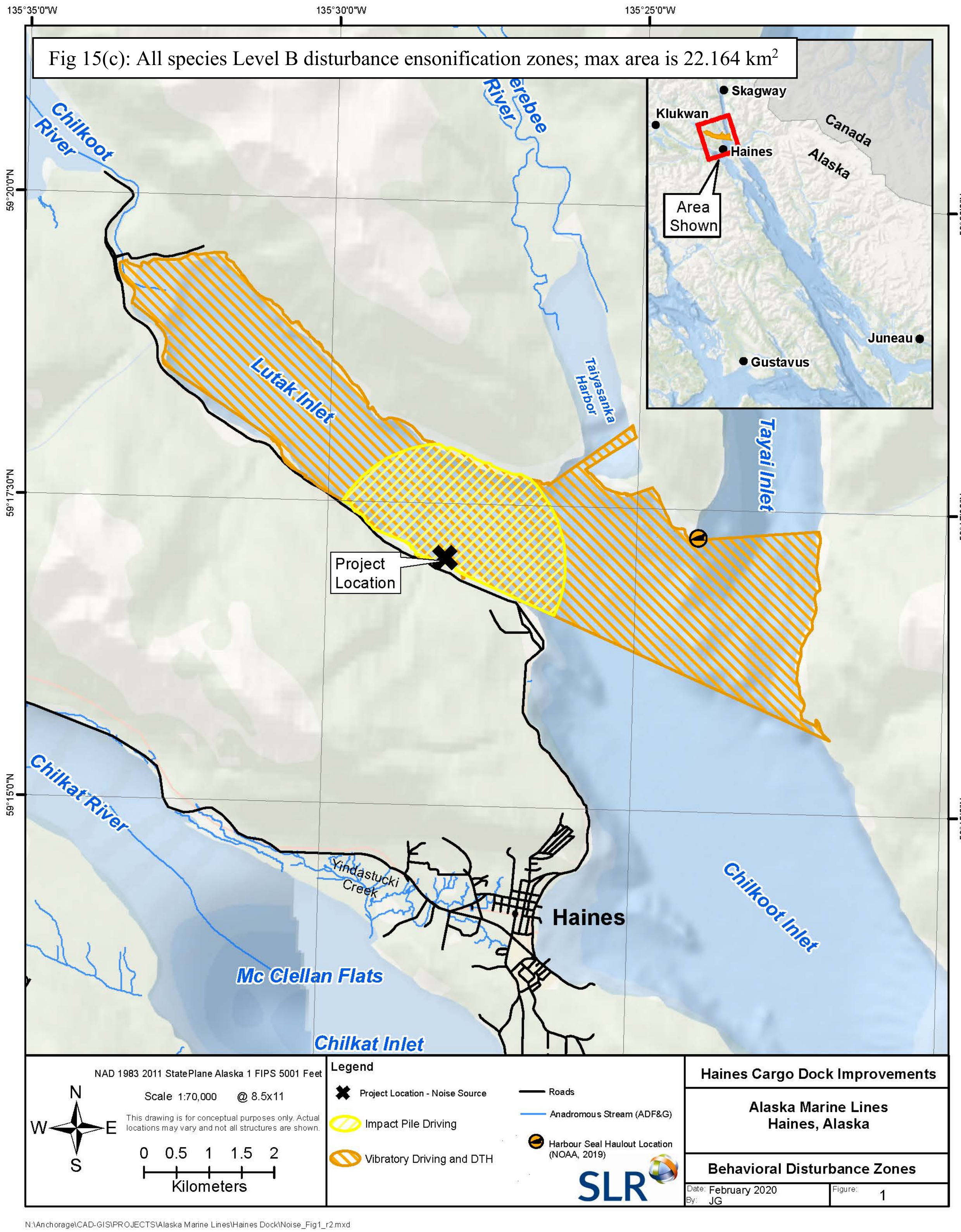


Fig 15(c): All species Level B disturbance ensonification zones; max area is 22.164 km^2



6.2.1.4 Anticipated Densities and Exposures of Listed Species

A determination of density of a given species requires a reasonable estimate of the abundance of that species. NMFS is not aware of reliable sea lion or humpback whale abundance or density data within the action area. There are, however, abundance data from Steller sea lion surveys conducted at Gran Point, approximately 21 km south of the project site (see section 4.3.1.3 and Figure 9). Similarly, our sea lion density estimates for the action area are derived from the closest available quantitative information from the Gran Point haulout averaged over the area between the haulout and the project site (91.3 km^2). This approach averages density over an area much larger than the action area. We concluded that this approach is reasonable because we expect sea lion density to be much higher near the Gran Point haulout, tapering off with distance north from that haulout. In other words, we expect that averaging our estimate across the higher density near the haulout and the presumed lower density in the action area results in an averaged density estimate that is likely biased high (i.e., likely to be higher than the actual density in the action area). Furthermore, there is an underlying assumption that all of the animals at the Gran Point haulout occur within the 91.3 km^2 survey area. Because Steller sea lions from Gran Point undoubtedly range well outside of this area, our density estimate is again biased high and is therefore quite conservative. Fewer animals are likely to be taken than our estimates indicate, although we have no information to indicate how many fewer animals may be taken.

Our expected exposure of wDPS Steller sea lions to Level B harassment due to pile driving for this project is 18, as calculated below. No Level A harassment is expected for ESA-listed Steller sea lions because the 200 m shutdown zone effectively prevents any Level A harassment.

