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

City and Borough of Sitka Gary Paxton Industrial Park Multipurpose Dock Project
Sawmill Cove, Sitka, Alaska

NMFS Consultation Number: AKR-2017-9686

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

Affected Species and Determinations:

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

Consultation Conducted By: National Marine Fisheries Service, Alaska Region

Issued By:

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

Date: September 29, 2017

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TERMS AND ABBREVIATIONS

CBS	City and Borough of Sitka
DPS	Distinct Population Segment
ESA	Endangered Species Act
GOA	Gulf of Alaska
GPIP	Gary Paxton Industrial Park
IHA	Incidental Harassment Authorization
ITS	Incidental Take Statement
MLLW	Mean Lower Low Water
MMO	Marine Mammal Observer
MMPA	Marine Mammal Protection Act
PR1	Protected Resources, NMFS Headquarters Office
PRD	Protected Resources Division, Alaska NMFS
PSO	Protected Species Observers
PTS	Permanent Threshold Shifts
SPL	Sound Pressure Level
SSL	Steller sea lion
TTS	Temporary Threshold Shifts
WDPS	Western Distinct Population Segment
ZOE	Zone of Exclusion

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 are may fulfill this general requirement informally if they conclude that an action "may affect, but is not likely to adversely affect" endangered species, threatened species, or designated critical habitat, and NMFS or the USFWS concurs with that conclusion (50 CFR §402.14(b)).

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

In this document, the action agencies are the US Army Corps of Engineers (USACE) which proposes to authorize construction activities at the Gary Paxton Industrial Park (GPIP) Multipurpose Dock Project, and the NMFS Office of Protected Resources Permits and Conservation Division (PR1) which proposes to permit Marine Mammal Protection Act (MMPA) Level B take of Steller sea lions (SSL) and humpback whales in conjunction with the project. Solstice Alaska Consulting, Inc. (Solstice) is acting as the USACE's designated non-federal representative for this consultation. The consulting agency is NMFS's Alaska Region. This document represents NMFS's biological opinion (opinion) on the effects of this proposal on endangered and threatened species and designated critical habitat.

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

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

1.1 Background

This opinion considers the effects of constructing a multipurpose dock at Sawmill Cove in Sitka, Alaska. These actions have the potential to affect the endangered western Distinct Population Segment (DPS) Steller sea lion (*Eumetopias jubatus*) and the threatened Mexico DPS humpback whale (*M egaptera nov aeangliae*). No designated critical habitat for species under NMFS's jurisdiction exists in the action area.

This opinion is based on information provided by Solstice in the June 15, 2017 Biological Assessment and the June 21, 2017 Revised Incidental Harassment Authorization Application; Proposed Incidental Harassment Authorization Federal Register Notice (82 FR 34632); updated project proposals, email and telephone conversations between NMFS Alaska Region, Solstice, and NMFS PR1 staff; and other sources of information. A complete record of this consultation is on file at NMFS's Juneau, Alaska office.

1.2 Consultation History

On May 8, 2017, Solstice submitted an Incidental Harassment Authorization (IHA) application on behalf of the City and Borough of Sitka (CBS) to NMFS PR1 for the non-lethal taking of marine mammals incidental to pile driving and removal in Sawmill Cove, Sitka from October 1, 2017 through August 31, 2018. On May 26, 2017, USACE submitted a request for initiation of formal consultation regarding the Department of the Army (DA) permit application submitted by CBS, file number POA-2016-576 (USACE 2017), along with a draft of the Biological Assessment developed by Solstice. On June 15, Solstice submitted a revised BA to NMFS (Solstice Alaska Consulting 2017b). On June 21, 2017, Solstice submitted a revised IHA application (Solstice Alaska Consulting 2017c). Since NMFS AKR had yet to receive a request for formal consultation from PR1, NMFS stopped the consultation clock to wait for a complete initiation package. On July 24, 2017, PR1 submitted a request to initiate section 7 consultation to NMFS Alaska Region (NMFS 2017a). NMFS deemed the initiation package complete and initiated consultation with USACE and PR1 on July 24, 2017.

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. "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

This Opinion considers the effects of the USACE authorization of construction activities at the GPIP Multipurpose Dock Project and of the issuance of an IHA to take marine mammals by harassment under the MMPA incidental to CBS's construction activities between October 1, 2017 and August 31, 2018.

The purpose of the project is to construct a multipurpose dock that will serve a wide variety of vessels; provide deep water port access to the GPIP in Sawmill Cove, Sitka, AK (Figure 1); meet modern standards for safety; and promote marine commerce in the region. GPIP does not currently have a deep-water dock or a safe and useable multipurpose docking facility.

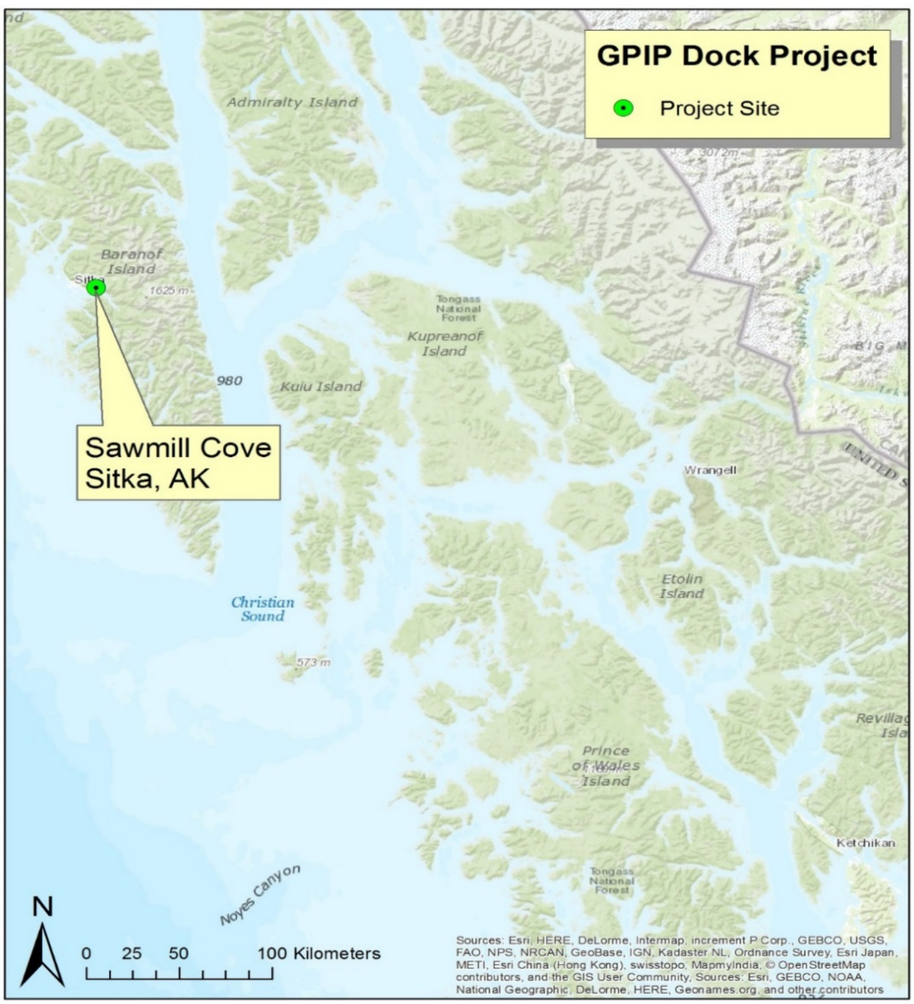

Figure 1. Area map of GPIP Dock Project

2.1.1 Proposed Activities

The project would remove abandoned creosote treated piles and docks in Sawmill Cove and construct a barge dock with an attached small craft float. Construction includes the following activities over and in Sawmill Cove:

- Remove approximately 280 abandoned creosote treated 12” and 16” piles and structures as funding allows;
- Install a 76.2 m (250 ft) by 22.5 m (74 ft) by 5.8 m (19 ft) floating dock (a repurposed barge) with an attached 3.6 m (12 ft) by 36.5 m (120 ft) small craft float, gangway, and 27.4 m (90 ft) by 7.6 m (25 ft) transfer bridge; and an abutment and retaining wall (the retaining wall does not require sheet pile);
- Install 12 temporary 76.2 cm (30 in) diameter steel piles (these piles serve as templates to guide proper installation of permanent piles and would be removed prior to project completion);
- Install two 3-pile dolphins to support the dock each consisting of 1 permanent 1.2 m (48 in) vertical piles; and 2 permanent 76.2 cm (30 in) batter piles; and
- Install bull rail, berthing fenders, mooring cleats, and three mast lights (these components would be installed out of the water).

Piles would be removed and installed with a vibratory hammer and new piles would be proofed with an impact hammer. New piles would be secured into bedrock with a rock anchor drill. The following equipment would be used:

- Vibratory Hammer: ICE 44B/12,450 pounds static weight (operated at reduced energy)
- Diesel Impact Hammer: Delmag D46/Max Energy 107,280 ft-pounds
- Rock Anchor Drill: ICE 30-30,000 ft-pound

CBS anticipates proofing will likely require 400 strikes per pile lasting 10 minutes. Vibratory hammering may take 2-3 hours per day. In addition, CBS would remove approximately 280 abandoned, creosote treated piles using a vibratory hammer or by pulling them mechanically. CBS anticipates removal of the timber piles will take six days. To construct the dolphins, in total, would take 16 days; however, pile driving or removal would only occur on 10 of those days.

Construction for the entire project is expected to take 3 months beginning in October 2017. Pile driving (removal and installation) is expected to take 44 hours over the 16 day period (not necessarily consecutive). No dredging or blasting is proposed as part of this project. The construction duration accounts for the time required to mobilize materials and resources and construct the project. The duration also accounts for potential delays in material deliveries, equipment maintenance, inclement weather, and shutdowns that could occur if marine mammals for which take is not authorized come within disturbance zones associated with the project area.

Transport of Materials and Equipment

Materials and equipment, including the floating dock, would be transported to the project site by barge. While work is conducted in the water, anchored barges will be used to stage construction materials and equipment, and 25 ft skiffs with 250 horsepower motors will be used to support dock construction.

Removal of Existing Piles
The contractor would attempt to direct pull existing piles; if those efforts prove to be ineffective, a vibratory hammer would be used.

Installation and Removal of Temporary Piles
Temporary piles would be installed and removed with a vibratory hammer operated at a reduced energy setting. These piles serve as templates to guide proper installation of permanent piles and would be removed prior to project completion.

Installation of Permanent Piles
Permanent piles would be driven through approximately 18-21 m (60-70 ft) of unconsolidated sand with a vibratory hammer operated at a reduced energy setting, impacted into bedrock, and then anchored into 7.6-12.2 m (25-40 ft) of bedrock with a rock anchor drill and grout. To anchor the piles, a 10-inch casing would be inserted in the center of the permanent pile and a 15.2 cm (6 inch) rock anchor drill would be lowered into the casing and used to drill into bedrock. Rock fragments would be removed through the top of the casing. Finally, the drill and casing would be removed and the hole would be filled with grout to secure the pile to bedrock. This anchoring process is expected to take two hours per permanent pile. The pile that the casing and drill will be lowered into will serve as a cofferdam and prevent drilling noise from propagating through the water column.

Construction Sequence
In-water construction will begin with the removal of existing piles followed by installation of the two dolphins that will support the floating dock. The dolphins will be constructed one at a time. Construction will be sequenced as follows:

First, the contractor will remove 280 existing wood piles, as funding allows. Existing pile removal will take approximately six days.

Next the contractor will construct the first three-pile dolphin. Construction of the dolphin will take approximately eight days, with six temporary piles being installed or removed, or one permanent pile being installed per day. Dolphin construction will alternate daily between installation of template pile/permanent pile and welding the dolphin structure. Dolphin pile installation sequence is described below:

- Day 1: Vibrate six temporary 30-inch piles into place to create a template to guide later installation of permanent piles.
- Day 2: Weld frame around the temporary piles.
- Day 3: Vibrate and impact one permanent 48-inch vertical pile into place.
- Day 4: Weld dolphin structure.
- Day 5: Vibrate and impact one 30-inch batter pile into place.
- Day 6: Weld dolphin structure.
- Day 7: Vibrate and impact the final 30-inch batter pile into place.
- Day 8: Weld dolphin structure and remove the six temporary piles.

The contractor will construct the second three-pile dolphin using the construction sequence described above.

Table 1 provides an estimate of the amount of time required for vibratory pile removal and vibratory and impact pile installation.

Table 1. GPIP Multipurpose Dock Pilings Number, Size, and Estimated Number of Hours Required for Vibratory and Impact Pile Driving (Solstice Alaska Consulting 2017b).

Description	Project Component					
	Existing Pile Removal	**Temporary Pile Installation**	**Temporary Pile Removal**	**Vertical Pile Installation**	**Batter Pile Installation**	**Total Installation/ Removal per Day**
Pile Size (Diameter) and Type	12/16-inch wood	30-inch steel	30-inch steel	48-inch steel	30-inch steel	--
# of Piles	280	12	12	2	4	--
Vibratory Time Per Pile	5 minutes	30 minutes	10 minutes	2 hours	2 hours	--
Vibratory Time per day	5 hours	3 hours	1 hour	2 hours	2 hours	5 hours
Vibratory Time Total	23 hours	6 hours	2 hours	4 hours	8 hours	--
# of Strikes Per Pile	0	0	0	400 strikes	400 strikes	400 strikes
Impact Time Per Pile	0	0	0	10 minutes	10 minutes	--
Impact Time per Day	0	0	0	10 minutes	10 minutes	10 minutes
Impact Time Total	0	0	0	20 minutes	40 minutes	-----

2.1.2 Mitigation Measures

A number of proposed mitigation measures and construction techniques will be employed to minimize effects to marine mammal species. Mitigation measures for the project include general construction mitigation measures, mitigation measures during pile removal and installation, and marine mammal shutdown zones. These measures are detailed below.

General Construction Mitigation Measures

- The project uses the most compact design possible, while meeting the demands of the vessels that would use the facility.
- Wood that has been surface or pressure-treated with creosote or treated with pentachlorophenol will not be used. If treated wood must be used, any wood that comes in contact with water will be treated with waterborne preservatives in accordance with

Best Management Practices developed by the Western Wood Preservers Institute (Institute 2017). Treated wood will be inspected before installation to ensure that no superficial deposits of preservative material remain on the wood.
- The project uses a design that does not require dredging.
- Plans for avoiding, minimizing, and responding to releases of sediments, contaminants, fuels, oil, and other pollutants will be developed and implemented.
- Spill response equipment will be kept on-site during construction and operation.
- Floats or barges will not be grounded at any tidal stage.

Pile Driving and Removal Mitigation Measures
- The project has been designed to use the fewest piles practicable (alternative designs required significantly more piles). This design was selected to reduce noise impacts associated with the duration of pile driving.
- To minimize construction noise levels as much as possible, the contractor will first attempt to direct pull old, abandoned piles; if those efforts prove to be ineffective, they will proceed with a vibratory hammer.
- To reduce noise production, the vibratory hammer will be operated at a reduced energy setting (30 to 50 percent of its rated energy).
- Pile driving softening material will be used to minimize noise during vibratory and impact pile driving. Much of the noise generated during pile installation comes from contact between the pile being driven and the steel template used to hold the pile in place. The contractor will use high-density polyethylene (HDPE) or ultra-high-molecular-weight polyethylene (UHMW) softening material on all templates to eliminate steel on steel noise generation.
- Soft start procedures will be used prior to pile removal and installation, to allow marine mammals to leave the area prior to exposure to maximum noise levels. For vibratory hammers, the soft-start technique will initiate noise from the hammer for 15 seconds at a reduced energy level, followed by a 1 minute waiting period and will repeat the procedure 2 additional times. For impact hammers, the soft-start technique will initiate 3 strikes at a reduced energy level, followed by a 30-second waiting period. This procedure would also be repeated two additional times.
- The impact hammer will be operated at a reduced fuel setting as long as is practicable.

Protected Species Observers

Qualified PSOs will be employed for marine mammal monitoring and will be present during all in-water work. PSOs will maintain verbal communication with the construction personnel to implement the appropriate mitigation measures listed below. If the number of Steller sea lions or humpback whales observed within the Level B zones during noise-producing project activities approaches the number of takes authorized in the Incidental Take Statement (ITS), the CBS will notify NMFS and request that the USACE and NMFS PR1 reinitiate consultation.

Qualifications for Marine Mammal Observers

The following qualifications for PSOs will be implemented:
- Visual acuity in both eyes (correction is permissible) sufficient to discern moving targets at the water's surface with ability to estimate target size and distance. Use of binoculars or spotting scope may be necessary to correctly identify the target.

