



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**

National Park Service Monitoring activities in Alaska's National Parks:

Glaucous-winged Gull and Climate Monitoring & Research in Glacier Bay National Park,  
Alaska and Marine Bird and Mammal Monitoring in National Parks and adjoining coastlines in  
the Northern Gulf of Alaska

**NMFS Consultation Number:** AKR-2019-9851

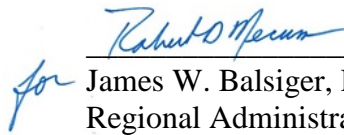
**Action Agencies:** National Marine Fisheries Service (NOAA), Office of Protected Resources,  
Permits and Conservation Division and National Park Service, Glacier Bay National Park and  
Southwest Alaska Network

**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 ( <i>Eumetopias jubatus</i> )	Endangered	Yes	No	No
Humpback Whale, Western North Pacific DPS ( <i>Megaptera novaeangliae</i> )	Endangered	No	No	N/A
Humpback Whale, Mexico DPS ( <i>Megaptera novaeangliae</i> )	Threatened	No	No	N/A
Cook Inlet Beluga Whales ( <i>Delphinapterus leucas</i> )	Endangered	No	No	No

**Consultation Conducted By:** National Marine Fisheries Service, Alaska Region

**Issued By:**

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

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## TERMS AND ABBREVIATIONS

μPa	Micro Pascal
ADEC	Alaska Department of Environmental Conservation
AKR	Alaska Regional Office
CH	Critical habitat
CV	Coefficient of Variation
CI	Confidence Interval
dB re 1μPa	Decibel referenced 1 microPascal
DPS	Distinct Population Segment
EEZ	Exclusive Economic Zone
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESCA	Endangered Species Conservation Act
GI	Gastrointestinal
GLBA	Glacier Bay National Park
GOA	Gulf of Alaska
Hz	Hertz
IHA	Incidental Harassment Authorization
ITS	Incidental Take Statement
JBER	Joint Base Elmendorf-Richardson
KATM	Katmai National Park and Preserve
KBAY	Kachemak Bay
KEFJ	Kenai Fjords National Park
LOA	Letter of Authorization
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NPFMC	North Pacific Fishery Management Council
NPS	National Park Service
PBF	Physical and biological features
PCE	Primary Constituent Elements
PTS	Permanent Threshold Shift
rms	Root Mean Square
RPM	Revolutions per minute
SWAN	Southwest Alaska Network
TTS	Temporary Threshold Shift
USFWS	U.S. Fish and Wildlife Service

## 1. INTRODUCTION

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.) requires each Federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a Federal agency's action "may affect" a protected species, that agency is required to consult with the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending upon the endangered species, threatened species, or designated critical habitat that may be affected by the action (50 CFR §402.14(a)). Federal agencies may fulfill this general requirement informally if they conclude that an action "may affect, but is not likely to adversely affect" endangered species, threatened species, or designated critical habitat, and NMFS or the USFWS concurs with that conclusion (50 CFR §402.14(b)).

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

For the actions described in this document, there are two action agencies – the National Park Service (NPS) and the NMFS Office of Protected Resources, Permits and Conservation Division (hereafter referred to as "the Permits Division"). The NPS proposes to conduct gull research and weather monitoring studies in Glacier Bay National Park (GLBA) and marine mammal and bird surveys through the Southwest Alaska Network (SWAN) of National Parks Inventory and Monitoring Program. The Permits Division proposes to issue a Letter of Authorization (LOA) pursuant to section 101(a)(5)(A) of the Marine Mammal Protection Act of 1972, as amended (MMPA) (16 U.S.C. 1361 et seq.), to NPS for harassment of marine mammals incidental to the proposed activities (83 FR 64078). When issued, the LOA will be valid from 2019 through 2024, and will authorize the incidental harassment of endangered western Distinct Population Segment (DPS) Steller sea lions.

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 ESA (16 U.S.C. 1536(b)), and implementing regulations at 50 CFR part 402.

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

### 1.1 Background

This opinion considers the effects of the NPS's gull research and weather monitoring studies in GLBA and the marine mammal and bird surveys conducted by SWAN, and the associated issuance of an LOA by the Permits Division for these activities. These actions have the potential to affect the endangered western DPS Steller sea lion, endangered western North Pacific DPS

humpback whale, threatened Mexico DPS humpback whale, the endangered Cook Inlet beluga whale, and designated critical habitat for the Steller sea lion and Cook Inlet beluga whale.

This opinion is based on information provided in the LOA application submitted by the NPS to the Permits Division on October 10, 2018, the Proposed Letter of Authorization Federal Register Notice (83 FR 64078; December 13, 2018), updated project proposals, email and telephone conversations between NMFS Alaska Region (AKR), NMFS Permits Division and NPS, and other sources of information. A complete record of this consultation is on file at NMFS's Anchorage, Alaska office.

## **1.2 Consultation History**

The Permits Division issued MMPA Incidental Harassment Authorizations (IHAs) to Glacier Bay National Park for incidental harassment of harbor seals during the course of the gull research and monitoring studies in 2015, 2016, and 2017. These activities will be ongoing, and rather than continuing to issue yearly IHAs, it was decided that a longer term LOA was appropriate.

SWAN has been conducting nearshore coastal surveys along the Katmai National Park and Preserve (KATM) and Kenai Fjords National Park (KEFJ) since 2006 and 2007, respectively (Colletti and Wilson 2018). The LOA application from NPS includes the SWAN activities (not included in the IHAs previously issued to NPS for the GLBA activities).