$[(Ns/Sa) \times Aa] \times Dp \times Sw = Se$

Where:

Ns = estimated number of Steller sea lions present in the survey area at any point in time during the project window (674.4 animals) [5]

Sa = size of the survey area (91.3 km^2)

Ns/Sa = density of Steller sea lions (7.4 animals/km^2)

Aa = size of the action area (22.2 km^2)

Ns/Sa x Aa = number of sea lions in the Action Area at any point in time

Dp = duration of pile driving in days (8) [6]

Sw = Proportion of sea lions that are of the listed wDPS (0.014)

Se = number of exposures of wDPS Steller sea lions to Level B harassment due to pile driving for this project (18)

We have even less data on local densities for humpback whales. A very small number of humpback whales were recorded on the above-described sea lion surveys near Gran Point (low

[5] To be conservative in our density and exposure analyses, we used the June estimate of Steller sea lion abundance, the highest abundance in all project months, even though the project may occur when abundance is significantly less. Estimates of abundance in June over multiple years were averaged to obtain this abundance. See section 4.3.1.3.

[6] We multiply by the number of days because each animal is considered to be taken by harassment no more than once per day. That is, if an animal is "taken" early on day one, it is considered to have been taken for that entire day. If it encounters harassing levels of noise three times on day one, it is still considered to have been taken only once. As discussed in section 2.1.1, the worst-case scenario assumes 8 days of pile driving activities.

single digits), representing our only non-anecdotal source of locally-obtained abundance data. Various reports, both anecdotal and from these surveys, put the number of humpback whales present near the project area in the single digits (NMFS 2017; ECO49 2019). We estimate that the number of whales that may encounter project sound per day is about 1 per day. Sometimes, a breeding female whale with a calf may pass by, increasing a particular day's total whale exposure rate from 1 to 2. Because this operation will continue for up to 8 days, we estimate no more than 10 whales total may encounter project sound at Level B Harassment levels. Of these 10 whales, 6.1% are expected to be of the listed entity, or about 0.6 whales, which we conservatively round up to 1 listed Mexico DPS whale exposed to Level B acoustic harassment.

No Level A harassment is expected for ESA-listed humpbacks due to the very small total number of humpbacks that are expected to be exposed (low single digits), and the expectation that only 6.1% of these low single digits of humpbacks will be of the listed Mexico DPS (e.g., 3 whales total x 0.061 = 0.2 Mexico DPS humpbacks. We expect that mitigation measures will result in even fewer animals exposed (200 m shutdown zone will reduce the rate of exposure to sounds capable of causing level A take). Furthermore, only impact pile driving has the potential to result in Level A injury to humpback whales. Therefore, we conclude that Level A harassment of ESA-listed humpback whales is extremely unlikely.

As discussed in Section 2.1.2 above, AML proposed mitigation measures to avoid or minimize exposure of wDPS Steller sea lions and Mexico DPS humpback whales to acoustic stressors. In particular, measures are meant to reduce overall noise, monitor marine mammals within designated impact zones (Level A and Level B zones), and shut down the project where necessary to prevent project-associated Level A sound exposure to most marine mammals. Several numbers involved in estimating exposures of listed species to in-water noise were precautionary and likely conservative. Specifically, the impact zones for all piles were based on the largest pile size, which overestimates the Level A and B zones for seven of the 13 piles to be driven, and the exposure estimates are based on the highest density of the species in any given month even though project activities may occur when density would be expected to be lower.

Even if we were to assume one wDPS Steller sea lion and one Mexico DPS humpback whale would be exposed to Level A harassment (which we think is unlikely), that would not change our conclusion below regarding the likelihood of the action to jeopardize the continued existence of either DPS.

6.2.2 Exposure to Vessel Noise

Vessel noise associated with this action will be transmitted through water and constitutes a non-impulsive noise source. NMFS anticipates that whenever noise is produced from vessel operations in the action area, it may overlap with wDPS Steller sea lions and Mexico DPS humpback whales and some individuals are likely to be exposed to these non-impulsive noise sources.

6.2.2.1 Results of Vessel Noise Exposure

There are two phases of vessel noise and associated disturbance related to the proposed action. The first is vessel noise associated with the construction phase, and the second is vessel noise associated with operation of the RoRo cargo facility.

These acoustic impacts will result from moving sources, and for individual marine mammals that are exposed to noise from transiting vessels, the effects from each exposure will be temporary in duration, on the order of minutes. Effects of transient and temporary noise are expected to result in low levels of exposure that the animals can likely avoid without foregoing highly valuable foraging opportunities.

Broadband source levels for tug and barges have been measured at 145 to 170 dB re: 1 µPa, and 170 to 180 dB re: 1µPa for small ships and supply vessels (Richardson *et al.* 1995). Sound from vessels within this size range would reach the 120 dB threshold distances between 86 m and 233 m (282 and 764 feet) from the source (Richardson et al. 1995). Listed cetaceans and pinnipeds have the potential to overlap with vessel noise associated with the proposed construction activities. We anticipate low level exposure of short-term duration to listed marine mammals from vessel noise, and do not expect significant behavioral reactions. We will discuss potential responses of listed species to vessel noise in Section 6.3.3.

We anticipate that the frequency of AML's cargo shipments will continue at historical levels, and vessel traffic is unlikely to increase as a result of this action. Furthermore, the construction equipment will be transferred to/from Lutak Dock via AML's regularly scheduled cargo service so no additional vessel trips will be necessary.