- Experience and ability to conduct field observations and collect data according to assigned protocols (this may include academic experience).
- Experience or training in the field identification of marine mammals (cetaceans and pinnipeds).
- Sufficient training, orientation or experience with vessel operation and pile driving operations to provide for personal safety during observations.
- Writing skills sufficient to prepare a report of observations. Reports should include such information as the number, type, and location of marine mammals observed; the number of takes by species; the behavior of marine mammals in the area of potential sound effects during construction; dates and times when observations and in-water construction activities were conducted; dates and times when in-water construction activities were suspended because of marine mammals, etc.
- Ability to communicate orally, by radio or in person, with project personnel to provide real time information on marine mammals observed in the area, as needed.

Monitoring Protocols

The following marine mammal monitoring protocols will be implemented during pile driving and removal activities to help prevent and document acoustic effects on marine mammals.

1. The PSO will have no other primary duties than watching for and reporting on events related to marine mammals.
2. The PSO will have the tools necessary to aid in determining the location of observed listed species, to take action if listed species are likely to enter a shutdown zone, and to record these events. These tools may include:
    a. binoculars
    b. spotting scope
    c. range finder
    d. GPS
    e. compass
    f. two-way radio communication with construction foreman/superintendent
    g. log book of all activities, which will be made available to U.S. Army Corps of Engineers and NMFS upon request
3. Prior to in-water pile driving and removal, monitoring and shutdown zones described in Table 2 will be field verified.
4. Pile driving and removal will not be conducted when weather conditions or darkness restrict clear, visible observation of all waters within and surrounding the shutdown zone.
5. Each day prior to commencing in-water work the PSO will conduct a radio check with the construction foreman or superintendent. The PSO will brief the foreman or supervisor as to the shutdown procedures if any of the listed species are observed likely to enter or within a shutdown zone, and will have the foreman brief the crew, requesting that the crew notify the PSO when a listed species is spotted.
6. The PSO will work in shifts lasting no longer than 4 hours with at least a 1-hour break between shifts, and will not perform duties as an PSO for more than 12 hours in a 24-hr period (to reduce PSO fatigue).
7. The PSO will remain onsite during in-water pile driving/removal.
8. One land-based PSO and one boat-based PSO will be used to monitor the area.
    a. The land-based PSO will be located at the GPIP construction site and will be able to view the area across Silver Bay to the west and east of Sugarloaf Point.

    b. If it is determined that the Level B harassment area cannot be monitored effectively by two PSOs, another PSO will be added to monitor the area.
9. The PSO will scan the monitoring zone for the presence of listed species for 30 minutes before any pile driving or removal activities take place, or if pile driving has not occurred for over one hour, specifically:
    a. Prior to any pile driving, the boat-based PSO will clear the action area. The PSO will transit to the head of Silver Bay to ensure that there are no marine mammals for which take is not authorized or to document species for with take is authorized.
    b. While the boat-based PSO is transiting to the head of the bay, the land-based PSO will monitor the mouth of Silver Bay to determine whether marine mammals enter the action area from East Channel of Sitka Sound.
    c. If any listed species are present within a shutdown zone, pile driving and removal activities will not begin until the animal(s) has left the shutdown zone or no listed species have been observed in the shutdown zone for 15 minutes (for pinnipeds) or 30 minutes (for cetaceans).
    d. The boat-based PSO will communicate with the construction foreman or superintendent once the area is determined to be clear and pile driving activities can begin.
    e. The boat-based PSO will then transit back to the construction site and spend the rest of the pile driving time monitoring the area from the boat.
10. Throughout all pile-driving activity, the land - and boat-based PSO will continuously scan the shutdown zone to ensure that listed species do not enter it.
    a. If any listed species enter, or appear likely to enter, the shutdown zone during pile-driving activities, all driving activity will cease immediately. Pile -driving may resume when the animal(s) has been observed leaving the area on its own accord. If the animal(s) is not observed leaving the area, pile-driving activity may begin 15 min (for pinnipeds) or 30 min (for cetaceans) after the animal is last observed in the area.
11. Once the shutdown zone has been cleared, ramp-up procedures will be applied prior to beginning pile driving activities each day and/or when pile driving hammers have been idle for more than 30 min:
    a. For impact pile-driving, contractors will be required to provide an initial set of three strikes from the hammer at 40 percent energy, followed by a 30-sec waiting period. This procedure will be repeated two additional times.
12. A data sheet will be used to record the species, behavior, date, and time of any marine mammal sightings. This data will be used to prepare a PSO report.

Monitoring Report

A final monitoring report will be provided to NMFS within 90 days of completion of pile driving. In general, reporting will include:

1. Numbers of days of observations.
2. Lengths of observation periods.
3. Locations of observation stations and dates used.
4. Numbers, species, dates, group sizes, and locations of marine mammals observed.
5. Descriptions of work activities, categorized by type of work taking place while marine mammals were being observed.

6. Distances to marine mammal sightings, including closest approach to construction activities.
7. Descriptions of any observable marine mammal behavior in the Level A and Level B harassment zones.
8. Actions performed to minimize impacts to marine mammals.
9. Times of shutdown events including when work was stopped and resumed due to the presence of marine mammals or other reasons.
10. Refined take estimates based on the numbers of humpback whales, killer whales, harbor porpoises, harbor seals, and Steller sea lions observed during the course of pile installation and removal activities.
11. Descriptions of the type and duration of any noise-generating work occurring and ramp-up procedures used while marine mammals were being observed.
12. Details of all shutdown events, and whether they were due to presence of marine mammals, inability to clear the hazard area due to low visibility, or other reasons.
13. Tables, text, and maps to clarify observations.
14. Full documentation of monitoring methods, an electronic copy of the data spreadsheets, and a summary of results will also be included in the report.
13. Final reports and reports of unauthorized take (detailed below) will be submitted to: NMFS Alaska Protected Resources Division and NMFS Office of Protected Resources.

Table 2. Level A Shutdown and Monitoring Zones by Species, Pile Size, and Pile Driving Method

Level A Shutdown Zones (m)		
Source	**Low-Frequency Cetaceans (humpback whale)**	**Otariid Pinnipeds (Steller sea lion)**
Vibratory Pile Driving		
All	10	
Impact Pile Driving		
30-inch steel (installation)	390	25
48-inch steel (installation)	1,100	50

Level A Monitoring and Shutdown Zones

The CBS is requesting no Level A take of humpback whales or Steller sea lions incidental to constructing the GPIP Multipurpose Dock and exposure will be limited to Level B harassment. Mitigation measures require that observers must be able to see the entirety of the Level A shutdown zone, or pile-driving will not begin. Additionally, any Steller sea lions or humpback whales observed within the Level B zones will be monitored to ensure they do not enter the Level A zones, and pile-driving operations will be shut down if they appear likely to enter the Level A zones. Monitoring and shutdown zones are summarized in Table 2 and shown in Figure 2.

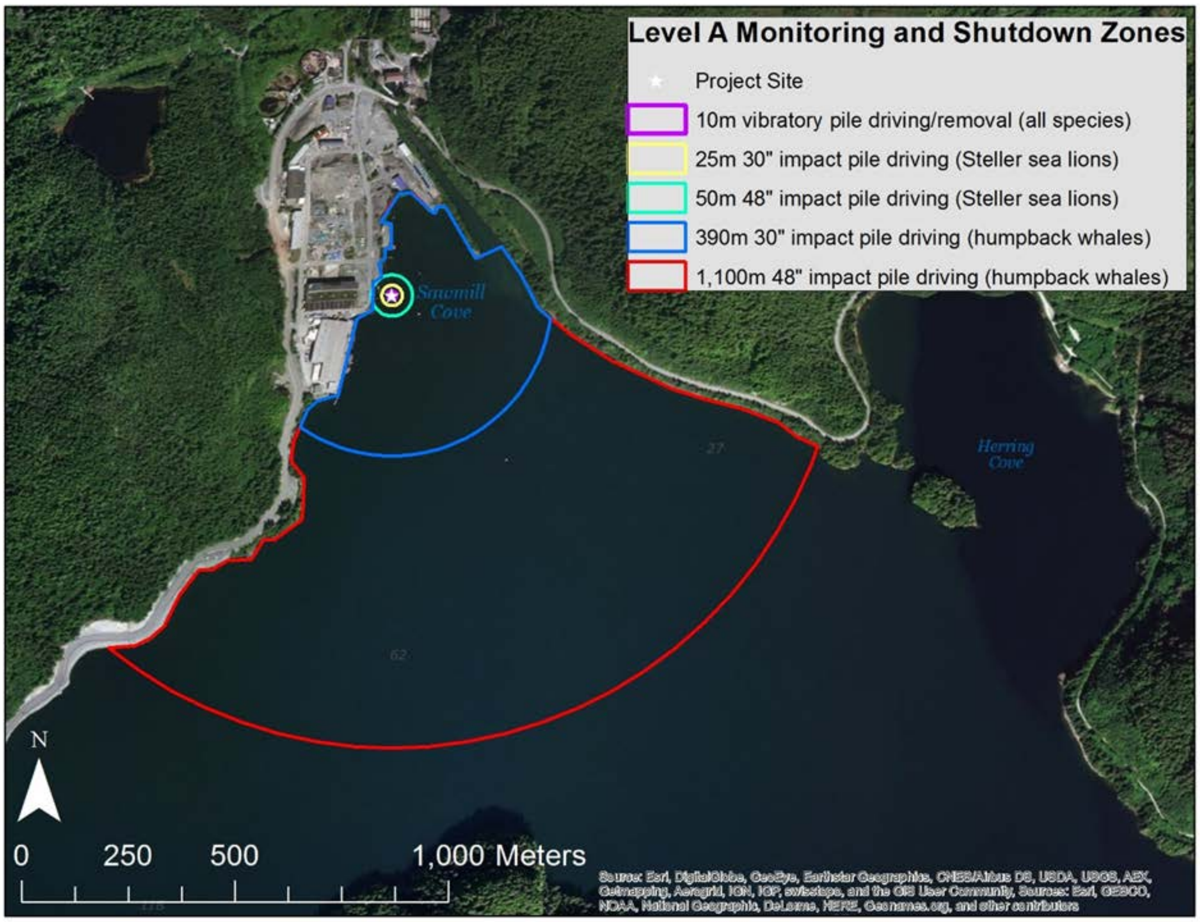

Figure 2. Level A Monitoring and Shutdown Zones

Level B Shutdown and Monitoring Zones

The CBS is requesting Level B take of humpback whales and Steller sea lions incidental to constructing the GPIP Multipurpose Dock, and shut downs associated with Level B harassment of these species are not proposed. The monitoring zones associated with Level B disturbance are outlined in Table 3 and Figure 3.

Table 3. Monitoring Zones for Level B Take

Pile Driving Noise Source	Monitoring Zones for Level B Take (m)
Vibratory Pile Driving	
12 and 16-inch wood (removal)	2,200
30-inch steel (installation and removal)	9,500 [a]
48-inch steel (installation and removal)	9,500 [b]
Impact Pile Driving	
30-inch steel (installation)	2,600
48-inch steel (installation)	3,800

Numbers rounded up to nearest 100 meters; see Table 7 for actual isopleth distances.

[a] Level B isopleth distance calculated to 11,659 m but would be truncated by landforms in project area to a maximum distance of 9,500 m.

[b] Level B isopleth distance calculated to 16,343 m but would be truncated by landforms in project area to a maximum distance 9,500 m.

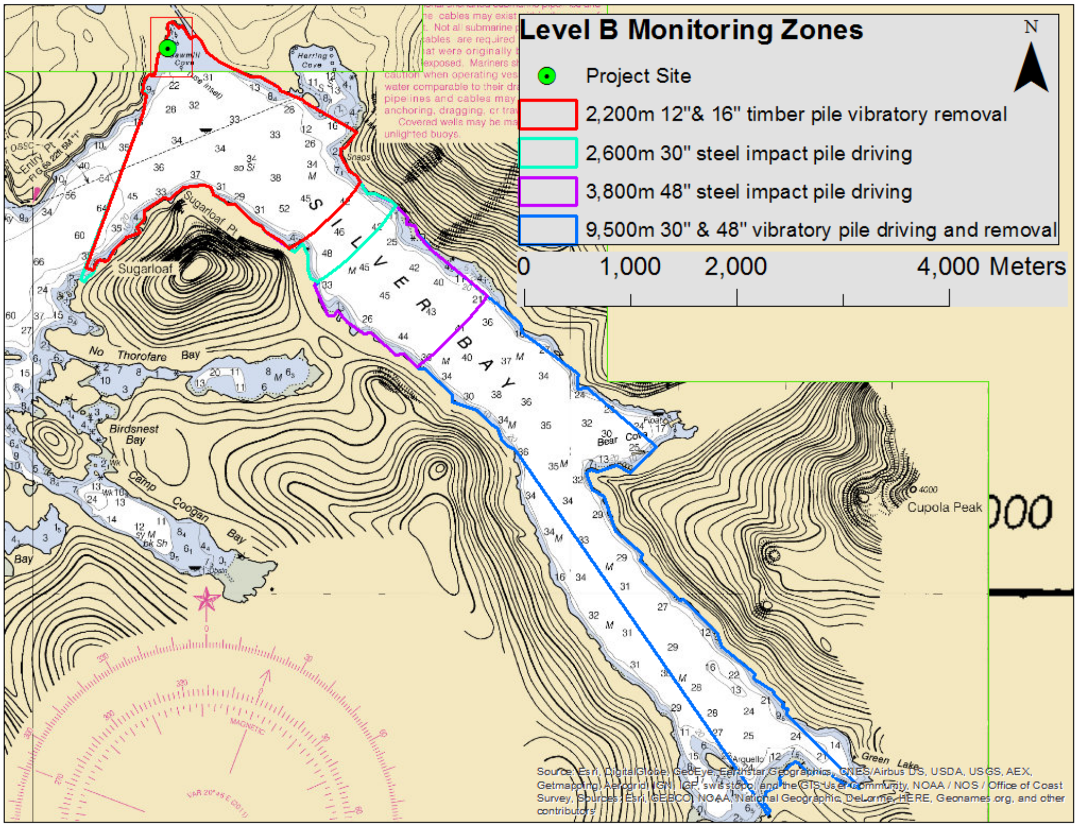

Figure 3. Monitoring Zones for Level B Take

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 the proposed dock project includes the maximum area within which project-related noise levels are expected to reach or exceed 120 dB re 1 µPa root mean square (rms) (henceforth 120 dB), i.e., ambient noise levels (where no measurable effect from the project would occur). Based on modeled sound propagation estimates, received levels from installation of 48-inch piles (the loudest noise source) are expected to decline to 120 dB within a 16 km (10 mi) radius of the project location. The action area will be truncated where land masses obstruct underwater sound transmission, thus, the action area is largely confined to marine waters within Sawmill Cove and Silver Bay and encompasses approximately 10.5 km^2 (4.04 mi^2) (Figure 4). The action area also includes the transit area for vessels involved in construction, and traffic lanes during operation of the dock.