For the current consultation, key steps included:

- **June 25, 2018:** call with the Permits Division, AKR, NPS (GLBA and SWAN) to discuss the joint GLBA-SWAN LOA application.
- **August 16, 2018:** NPS (GLBA) sent an updated draft of the LOA application, incorporating discussion points raised during the June 25 phone call, and over email since the June 25 call.
- **December 13, 2018:** The proposed Incidental Take Authorizations was published in the Federal Register.
- **December 13, 2018:** NMFS AKR initiated consultation, but consultation was held in abeyance for 38 days due to a lapse in appropriations and resulting partial government shutdown.
- **January 28, 2019:** Consultation resumed.

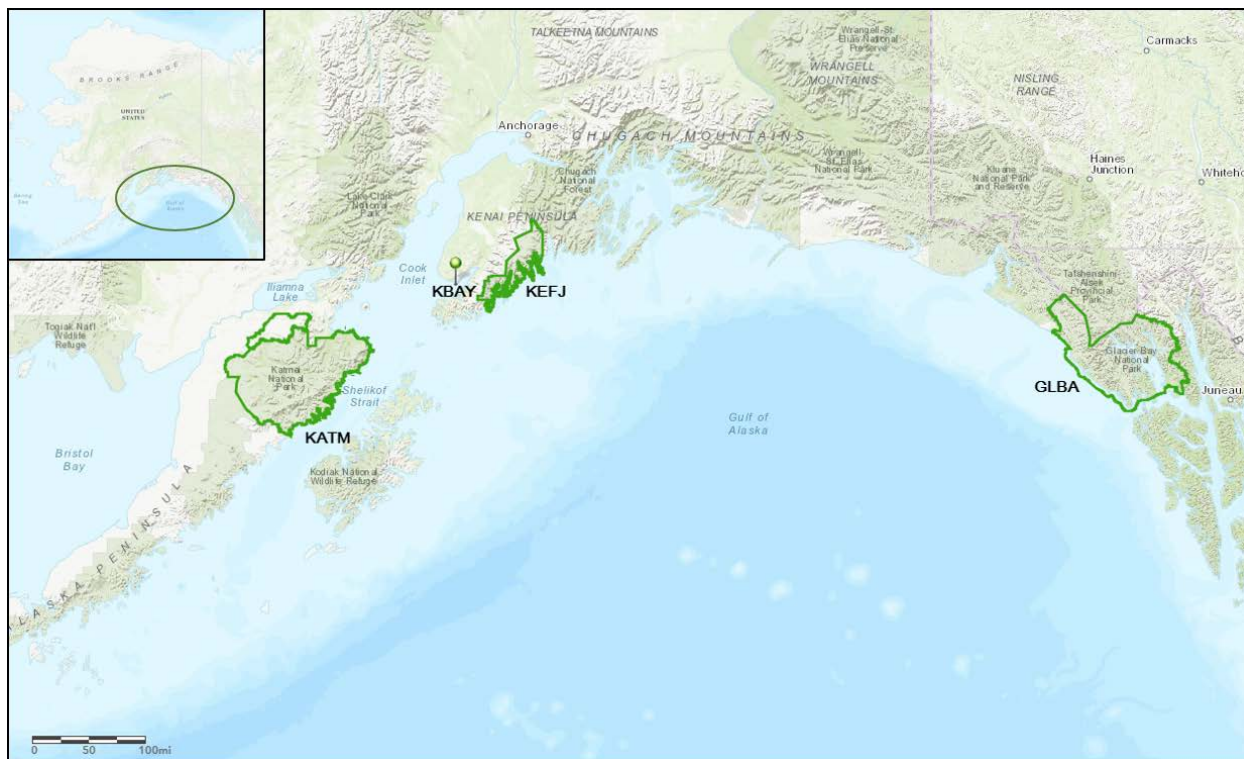


## 2. DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

### 2.1 Proposed Action

“Action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). “Interrelated actions” are those that are part of a larger action and depend on the larger action for their justification. (50 CFR 402.02). “Interdependent actions” are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

The NPS in Alaska is applying for an LOA, and the Permits Division is proposing to issue an Incidental Take Authorization, for an array of activities across three National Parks and a bay outside of the National Park system. The activities all are in the vicinity of the Gulf of Alaska – Glacier Bay National Park (GLBA), Katmai National Park and Preserve (KATM), Kenai Fjords National Park (KEFJ), and Kachemak Bay (KBAY)(Figure 1). GLBA will conduct two projects within the park: 1) glaucous-winged gull monitoring and 2) weather station operation for long-term climate monitoring. The Southwest Alaska Network (SWAN) of National Parks Inventory and Monitoring Program will conduct marine bird and mammal multi-species nearshore surveys along the coastlines of KATM, KEFJ, and in KBAY in support of long-term monitoring programs in these regions.



**Figure 1.** Map of Alaska showing the location of Katmai National Park and Preserve (KATM), Kenai Fjords National Park (KEFJ), Kachemak Bay (KBAY), and Glacier Bay National Park (GLBA).

### ***2.1.1 Proposed Activities***

#### Glacier Bay

##### *Gull Monitoring*

Gull monitoring will be conducted using a combination of ground and vessel surveys. There will be 1-3 ground visits and 1-2 vessel surveys at each site per summer adding up to a maximum of 5 visits per site per year. Duration of surveys will be 0.5 – 2 hours each. Ground surveys will occur on South Marble Island, Boulder Island, Lone Island, Geikie Rock, Flapjack Island, and Tlingit Point Islet (Figure 2). The islands will be accessed using a kayak, a 32.8 to 39.4-foot (ft) (10 to 12 meter (m)) motorboat, or a 12 ft (4 m) inflatable rowing dinghy. The landing crafts' transit speed would not exceed 4 knots (4.6 miles per hour (mph)).