6.3 Response Analysis

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

6.3.1 Responses to Noise from Pile Driving

As described in the Section 6.2.1, wDPS Steller sea lions and Mexico DPS humpback whales are anticipated to occur in the action area and are anticipated to overlap with noise associated with pile driving/removal activities. We assume that some individuals are likely to be exposed and respond to these impulsive and non-impulsive noise sources. Out of the 1,309 potential Level B exposures to Steller sea lions, only 18 exposures are anticipated for wDPS animals (1.4% of total exposures). No level A exposures to Steller sea lions are anticipated. Out of the 10 potential exposures to humpback whales, only one exposure is anticipated for Mexico DPS animals (6.1% of total exposures, rounded up to 1). Due to the small fraction of Mexico DPS humpbacks in the action area, that one exposure is most likely to be from Level B harassment, and not Level A harassment (see Section 6.2.1.4).

The effects of sounds from pile driving might result in one or more of the following: temporary or permanent hearing impairment, non-auditory physical or physiological effects, behavioral disturbance, and masking (Richardson *et al.* 1995, Gordon *et al.* 2004, Nowacek *et al.* 2007, Southall *et al.* 2007). The effects of pile driving on marine mammals are dependent on several factors, including the size, type, and depth of the animal; the depth, intensity, and duration of the pile driving sound; the depth of the water column; the substrate of the habitat; the standoff distance between the pile and the animal; and the sound propagation properties of the environment. Impacts to marine mammals from pile driving activities are expected to result primarily from acoustic pathways. As such, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. The further away from the source, the less intense the exposure should be. The substrate and depth of the habitat affect the sound propagation properties of the environment. Shallow environments are typically more structurally complex, which leads to rapid sound attenuation. In addition, substrates that are soft (e.g., sand) absorb or attenuate the sound more readily than hard substrates (e.g., rock), which may reflect the acoustic wave. Soft porous substrates would also likely require less time to drive the pile, and possibly less forceful equipment, which would ultimately decrease the intensity of the acoustic source.

Marine mammals exposed to high intensity sound repeatedly or for prolonged periods can experience hearing threshold shift (TS), which is the loss of hearing sensitivity at certain frequency ranges (Kastak *et al.* 1999, Schlundt *et al.* 2000, Finneran *et al.* 2005). TS can be permanent (PTS), in which case the loss of hearing sensitivity is not recoverable, or temporary (TTS), in which case the animal's hearing threshold would recover over time (Southall *et al.* 2007). Marine mammals depend on acoustic cues for vital biological functions, (e.g., orientation, communication, finding prey, avoiding predators); thus, TTS may result in reduced fitness in survival and reproduction. However, this depends on the frequency and duration of TTS, as well as the biological context in which it occurs. TTS of limited duration, occurring in a frequency range that does not coincide with that used for recognition of important acoustic cues, would have little to no effect on an animal's fitness. Repeated sound exposure that leads to TTS could cause PTS. PTS constitutes injury, but TTS does not (Southall *et al.* 2007). The following subsections discuss in somewhat more detail the possibilities of TTS, PTS, and non-auditory physical effects.

6.3.1.1 Temporary Threshold Shift

TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter 1985). While experiencing TTS, the hearing threshold rises, and a sound must be stronger in order to be heard. In terrestrial mammals, TTS can last from minutes or hours to days (in cases of strong TTS). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the sound ends. Few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals, and none of the published data concern TTS elicited by exposure to multiple pulses of sound. Available data on TTS in marine mammals are summarized in Southall *et al.* (2007).

For low-frequency cetaceans, no behavioral or auditory evoked potential (AEP) threshold data exist. Therefore, hearing thresholds were estimated by synthesizing information from anatomical measurements, mathematical models of hearing, and animal vocalization frequencies (NMFS 2016c).

California sea lions experienced TTS-onset from underwater non-pulsed sound at 174 dB re 1 µpa (Kastak *et al.* 2005), but also did not show TTS-onset from pulsed sound at 183 dB re 1 µpa (Finneran *et al.* 2003). It is not clear exactly when Steller sea lions may experience TTS and PTS.

6.3.1.2 Permanent Threshold Shift

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

Relationships between TTS and PTS thresholds have not been studied in marine mammals but are assumed to be similar to those in humans and other terrestrial mammals, based on anatomical similarities. PTS might occur at a received sound level at least several decibels above that inducing mild TTS if the animal were exposed to strong sound pulses with rapid rise time. For non-impulsive exposures (i.e., vibratory pile driving), a variety of terrestrial and marine mammal data sources indicate that threshold shift up to 40 to 50 dB may be induced without PTS, and that 40 dB is a conservative upper limit for threshold shift to prevent PTS. An exposure causing 40 dB of TTS is therefore considered equivalent to PTS onset (NMFS 2016c).

6.3.1.3 Non-Auditory Physiological Effects

Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage (Cox *et al.* 2006, Southall *et al.* 2007). Studies examining such effects are limited. In general, little is known about the potential for pile driving to cause auditory impairment or other physical effects in marine mammals. Available data suggest that such effects, if they occur at all, would presumably be limited to short distances from the sound source and to activities that extend over a prolonged period. The available data do not allow identification of a specific exposure level above which non-auditory effects can be expected (Southall *et al.* 2007) or any meaningful quantitative predictions of the numbers (if any) of marine mammals that might be affected in those ways. Marine mammals that show behavioral avoidance of pile driving, including some odontocetes and some pinnipeds, are especially unlikely to incur auditory impairment or non-auditory physical effects.