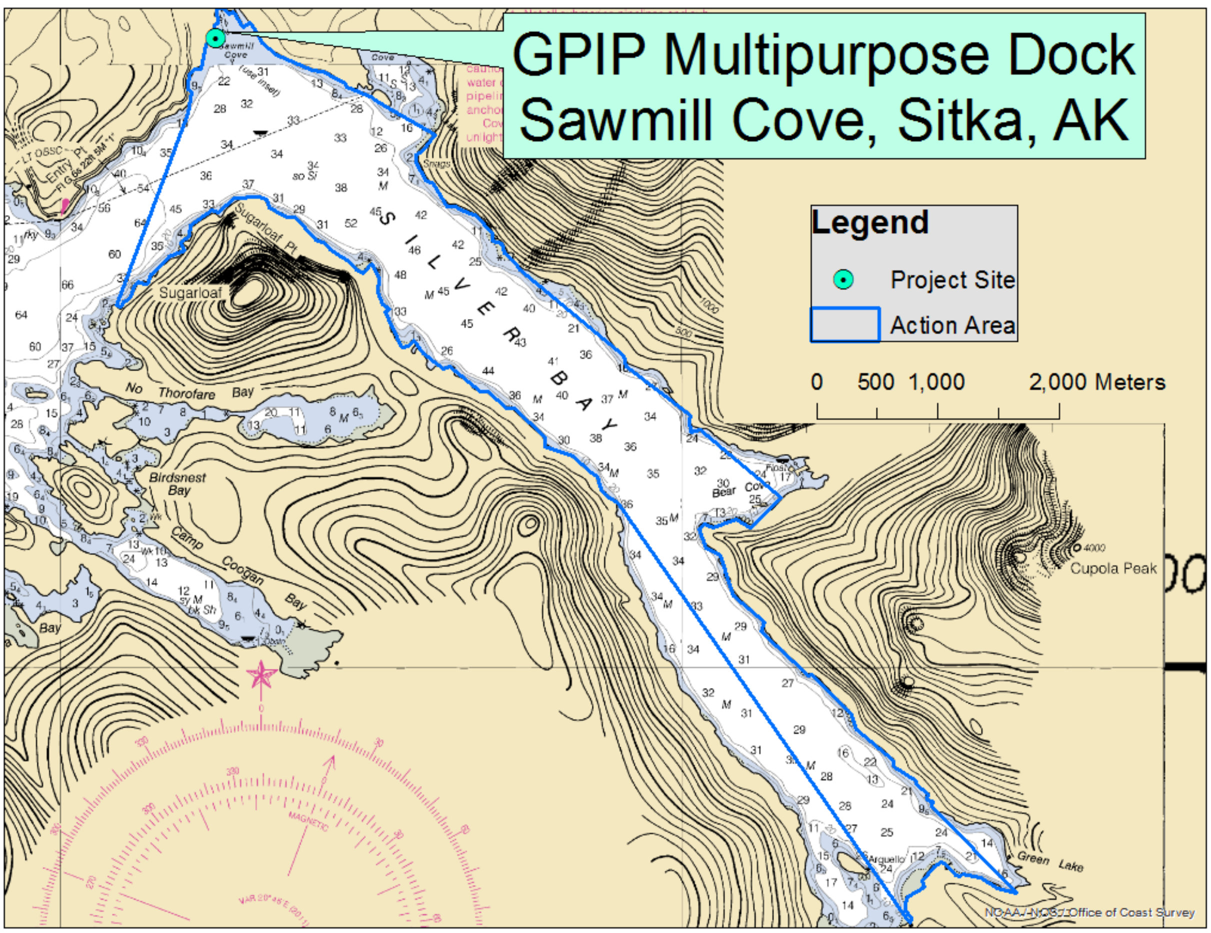

Figure 4. GPIP Multipurpose Dock Project Action Area

3. APPROACH TO THE ASSESSMENT

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

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

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

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

We use the following approach to determine whether the proposed action described in Section 2.1 is likely to jeopardize listed species or destroy or adversely modify critical habitat:

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

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

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

- Analyze the effects of the proposed 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, which are reasonably certain to occur within the action area. Future Federal actions that are unrelated to the proposed action are not considered because they require separate section 7 consultation. Cumulative effects are considered in Section 7 of this opinion.

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

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

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

4. RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT

Two species of marine mammals listed under the ESA under NMFS's jurisdiction may occur in the action area— western Distinct Population Segment (WDPS) Steller sea lions and Mexico DPS humpback whales. No critical habitat occurs within the action area. This Opinion considers the effects of the proposed action on these species (Table 4).

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

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

4.1 Climate Change

In accordance with NMFS guidance on analyzing the effects of climate change (Sobeck 2016), NMFS assumes that climate conditions will be similar to the status quo throughout the length of the direct and indirect effects of this project. We present an overview of the potential climate change effects on WDPS Steller sea lions and Mexico DPS humpback whales and their habitat below.

There is 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 direct and indirect effects on individuals, populations, species, and the structure and function of marine, coastal, and terrestrial ecosystems in the foreseeable future (Houghton 2001, McCarthy 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).

The indirect 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.

4.2 Status of Listed Species

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02.

This section consists of narratives for each of the endangered and threatened species that occur in the action area and 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 direct or indirect effects are likely to increase the species' probability of becoming extinct or failing to recover.

More detailed background information on the status of these species can be found in a number of published documents including stock assessment reports on Alaska marine mammals by Allen and Angliss (2015), the humpback whale status review (NMFS 2015) and the Steller sea lion recovery plan (NMFS 2008). In addition, Straley (Straley 2017) provides information on the distribution of marine mammals for the action area considered in this opinion.

4.2.1 Status of WDPS Steller Sea Lions

The Steller sea lion (*Eumetopias jubatus*) is classified within the Order Carnivora, Suborder Pinnipedia, Family Otariidae, and Subfamily Otariinae. The Steller sea lion is the only extant species of the genus *Eumetopias*.

Population Structure and Distribution

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

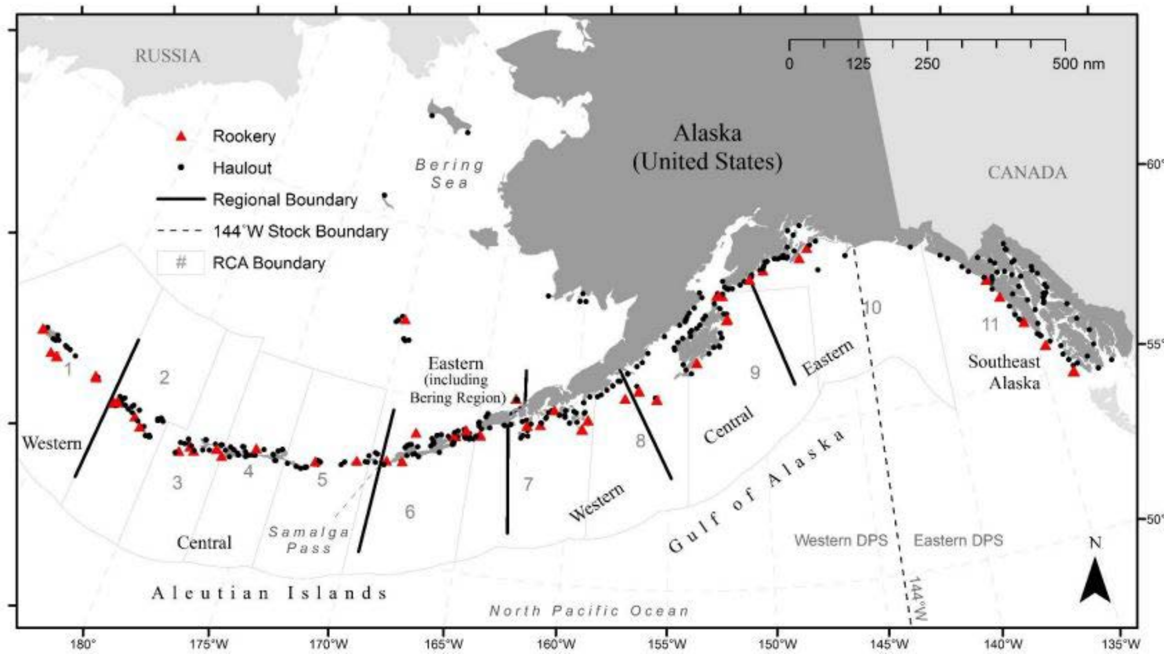

Figure 5. Map of Alaska showing the NMFS Steller sea lion survey regions, rookery, and haulout locations. The line (144°W) separating primary breeding rookeries of the eastern and western distinct population segments (EDPS vs WDPS) is also shown (Fritz et al. 2016).

The eastern Distinct Population Segment (EDPS), extending from Cape Suckling (144° W) east to British Columbia and south to California, was listed as threatened because of concern over WDPS animals ranging into the east, the larger decline overall in the U.S. population, human interactions, and the lack of recovery in California (62 FR 24345). The EDPS continued to recover, however, and NMFS removed the EDPS from the list of threatened species on November 4, 2013 (78 FR 66140), since the recovery criteria in the Steller Sea Lion Recovery Plan (NMFS 2008) were achieved and the stock no longer met the definition of a threatened species under the ESA. Because the EDPS is no longer listed under the ESA, this Opinion does not analyze effects of the proposed action on that DPS.

Movement of Steller sea lions between the WDPS and EDPS may affect population dynamics and patterns of underlying genetic variation. Studies have confirmed movement of animals across the 144° W boundary (Fritz et al. 2013), (Jemison et al. 2013), (Pitcher et al. 2007), (Raum-Suryan et al. 2002). Jemison et al (2013) found regularly occurring temporary movements of WDPS Steller sea lions across the 144 W longitude boundary, and some WDPS females have likely emigrated permanently and given birth at White Sisters and Graves rookeries. The vast majority of these sightings have been in northern Southeast Alaska, north of Frederick Sound (the action area is also in northern Southeast Alaska). Fritz et al (2013) estimated an average annual breeding season movement of WDPS Steller sea lions to southeast Alaska of 917 animals.

Within the action area, Steller sea lions are anticipated to be predominantly from the EDPS;

however, WDPS animals may be found here as well.

Reproduction and Growth

Detectable changes in a population's birth rate may provide insight into the nature of the factors controlling Steller sea lion population dynamics. While this has been broadly recognized and the focus of many studies, few empirical data exist to directly infer birth rate in wild Steller sea lions. The best data for inferring WDPS Steller sea lion birth rate are available for the central Gulf of Alaska (GOA) where collections from the 1970s and 1980s provide direct measurements and a basis for comparing birth rates in the central GOA over time. The numerous models developed from these historic collections yield generally consistent results: the decline of Steller sea lions in the central GOA in the 1980s was driven by low juvenile survival and the continued decline in the 1990s was likely driven by reduced birth rate.

Several models have demonstrated the relevance of spatial heterogeneity in vital rates (birth rate, death rate, population growth rate) among subpopulations in the WDPS of Steller sea lion. As such, vital rates from one Steller sea lion subpopulation may not be applicable to another, especially where the rate and direction of population growth diverge. Another common conclusion from the age-structured modeling studies is that the fraction of juveniles in the non-pup counts is an important variable for inferring changes in vital rates over time (Muto et al. 2017). Many studies have concluded that the available count data do not provide insight into the relative contribution of survival and birth rate in current Steller sea lion population trends. However, Holmes *et al.*(Holmes 2007) included information on changes in the juvenile fraction of the population to help estimate vital rate changes in the central GOA sea lion population. This information improves the ability to estimate vital rate changes in the absence of sightings of known–age individuals.

The best available data from the eastern GOA suggest that birth rate is similar to pre-decline birth rates, while the best available data from the central GOA suggest that the birth rate continues to decline steadily relative to 1976 levels. Therefore, birth rate, an important parameter driving population trends, is not consistent across the WDPS and is highest in the eastern portion of the WDPS Steller sea lion range (Muto et al. 2017)

Feeding and Prey Selection

Steller sea lions consume a variety of demersal, semi-demersal, and pelagic prey, indicating a potentially broad spectrum of foraging styles, probably based primarily on availability. Overall, the available data suggest two types of distribution at sea by Steller sea lions: 1) less than 20 km (12 mi) from rookeries and haulout sites for adult females with pups, pups, and juveniles, and 2) much larger areas (greater than 20 km [12 mi]) where these and other Steller sea lions may range to find optimal foraging conditions once they are no longer tied to rookeries and haulout sites for nursing and reproduction. Large seasonal differences in foraging ranges have been observed associated with seasonal movements of prey (Merrick et al. 1997).

The seasonal ecology of Steller sea lions in Southeast Alaska has been studied by relating the distribution of sea lions to prey availability (Womble et al. 2005, Womble et al. 2009). Figure 6 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 in some areas of Southeast Alaska. Similarly, the Status Review of Southeast Alaska Pacific Herring (NMFS 2014c) 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 2000).

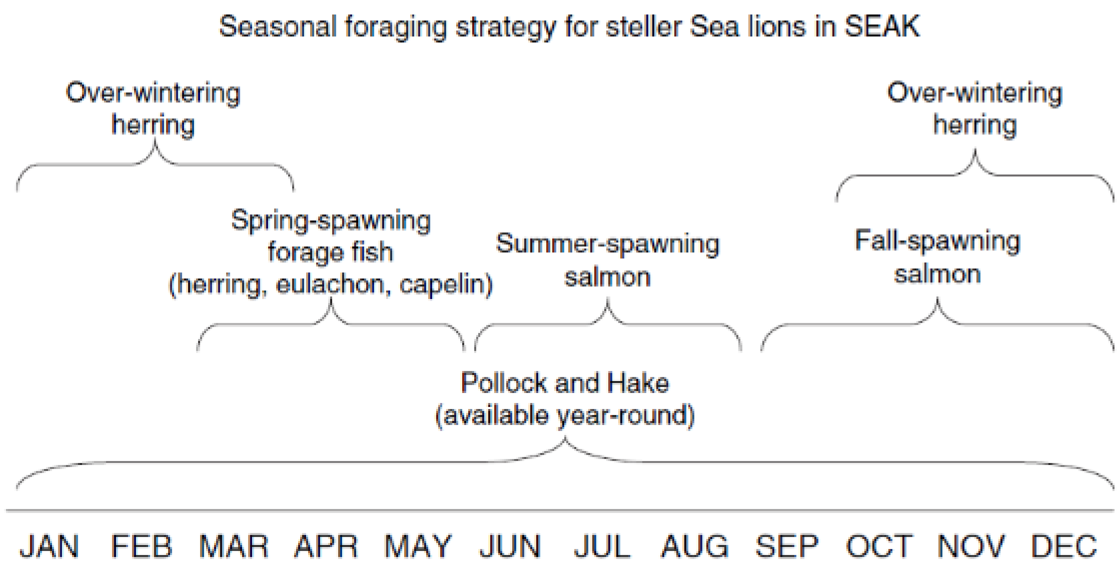

Figure 6. Seasonal foraging ecology of SSL. Reproduced with permission from Womble et al. 2009.

The action area and surrounding waters contain abundant sources of prey species, which draw Steller sea lions in to forage year-round. In particular, herring overwinter in Silver Bay attracting high numbers of Steller sea lions (Womble et al. 2009).

Diving and Social Behavior

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

Vocalization and Hearing

The ability to detect sound and communicate underwater is important for a variety of Steller sea lion life functions, including reproduction and predator avoidance. NMFS categorizes Steller sea lions in the otariid pinniped functional hearing group, with an applied frequency range between 60 Hz and 39 kHz in water (NMFS 2016c). 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).

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.

The action area does not overlap Steller sea lion critical habitat. The Biorka Island haulout is the closest designated critical habitat in Southeast Alaska and is over 30 km southwest of the project area (Figure 7).

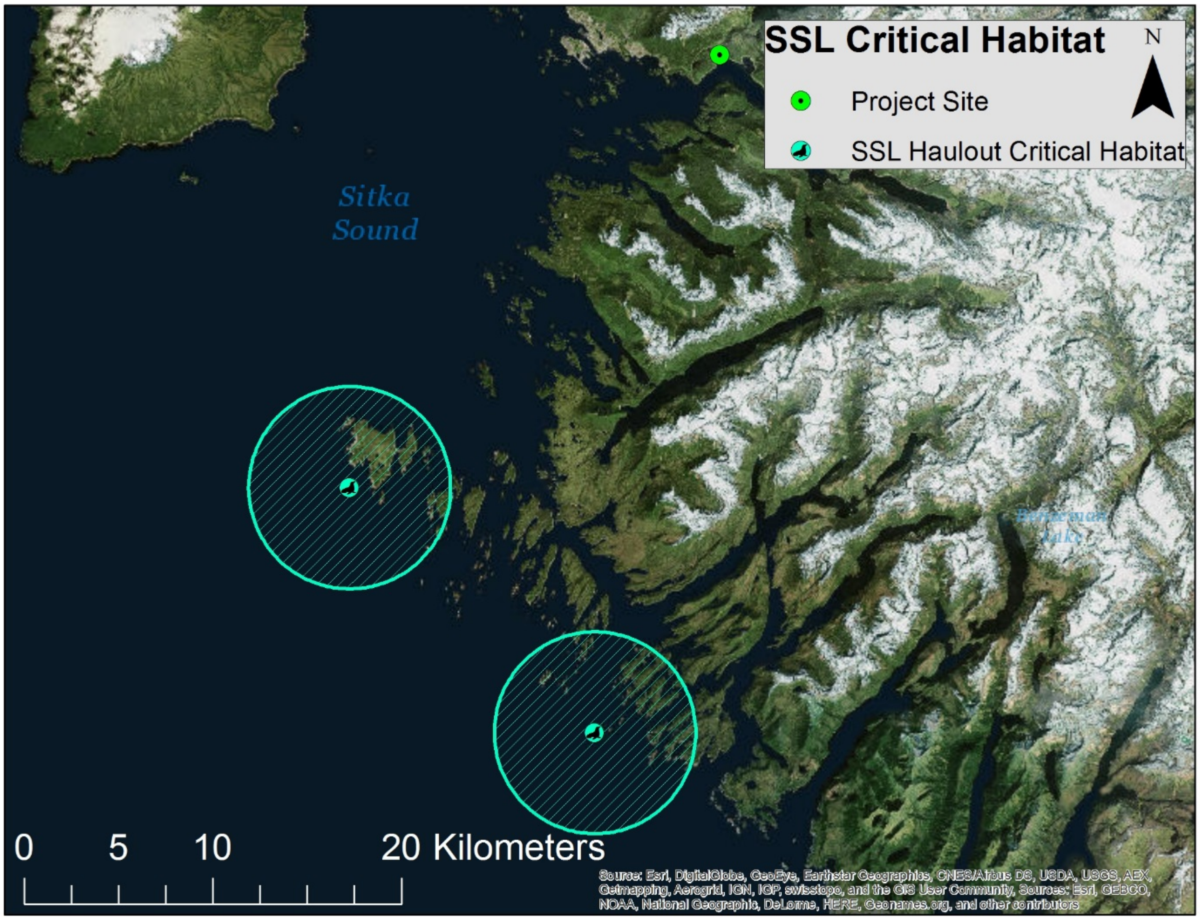

Figure 7. Steller Sea Lion Critical Habitat near Sitka Sound in relation to GPIP Project Site.