Vessel surveys will be conducted on South Marble Island, Boulder Island, Lone Island, Geikie Rock, Tlingit Point Islet (Figure 2), and other suspected gull colonies. Vessel surveys will be conducted from the deck of a 5 – 20 m motorized vessel circling the islands at approximately 100 m and counting the number of adult and chick gulls as well as other bird and mammal species present.



**Figure 2.** Study sites for Glacier Bay glaucous-winged gull and climate monitoring sites in 2019-2023 with symbols indicating locations where harbor seals have been observed hauled out (stars) and locations where harbor seals have not been observed hauled out (triangles). Steller sea lions occupy parts of South Marble Island (NPS 2018).

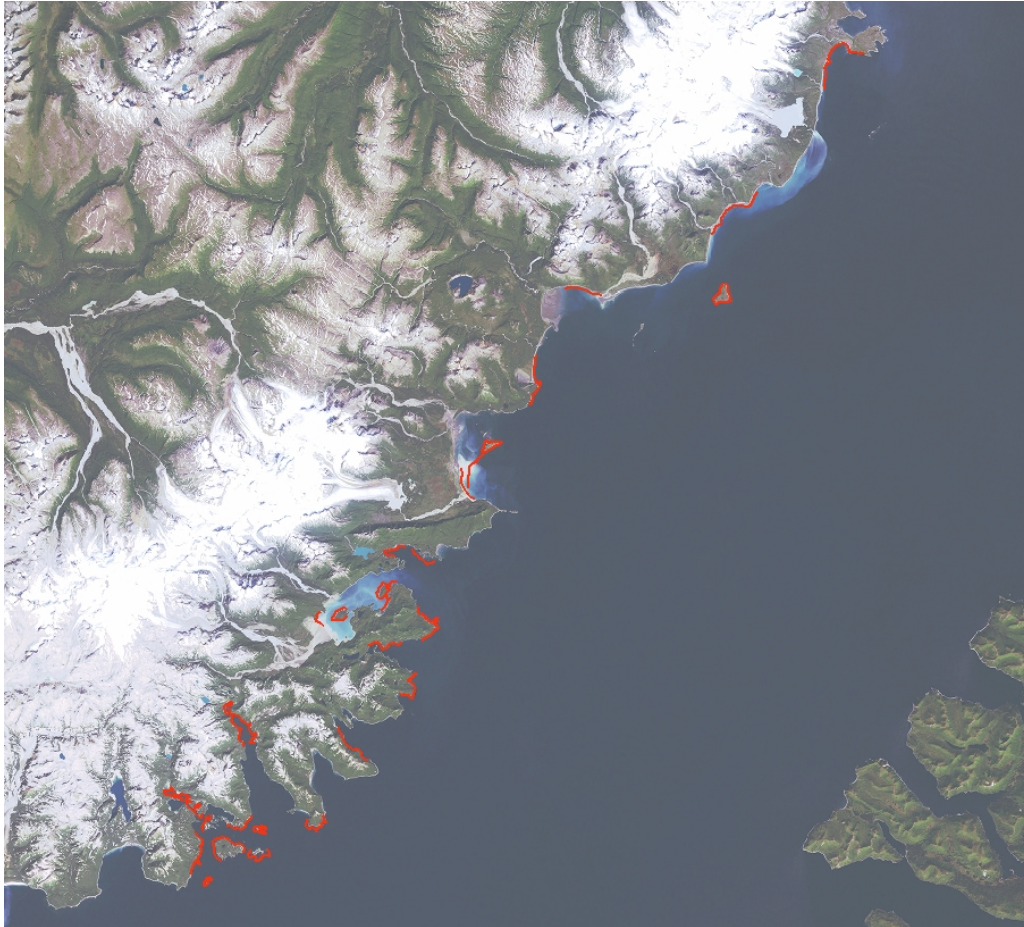
*Climate Monitoring*

GLBA researchers will access Lone Island (Figure 2) for maintenance of the weather station starting March 1, 2019. The island will be accessed generally between October 1 and April 30, up to three times per year (in addition to the five gull monitoring surveys). Lone Island will be accessed by a 10-20 meter motor vessel to maintain the weather station. Materials will be carried by hand to the location.