6.3.1.4 Disturbance Reactions

Disturbance includes a variety of effects, including subtle changes in behavior, more conspicuous changes in activities, and displacement. Behavioral responses to sound are highly variable and context-specific, and reactions, if any, depend on species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day, and many other factors (Richardson *et al.* 1995, Wartzok *et al.* 2003, Southall *et al.* 2007).

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

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway *et al.* 1997, Finneran *et al.* 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices, but also including impact pile driving) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds 2002, Thorson and Reyff 2006, see also Gordon *et al.* 2004, Wartzok *et al.* 2003, Nowacek *et al.* 2007). Responses to continuous sound, such as vibratory pile installation, have not been documented as well as responses to pulsed sounds.

With both types of pile driving, it is likely that the onset of pile driving could result in temporary, short term changes in an animal's typical behavior and/or avoidance of the affected area. These behavioral changes may include (Richardson *et al.* 1995): changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where sound sources are located; and/or flight responses (e.g., pinnipeds flushing into water from haulouts or rookeries). Pinnipeds may increase their haulout time, possibly to avoid in-water disturbance (Thorson and Reyff 2006).

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

- Drastic changes in diving/surfacing patterns (such as those thought to cause beaked whale stranding due to exposure to military mid-frequency tactical sonar);
- Habitat abandonment due to loss of desirable acoustic environment; and
- Cessation of feeding or social interaction.

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

6.3.1.5 Auditory Masking

Natural and artificial sounds can disrupt behavior by masking, or interfering with, a marine mammal's ability to hear other sounds. Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher levels. Chronic exposure to excessive, though not high-intensity, sound could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions. Masking can interfere with detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs only during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

Noise from pile driving and removal is relatively short-term. It is possible that pile driving/removal noise resulting from this proposed action may mask acoustic signals important to wDPS Steller sea lions and Mexico DPS humpback whales, but the short-term duration (4-8 days) and limited affected area would result in minimal effects from masking. Any masking event that could possibly rise to Level B harassment under the MMPA would occur concurrently within the zones of behavioral harassment already estimated for vibratory pile driving, and which have already been taken into account in the exposure analysis.

6.3.2 Probable Responses to Noise from Pile Driving

Pile driving activities associated with the RoRo modification at Lutak Dock, as outlined previously, have the potential to disturb or displace marine mammals. The specified activities may result in take from underwater sounds generated from pile driving. Potential harassment could occur if individuals of these species are present in the ensonified zone during pile driving activities. The potential for these outcomes is minimized through the construction method and the implementation of the planned mitigation measures. Specifically, vibratory hammers will be the primary method of installation, and impact hammer driving will be used for final proofing of each pile and as needed in the event that the vibratory hammer is not able to advance the pile. Vibratory driving is not likely to cause injury to marine mammals due to the relatively low source levels produced.

Impact pile driving produces short, sharp pulses with higher peak levels and much sharper rise time to reach those peaks. When impact driving is necessary, required measures (implementation of a 200 m shutdown zone) reduce the potential for injury. Given sufficient "notice" through use of soft start (for impact driving), marine mammals are expected to move away from a sound source that is annoying prior to the noise becoming potentially injurious. The high likelihood of marine mammal detection by trained observers under the required observation protocols further enables the implementation of shutdowns to avoid injury, serious injury, or mortality.

The applicant's proposed activities are spatially and temporally localized, varying between four to eight days depending upon conditions. These localized and short-term noise exposures may cause brief startle reactions or short-term behavioral modification by the animals. These reactions and behavioral changes are expected to subside quickly when the exposures cease.

Moreover, the proposed mitigation and monitoring measures are expected to reduce potential exposures and behavioral modifications even further.

In summary, up to 18 wDPS Steller sea lions and 1 Mexico DPS humpback whales may be exposed to Level B harassment sound levels during the proposed action. While mitigation measures include shut-down zones to prevent Level A exposure, there is no proposed shut-down to avoid level B exposure. If animals enter the Level B zone during pile removal or driving, harassment may occur. At these distances, a marine mammal that perceived pile driving operations is likely to ignore such a signal and devote its attentional resources to stimuli in its local environment. If animals do respond, some are likely to change their behavioral state – reduce the amount of time they spend at the ocean's surface, increase their swimming speed, change their swimming direction to avoid pile driving, change their respiration rates, increase dive times, reduce feeding behavior, and/or alter vocalizations and social interactions (Frid and Dill. 2002, Koski *et al.* 2009, Funk *et al.* 2010, Melcon *et al.* 2012). We anticipate that few (if any) exposures would occur at received levels >120 dB or 160 dB respectively for vibratory or impact pile driving due to avoidance of high received levels, and shut-down mitigation measures.

6.3.2.1 Prey

Noise generated from pile driving can reduce the fitness and survival of fish in areas used by foraging marine mammals; however, given the small size of the action area relative to known feeding areas in the vicinity, and the fact that any physical changes to this habitat would not be likely to reduce the localized availability of fish (Fay and Popper 2012), it is unlikely that marine mammals would be measurably affected.

6.3.3 Responses to Vessel Traffic

We assume that some Mexico DPS humpback whales and wDPS Steller sea lions are likely to be exposed and respond to non-impulsive noise from vessels.