WDPS Status and Trends

In the 1950s, the worldwide abundance of Steller sea lions was estimated at 240,000 to 300,000 animals, with a range that stretched across the Pacific Rim from southern California, Canada, Alaska, and into Russia and northern Japan. In the 1980s, annual rates of decline in the range of what is now recognized as the western population were as high as 15 percent. The worldwide Steller sea lion population declined by over 50 percent in the 1980s, to approximately 116,000 animals (Loughlin 1992). By 1990, the U.S. portion of the population had declined by about 80 percent relative to the 1950s. On April 5, 1990, NMFS issued an emergency interim rule to list the Steller sea lion as threatened (55 FR 12645). On November 26, 1990, NMFS issued the final rule to list Steller sea lions as a threatened species under the ESA (55 FR 49204).

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

More recently, WDPS Steller sea lions have shown an increasing trend in abundance in much of their range. The 2016 Stock Assessment Report for WDPS Steller sea lions indicates a minimum population estimate of 50,983 individuals (Muto et al. 2017). The population trend of non-pup WDPS Steller sea lions from 2000-2014 varies regionally, from -8.71 percent per year in the Western Aleutians to +5.07 percent per year in the eastern Gulf of Alaska. Despite incomplete surveys conducted in 2006 and 2007, the available data indicate that overall WDPS Steller sea lions have at least been stable since 2004 (when the last complete assessment was done), although declines continue in the western Aleutian Islands. Overall, WDPS Steller sea lion pup and non-pups counts were estimated to be increasing at about 2 percent per year from 2000-2015 (Muto et al. 2017).

Steller Sea Lions in the Action Area

Steller sea lions occur year-round in the project area. From September to May between 1994 and 2000, marine biologist Jan Straley conducted weekly land-based surveys of marine mammals from Sitka’s Whale Park, located at the entrance to Silver Bay (these land based surveys were not performed in June, July, and August). From 2000 to 2016, Straley also collected marine mammal data from small vessels or Allen Marine’s 100 foot tour catamarans throughout the year. Based on Straley’s surveys, Steller sea lion numbers are highest near the project area, in Silver Bay and Eastern Channel of Sitka Sound, in January and February (Figure 8). Sea lions were often seen in groups of 4 or more; however, a group of more than 100 was sighted on at least 1 occasion (Straley 2017).

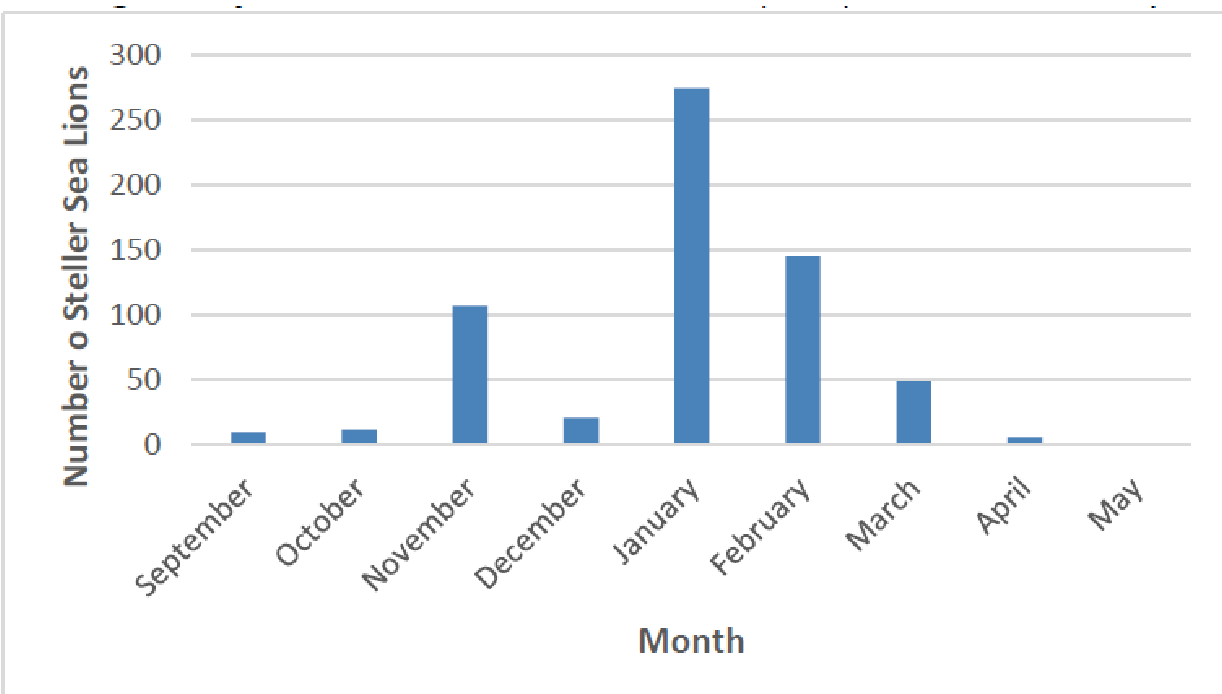

Figure 8. Steller Sea Lion Counts from Land-Based Surveys at Whale Park from September through May between 1994 and 2000. (Adapted from Straley 2017)

Sea lions are residents of the project vicinity and commonly exhibit feeding behavior. Survey data indicates a typical group of 1-2 sea lions, a maximum group size of over 100 sea lions, and approximately 3.46 sea lions occurring per day. Anecdotal evidence also indicates that sea lions are common in Sawmill Cove near the project footprint. In recent years, one sea lion has frequently been sighted near the Silver Bay Seafoods dock (adjacent to the project footprint) and in summer months it is common to see groups of up to ten sea lions in Sawmill Cove (Solstice Alaska Consulting 2017a).

Threats

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

Natural Threats

Killer Whale 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 in both the eastern and western stocks are eaten by killer whales (Dahlheim and White 2010, Ford *et al.* 1998, Heise *et al.* 2003, Horning and Mellish 2012, Maniscalco *et al.* 2007, Matkin *et al.* 2007, Springer *et al.* 2008, Williams *et al.* 2004).

Relative to other WDPS sub-regions, transient killer whale abundance and predation on Steller sea lions has been well studied in the Prince William Sound and Kenai Fjords portion of the eastern GOA. Steller sea lions represented 33% (Heise *et al.* 2003) and 5% (NMFS 2013) of the remains found in deceased killer whale stomachs in the GOA, depending on the specific study results. Matkin *et al.* (2012) estimated the abundance of transient killer whales in the eastern GOA to be 18. Maniscalco *et al.* (2007) identified 19 transient killer whales in Kenai Fjords from 2000 through 2005 and observed killer whale predation on 6 pup and three juvenile Steller sea lions. Maniscalco *et al.* (2007) estimated that 11 percent of the Steller sea lion pups born at the Chiswell Island rookery (in the Kenai Fjords area) were preyed upon by killer whales from 2000 through 2005 and concluded that GOA transient killer whales were having a minor impact on the recovery of the sea lions in the area. Maniscalco *et al.* (2008) further studied Steller sea lion pup mortality using remote video at Chiswell Island. Pup mortality up to 2.5 months postpartum averaged 15.4 percent, with causes varying greatly across years (2001–2007). They noted that high surf conditions and killer whale predation accounted for over half the mortalities. Even at this level of pup mortality, the Chiswell Island Steller sea lion population has increased.

Other studies in the Kenai Fjords/Prince William Sound region have also found evidence for high levels of juvenile Steller sea lion mortality, presumably from killer whales. Based on data collected post-mortem from juvenile Steller sea lions implanted with life history tags, 12 of 36 juvenile Steller sea lions were confirmed dead, at least 11 of which were killed by predators (Horning and Mellish 2012). Horning and Mellish (2012) estimated that over half of juvenile Steller sea lions in this region are consumed by predators before age 4 yr. They suggested that low juvenile survival due to predation, rather than low natality, may be the primary impediment to recovery of the WDPS of Steller sea lions in the Kenai Fjords/Prince William Sound region.

<u>Shark Predation</u>

Steller sea lions may also be attacked by sharks, 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 (NMFS 2008). Sleeper shark and sea lion home ranges overlap (Hulbert *et al.* 2006).. A significant increase in the relative abundance of sleeper sharks occurred during 1989–2000 in the central GOA; however, samples of 198 sleeper shark stomachs found no evidence of Steller sea lion predation (Sigler *et al.* 2006). Sigler *et al.* (2006) sampled sleeper shark stomachs collected in the GOA near sea lion rookeries when pups may be most vulnerable to predation (i.e., first water entrance and weaning) and found that fish and cephalopods were the dominant prey. Tissues of marine mammals were found in 15 percent of the shark stomachs, but no Steller sea lion tissues were detected (Sigler *et al.* 2006). One study suggests that predation on Steller sea lions by sleeper sharks may be occurring- approximately 27% of observed events of predation on juvenile Steller sea lions could be attributed to Pacific sleeper sharks. Although these observations do not constitute proof of attacks on live Steller sea lions by Pacific sleeper sharks, this data indicates that Pacific sleeper sharks could be considered as a possible source of mortality of juvenile Steller sea lions in the Gulf of Alaska and Prince William Sound (Horning 2014).

<u>Disease and Parasites</u>

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked diseases and parasites as a low threat to the recovery of the WPDS. There is no new information on disease in the WDPS relative to the information in the BiOp for the Fishery Management Plan (FMP) for the Gulf of Alaska (FMP BiOp) (NMFS 2010).

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

The Steller Sea Lion Recovery Plan ranks environmental variability as a potentially high threat to recovery of the WDPS (NMFS 2008). The Bering Sea and Gulf of Alaska are subjected to large-scale forcing mechanisms that can lead to basin-wide shifts in the marine ecosystem resulting in significant changes to physical and biological characteristics, including sea surface temperature, salinity, and sea ice extent and amount. Physical forcing affects food availability and can change the structure of trophic relationships by impacting climate conditions that influence reproduction, survival, distribution, and predator-prey relationships at all trophic levels (Wiese *et al.* 2012). Populations of Steller sea lions in the GOA and Bering Sea have experienced large fluctuations due to environmental and anthropogenic forcing (Mueter *et al.* 2009). As we work to understand how these mechanisms affect various trophic levels in the marine ecosystem, we must consider the additional effects of global warming, which are expected to be most significant at northern latitudes (IPCC 2013, Mueter *et al.* 2009).

Anthropogenic Threats

Fishing Gear and Marine Debris Entanglement

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked interactions with fishing gear and marine debris as a low threat to the recovery of the WDPS. Helker *et al.* (2015) report 352 cases of serious injuries to EDPS Steller sea lions from interactions with fishing gear, mostly from troll gear and other marine debris between 2009 and 2013. These interactions occur in fisheries that are not observed. Raum-Suryan *et al.* (2009) found 386 animals either entangled in marine debris or having ingested fishing gear over the period 2000-2007 in Southeast Alaska and northern British Columbia.

Over the same period, the WDPS mostly interacted with observed trawl (66) and some longline (3) groundfish fisheries, typically resulting in death. The minimum estimated mortality rate of western Steller sea lions incidental to all U.S. commercial fisheries is 33.2 sea lions per year, based on observer data (31) and stranding data (2.2) where observer data were not available. Several fisheries that are known to interact with the WDPS have not been observed reaching the minimum estimated mortality rate (Allen and Angliss 2015).

Competition between Commercial Fishing and Steller Sea Lions for Prey Species

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 (2014) analyzes this threat in detail.

Subsistence/Native Harvest

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked subsistence harvest as a low threat to the recovery of the WDPS. The most recent subsistence harvest data were collected by the Alaska Department of Fish and Game through 2008 and by the Ecosystem Conservation Office of the Aleut Community of St. Paul through 2009. The mean annual subsistence take from the WDPS in Alaska over the 5-year period from 2004 through 2008, combined with the mean take over the 2005–2009 period from St. Paul, was 199 Steller sea lions/year (Allen and Angliss 2015).

Illegal Shooting

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked illegal shooting as a low threat to the recovery of the WDPS. Illegal shooting of sea lions was thought to be a potentially significant source of mortality prior to the listing of sea lions as threatened under the ESA in 1990. There have been no cases of illegal shooting successfully prosecuted since 1998 (NMFS, Alaska Enforcement Division), although the NMFS Alaska Stranding Program documents 60 Steller sea lions with suspected or confirmed firearm injuries from 2000 – 2016 in Southeast Alaska (NMFS 2017c).

On June 1, 2015, the NMFS AKR Stranding Response Program received reports of at least five dead Steller sea lions on the Copper River Delta. Two NMFS biologists recorded at least 18 pinniped carcasses, most of which were Steller sea lions, on June 2, 2015. A majority of the carcasses had evidence of being intentionally killed by humans. Subsequent surveys resulted in locating two additional Steller sea lions, with some evidence suggestive of intentional killing.

NMFS Alaska Region designed a 2016 survey plan for the Copper River Delta focused on the time period of greatest overlap between the salmon driftnet fishery and marine mammals. The purpose of the surveys was to determine if the intentional killing observed in 2015 continued, and to collect cause of death evidence and samples for health assessments. Intentional killing by humans appears to be continuing and was the leading cause of death of the pinnipeds (harbor seals and Steller sea lions) NMFS assessed on the Copper River Delta from May 10 to August 9, 2016. Without continuous monitoring in past years it is impossible to know if the lack of reported carcasses in the decade prior to 2015 accurately reflects past intentional killings by humans. Numbers of marine mammals found dead with evidence of human interaction dropped considerably between 2015 and 2016, and may be a result of increased Office of Law Enforcement (OLE), NMFS Alaska Region, and USCG presence and activity in the Delta.

Mortality and Disturbance from Research Activities

The Steller Sea Lion Recovery Plan (NMFS 2008) ranked effects from research activities as a low threat to the recovery of the WDPS. Mortalities may occur incidental to marine mammal research activities authorized under ESA and MMPA permits issued to a variety of government, academic, and other research organizations. Between 2006 and 2010, there were no mortalities resulting from research on the WDPS of Steller sea lions (Allen and Angliss 2015).

Vessel Disturbance

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

Risk of Vessel Strike

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

Toxic Substances

The Steller Sea Lion Recovery Plan ranked the threat of toxic substances as medium (NMFS 2008).

Climate Change and Ocean Acidification

Marine ecosystems are susceptible to impacts from climate change and ocean acidification linked to increasing global anthropogenic CO_2 emissions. As discussed in the FMP Opinion (NMFS 2010), there is strong evidence that ocean pH is decreasing, ocean temperatures are increasing, and that this warming is accentuated in the Arctic. Scientists are working to understand the impacts of these changes to marine ecosystems; however, the extent and timescale over which WDPS Steller sea lions may be affected by these changes is unknown. Readers are referred to the discussion on climate change in Section 4.1.6 of the FMP Opinion (NMFS 2010) and to the discussion on ocean acidification in Section 7.3 of the Final Environmental Impact Statement for the Steller sea lion protection measures(NMFS 2014b).

4.2.2 Status of Mexico DPS Humpback Whales

Population Structure and Status

The humpback whale (a mysticete or “baleen” 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 nine are no longer listed under the ESA (81 FR 62260; September 8, 2016).

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

Table 5. Probability of encountering humpback whales from each DPS in the North Pacific Ocean (columns) in various feeding areas (on left). Adapted from Wade *et al.* (2016).

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

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

Whales from the Western North Pacific, Mexico, and Hawaii DPSs overlap on feeding grounds off Alaska, and are not visually distinguishable. 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. Critical habitat has not been designated for the Western North Pacific or Mexico DPSs (NMFS 2016a).

The Mexico DPS 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).

Humpback whales migrate seasonally between warmer, tropical or sub-tropical waters in winter months (where they reproduce and give birth to calves) and cooler, temperate or sub-Arctic waters in summer months (where they feed) (see Figure 9). 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).