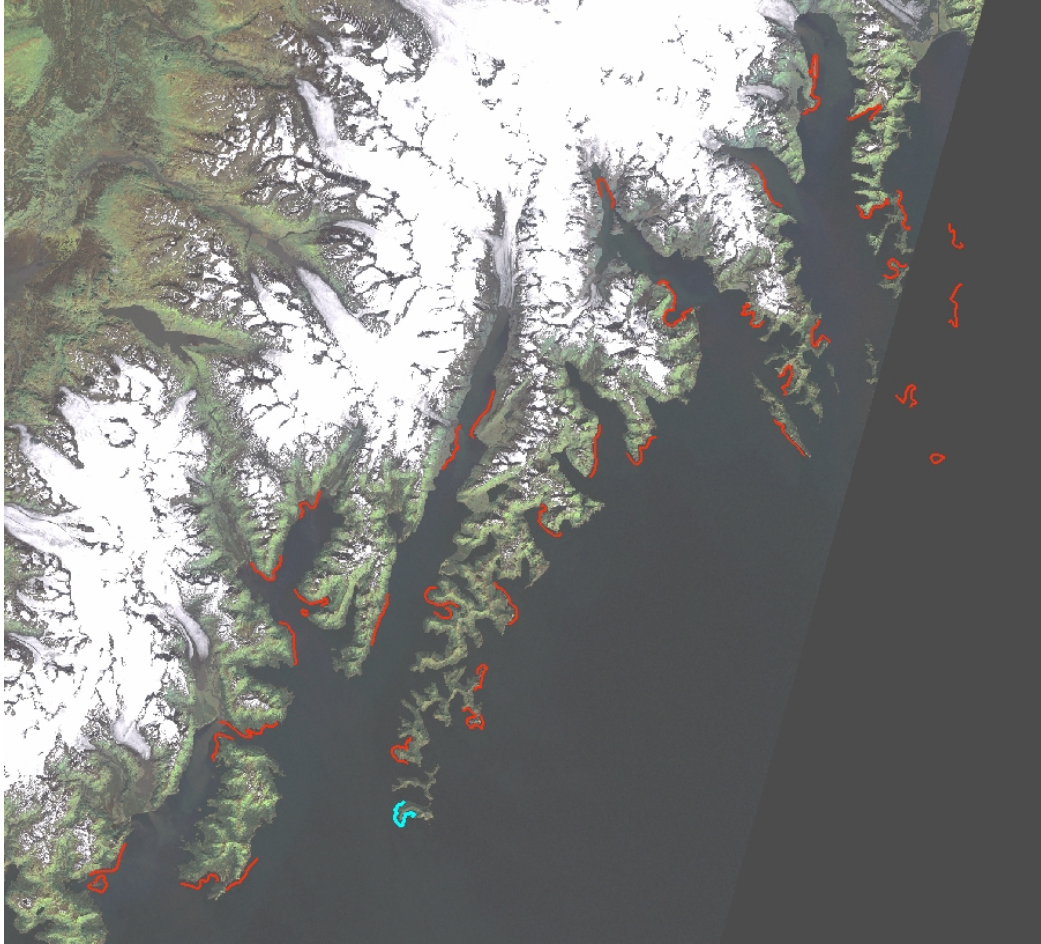
*SWAN*

Surveys of marine birds will be conducted in KATM (Figure 3) and KEFJ (Figure 4) in winter (March) and summer (between late June and early July) from small vessels (5-8 m length) traveling at speeds of 8-12 knots along randomly selected sections of coastline that represent independent transects. The transect width is 200 – 300 m, depending on the elevation of the observer platform, and the survey boat represents the midpoint. Transects are surveyed by a team of three. The boat operator generally surveys the 100 - 150 m offshore area of the transect, while a second observer surveys the 100 - 150 m nearshore area. The third team member enters the observations into a laptop running program dLOG, specifically designed for this type of surveying, and the third team member can assist with observations when needed. All marine birds and mammals within the 200 - 300 m transect swath are identified and counted. Detailed descriptions of methods and procedures can be found in the Marine Bird and Mammal Survey SOP (Bodkin 2011). SWAN is also proposing similar surveys be implemented in KBAY in cooperation with USGS and Gulf Watch Alaska. A survey design has been proposed (Figure 5) and will be implemented in 2019. Summer surveys will occur annually either in June or July.

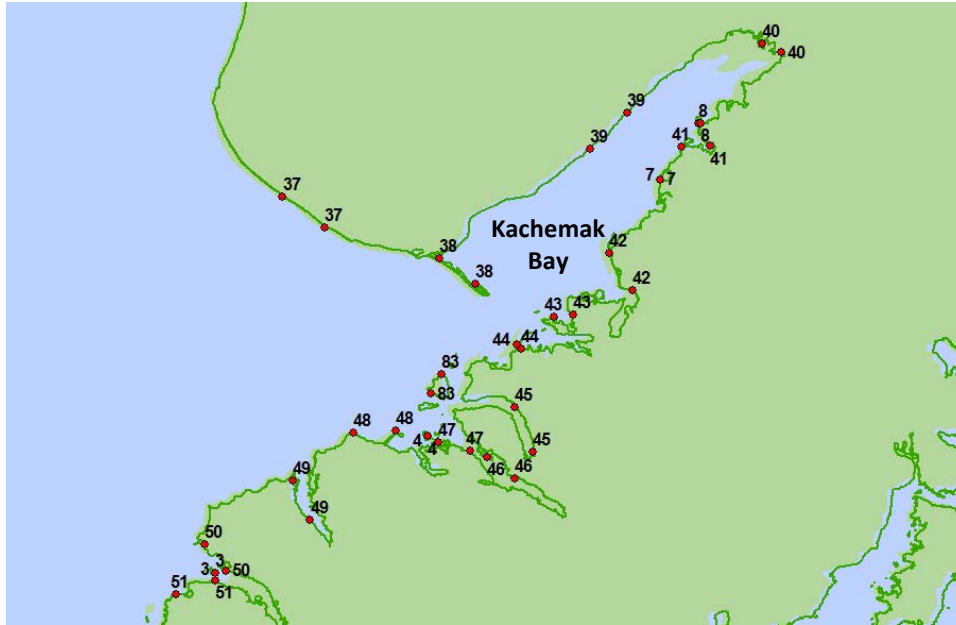




**Figure 3.** SWAN transects (red) along the KATM coast (NPS 2018).



**Figure 4.** SWAN transects (red) along the KEFJ coast. The single transect highlighted in blue is in close proximity to a Steller sea lion rookery. This transect has not been surveyed since the design was implemented because of the proximity to the rookery (NPS 2018).



**Figure 5.** SWAN start and end point (red) along in Kachemak Bay. No known Steller sea lion haulouts or rookeries exist in this area (NPS 2018).