Numerous studies of interactions between surface vessels and marine mammals have demonstrated that free-ranging marine mammals engage in avoidance behavior when surface vessels move toward them. It is not clear whether these responses are caused by the physical presence of a surface vessel, the underwater noise generated by the vessel, or an interaction between the two (Goodwin and Cotton 2004, Lusseau 2006). However, several authors suggest that the noise generated during motion is probably an important factor (Evans *et al.* 1992, Blane and Jaakson 1994, Evans *et al.* 1994). These studies suggest that the behavioral responses of marine mammals to surface vessels are similar to their behavioral responses to predators.

As we discussed previously, based on the suite of studies of cetacean behavior to vessel approaches (Au and Perryman 1982, Hewitt 1985, Bauer and Herman 1986, Corkeron 1995, Bejder *et al.* 1999, Au and Green 2000, Nowacek *et al.* 2001, David 2002, Magalhaes *et al.* 2002, Ng and Leung 2003, Goodwin and Cotton 2004, Bain *et al.* 2006, Bejder *et al.* 2006, Lusseau 2006, Richter *et al.* 2006, Lusseau and Bejder 2007, Schaffar *et al.* 2013), the set of variables that help determine whether marine mammals are likely to be disturbed by surface vessels include the number of vessels, distance between vessel and marine mammals, vessel speed and vector, predictability of the vessel's path, vessel noise, vessel type, and behavioral state of the marine mammals.

While there are no sea lion haulouts in the action area, there is one ~13 miles south of Lutak Dock (Gran Point). Vessels that approach rookeries and haulouts at slow speed, in a manner that sea lions can observe the approach, have less effect than fast approaches and a sudden appearance. Sea lions may become accustomed to repeated slow vessel approaches, resulting in minimal response.

Humpback whale reactions to approaching boats are variable, ranging from approach to avoidance (Payne 1978, Salden 1993). Baker *et al.* (1983) reported that humpbacks in Hawaii responded to vessels at distances of 2 to 4 km. Bauer and Herman (1986) concluded that reactions to vessels are probably stressful to humpback whales, but that the biological significance of that stress is unknown. Humpback whales seem less likely to react to vessels when actively feeding than when resting or engaged in other activities (Krieger and Wing 1984).

Although there is regular vessel traffic at the project site and through portions of the action area, no documented vessel strikes of either Steller sea lions or humpback whales have occurred in the action area and NMFS does not have reason to expect an increase in the risk of vessel strike resulting from this action. Therefore, we consider the impact of vessel strike on Mexico DPS humpback whales and wDPS Steller sea lions to be minor.

We anticipate low level exposure of short-term duration to listed marine mammals from vessel noise. If animals do respond, they may exhibit slight deflection from the noise source, engage in low-level avoidance behavior, short-term vigilance behavior, or short-term masking behavior, but these behaviors are not likely to result in adverse consequences for the animals. The nature and duration of response is not anticipated to be a significant disruption of important behavioral patterns such as feeding or resting. During the period of construction, the action area is not considered high quality habitat for humpback whales or Steller sea lions so slight avoidance of the area is not likely to adversely affect these species.

The small number of vessels involved in the action, the short duration of exposure due to the transitory nature, and vessels following the Alaska Humpback Whale Approach Regulations and marine mammal code of conduct should prevent close approaches and additional harassment of Steller sea lions and humpback whales. The impact of vessel traffic on Mexico DPS humpback whales and wDPS Steller sea lions is not anticipated to reach the level of harassment under the ESA, and is considered inconsequential.

7. CUMULATIVE EFFECTS

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

Some continuing non-Federal activities are reasonably certain to contribute to climate change within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the *Environmental Baseline* (Section 5.0).

NMFS reviewed available information to identify actions that were anticipated to occur in the action area over the next two years. Reasonably foreseeable future state, tribal, local, or private actions include activities that relate to different scenarios of disturbance from vessel traffic: transportation, tourism, and community development.

7.1 Transportation

Nuka (2012) reports that ferries (28%), passenger vessels with overnight accommodations (20%), and cruise ships (19%) comprise the majority of vessel activity in Southeast Alaska even though most of these vessels only operate during the five month period from May through September. Dry freight cargo barges and tank barges account for 19% and 11% of total vessel activity, respectively, while freight ships, both log and ore carriers, comprise less than 3% of the total (Nuka 2012).

Regularly-occurring vessel traffic in the action area can be generally characterized as ferries, cargo vessels, or recreational craft. Cruise ships do not use the Haines ferry terminal or Lutak Inlet, but do utilize nearby waters off of Haines and move through the action area (the section that extends out to Lynn Canal) when transiting to and from the port of Skagway. Alaska Marine Highway System ferries will continue to use the Haines Ferry Terminal, which is co-located at Lutak Dock.

The proposed modification of AML's RoRo is expected to improve safety and efficiency of cargo vessels using the RoRo, but it is not being improved for the explicit purposes of increasing vessel capacity. AML's RoRo is used by cargo vessels to get supplies to the community of Haines, and it is unlikely that there will be a sudden and significant increase in demand of goods by the community to necessitate increased vessel traffic. Thus, NMFS assumes that the amount and frequency of use of the improved RoRo is unlikely to change in the near future.

7.2 Commercial Fishing

Commercial fishing is expected to continue into the future at a level comparable to current effort, and is expected to continue to result in periodic interactions with wDPS Steller sea lions and Mexico DPS humpback whales.

7.3 Tourism

Marine and coastal vessel traffic could contribute to cumulative effects through the disturbance of listed marine mammals associated with tourism. Tourism is a large industry in Southeast Alaska, as shown in a recent report on visitor statistics (McDowell 2016). The vast majority of this volume comes on cruise ships and via airplanes.