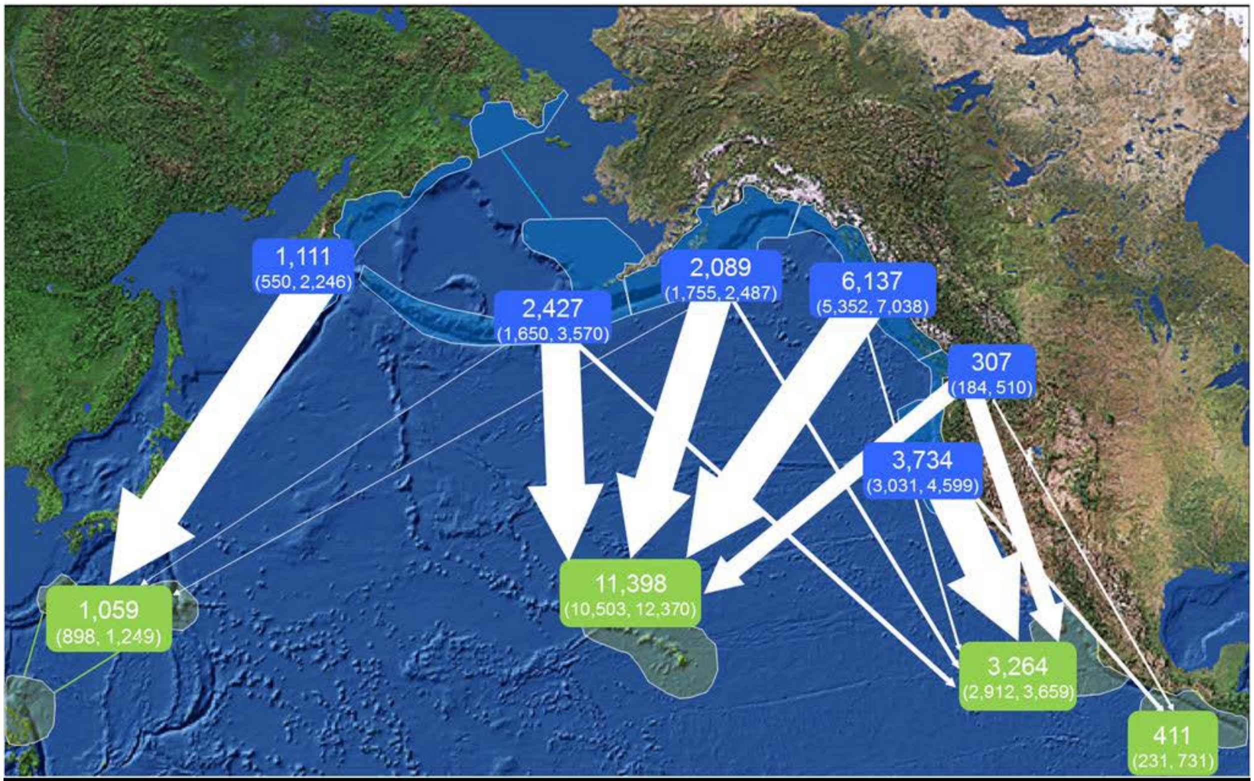

Figure 9. Abundance by summer feeding areas (blue), and winter breeding areas (green), with 95% confidence limits in parentheses. Migratory destinations from feeding area to breeding area are indicated by arrows with width of arrow proportional to the percentage of whales moving into winter breeding area (Wade *et al.* 2016).

Humpback Whales in the Action Area

Humpback whales in southeast Alaska have been steadily increasing in recent decades. The southeast Alaska-specific rate of increase is approximately 5.6% annually (Calambokidis et al. 2008) and the latest estimate of abundance for Southeast Alaska and northern British Columbia is between 3,005 and 6,137, depending on the modeling approach employed. 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.

Humpback whales are present in Southeast Alaska in all months of the year. Most Southeast Alaska humpback whales winter in low latitudes, but some individuals have been documented over-wintering near Sitka and Juneau (NPS Fact Sheet available at http://www.nps.gov/glba). Late fall and winter whale habitat in Southeast Alaska appears to correlate with areas that have over-wintering herring, such as Sitka Sound (Baker *et al*. 1985, Straley, 1990, Straley *et al*. 2016, Moran and Straley, in press).

Although humpback whales are known to undertake seasonal migrations from their tropical calving and breeding grounds in winter to their high-latitude feeding grounds in summer, humpback whales have been observed in Southeast Alaska in all months of the year. Humpback whales are most common in the GPIP Multipurpose Dock Project area in November, December, and January (Figure 10). In late fall and winter, herring sometimes overwinter in deep fjords in Silver Bay and Eastern Channel of Sitka Sound, and humpback whales aggregate in these areas to feed on them. In summer when prey is dispersed throughout Sitka Sound, humpback whales also disperse throughout the Sound and away from the project area (Straley 2017).

Between September and May between 1994 and 2000, marine biologist Jan Straley conducted weekly land-based surveys of marine mammals from Sitka's Whale Park, located at the entrance to Silver Bay (no surveys were done in June, July, and August). Many humpback whales were observed during these surveys.

Survey data indicate that the typical group size for humpback whales in the area is between 2 and 4 whales, and approximately 2.18 whales occur in the area per day. The maximum group size is unknown. When present in the area, humpback whales are foraging primarily on herring.

Most of the humpback whales that are found feeding in Sitka Sound in winter migrate to their mating and calving grounds in Hawaii and Mexico; however, this likely occurs after herring have moved out of the project area. Humpback whales have been documented making this migration in under forty days, allowing whales to feed longer in Alaska before they migrate south for mating and calving activities (Straley 1997).

Given their widespread range and their opportunistic foraging strategies, humpback whales may be in the project vicinity during the proposed project activities.

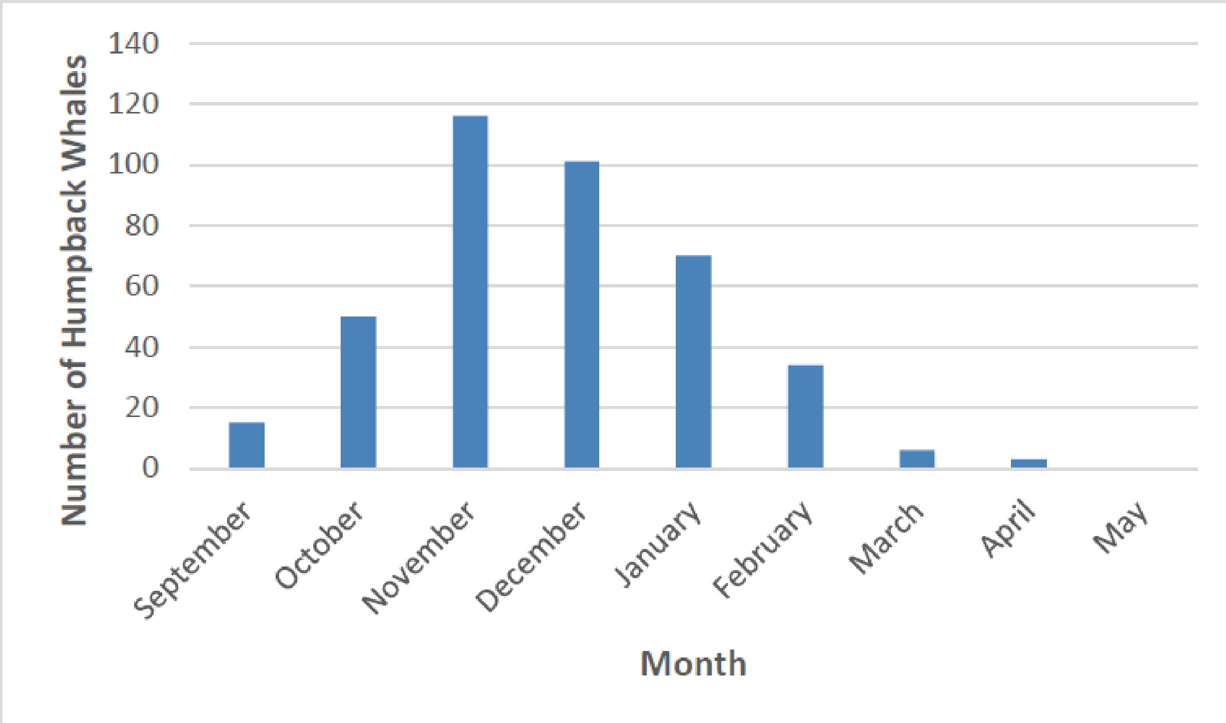

Figure 10. Humpback Whale Counts from Land-Based Surveys at Whale Park, Sitka from September Through May Between 1994 and 2000. (Adapted from Straley 2017)

Reproduction and Growth

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

Feeding and Prey Selection

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

Humpback whales are relatively generalized in their feeding compared to some other baleen whales. In the Northern Hemisphere, known prey includes: euphausiids (krill); copepods; juvenile salmonids; Arctic cod; walleye pollock; pteropods; and cephalopods (Johnson and Wolman 1984, Perry *et al.* 1999). In late fall and winter, herring sometimes overwinter in deep fjords in Silver Bay and Eastern Channel of Sitka Sound, and humpback whales aggregate in these areas to feed on them.

Diving and Social Behavior

In Southeast Alaska waters, humpback whales have been observed diving for an average of 2.8 min for feeding whales, 3.0 min for non-feeding whales, and 4.3 min for resting whales, with the deepest dives to 148 m (Dolphin 1987). Because most humpback prey is likely found above 300 m depths, most humpback dives are probably relatively shallow. Hamilton *et al.* (1997) tracked one whale possibly feeding near Bermuda to 240 m depth.

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

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 an applied frequency range between 7 Hz and 35 kHz (NMFS 2016c). 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).

Critical Habitat

Critical habitat has not been designated for Mexico DPS humpback whales, and therefore is not analyzed in this Opinion.

Threats

Brief descriptions of threats to humpback whales follow. More detailed information can be found in the Humpback Whale Recovery Plan (NMFS 1991) (available at: http://www.nmfs.noaa.gov/pr/pdfs/recovery/whale_humpback.pdf), the NMFS Stock Assessment Reports (available at: http://www.nmfs.noaa.gov/pr/sars/species.htm), the Global Status Review (Fleming and Jackson, 2011) (available at: http://www.alaskafisheries.noaa.gov/protectedresources/whales/humpback/reports/globalreview0311.pdf), and the ESA Status Review (Bettridge *et al.* 2015) (available at http://www.nmfs.noaa.gov/pr/species/Status%20Reviews/humpback_whale_sr_2015.pdf).

Natural Threats

Disease and Parasites

Humpback whales can carry the giant nematode *Crassicauda boopis* (Bayliss 1920), which appears to increase the potential for kidney failure in humpback whales and may be preventing some populations from recovering (Lambertsen 1992). No information specific to the Mexico DPS is available.

Predation

The most common predator of humpback whales is the killer whale (Orcinus orca, Jefferson *et al.*, 1991), although predation by large sharks may also be significant (attacks are mostly undocumented).

Predation by killer whales on humpback calves has been inferred by the presence of distinctive parallel ‘rake’ marks from killer whale teeth across the flukes (Shevchenko 1975). While killer whale attacks of humpback whales are rarely observed (Ford and Reeves 2008), the proportion of photo-identified whales bearing rake scars is between zero and 40%, with the greater proportion of whales showing mild scarring (1-3 rake marks) (Mehta *et al.* 2007, Steiger *et al.* 2008). This suggests that attacks by killer whales on humpback whales vary in frequency across regions. It also suggests either that either most killer whale attacks result in mild scarring, or that those resulting in severe scarring (4 or more rakes, parts of fluke missing) are more often fatal. 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).

Photo-identification data indicate that rake marks are often acquired very early in life, though attacks on adults also occur (Mehta *et al.* 2007, Steiger *et al.* 2008). Killer whale predation may be a factor influencing survival during the first year of life (Mehta *et al.* 2007). There has been some debate as to whether killer whale predation (especially on calves) is a motivating factor for the migratory behavior of humpback whales (Clapham 2001, Corkeron and Connor 1999); however, this remains unsubstantiated.

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).

Anthropogenic Threats

Fleming and Jackson (2011), Bettridge *et al.* (2015), and the 1991 Humpback Whale Recovery Plan list the following range-wide anthropogenic threats for the species: vessel strikes, fishery interactions including entanglement in fishing gear, subsistence harvest, illegal whaling or resumed legal whaling, pollution, and acoustic disturbance. Vessel strikes (Fleming and Jackson 2011) and fishing gear entanglement (Bettridge *et al.* 2015 and Fleming and Jackson 2011) are listed as the main threats and sources of anthropogenic impacts to humpback whale DPSs in Alaska.

<u>Fishery Interactions including Entanglements</u>

Entanglement in fishing gear is a documented source of injury and mortality to cetaceans. Entanglement may result in only minor injury or may potentially significantly affect individual health, reproduction, or survival (NMFS 2011). Bettridge *et al.* (2015) report that fishing gear entanglements may moderately reduce the population size or the growth rate of the Hawaii, Central America, and Mexico DPSs.

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. Between 2009 and 2013, there were two known mortalities of humpback whales in the Bering Sea/Aleutian Islands pollock trawl fishery and one in the Bering Sea/Aleutian Islands flatfish trawl fishery (Allen and Angliss 2015). One humpback whale was also injured in the Hawaii shallow set longline fishery in 2011. Average annual mortality from observed fisheries was calculated as 0.6 humpbacks for the period 2009-2013 (Allen and Angliss). Mean annual mortality to western North Pacific DPS humpbacks caused by entanglement from fishing gear was 1.4 between 2009-2013 (Allen and Angliss 2015).

<u>Subsistence, Illegal Whaling, or Resumed Legal Whaling</u>

There are no reported takes of humpback whales from the Mexico DPS by subsistence hunters in Alaska or Russia for the 2008-2012 period (Allen and Angliss 2015). One humpback whale was killed illegally by hunters in the vicinity of Toksook Bay in western Alaska in 2016 (NMFS unpublished data).

<u>Vessel Strikes and Disturbance</u>

Vessel strikes often result in life-threatening trauma or death for cetaceans. Impact is often initiated by forceful contact with the bow or propeller of the vessel. 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).
Between 2009 and 2013, mean annual mortality and serious injury due to strikes from charter, recreational, research, and unknown vessels to Central North Pacific humpback whales in Alaska was 1.9 (Allen and Angliss 2015). Most of the vessel collisions were reported in Southeast Alaska, but it is unknown whether the difference in ship strike rates between Southeast Alaska and other areas is due to differences in reporting, amount of vessel traffic, densities of whales, and/or other factors (Allen and Angliss 2015).

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). The health effects of different doses of contaminants are currently unknown for humpback whales (Krahn *et al.* 2004).

Acoustic Disturbance

Anthropogenic sound has increased in all oceans over the last 50 years and is thought to have doubled each decade in some areas of the ocean over the last 30 or so years (Croll *et al.* 2001, Weilgart 2007). Low-frequency sound comprises a significant portion of this and stems from a variety of sources including shipping, research, naval activities, and oil and gas exploration. Understanding the specific impacts of these sounds on mysticetes, and humpback whales specifically, is difficult. However, it is clear that the geographic scope of potential impacts is vast, as low-frequency sounds can travel great distances under water.

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 (Weilgart 2007). Other detrimental effects of anthropogenic noise include masking and temporary threshold shifts (TTS). These processes are described in greater detail later in this document.

5. ENVIRONMENTAL BASELINE

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

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

5.1 Coastal Zone 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. The shoreline in the immediate project area is highly developed, and, as mentioned above, impervious surfaces directly abut the shoreline and abandoned in-water structures (primarily piles) are adjacent to the project footprint (Figures 11 and 12).