### 2.1.2 Mitigation Measures

The following mitigation measures will be implemented by GLBA and SWAN researchers to minimize disturbance to marine mammals:

#### GLBA

1. The NPS lead biologist will instruct additional survey crew on appropriate conduct when in the vicinity of hauled-out marine mammals. In addition, the training shall brief survey personnel on marine mammals (inclusive of identification as needed, e.g., neonates).
2. The NPS research teams will maintain a quiet working atmosphere by avoiding making unnecessary noise and by using hushed voices while near hauled out seals and sea lions;
3. Conduct pre-survey monitoring before deciding to access study sites of Boulder, Lone, Flapjack, or Geikie, using high-powered binoculars to determine and document the number species and location of hauled-out marine mammals on each island.
4. Prior to deciding to land onshore to conduct the study, the researchers will use high-powered image stabilizing binoculars from the watercraft to document the number, species, and location of hauled out marine mammals at each island.
5. The vessels would maintain a distance of 328 to 1,640 ft (100 to 500 m) from the shoreline to allow the researchers to conduct pre-survey monitoring.
6. During pre-survey monitoring, NPS will monitor for offshore predators and conclude survey activities if harbor seals and sea lions are hauled out and killer whales are observed within 1 mile of the study site.

7. NPS will not approach Steller sea lions closer than 100 meters to conduct gull or climate monitoring research vessel surveys at South Marble Island, while maintaining 100 m minimum distance from Steller sea lions at all times, and ground surveys will only be conducted if the researchers are able to land on the island at a distance of at least 100 m from any hauled out Steller sea lion.
8. If hauled out Steller sea lions occupy all landing beaches on the island, a ground survey will not be conducted.
9. NPS will avoid operation of a motor vessel within ¼ mile of a whale. If accidentally positioned within 1/4 nautical mile of a whale, NPS will slow their speed to 10 knots or less and maintain their course away from the whale until at least 1/4 nautical mile of separation exists. For humpback whales, these avoidance measures are required by regulations (50 CFR 216.18, 223.214, and 224.103).
10. NPS will record the date, time, and location of each visit to research sites.

### SWAN

1. The survey vessels will maintain a distance of 100 to 150 m from the shoreline at all times.
2. If NPS researchers observe harbor seals or Steller sea lions hauled out, they will minimize potential disturbance during survey activities by:
  - a. Maintaining survey speed and distance from the haulout
  - b. Attempt to conduct survey (counts) of observed animals from a distance > 150m, if conditions allow
3. SWAN will avoid transects that pass known Steller sea lion rookery beaches in order to minimize disturbance of these rookeries and the surrounding critical habitat.
4. SWAN will avoid operation of a motor vessel within ¼ mile of a whale. If accidentally positioned within 1/4 nautical mile of a whale, SWAN will slow their vessel speed to 10 knots or less and direct their course away from the whale until at least 1/4 nautical mile of separation exists. For humpback whales, these avoidance measures are required by regulations (50 CFR 216.18, 223.214, and 224.103).

### Monitoring

Researchers with both the SWAN and GLBA activities will:

1. Conduct and record observations of pinnipeds in the vicinity of the proposed research areas. The monitoring notes will provide dates, transect location, species, numbers of animals present within the transect, and numbers of pinnipeds that flushed into the water.
2. Record disturbances based on a three-point scale: 1) alert, 2) movement, 3) flush (see Mortenson 1996). Because SWAN surveys are conducted at speed, researchers will be able to record the total number of each pinniped species observed and the number of Level 3 (Flushing) responses that occur, but not other, less noticeable disturbance responses.



### Reporting

1. SWAN and GLBA NP are each required to submit separate draft annual reports on all activities and marine mammal monitoring results to NMFS within ninety days following the end of its monitoring period.
2. These reports will include a summary of the information gathered pursuant to the monitoring requirements set forth in the Authorization. SWAN and GLBA NP will submit final reports to NMFS within 30 days after receiving comments on the draft report. If SWAN or GLBA NP receive no comments from NMFS on the report, NMFS will consider the draft report to be the final report.
3. NPS will also submit a comprehensive 5-year report covering all activities conducted under the incidental take regulations 90 days following expiration of the MMPA incidental take regulations or, if new regulations are sought, no later than 90 days prior to expiration of the regulations.
4. Each report will describe the operations conducted and sightings of marine mammals near the proposed project. The report will provide full documentation of methods, results, and interpretation pertaining to all monitoring. The report will provide:
  - a. A summary and table of the dates, times, and weather during all research activities;
  - b. Species, number, location, and behavior of any marine mammals observed throughout all monitoring activities;
  - c. An estimate of the number (by species) of marine mammals exposed to acoustic or visual stimuli associated with the research activities; and
  - d. A description of the implementation and effectiveness of the monitoring and mitigation measures of the Authorization and full documentation of methods, results, and interpretation pertaining to all monitoring.
5. In the unanticipated event that the specified activity causes the take of a marine mammal in a manner prohibited by the authorization, such as an injury (Level A harassment), serious injury, or mortality (*e.g.*, vessel-strike, stampede, etc.), NPS shall immediately cease the specified activities and immediately report the incident to the Office of Protected Resources ([jolie.harrison@noaa.gov](mailto:jolie.harrison@noaa.gov)) and the Alaska Regional Stranding Coordinator ([barbara.mahoney@noaa.gov](mailto:barbara.mahoney@noaa.gov)). The report must include the following information:
  - a. Time, date, and location (latitude/longitude) of the incident;
  - b. Description and location of the incident (including tide level if applicable);
  - c. Environmental conditions (*e.g.*, wind speed and direction, Beaufort sea state, cloud cover, and visibility);
  - d. Description of all marine mammal observations in the 24 hours preceding the incident;
  - e. Species identification or description of the animal(s) involved;
  - f. Fate of the animal(s); and