There are no directed whale-watching tours out of Haines or Skagway, but there are boat-based tours that view whales opportunistically in northern Lynn Canal.

Given the recent trends in numbers of summer visitors reported above and the modest growth projected statewide, NMFS anticipates no increase in tourism-related activities due to the proposed action.

7.4 Summary of Cumulative Effects

The action area will likely continue to function as a localized water-based transit station, especially for AML barges, Delta Western tugs and barges, and ferry traffic. Restrictions in capacity at the Haines dock, low demand, and low expected population growth in the area will likely limit substantial growth. Tourism activities will continue to occur in northern Lynn Canal, but at a level comparable to present. The current and recent population trends for both wDPS Steller sea lions and Mexico DPS humpback whales indicate that these levels of activity are not hindering population growth.

8. INTEGRATION AND SYNTHESIS

The Integration and Synthesis section is the final step of NMFS's assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 6) to the environmental baseline (Section 5) and the cumulative effects (Section 7) to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) result in appreciable reductions in the likelihood of the survival or recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) result in the adverse modification or destruction of critical habitat as measured through potential reductions in the value of designated critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species (Section 4).

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

In section 4.1, we considered potential effects to sperm whales and determined that while there is the possibility they may be present in Lynn Canal, the fact that they have never been reported in the action area, coupled with the lack of seasonal overlap between sightings and the project window, and the project mitigation measures, favors a conclusion that project-related activities may affect, but are not likely to adversely affect sperm whales given their rarity in Lynn Canal and heretofore absence from the action area.

8.1 wDPS Steller Sea Lion Risk Analysis

Based on the results of the *Exposure Analysis* for the proposed activities, we expect a maximum of 1,309 Steller sea lions may be behaviorally harassed by noise from pile driving, and we assume that 1.4% (18) of those individuals will be from the wDPS (see Tables 11 and 12).

Exposure to vessel noise from transit and potential for vessel strike may occur, but adverse effects from vessel disturbance and noise are likely to be too small to detect or measure due to the small marginal increase in such activities relative to the environmental baseline, mitigation measures in place to reduce approach distances, and the transitory nature of vessels. Adverse effects from vessel strike are considered extremely unlikely because no additional vessels are anticipated to be introduced by the action, and even if there were a few additional vessels, these types of interactions are rare and unlikely to occur as a result of this project.

The Steller sea lion recovery plan (NMFS 2008) lists recovery criteria that include an increased population size, requirements that any two adjacent sub-regions cannot be declining significantly, reducing the threats to sea lion foraging habitat, reducing intentional killing and overutilization, and others. NMFS concludes that wDPS Steller sea lion response from the proposed activities will not impede progress towards these recovery criteria due to the low anticipated level of harassment, no anticipated injury or mortality, and no significant effects to habitat.

Steller sea lions' probable response to pile driving and removal includes brief startle reactions or short-term behavioral modification. These reactions and behavioral changes are expected to subside quickly when the exposures cease. The primary mechanism by which the behavioral changes we have discussed affect the fitness of individual animals is through the animals' energy budget, time budget, or both (the two are related because foraging requires time). Even if exposure to some wDPS Steller sea lions were to occur from pile driving and removal operations, the individual and cumulative energy costs of the behavioral responses we have discussed are not likely to reduce the energy budgets of Steller sea lions. NMFS does not anticipate any effects from this action on the reproductive success of Steller sea lions. As discussed in the *Description of the Action* section, this action area does not overlap with sea lion rookeries. As a result, the probable responses to pile driving noise are not likely to reduce the current or expected future reproductive success of wDPS Steller sea lions or reduce the rates at which they grow, mature, or become reproductively active.

Despite exposure to construction activities and ferry and vessel operations for decades, the increase in the number of wDPS Steller sea lions suggests that the stress regime these sea lions are exposed to has not prevented them from increasing their numbers and expanding their range in the action area.

Therefore, exposures associated with the proposed action are not likely to reduce the abundance, reproduction rates, or growth rates (or increase variance in one or more of these rates) of the populations those individuals represent. While a single individual may be exposed multiple times during the project, both the short duration of sound generation and the implementation of mitigation measures to reduce exposure to high levels of sound reduce the likelihood that exposure would cause a behavioral response that may affect vital functions, or cause TTS or PTS. Cumulative effects of future state or private activities in the action area are likely to affect Steller sea lions at a level comparable to present. The current and recent population trends for wDPS Steller sea lions indicate that these levels of activity are not hindering population growth.

As a result, this project is not likely to appreciably reduce wDPS Steller sea lions' likelihood of surviving or recovering in the wild.

8.2 Mexico DPS Humpback Whale Risk Analysis

Based on the results of the *Exposure Analysis*, we expect a maximum of three humpback whales may be exposed to received sound levels from pile driving activities sufficiently high to result in Level A harassment. Due to the small fraction of humpback whales that are expected to be from the Mexico DPS and the mitigation measures in place to reduce the likelihood of exposure to noises constituting Level A harassment, no Level A harassment of Mexico DPS humpback whales is expected or authorized. Out of the seven potential Level B exposures to humpback whales, only one exposure is anticipated for threatened Mexico DPS animals (6% of total exposures; Tables 11 and 12).

Exposure to vessel noise from transit and potential for vessel strike may occur, but adverse effects from vessel disturbance and noise are likely to be too small to detect or measure due to the small marginal increase in such activities relative to the environmental baseline, mitigation measures in place to reduce approach distances, and the transitory nature of vessels. Adverse effects from vessel strike are considered extremely unlikely because of the few, if any, additional vessels which might be introduced by the action, the slow speed at which any vessels associated with the action would operate, and existing approach regulations designed to minimize the risk of vessel strike.