Figure 11. Aerial View of Proposed GPIP Multipurpose Dock Site in Sawmill Cove. (Association 2017)

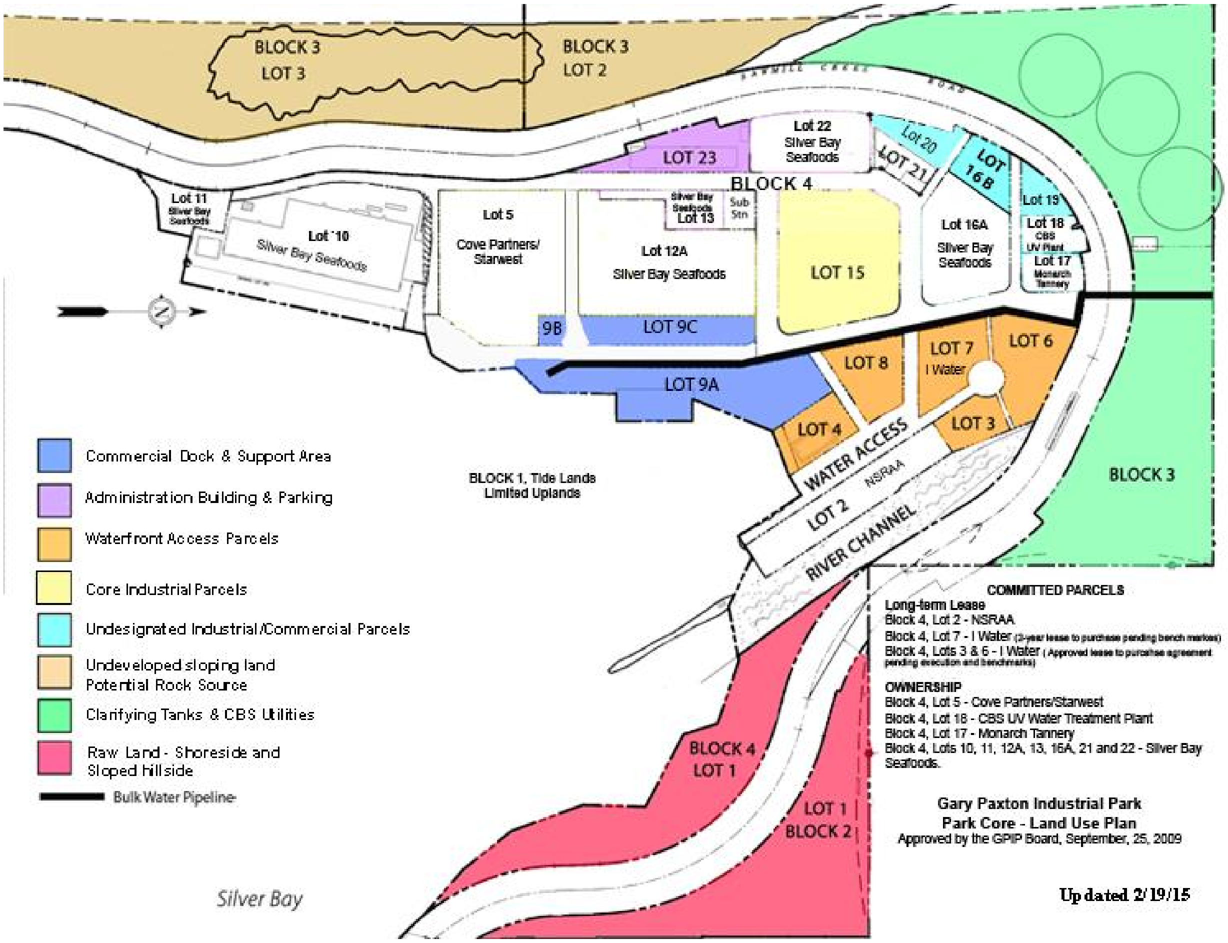

Figure 12. Designated Land Use in the GPIP Multipurpose Dock Project Vicinity. (Hastings and Popper 2005, Association 2017)

5.2 In-Water Noise

The dock project area is subject to noise from many anthropogenic sources, including marine vessels, shore-based processing, shoreline and dock construction, and land vehicles. The project is located in a previously disturbed active marine industrial area that is subject to anthropogenic noise produced by industrial activities associated with the GPIP. The project area is frequented by fishing vessels and tenders and other commercial and recreational vessels. These vessels use the project vicinity to access facilities in the GPIP including the Silver Bay Seafoods Processing plant where fish catches are offloaded, the Medvejie hatchery located at the head of Silver Bay, and for other commercial and recreational uses. Beyond Sawmill Cove, the action area extends the length of Silver Bay, a relative undeveloped area.

5.3 Other Stressors on WDPS Steller Sea Lions

Disturbance from vessel transit, competition for prey, subsistence hunting, and effects from climate change are existing sources of potential stress to Steller sea lions in the action area. Short descriptions and summaries of the effects of these stressors are presented below. A more detailed analysis is available in a recent biological opinion of the effects of groundfish fisheries (NMFS 2014) and the SSL recovery plan (NMFS 2008).

5.3.1 Vessel Disturbance and Strike

Ferries, cruise ships, yachts, fishing vessels and tenders, barges, tugboats, and other commercial and recreational vessels use Sitka Sound and Sitka Harbors (CBS 2017, Nuka 2012). During peak fishing seasons (April – September), vessel traffic increases in Sawmill Cove and Silver Bay. Fishing vessels offload catch at the Silver Bay Seafoods processing plant located adjacent to the proposed dock (SolsticeAK 2017).

These activities increase ambient in-air and underwater noise and pose risk of vessel strike. NMFS provides a voluntary framework for vessel operators to follow a code of conduct to reduce marine mammal interactions including:

- remain at least 100 yards from marine mammals,
- time spent observing individual(s) should be limited to 30 minutes, and
- vessels should leave the vicinity if they observe Steller sea lion behaviors such as these:
    - Increased movements away from the disturbance, hurried entry into the water by many animals, or herd movement towards the water; or
    - Increased vocalization, aggressive behavior by many animals towards the disturbance, or several individuals raising their heads simultaneously.

These guidelines can be viewed at https://alaskafisheries.noaa.gov/pr/mm-viewing-guide.

There are three documented occurrences of Steller sea lions being struck by vessels in Southeast Alaska; all were near Sitka. Although risk of ship strike has not been identified as a significant concern for Steller sea lions (Loughlin and York 2000), the recovery plan for this species states that Steller sea lions may be more susceptible to ship strike mortality or injury in harbors or in areas where animals are concentrated (e.g., near rookeries or haulouts) (NMFS 2008).

5.3.2 Competition for Prey

Competition for prey species could exist between Steller sea lions and commercial fishing. NMFS (2008) noted there are commercial fisheries that target key Steller sea lion prey, including Pacific cod, salmon, and herring in the eastern portion of their range. It was recognized that in some regions, fishery management measures appear to have reduced this potential competition (e.g., no trawl zones and gear restrictions on various fisheries in southeast Alaska), and in others a very broad distribution of prey and a lack of seasonal overlap between fisheries and prey preference by sea lions may minimize competition as well. There are no fishery management measures intended to limit interactions with Steller sea lions in the action area since there are no haulouts or rookeries. Given the recent abundance trends discussed above and the remoteness and small scale of the action area compared to nearby fishing grounds, NMFS expects any competition for prey in the action area to be insignificant.

5.3.3 Climate Change

The indirect effects of climate change would result from changes in the distribution of temperatures suitable for reproduction, the distribution and abundance of prey, and abundance of competitors or predators. The effects of climate 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).

5.3.4 Subsistence Uses

Alaska Natives have traditionally harvested Steller sea lions in Southeast Alaska for hundreds of years. Since surveys of sea lion subsistence harvest in Alaska began in 1992, the number of Southeast Alaska households hunting and harvesting sea lions has remained relatively constant at low levels. In 2012, the community of Sitka had an estimated subsistence take of 1 Steller sea lion (Wolf, 2013).

5.4 Other Stressors on Mexico DPS Humpback Whales

Disturbance and risk of vessel strike from transiting vessels, competition for prey, and effects from climate change are existing sources of potential stress to humpback whales in the action area. A short description and summary of the effects of these stressors are presented below. More detailed analyses are available in the most recent humpback whale recovery plan (NMFS 1991) and ESA Status Review (Bettridge *et al.* 2015).

5.4.1 Vessel Disturbance and Strike

Ferries, cruise ships, yachts, fishing vessels and tenders, barges, tugboats, and other commercial and recreational vessels use Sitka Sound and Sitka Harbors (Research 2012, Sitka 2017). During peak fishing seasons (April – September), vessel traffic increases in Sawmill Cove and Silver Bay. Fishing vessels offload catch at the Silver Bay Seafoods processing plant located adjacent to the proposed dock (Solstice Alaska Consulting 2017a).

All of these sources of vessel traffic increase underwater noise and contribute to the risk of vessel-whale collisions.

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

- Most vessels that strike whales are less than 49 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, previous locations of whale strikes were used to produce a kernel density estimation. The high risk areas shown in red in Figure 13 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.

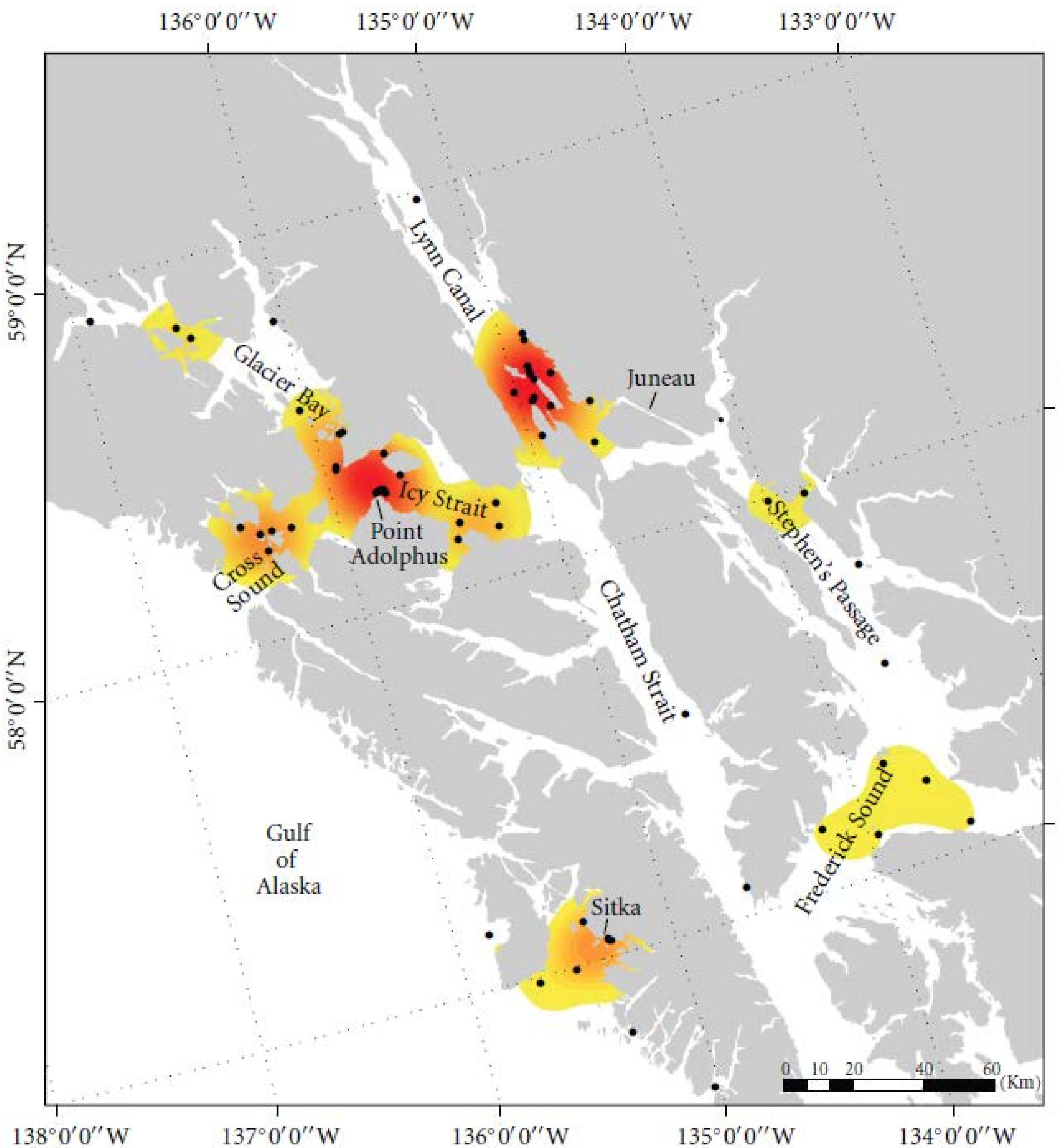

Figure 13. High Risk Areas for Vessel Strike in northern Southeast Alaska. Used with permission from Neilson et al. (2012)

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

a. Not approach within 100 yards of a humpback whale, or cause a vessel or other object to approach within 100 yards of a humpback whale,
b. Not place vessel in the path of oncoming humpback whales causing them to surface within 100 yards of vessel,
c. Not disrupt the normal behavior or prior activity of a whale, and

d. Operate vessel at a slow, safe speed when near a humpback whale. Safe speed is defined in regulation (see 33 CFR § 83.06).

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

5.4.2 Competition for Prey

Competition for prey may exist between humpback whales and human fisheries. Humpback whales feed on schooling fish, including species that are harvested by humans commercially or for personal use. Given the recent abundance trends discussed above, and the 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 insignificant.

5.4.3 Climate Change

The indirect 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. We have no information to indicate that this has happened to date.

6. EFFECTS OF THE ACTION

"Effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

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

Based on our review of the Biological Assessment (Solstice Alaska Consulting 2017b), the IHA application (Solstice Alaska Consulting 2017c), the proposed notice for issuing the IHA (NMFS 2017b), personal communications, and other available literature as referenced in this Opinion, our analysis recognizes that the proposed construction activities associated with the GPIP Dock Project may cause these primary stressors:

1. sound fields produced by impulsive noise sources (impact hammers);
2. sound fields produced by continuous noise sources including vessels, vibratory hammers, and drilling;
3. risk of vessels associated with the construction striking marine mammals;
4. changes in habitat associated with construction, including effects on water quality and turbidity and effects on the habitat of prey.

Most of the analysis and discussion of effects to WDPS Steller sea lions and Mexico DPS humpback whales from this action will focus on exposure to impulsive and continuous noise sources because these stressors will likely have the most direct impacts on listed species. In this analysis, we used studies incorporating similar pile types and sizes conducted at Ketchikan, Alaska (Denes et al. 2016) and Anchorage, Alaska (Austin et al. 2016) to inform our representation of the sound field produced by these stressors depicted in Figure 2 and Figure 3, and on NMFS's acoustic thresholds (NMFS 2017b) to evaluate the effects of those sound fields above the ambient sound levels.

6.1.1 Acoustic Thresholds

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

Since 1997, NMFS has used generic sound exposure thresholds to determine whether an activity produces underwater and in-air sounds that might result in impacts to marine mammals (70 FR 1871). NMFS recently developed comprehensive guidance on sound levels likely to cause injury to marine mammals through onset of permanent and temporary thresholds shifts (PTS and TTS; Level A harassment) (81 FR 51693). NMFS is in the process of developing guidance for behavioral disruption (Level B harassment under the MMPA). However, until such guidance is available, NMFS uses the following conservative thresholds of underwater sound pressure levels[1], expressed in root mean square[2] (rms), from broadband sounds that cause behavioral disturbance, and referred to as Level B harassment under section 3(18)(A)(ii) of the Marine Mammal Protection Act (MMPA):

- impulsive sound: 160 dB re 1 μPa_{rms}
- continuous sound: 120 dB re 1μPa_{rms}

Under the PTS/TTS Technical Guidance, NMFS uses the following thresholds for underwater sounds that cause injury, referred to as Level A harassment under section 3(18)(A)(i) of the MMPA (NMFS 2016c). These acoustic thresholds are presented using dual metrics of cumulative sound exposure level (L_E) and peak sound level (PK) for impulsive sounds and L_E for non-impulsive sounds (Table 6). NMFS categorizes humpback whales in the Low-Frequency Cetaceans functional hearing group and Steller sea lions in the Otariid Pinniped functional hearing group.

Table 6. PTS Onset Acoustic Thresholds for Level A Harassment (NMFS 2016c).

	PTS Onset Acoustic Thresholds* (Received Level)	
Hearing Group	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

[1] 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.

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

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

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

While the ESA does not define "harass," NMFS recently 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 the purposes of this consultation, any action that amounts to incidental harassment under the MMPA—whether Level A or Level B—constitutes an incidental "take" under the ESA and must be authorized by the ITS (Section 10).

As described below, we anticipate that exposures to listed marine mammals from noise associated with the proposed action may result in disturbance (Level B harassment). With the addition of mitigation measures including shutdown zones, no mortalities or permanent impairment to hearing are anticipated. The Level A and Level B thresholds and associated isopleths for the GPIP project are shown in Table 7.

Table 7. Level A and B Isopleth Distances for Pile Driving Associated with GPIP Multipurpose Dock Construction

Source Activity and Duration	Source level (dB)	Level A[3] Thresholds (m)		Level B Thresholds (m)
		humpback whales	Steller sea lions	All Species
Vibratory Pile Driving				
12 and 16-inch wood removal (5 hours per day)	155 SPL	8.0	0.3	2,154
30-inch steel temporary installation (3 hours per day)	166 SPL	30.6	1.3	11,659[4]
30-inch steel temporary removal (1 hour per day)	166 SPL	14.7	0.6	11,659[4]
30-inch steel permanent installation (2 hours per day)	166 SPL	23.4	1.0	11,659[4]
48-inch steel permanent installation (2 hours per day)	168.2 SPL	32.7	1.4	16,343[4]
Impact Pile Driving				
30-inch steel permanent installation (10 minutes per day)	180.7 SEL[1]/ 196 SPL[2]	380.9	14.8	2,512
48-inch steel permanent installation (10 minutes per day)	186.7 SEL[1]/ 198.6 SPL[2]	1,052.4	41.0	3,744

[1] Single strike sound exposure levels (SELs) are derived from the Port of Anchorage test pile project for 48-in piles (Austin et al. 2016) and Alaska Department of Transportation hydroacoustic studies for 30-in piles (Denes et al. 2016).