- g. Photographs or video footage of the animal(s) (if equipment is available).
6. NPS shall not resume its activities until NMFS is able to review the circumstances of the prohibited take. NMFS will work with NPS to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. NPS may not resume their activities until notified by NMFS via letter, email, or telephone.
7. In the event that NPS discovers an injured or dead marine mammal, and the lead researcher determines that the cause of the injury or death is unknown and the death is relatively recent (*i.e.*, in less than a moderate state of decomposition as we describe in the next paragraph), NPS will immediately report the incident to the Office of Protected Resources ([jolie.harrison@noaa.gov](mailto:jolie.harrison@noaa.gov)) and the Alaska Regional Stranding Coordinator ([barbara.mahoney@noaa.gov](mailto:barbara.mahoney@noaa.gov)). The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with NPS to determine whether modifications in the activities are appropriate.
8. In the event that NPS discovers an injured or dead marine mammal, and the lead visual observer determines that the injury or death is not associated with or related to the authorized activities (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), NPS will report the incident to the incident to the Office of Protected Resources ([jolie.harrison@noaa.gov](mailto:jolie.harrison@noaa.gov)) and the Alaska Regional Stranding Coordinator ([barbara.mahoney@noaa.gov](mailto:barbara.mahoney@noaa.gov)) within 24 hours of the discovery. NPS researchers will provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS. NPS can continue their research activities.

### ***2.1.3 Additional Mitigation Measure***

In addition to the mitigation measures that are included in the LOA, NPS also agreed to the following mitigation measure as part of the ESA consultation:

1. If the SWAN survey team encounters beluga whales, they will take ample photographic and locational data to provide to NMFS as a verified sighting.

There are no interdependent or interrelated activities associated with this action. All activities that would not occur but for the action are addressed in this Opinion.

## **2.2 Action Area**

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

The action area for this project includes the coastal areas where NPS will be conducting vessel and ground surveys, along the coastline of Katmai National Park, Kenai Fjords National Park, Kachemak Bay, and Glacier Bay National Park (Figure 1).

Noise from the vessels is the primary stressor that may affect listed species. Vessel surveys will be conducted from small vessels (5-20 m), which produce broad-band sounds of around 156 dB dB re 1  $\mu\text{Pa}_{\text{rms}}$  underwater (Richardson et al 1995) and 55 – 89 dBA re 20  $\mu\text{Pa}$  in air (Rodino and Masson 2015). The underwater noise is expected to attenuate to ambient ocean noise levels (assumed to be 120 dB re 1  $\mu\text{Pa}_{\text{rms}}$ ) at 251 m from the vessels, assuming practical spreading, therefore the action area includes the marine waters along the vessel transit paths out to 251 m.

Based on estimated ambient airborne noise levels of 65 dB (WSDOT 2018), and using the upper range (89 dBA), vessel noise will attenuate to ambient noise levels at about 50 meters from the vessel. Therefore, the in-air portion of the action area is defined as 50 meters from the source.

### 3. APPROACH TO THE ASSESSMENT

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

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

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

The designation(s) of critical habitat for western DPS Steller sea lions and Cook Inlet beluga whales use the term primary constituent element (PCE) or essential features. The subsequent critical habitat regulations (81 FR 7414, February 11, 2016) 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 rangewide status of the species and critical habitat likely to be adversely affected by the proposed action. This section describes the current status of each listed species and its critical habitat relative to the conditions needed for recovery. We determine the rangewide status of critical habitat by examining the condition of its PBFs - which were identified when the critical habitat was designated. Species and critical habitat status are discussed in Section 4 of this opinion.
- Describe the environmental baseline including: past and present impacts of Federal, state, or private actions and other human activities in the action area; anticipated impacts of proposed Federal projects that have already undergone formal or early section 7

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

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

#### 4. RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT

Three species (comprising four DPSs) of marine mammals listed under the ESA under NMFS's jurisdiction may occur in the action area. The action area also includes critical habitat for two species. This opinion considers the effects of the proposed action on these species and designated critical habitats (Table 1).

**Table 1.** Listing status and critical habitat designation for marine mammals considered in this opinion.

Species	Status	Listing	Critical Habitat
Steller Sea Lion, Western DPS ( <i>Eumatopias jubatus</i> )	Endangered	NMFS 1997, <a href="#">62 FR 24345</a>	NMFS 1993, <a href="#">58 FR 45269</a>
Humpback Whale, Western North Pacific DPS ( <i>Megaptera novaeangliae</i> )	Endangered	NMFS 1970, <a href="#">35 FR 18319</a> NMFS 2016 <a href="#">81 FR 62260</a>	Not designated
Humpback Whale, Mexico DPS ( <i>Megaptera novaeangliae</i> )	Threatened	NMFS 1970, <a href="#">35 FR 18319</a> NMFS 2016 <a href="#">81 FR 62260</a>	Not designated
Cook Inlet beluga whale ( <i>Delphinapterus leucas</i> )	Endangered	NMFS 2008, <a href="#">73 FR 62919</a>	NMFS 2011, <a href="#">76 FR 20180</a>

##### 4.1 Species and Critical Habitat Not Likely to Be Adversely Affected

If an action's effects on ESA-listed species will be insignificant, discountable, or completely beneficial, we conclude that the action is not likely to adversely affect those species. Insignificant effects relate to the size of the impact and are those that one would not be able to meaningfully measure, detect, or evaluate, and should never reach the scale where take occurs. Discountable effects are those that are extremely unlikely to occur. Similarly, if proposed activities are not likely to destroy or adversely modify critical habitat, further analysis is not required.

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, including all the listed species discussed in this opinion, by Muto et al. (2018), and the recovery plans for humpback whales (NMFS 1991; Bettridge et al. 2015) and Cook Inlet beluga whales (NMFS 2016b).