Humpback whales' probable response to pile driving and pile removal includes brief startle reactions or short-term behavioral modification. These reactions and behavioral changes are expected to subside quickly when the exposures cease. The primary mechanism by which the behavioral changes we have discussed affect the fitness of individual animals is through the animals' energy budget, time budget, or both (the two are related because foraging requires time). Large whales such as humpbacks have an ability to store substantial amounts of energy, which allows them to survive for months on stored energy during migration and while in their wintering areas, and their feeding patterns allow them to acquire energy at high rates. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to reduce the energy budgets of humpback whales, and their probable exposure to noise sources are not likely to reduce their fitness. As discussed in the *Description of the Action* and *Status of the Species* sections, this action does not overlap in space or time with humpback whale breeding. Mexico DPS humpback whales feed in Southeast Alaska in the summer months, but migrate to Mexican waters for breeding and calving in winter months. As a result, the probable responses to pile driving and removal noise are not likely to reduce the current or expected future reproductive success of Mexico DPS humpback whales or reduce the rates at which they grow, mature, or become reproductively active.

Therefore, these exposures are not likely to reduce the abundance, reproduction rates, or growth rates (or increase variance in one or more of these rates) of the populations those individuals represent. The short duration of sound generation and implementation of mitigation measures to reduce exposure to high levels of sound reduce the likelihood that exposure would cause a behavioral response that may affect vital functions, or cause TTS or PTS. Cumulative effects of future state or private activities in the action area are likely to affect humpback whales at a level comparable to present.

The strongest evidence supporting the conclusion that pile driving and removal and vessel noise will likely have minimal impact on humpback whales is the estimated growth rate of the humpback whale populations in the North Pacific (5-7%). While there is no accurate estimate of the maximum productivity rate for humpback whales, it is assumed to be 7% (Wade and Angliss 1997, Allen and Angliss 2015). Despite exposure to pile driving, cargo shipments, tug and barge activities, and ferry operations for decades, this increase in the number of listed whales suggests that the stress regime these whales are exposed to has not prevented them from increasing their numbers.

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

9. CONCLUSION

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, NMFS's biological opinion is that the Corps' permitting of AML's proposed action, and PR1's proposed issuance of an IHA to AML for the proposed modification to their RoRo facility at Lutak Dock near Haines, Alaska is not likely to jeopardize the continued existence of the following species:

- wDPS Steller sea lion
- Mexico DPS humpback whale

In addition, the proposed action is not likely to adversely affect the following species:

- Sperm whale

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)).

Federal regulations promulgated pursuant to section 4(d) of the ESA extend the section 9 prohibitions to the take of threatened Mexico DPS humpback whales (81 FR 62259).

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. PR1 and the Corps have a continuing duty to regulate the activities covered by this ITS. In order to monitor the impact of incidental take, PR1 and the Corps 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 PR1 and the Corps (1) fail to require the permit holder to adhere to the terms and conditions of the ITS through enforceable terms that are added to the authorization, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

10.1 Amount or Extent of Take

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

TABLE 10: Summary of instances of exposure associated with the proposed pile driving/removal and DTH hammering resulting in incidental take of ESA-listed species by Level A and Level B harassment

DPS and Species	Total Amount of Take Associated with Proposed Action		Anticipated Temporal Extent of Take
	Level A	Level B	
Western DPS Steller sea lion (*Eumetopias jubatus*)	0	18[7]	Mid-June 2020 through end of October 2020
Mexico DPS humpback whale (*Megaptera novaeangliae*)	0	1[8]	

For wDPS Steller sea lions and Mexico DPS humpback whales, based on the best scientific and commercial information available, we would not anticipate responses to impulsive noise at received levels < 160 dB re 1 μPa rms would rise to the level of "take" as defined under the ESA. For this reason, in assessing the total instances of harassment for sea lions and whales from impact pile driving, NMFS only considered exposures at received levels ≥ 160 dB re 1 μPa rms. For non-impulsive noise sources such as vibratory pile driving and DTH drilling, we only considered exposures at received levels ≥120 dB re 1 μPa rms.

The taking of 18 wDPS Steller sea lions and 1 Mexico DPS humpback whale (Table 10) shall be by incidental (acoustic) harassment only. This ITS does not authorize taking by serious injury or death. The taking of any marine mammal in a manner other than that described in this ITS must be reported immediately to NMFS AKR, Protected Resources Division at 907-586-7236, and via email to Greg.Balogh@noaa.gov and Aleria.Jensen@noaa.gov.

10.2 Effect of the Take

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

Studies of marine mammals and responses to anthropogenic impacts have shown that Steller sea lions and humpback whales are likely to respond behaviorally upon exposure to high levels of acoustic disturbance. All of the authorized takes from the proposed action are associated with behavioral harassment from acoustic noise (Section 6.2.1). No serious injury or mortalities are anticipated or authorized as part of this proposed action. Although the biological significance of those behavioral responses remains unknown, this consultation has assumed that exposure to

[7] The proposed IHA (84 FR 65117) indicated a requested Level A take of 0 Steller sea lion, and a Level B take of 1,309 Steller sea lions. Of the proposed takes, 1.4% are anticipated to occur to ESA-listed western DPS animals. The basis for this apportionment is described in Section 4.3.1.