[2]SPL rms values were used to calculate distances to Level B harassment isopleths.

[3] The values provided here represent the distances at which an animal may incur PTS if that animal remained at that distance for the entire duration of the activity. For example, a humpback whale (low frequency cetacean) would have to remain 8 meters from timber piles being removed for 5 hours for PTS to occur.

[4]These represent calculated distances based on practical spreading model; however, land at the end of Silver Bay obstructs underwater sound transmission at approximately 9,500 m from the source.

6.1.2 Vessel Strike and Noise

Humpback whales and Steller sea lions are anticipated to occur in the action area and, therefore, to overlap with noise associated with vessels associated with the project. We assume that exposed individuals may potentially respond to this continuous noise source. Further, vessels transiting into and out of the project area could increase the risk of vessel strike for humpback whales and Steller sea lions in the action area.

6.1.3 Stressors Not Likely to Adversely Affect ESA-listed Species

Based on a review of available information, we determined which of the possible stressors may affect, but are not likely to adversely affect, listed species and, therefore, need not be evaluated further in this Opinion. These include changes in habitat and in-air noise. We have briefly analyzed them below.

Changes in Habitat Due to Water Quality and Turbidity

Because of the nature of the project site, CBS suspect that there will be relatively small amounts of silt suspended in the water column during pile driving. 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). Because of local currents and tidal action, any potential water quality exceedances are expected to be temporary and highly localized. The local currents will disperse suspended sediments from pile-driving operations and dredging at a moderate to rapid rate depending on tidal stage.

Hollow steel piles used during construction will not introduce or leach contaminants into the sediment, and resuspension will be temporary, highly localized, and minor. Pile removal will be conducted with a vibratory hammer, creating minimal resuspension.

Increased turbidity caused by construction activities 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. Increased turbidity is expected to occur in the immediate vicinity of construction activities. However, suspended sediments and particulates are expected to dissipate quickly within a single tidal cycle.

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). Estimates of anticipated turbidity levels from the proposed action are unknown, however, are expected to be temporary and highly localized (< 25 feet from the pile or dredge activity; AKDOT 2017b). Therefore, 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. 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, it is unlikely that the short-term and localized increase in turbidities generated by the proposed actions would measurably affect juvenile or adult salmonids or herring that may be present in the project area. Therefore, the potential indirect effects on the prey species of WDPS Steller sea lions and Mexico DPS humpback whales will be insignificant.

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. Therefore, the potential direct effects on WDPS Steller sea lions and Mexico DPS humpback whales will be insignificant.

Short-term effects on listed marine mammal species may occur if petroleum or other contaminants accidentally spill into Sawmill Cove 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. If a spill were to occur, plans will be in place and materials will be available for cleanup activities. Spill prevention and spill response procedures will be maintained throughout construction activities. Therefore, short-term adverse effects on WDPS Steller sea lions and Mexico DPS humpback whales will be small in scale and are considered insignificant.

No long-term effects on water quality are expected to occur in the action area as the result of the proposed action.

Changes in Habitat of Prey Species

A loss of habitat due to the project footprint is not anticipated because the dock footprint is previously disturbed by existing abandoned structures (Figure 12).

Fish populations in the project area that serve as Steller sea lion and humpback whale prey could be affected by noise from in-water pile-driving. High underwater sound pressure levels (SPL) have been documented to alter behavior, cause hearing loss, and injure or kill individual fish by causing serious internal injury (Hastings and Popper 2005).

In general, impacts to marine mammal prey species are expected to be minor and temporary. The area likely impacted by the proposed project is relatively small compared to the available habitat around Sitka. The most likely impact to fish from the proposed project will be temporary behavioral avoidance of the immediate area. Any behavioral avoidance by fish of the immediate area will still leave large areas of fish and foraging habitat in the action area. Therefore, the effects on the prey species of WDPS Steller sea lions and Mexico DPS humpback whales will be insignificant.

In-Air Noise

Pinnipeds can be adversely affected by in-air noise. Loud noises can cause hauled-out pinnipeds to flush back into the water, leading to disturbance and possible injury. Pile driving and removal associated with this project will generate in-air noise above ambient levels within Sawmill Cove. However, the predicted distances to the in-air noise disturbance threshold for hauled-out pinnipeds (100 dB rms) will not extend more than 53 m from any type of pile being driven or 17m from any pile being extracted[3]. As indicated in Table 1, such sounds will occur for an estimated 44 hours over a 16 day period. Because there are no natural or artificial haulouts or docks within this close distance, no in-air disturbance to hauled-out individuals is anticipated as a result of the GPIP Multipurpose Dock Project. Any WDPS Steller sea lion close enough to the sound source to be considered a 'take' from in-air noise associated with pile driving would already have been accounted for by in-water take, or take would have been avoided due to the proposed mitigation measures.

6.1.4 Summary of Effects

Stressors Not Likely to Adversely Affect ESA-listed Species

NMFS determined that changes to water quality and turbidity and habitat due to the activities associated with this project may occur, but the associated effects are expected to be too small to detect or measure and therefore insignificant to WDPS Steller sea lions and Mexico DPS humpback whales. These stressors will not be considered further in this Opinion.

Stressors Likely to Adversely Affect ESA-listed Species

NMFS anticipates that increased exposure to sound levels above ambient noise and increased disturbance and risk of vessel strike associated with construction vessels present in the action area are likely to adversely affect WDPS Steller sea lions and Mexico DPS humpback whales. These two stressors are discussed further in the Exposure Analysis.

Interrelated/Interdependent Effects

NMFS did not identify any interrelated or interdependent effects associated with this project.

[3] Predicted distances were based on source levels in Washington and Alaska. At Puget Sound, WA, Laughlin (2010) found in-air measurements averaged 96.5 dB rms at 15 m during vibratory installation of 30-inch steel piles. At the Port of Anchorage, AK, Austin et al. (2016) found source levels of 101 dB @15 m during impact installation of 48-inch diameter steel piles.

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

WDPS Steller sea lions and Mexico DPS humpback whales may be present within the waters of the action area during the 16 days that pile driving and removal work is being conducted, and could potentially be exposed to temporarily elevated underwater and/or in-air noise levels.

Temporarily elevated underwater noise during vibratory and impact pile driving has the potential to result in Level B (behavioral) harassment of marine mammals. Level A harassment (resulting in injury) is not expected to occur as a result of the proposed action due to the small threshold sizes for vibratory pile driving (Table 7), and the implementation of shutdown zones (Table 2) and the marine mammal monitoring plan in Section 2.1.2 will reduce the potential for exposure to levels of underwater noise above the injury threshold established by NMFS.

Approach to Estimating Exposures to Noise from Pile Driving

There are no available density estimates of humpback whales or Steller sea lions in the action area. The best available information on the distribution of these marine mammals in the study area comes from the weekly land-based surveys of marine mammals from Sitka's Whale Park, conducted between September and May from 1994 to 2000 by marine biologist Jan Straley (Straley 2017) (Figures 8 and 10). No surveys were done in June, July, and August.

These sightings are the best available information regarding the presence of Steller sea lions and humpback whales in the action area during the months when the project will occur. Opportunistic sightings are not considered abundance estimates and do not account for unseen animals in the area and in the water. Opportunistic surveys do not have a correction factor for those uncounted animals. However, in the absence of density estimates, NMFS used this data to estimate the numbers of individuals that may be exposed to noise from pile driving. Even without a correction factor, NMFS considers these estimates to be conservative for the following reasons:

- For this analysis, it is assumed that humpback whales could be present within the Level B disturbance zone on any day of pile driving. The average number of humpback whales reported by Straley per day was 2.18 with typical group sizes varying from 2 to 4 whales (Straley 2017). NMFS used the conservative value of 4 whales for this analysis.

- Based on survey data and localized observations, between 1 and 10 Steller sea lions can be present within Sawmill Cove on any day (SolsticeAK 2017). The average number of Steller sea lions reported by Straley per day was 3.46 (Straley 2017). NMFS used these observations and datasets for this analysis. Thus, using a conservative approach, it was assumed that on any day of pile driving, 10 Steller sea lions could be present within Sawmill Cove and another group of 4 Steller sea lions could be present in the farther reaches of the disturbance zone, for a combined exposure of 14 Steller sea lions on each day of pile driving.

The calculation for marine mammal exposures is estimated by:

Exposure estimate = N (number of animals) × number of days animals are expected during pile driving activities

Humpback whales

Underwater Level B exposure estimate: 4 animals/day × 16 days of pile activity = 64

Of the 64 humpback whales exposed to Level B harassment, we anticipate 6% to be from the threatened Mexico DPS (~ 4 takes) (Wade *et al.* 2016). The remaining exposures are anticipated to be non-listed Hawaii DPS individuals.

Steller sea lions

Underwater Level B exposure estimate: 14 animals/day × 16 days of pile activity = 224

Of the 224 exposed Steller sea lions, we expect <2% to be from the endangered WDPS (~3 takes) and the remainder to be from the EDPS based on recent observations of branded animals in the Sitka Alaska area (Jemison, 2017). Solstice requested a more conservative 5 takes in their IHA application. The estimated number of takes by harassment due to noise from pile driving is presented in Table 8.

Table 8. Estimated numbers of humpback whales and Steller sea lions that may be exposed to Level B harassment.

Common name	DPS	Level B
Humpback whale	Hawaii DPS	60
	Mexico DPS	4
Steller sea lion	Western DPS	5
	Eastern DPS	219

As discussed in Section 2.1.2 above, the CBS is requesting no Level A take of humpback whales or Steller sea lions incidental to constructing the GPIP Multipurpose Dock and exposure will be limited to Level B harassment. Mitigation measures require that any Steller sea lions or humpback whales observed within the Level B zones will be monitored to ensure they do not enter the Level A zones, and pile-driving operations will be shut down if they appear likely to enter the Level A zones. Monitoring and shutdown zones are summarized in Table 2 and shown in Figure 1.

6.2.2 Exposure to Vessel Strike and Noise

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

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 1995). Also, as previously discussed, vessel strikes of humpback whales and Steller sea lions in the region have been documented.

Approach to Estimating Exposures to Vessel Noise

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 GPIP dock.

The purpose of this project is to construct a multipurpose dock that will serve a wide variety of vessels, and provide deep water port access to the GPIP. A screening-level feasibility assessment (Economics 2013) characterized inbound and outbound freight to the Sitka area. The assessment found that approximately 60 percent of all cargo to the Sitka area is inbound and 40 percent is outbound. The assessment determined that Sitka’s inbound and outbound cargo needs are being met at this time through a combination of private and public docks, and, given a flat population projection through 2035, no major changes in cargo shipments are expected.

Currently, the CBS does not have leases in place for use of the proposed GPIP dock. In the near future, the dock will likely be used to berth vessels associated with the existing commercial fishing industry and a net increase in vessels is not expected.

Historically Sawmill Cove was used by the Alaska Pulp Corporation and outbound pulp shipments were frequent during the corporation’s operations from 1959 to 1993. There are no identified manufacturing or processing activities that would achieve historic levels of use at the proposed GPIP dock (Economics 2013).

Because the dock will likely be used to berth vessels associated with the existing commercial fishing industry, a net increase in vessels is not expected. NMFS will assume that vessel traffic is unlikely to increase as a result of dock operation.

We based our analysis on vessels associated with construction from measurements that were conducted in Knik Arm for the Knik Arm bridge project. The loudest vessel noise associated with that project was produced by ships ranging in length from 180 to 279 feet, with source levels ranging from 170 to 180 dB re: 1 µPa (Richardson 1995). Sound from a vessel of that size would attenuate below 120 dB re: 1 µPa (the threshold NMFS currently uses to determine Level B harassment from a continuous noise disturbance) between 86 m and 233 m (282 and 764 feet) from the source. We anticipate low level exposure of short-term duration to listed marine mammals from vessel noise, and do not expect such noise to cause Level B harassment. See Section 6.3.8 for a discussion on potential responses.

Approach to Estimating Exposures to Vessel Strike

Vessel strikes of humpback whales occur in Southeast Alaska, and can result in life-threatening trauma or death for the cetacean.

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

Tug towing operations for construction occur at relatively low speed limits (5 knots). However, other vessels can operate greater speeds (up to 36 knots) and during periods of limited visibility. Both of these factors increase the risk of collisions with marine mammals.

In Southeast Alaska, there have been 25 reports of humpback whale collisions with vessels and one report of a Steller sea lions collision between 2010 and 2016 (NMFS 2016b). Between 2008 and 2012 the mean minimum annual human-caused mortality and serious injury rate for humpback whales based on vessel collisions in Alaska was reported in the NMFS Alaska Regional Office stranding database as 0.45 (Allen and Angliss 2015). These incidences account for a very small fraction of the total humpback whale population (Laist et al. 2001).

Vessels would have a transitory presence in any specific location. NMFS is not able to quantify existing traffic conditions across the entire action area to provide context for the addition of vessels during construction. However, the rarity of collisions involving vessels and listed marine mammals in Sitka despite decades of spatial and temporal overlap suggests that the probability of collision is low. In addition, all vessels will be required to observe the Alaska humpback whale approach regulations, which will further reduce the likelihood of interactions.

NMFS concludes that the risk of vessel strike to WDPS Steller sea lions and Mexico DPS humpback whales associated with this action is discountable for the following reasons. The lack of historic strikes in the action area, the relatively small size of the action area compared to available habitat for both species, the limited number of vessels associated with the proposed action, and the limited duration of operations suggest that juxtaposition in space and time of vessels and these listed marine mammals is unlikely.

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 Section 6.2, 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 continuous noise sources. Out of the 224 potential Level B exposures to Steller sea lions, 5 exposures are anticipated for WDPS animals (2% of total exposures). Out of the 64 potential Level B exposures to humpback whales, 4 exposures are anticipated from the Mexico DPS (6% of total exposures; see Table 8).

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.

In the absence of mitigation, impacts to marine species would be expected to result from physiological and behavioral responses to both the type and strength of the acoustic signature (Viada *et al.* 2008). The type and severity of behavioral impacts are more difficult to define due to limited studies addressing the behavioral effects of impulsive sounds on marine mammals. Potential effects from impulsive sound sources can range in severity from effects such as behavioral disturbance or tactile perception to physical discomfort, slight injury of the internal organs and the auditory system, or mortality (Yelverton *et al.* 1973).

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.* 2002, 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, 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. We anticipate that few (if any) exposures would occur at received levels >160 dB due to avoidance of high received levels, and shut-down mitigation measures.

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) (see Section 1.9.1).

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

Few (if any) exposures would occur at received levels >160 dB resulting in TTS due to avoidance of high received levels, and shut-down mitigation measures.

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).

No exposures are anticipated at levels resulting in PTS due to avoidance of high received levels, and shut-down mitigation measures.

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.

6.3.2 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 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).

6.3.3 Auditory Masking

Natural and artificial sounds can disrupt behavior by masking, or interfering with, a marine mammal's ability to hear other sounds. Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher levels. Chronic exposure to excessive, though not high-intensity, sound could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions. Masking can interfere with detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired from maximizing their performance fitness in survival and reproduction. If the coincident (masking) sound were anthropogenic, it could be potentially harassing if it disrupted hearing-related behavior. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs only during the sound exposure. Because masking (without resulting in TS) is not associated with abnormal physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

Masking occurs at the frequency band the animals utilize, so the frequency range of the potentially masking sound is important in determining any potential behavioral impacts. Lower frequency man-made sounds are more likely to affect detection of communication calls and other potentially important natural sounds such as surf and prey sound. It may also affect communication signals when they occur near the sound band and thus reduce the communication space of animals (e.g., Clark *et al.* 2009) and cause increased stress levels (e.g., Foote *et al.* 2004, Holt *et al.* 2009).

Masking has the potential to impact species at the population or community levels as well as at individual levels. Masking affects both senders and receivers of the signals and can potentially have long-term chronic effects on marine mammal species and populations. Recent research suggests that low frequency ambient sound levels have increased by as much as 20 dB (more than three times in terms of SPL) in the world's ocean from pre-industrial periods, and that most of these increases are from distant shipping (Hildebrand 2009). All anthropogenic sound sources, such as those from vessel traffic, pile driving, and dredging activities, contribute to the elevated ambient sound levels, thus intensifying masking.

Noise from pile driving 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 (up to 44 total hours of impact and vibratory pile driving spread over 16 days) and limited affected area would result in insignificant impacts 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.