##### 4.1.1 Cook Inlet beluga whales and Cook Inlet beluga whale Critical Habitat

The best available historical abundance estimate of the Cook Inlet beluga whale population is from a survey in 1979 which resulted in an estimate of 1,293 whales (Calkins 1989). NMFS began conducting comprehensive and systematic aerial surveys of the beluga population in 1993. These surveys documented a decline in beluga abundance from 653 whales in 1994 to 347 whales in 1998, a decline of nearly 50 percent. In response to this decline NMFS designated the

Cook Inlet beluga whale population as depleted under the MMPA in 2000. Abundance data collected since 1999 indicate that the population has not increased, and the lack of population growth led NMFS to list the Cook Inlet beluga whale as endangered under the ESA on October 22, 2008 (73 FR 62919). The 2014 population abundance estimate was 340 whales, indicating a 10 year decline of 0.4 percent per year (Shelden et al. 2015). The 2016 beluga aerial survey resulted in a population estimate of 328. Further analyses is required to ascertain a valid population trend through 2016 (NMFS, MML, Unpublished data, 2017).

The distribution of Cook Inlet belugas has changed significantly since the 1970s. There have been fewer sightings of belugas in lower Cook Inlet in recent decades (Hansen and Hubbard 1999; Speckman and Piatt 2000; Rugh, Shelden, and Mahoney 2000; Rugh, Shelden, and Hobbs 2010) indicating that the summer range has contracted to the mid and upper Inlet, coincident with their decline in population size. The range contraction brings animals in a small range proximal to Anchorage during summer months, where there is increased potential for disturbance from human activities. The Susitna River Delta, Turnagain Arm, Kenai River, and Knik Arm are known to be important current or historic feeding grounds for Cook Inlet beluga whales (NMFS 2016b), although belugas remain largely absent from the waters in and around the Kenai River during the very large summer salmon runs in that river. Information on Cook Inlet beluga whale biology and habitat (including critical habitat) is available at:

<http://alaskafisheries.noaa.gov/pr/ci-belugas>  
<https://www.fisheries.noaa.gov/species/beluga-whale/spotlight>

The area of SWAN survey activities will include Kachemak Bay in lower Cook Inlet. Generally, belugas spend the ice-free months in the upper inlet, often at discrete high-use areas (T.M., A., and Bisson 2014), then expand their distribution south and into more offshore waters of the middle inlet in winter (Hobbs et al. 2005), although they may be found throughout the inlet at any time of year. The distribution of Cook Inlet belugas has changed significantly since the 1970s, to include the northeast contraction of the summer range of belugas into upper Cook Inlet (Rugh, Shelden, and Hobbs 2010). Fewer sightings of Cook Inlet belugas in the lower inlet in recent decades (Hansen and Hubbard 1999; Speckman and Piatt 2000; Moore et al. 2000; Rugh, Shelden, and Hobbs 2010; Shelden et al. 2015) also indicate that the summer range of Cook Inlet belugas has contracted to the mid and upper inlet, coincident with their decline in population size. The reason for this change of distribution is not known, but several hypotheses have been proposed. Regardless of the reason, the result of the Cook Inlet beluga range contraction has been that there have been no confirmed reports of Cook Inlet beluga whales in Kachemak Bay in over eight years. In the unlikely event that the SWAN team does encounter a beluga whale, the implementation of mitigation measure number 14 (see Section 2.1.2) will ensure that any effects to the whales are immeasurably small. It is therefore extremely unlikely that Cook Inlet beluga whales would suffer any adverse effects from the proposed action, and any such effects are insignificant or discountable.

#### Cook Inlet Beluga Whale Critical Habitat

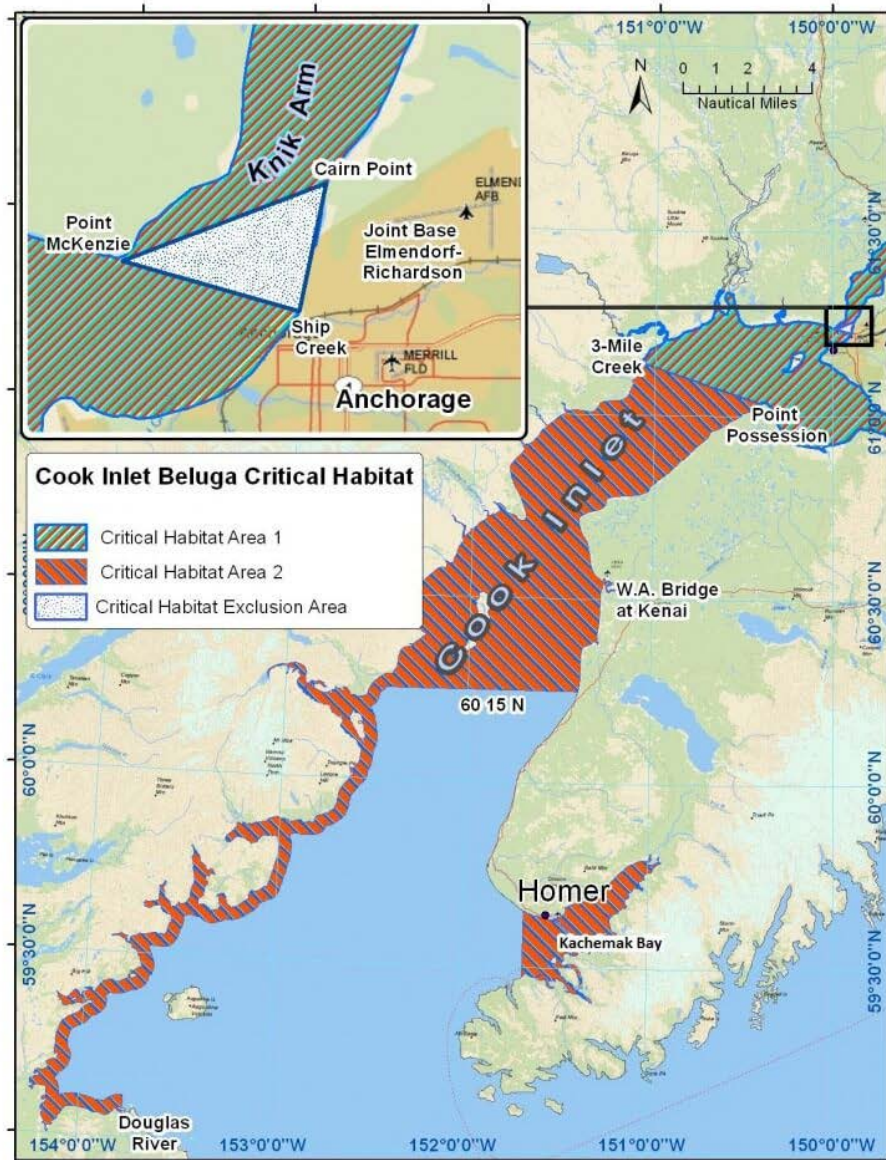
NMFS designated critical habitat (CH) for the Cook Inlet beluga whales on April 8, 2011 (NMFS 2011, 76 FR 20180) (Figure 6). Critical habitat includes two areas: CH Area 1 and CH Area 2 that encompass 7,800 km<sup>2</sup> (3,013 mi<sup>2</sup>) of marine and estuarine habitat in Cook Inlet (76 FR 20180). For national security reasons, critical habitat excludes all property and waters of