[8] The proposed IHA (84 FR 65117) indicated a requested Level A take of 3 humpback whales, and a Level B take of 7 humpback whales. Humpback whales in southeast Alaska include individuals from two DPSs. Of the proposed takes, 6.1% are anticipated to occur to ESA-listed Mexico DPS animals. The basis for this apportionment is described in Section 4.3.2.

major noise sources might disrupt one or more behavioral patterns that are essential to an individual animal's life history. However, any behavioral responses of these whales and pinnipeds to major noise sources and any associated disruptions are not expected to affect the reproduction, survival, or recovery of these species.

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.

1. PR1 and the Corps shall require the applicant to implement a monitoring program that allows NMFS AKR to evaluate the exposure estimates contained in this opinion and that underlie this incidental take statement.

2. PR1 and the Corps shall provide the applicant's report to NMFS AKR that evaluates the mitigation measures and the results of the monitoring program.

10.4 Terms and Conditions

"Terms and conditions" implement the reasonable and prudent measures (50 CFR §402.14). 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, PR1, the Corps, or any applicant 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. PR1, the Corps, or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR § 402.14).

Partial compliance with these terms and conditions may result in more take than anticipated, and may invalidate this take exemption. These terms and conditions constitute no more than a minor change to the proposed action because they are consistent with the basic design of the proposed action.

To carry out RPM #1, NMFS PR1, the Corps, or their authorization holder must undertake the following:

A. NMFS PR1 and the Corps shall require their permitted operators to possess a current and valid Incidental Harassment Authorization (IHA) issued by NMFS under section 101(a)(5) of the MMPA, and any take must occur in compliance with all terms, conditions, and requirements included in such authorizations.

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

C. The monitoring program described in section 2.1.2 of this opinion must be followed, and the observation and shut down zones must be fully observed in order to adequately document observed incidents of harassment as described in the mitigation measures associated with this action.

D. PR1 will notify NMFS AKR of project start and end dates.

E. If the number of takes approaches 75% of the total amount authorized, PR1 must send that information in a report to Greg.Balogh@noaa.gov within 5 business days. That report must contain a description of the amount of project activity remaining at that point.

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

A. AML, through PR1, must submit a project specific report at the end of the construction project (within 90 calendar days of the completion of marine mammal and acoustic monitoring or 60 days prior to the issuance of any subsequent IHA for this project, whichever comes first) that analyzes and summarizes marine mammal interactions during this project to the Protected Resources Division, NMFS AKR by email to Greg.Balogh@noaa.gov. This report must contain the following information:

   i. Dates, times, species, number, location, and behavior of any observed ESA-listed marine mammals, including all observed Steller sea lions and humpback whales. Note that only 1.4% of Steller sea lions and 6.1% of humpback whales observed are assumed to be from the ESA-listed DPSs and will count towards the amount of take authorized for Steller sea lions and/or humpback whales in this ITS.

   ii. Number of power-downs and shut-downs throughout all monitoring activities.

   iii. An estimate of the instances of exposure (by species) of ESA-listed marine mammals that: (A) are known to have been exposed to noise from pile driving with a discussion of any specific behaviors those individuals exhibited, and (B) may have been exposed to noise from pile driving, with a discussion of the nature of the probable consequences of that exposure on the individuals that were or may have been exposed.

   iv. The report must clearly compare the number of takes (i.e., instances of exposure) authorized in the ITS with those observed during project operations.

   v. A description of the implementation and effectiveness of each Term and Condition, as well as any conservation recommendations, for minimizing the adverse effects of the action on ESA-listed marine mammals.

B. The taking of any marine mammal in a manner other than that described in this ITS must be reported immediately to NMFS AKR, Protected Resources Division at 907-586-7236 and via email to Greg.Balogh@noaa.gov and Aleria.Jenson@noaa.gov.

C. In the event that the proposed action causes a take of a marine mammal that results in a serious injury or mortality (e.g. ship-strike, stranding, and/or entanglement), immediately cease operations and immediately report the incident to the NMFS Alaska Region, Protected Resources Division via Greg.Balogh@noaa.gov (907-271-3023), and the Alaska Regional Stranding Coordinator, Mandy.Keogh@noaa.gov (907-586-7070 or the AKR Stranding Hotline at 1-877-925-7773), and to NMFS Office of Protected Resources, PR1 via 301-427-8401 and/or Jaclyn.Daly@noaa.gov and Dwayne.Meadows@noaa.gov.

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).

We offer the following conservation recommendations, which will provide information for future consultations involving the issuance of permits that may affect ESA-listed whales and pinnipeds:

1. Behavioral responses of marine mammals: We recommend that PR1 summarize findings from past IHA holders about behavioral responses of ESA-listed species to sounds from DTH hammering. Better understanding of how ESA-listed species have responded to sounds from past projects will inform our exposure and response analyses in the future.

2. Ship strike reduction: All AML vessel crews should participate in the WhaleAlert program to report and view real-time sightings of whales while transiting in the waters of Southeast Alaska and minimize the risk of vessel strikes. More information is available at https://www.fisheries.noaa.gov/resource/tool-app/whale-alert.

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

12. REINITIATION OF CONSULTATION

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

13. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

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

13.1 Utility

This document records the results of an interagency consultation. The information presented in this document is useful to NMFS, the Corps, 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 Biological Opinions website (https://www.fisheries.noaa.gov/alaska/consultations/section-7-biological-opinions-issued-alaska-region). The format and name adhere to conventional standards for style.

13.2 Integrity

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

13.3 Objectivity

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

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

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

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

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