6.3.4 Probable Responses to Noise from Pile Driving

Pile driving activities associated with the GPIP dock construction, as outlined previously, have the potential to disturb or displace marine mammals. The specified activities may result in take, in the form of Level B harassment (behavioral disturbance), from underwater sounds generated from pile driving. Potential takes could occur if individuals of these species are present in the ensonified zone during pile driving activities.

NMFS does not anticipate any Level A take due to appropriate monitoring and shutdown zones. NMFS does not anticipate injury or mortality given the nature of the activity and measures designed to minimize the possibility of injury to WDPS Steller sea lions or Mexico DPS humpback whales. 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 shutdown zones) 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. All piles would be driven with a vibratory hammer to the maximum extent practicable and proofed with an impact hammer. CBS anticipates proofing will likely require 400 strikes per pile lasting 10 minutes. Vibratory hammering may take 2-3 hours per day. In addition, CBS would remove approximately 280 abandoned, creosote treated piles using a vibratory hammer or by pulling them mechanically. CBS anticipates removing the timber piles will take 6 days. To construct the dolphins, in total, is expected to take 16 days; however, pile driving or removal would only occur on 10 of those days. 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 5 WDPS Steller sea lions and 4 Mexico DPS humpback whales may be exposed to Level B harassment sound levels during the proposed action. Pile installation/removal will occur as early in the construction authorization window as possible to reduce potential overlap with late fall marine mammal aggregations. While mitigation measures include shut-down zones to prevent Level A exposure, if animals approach within the corresponding thresholds shown in Table 7, Level B 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 listed species 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 >160 dB due to avoidance of high received levels, and shut-down mitigation measures.

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 area of the project site relative to known feeding areas in Southeast Alaska, 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 affected. The removal of a significant number of creosote treated piles may positively impact prey by increasing overall water quality in the area. We consider potential impacts to prey resources as insignificant.

6.3.5 Responses to Vessel Traffic and Noise

As described in Section 6.2.2, Mexico DPS humpback whales and WDPS Steller sea lions are anticipated to occur in the action area and are anticipated to overlap with noise associated with vessel transit. We assume that some individuals are likely to be exposed and respond to this continuous noise source.

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 2004a, 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.* 1994a). 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 2002a, Magalhaes et al. 2002, Ng and Leung 2003, Goodwin and Cotton 2004b, 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:

1. *number of vessels*. The behavioral repertoire marine mammals have used to avoid interactions with surface vessels appears to depend on the number of vessels in their perceptual field (the area within which animals detect acoustic, visual, or other cues) and the animal’s assessment of the risks associated with those vessels (the primary index of risk is probably vessel proximity relative to the animal’s flight initiation distance). Below a threshold number of vessels (which probably varies from one species to another, although groups of marine mammals probably share sets of patterns), studies have shown that whales will attempt to avoid an interaction using horizontal avoidance behavior. Above that threshold, studies have shown that marine mammals will tend to avoid interactions using vertical avoidance behavior, although some marine mammals will combine horizontal avoidance behavior with vertical avoidance behavior (Lusseau 2003, Christiansen *et al.* 2010);
2. *distance between vessel and marine mammals* when the animal perceives that an approach has started and during the course of the interaction (Au and Perryman 1982, Kruse 1991, David 2002b);
3. *vessel’s speed and vector* (David 2002b);
4. *predictability of the vessel’s path*. That is, cetaceans are more likely to respond to approaching vessels when vessels stay on a single or predictable path (Williams *et al.* 2002, Lusseau 2003) than when it engages in frequent course changes (Evans *et al.* 1994b, Williams *et al.* 2002, Lusseau 2006);
5. *noise associated with the vessel* (particularly engine noise) and the rate at which the engine noise increases, which the animal may treat as evidence of the vessel’s speed (David 2002b, Lusseau 2003, Lusseau 2006);
6. *type of vessel* (displacement versus planing), which marine mammals may be interpret as evidence of a vessel’s maneuverability (Goodwin and Cotton 2004b);
7. *behavioral state of the marine mammals* (David 2002b, Lusseau 2003, Lusseau 2006). For example, Würsig *et al.* (1998) concluded that whales were more likely to engage in avoidance responses when the whales were ‘milling’ or ‘resting’ than during other behavioral states.

Most of the investigations cited earlier reported that animals tended to reduce their visibility at the water’s surface and move horizontally away from the source of disturbance or adopt erratic swimming strategies (Williams *et al.* 2002, Lusseau 2003, Lusseau 2006). In the process, their dive times increased, vocalizations and jumping were reduced (with the exception of beaked whales), individuals in groups move closer together, swimming speeds increased, and their direction of travel took them away from the source of disturbance (Kruse 1991, Evans *et al.* 1994b). Some individuals also dove and remained motionless, waiting until the vessel moved past their location. Most animals finding themselves in confined spaces, such as shallow bays, during vessel approaches tended to move towards more open, deeper waters (Kruse 1991). We assume that this movement would give them greater opportunities to avoid or evade vessels as conditions warranted.

Disturbance of Steller sea lion haulouts and rookeries can potentially cause disruption of reproduction, stampeding, or increased exposure to predation by marine predators. Close approach by humans, boats, or aircraft caused hauled out sea lions to go into the water, and caused some animals to move to other haulouts during a study in Southeast Alaska (Kucey 2005). While there are no haulouts or rookeries in the action area, the Biorka Island haulout is the closest designated critical habitat and is over 30 km southwest of the project area (Figure 7). 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 (NMFS 2011). Sea lions may become accustomed to repeated slow vessel approaches, resulting in minimal response. Although low levels of occasional disturbance may have little long-term effect, areas subjected to repeated disturbance may be permanently abandoned (Kenyon 1962).

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). Mothers with newborn calves seem most sensitive to vessel disturbance (Clapham and Mattila 1993). Marine mammals that have been disturbed by anthropogenic noise and vessel approaches are commonly reported to shift from resting behavioral states to active behavioral states, which would imply that they incur an energy cost. Morete et al. (2007) reported that undisturbed humpback whale cows that were accompanied by their calves were frequently observed resting while their calves circled them (milling) and rolling interspersed with dives. When vessels approached, the amount of time cows and calves spent resting and milling respectively declined significantly.

Animals that perceive an approaching potential predator, predatory stimulus, or disturbance stimulus have four behavioral options (*see* (Nonacs and Dill 1990, Blumstein 2003):

a. ignore the disturbance stimulus entirely and continue behaving as if a risk of predation did not exist;
b. alter their behavior in ways that minimize their perceived risk of predation, which generally involves fleeing immediately;
c. change their behavior proportional to increases in their perceived risk of predation, which requires them to monitor the behavior of the predator or predatory stimulus while they continue their current activity; or
d. take proportionally greater risks of predation in situations in which they perceive a high gain and proportionally lower risks where gain is lower, which also requires them to monitor the behavior of the predator or disturbance stimulus while they continue their current activity.

The latter two options are energetically costly and reduce benefits associated with the animal's current behavioral state. As a result, animals that detect a predator or predatory stimulus at a greater distance are more likely to flee at a greater distance (Lord *et al.* 2001). Some investigators have argued that short-term avoidance reactions can lead to longer term impacts, such as causing marine mammals to avoid an area (Salden 1988) or altering a population's behavioral budget—time and energy spent foraging versus travelling (Lusseau 2004). These impacts can have biologically significant consequences on the energy budget and reproductive output of individuals and their populations. However, these level of responses are not anticipated in association with the proposed action as described below.

6.3.6 Probable Responses to Vessel Traffic

Materials and equipment, including the floating dock, would be transported to the project site by barge. While work is conducted in the water, anchored barges will be used to stage construction materials equipment, and two 25 ft skiffs with 250 horsepower motors will be used to support dock construction. Vessel speed, course changes, and sounds associated with their engines may be considered stressors to marine mammals.

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 cause significant disruption of either species' behaviors.

7. CUMULATIVE EFFECTS

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, and 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).

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.

There are currently no other state or private activities reasonably certain to occur in the action area.

8. INTEGRATION AND SYNTHESIS

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

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

8.1 WDPS Steller Sea Lion Risk Analysis

The Steller sea lion recovery plan (NMFS 2008) lists recovery criteria that should be accomplished in order to downlist the WDPS from endangered to threatened and to delist the WDPS. More details and exact specifications can be found in the plan, but these criteria generally include an increased population size, requirements that any two adjacent sub-regions cannot be declining significantly, reducing the threats to sea lion foraging habitat, reducing intentional killing and overutilization, and others. 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.

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 insignificant due to the small marginal increase in such activities relative to the environmental baseline and the transitory nature of vessels. Adverse effects from vessel strike are considered discountable because of the few additional vessels introduced by the action and the unlikelihood of these type of interactions.

Based on the results of the exposure analysis for the proposed activities, we expect a maximum of 224 Steller sea lions may be behaviorally harassed by noise from pile driving, and we assume that 2% (5) of those individuals are from the WDPS.

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). Most adult Steller sea lions occupy rookeries during the pupping and breeding season, which extends from late May to early June (NMFS 2008a). While the pupping and breeding season overlaps with the proposed action activities, no rookeries or haulouts are within the action area. The endangered WDPS Steller sea lion population is increasing at ~2 percent per year (Muto 2017). 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 does not overlap in space or time with sea lion breeding. There are no rookeries in the action area, and there are no construction activities occurring during the breeding season. 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.

Coastal development can affect WDPS Steller sea lions, especially where new facilities are built in harbors with fish processing facilities, as sea lions tend to be frequently or continuously present near these sites. Such effects are likely not hindering recovery, however. Commercial fishing likely affects prey availability throughout much of the WDPS's range, and causes a small number of direct mortalities each year. Predation has been considered a potentially high level threat to this DPS, and may remain so. Subsistence hunting occurs at fairly low levels for this DPS. Illegal harvest is also a continuing threat, but it probably does not occur at levels that are preventing recovery. Ship strikes do not seem to be of concern for this species due to its maneuverability and agility in water and the limited number of vessels associated with the proposed action. 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 possibly 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, and will not even when considered in combination with the effects of the proposed action.

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 64 humpback whales may be exposed to noise from pile driving, and 6% (4) of those humpback whales are anticipated to be from the Mexico DPS. 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 insignificant due to the small marginal increase in such activities relative to the environmental baseline and the transitory nature of vessels. Adverse effects from vessel strike are considered discountable because of the few additional vessels introduced by the action and the unlikelihood of these type of interactions.

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 the Sitka area in the summer and fall months, but migrate to Mexican waters for breeding and calving in the late winter months. As a result, the probable responses to pile driving and removal noise are not likely to reduce the current or expected future reproductive success of Mexico DPS humpback whales or reduce the rates at which they grow, mature, or become reproductively active.

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

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

This Biological Opinion has considered the direct, indirect, and cumulative effects of this action on WDPS Steller sea lions and Mexico DPS humpback whales. The proposed action is expected to result in direct and indirect impacts to these species. We estimate Level B take of 5 WDPS Steller sea lions and 4 Mexico DPS humpback whales may occur during the term of the MMPA authorization (i.e. construction period) by harassment. This harassment is not likely to result in injury or death, although individuals may alter their behavior for a brief period of time.

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 proposed action is not likely to jeopardize the continued existence of WDPS Steller sea lions (*Eumetopias jubatus*) or Mexico DPS humpback whales (*Megaptera novaeangliae*).

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 recent NMFS guidance, the term “harass” under the ESA means to: “create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering” (Wieting 2016). The MMPA defines “harassment” as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment] (16 U.S.C. §1362(18)(A)(i) and (ii)). For this consultation, USACE and PR1 anticipate that any take will be by harassment only. No Level A takes are contemplated or authorized.

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

10.1 Amount or Extent of Take

Section 7 regulations require NMFS to estimate the number of individuals that may be taken by proposed actions or 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 9 lists the amount and timing of authorized take (incidental take by harassment) for this action.

For Mexico DPS humpback whales and WDPS Steller sea lions, 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 whales and sea lions from impact pile driving, NMFS only considered exposures at received levels ≥ 160 dB re 1 μPa rms. For continuous noise sources such as vibratory pile driving, we only considered exposures at received levels ≥120 dB re 1 μPa rms.

Table 9. Summary of anticipated instances of exposure to sound from pile driving and pile removal resulting in the incidental take of WDPS Steller sea lions and Mexico DPS humpback whales by behavioral 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	0	5	October 2017 through December 2017
Mexico DPS humpback whale	0	4	

*These take numbers reflect only the individuals from these species that are expected to be from ESA-listed DPSs.

10.2 Effect of the Take

Studies of marine mammals and responses to seismic transmissions have shown that humpback whales and Steller sea lions are likely to respond behaviorally upon hearing low-frequency seismic transmissions. The only takes authorized during the proposed action are takes by acoustic harassment. 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 major noise sources might disrupt one or more behavioral patterns that are essential to an individual animal's life history. However, any behavioral responses of these whales and pinnipeds to major noise sources and any associated disruptions are not expected to affect the reproduction, survival, or recovery of these species.

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

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. This ITS is valid only for the activities described in this Opinion, and which have been authorized under section 101(a)(5) of the MMPA.
2. The taking of WDPS Steller sea lions and Mexico DPS humpback whales shall be by incidental harassment only. The taking by serious injury or death is prohibited and will result in the modification, suspension, or revocation of the ITS.
3. USACE and PR1 shall implement a monitoring program that allows NMFS AKR to evaluate the exposure estimates contained in this Opinion and that underlie this incidental take statement.
4. USACE and PR1 shall submit a final 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, USACE and PR1 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. USACE and PR1 or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14).

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, FHWA, NMFS PR1, or their authorization holder must undertake the following:

A. USACE and NMFS PR1 shall require their permitted operators to possess a current and valid Incidental Harassment Authorization 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.

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

A. Conduct the action as described in this opinion including all mitigation measures and observation and shut-down zones.
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 907-586-7638.
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 NMFS AKR, Protected Resources Division at 907-586-7638 and/or by email to Jon.Kurland@noaa.gov,

David.Gann@noaa.gov, the NMFS Alaska Regional Stranding Coordinator at 907-271-1332 or Mandy.Migura@noaa.gov, and NMFS PR1 at 301-427-8401 or Jaclyn.Daly@noaa.gov.

D. Activities must not resume until NMFS is able to review the circumstances of the prohibited take. NMFS will work with CBS to determine what is necessary to minimize the likelihood of further prohibited take and ensure ESA compliance. CBS may not resume its activities until notified by NMFS via letter, email, or telephone.

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

A. The disturbance and shutdown zones must be fully observed by qualified PSOs during all in-water work, in order to document observed incidents of harassment as described in the mitigation measures associated with this action.
B. If take of Steller sea lions or humpback whales approaches the number of takes authorized in the ITS, the CBS will notify NMFS by email, attn: David.Gann@noaa.gov and request that the USACE and NMFS PR1 reinitiate consultation.

To carry out RPM #4, USACE, NMFS PR1, or their authorization holder must undertake the following:

A. Adhere to all monitoring and reporting requirements as detailed in the IHA issued by NMFS under section 101(a)(5) of the MMPA.
B. In the unanticipated event that the specified activity causes the take of a marine mammal in a manner prohibited by the IHA, the entity would immediately cease the specified activities and the take would be reported to NMFS within one business day. PSO records for unauthorized take by project activities will include:

- All the information that will be listed in the monitoring report (Section 2.1.2).
- Number of listed animals taken by species.
- The date and time of each take.
- The cause of the take (e.g., ship-strike, failure to shut down, impact hammer operating at maximum energy, etc).
- The time the animal(s) entered the shutdown zone, and, if known, the time it exited the zone.
- Mitigation measures implemented prior to and after the animal entered the shutdown zone.

C. Submit a project specific report within 90 days of the conclusion of the project that analyzes and summarizes marine mammal interactions during this project. The report should be submitted by email to the Protected Resources Division, NMFS Alaska Region Attn: David.Gann@noaa.gov. This report must contain the following information:

- Dates, times, species, number, location, and behavior of any observed ESA-listed marine mammals, including all observed Steller sea lions and/or humpback whales. Note that only 2% of Steller sea lions and 6% of humpback whales are expected to be from the ESA listed DPSs and will count towards the Steller sea lions and/or humpback whales listed in the Incidental Take Statement associated with this Opinion.

- Number of shut-downs throughout all monitoring activities.
- 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.
- 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.

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).

1. CBS should make every effort to complete pile driving activities early in the temporal window provided in Table 9 to minimize impacts to higher localized concentrations of humpback whales in November and December.

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

12. REINITIATION OF CONSULTATION

As provided in 50 CFR 402.16, reinitiation of formal 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, USACE, and the general public. These consultations help to fulfill multiple legal obligations of the named agencies. The information is also useful and of interest to the general public as it describes the manner in which public trust resources are being managed and conserved. The information presented in these documents and used in the underlying consultations represents the best available scientific and commercial information and has been improved through interaction with the consulting agency.

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

13.2 Integrity

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

13.3 Objectivity

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

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

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

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

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