Joint Base Elmendorf-Richardson (JBER) and waters adjacent to the Port of Alaska. CH Area 1 does not exist in the action area; however, CH Area 2 does exist within the action area.

*CH Area 1:* CH Area 1 consists 1,909 km<sup>2</sup> (738 mi<sup>2</sup>) of Cook Inlet, north of Threemile Creek and Point Possession (76 FR 20180). Area 1 contains shallow tidal flats or mudflats and mouths of rivers that provide important areas for foraging, calving, molting and escape from predation. High concentrations of beluga whales are often observed in these areas from spring through fall. Additionally, anthropogenic threats have the greatest potential to adversely impact beluga whales in CH Area 1 (76 FR 20180). The action area does not overlap with CH Area 1.

*CH Area 2:* CH Area 2 consists of 5,891 km<sup>2</sup> (2,275 mi<sup>2</sup>) south of CH Area 1 and includes nearshore areas along western Cook Inlet and Kachemak Bay. CH Area 2 is known fall and winter foraging and transit habitat for beluga whales as well as spring and summer habitat for smaller concentrations of beluga whales (76 FR 20180). The action area does overlap with CH Area 2.





**Figure 6.** Designated Cook Inlet beluga critical habitat.

NMFS identified five primary constituent elements (PCEs) essential for conservation of Cook Inlet beluga whales (76 FR 20180; April 11, 2011). Since that designation, NMFS has changed its terminology, and now refers not to PCEs, but to physical and biological features (PBFs) as the components of critical habitat. The proposed project may impact Cook Inlet beluga whale critical habitat through vessel transit. The five PBFs and how the proposed project may impact each are described below:

*1. Intertidal and subtidal waters of Cook Inlet with depths <30 feet (MLLW) and within 5 miles of high and medium flow anadromous fish streams.*

The proposed vessel route will transverse waters with depths of <30 feet (MLLW) and within 5 miles of high and medium flow anadromous fish streams. The proposed activities will occur near four anadromous fish streams (ADFG 2018); Beluga Slough, on the northwest entrance to

Kachemak Bay, and Silver Creek, Stonehocker Creek and Woshenesenski River located on the east side of Kachemak Bay. Beluga Slough is rearing habitat for coho salmon, while Silver and Stonehocker Creeks are used by spawning coho salmon, and the Woshenesenski River is used by sockeye (spawning and rearing), chum (present), and pink (present) salmon (ADFG 2018).

Effects of this proposed project on Cook Inlet beluga whale critical habitat are expected to be limited to noise from the vessel transiting through critical habitat and the associated risk of small fuel spills. Project-related vessels will be small vessels (see section 2) with temporary, low impact presence due to their transitory acoustic effects. The acoustic effects upon this PBF would be very small (see section 2.2) and short in duration.

This PBF could be affected by spilled fuel or other petroleum products. However, the likelihood of a spill is low, and in the unlikely event that a spill occurs, it is likely to be very small. The extreme tidal currents in Cook Inlet would act to quickly dissipate spilled product, and small spills would remain on the surface for only a very short time (on the order of hours), and would have a very small effect on this PBF, likely not encountering more than one 5-mile radius zone associated with a single anadromous fish stream. The probability of acoustic impacts from the vessel and/or a small spill of fuel or other toxic chemicals occurring is very small, and thus adverse effects to this PBF are extremely unlikely to occur. We therefore conclude that the effects of proposed project vessel traffic and associated spills on this PBF are discountable.

*2. Primary prey species consisting of four species of Pacific salmon (Chinook, sockeye, chum, and coho), Pacific eulachon, Pacific cod, walleye pollock, saffron cod, and yellowfin sole.*

Fish, which comprise the primary diet of Cook Inlet beluga whales, can also be affected physiologically and behaviorally by noise (Normandeau Associates 2012). However, the noise generated from the small vessels associated with project activities will be from small vessels, and short in duration. The impact to fish from vessel noise is expected to be limited to temporary avoidance of waters in the immediate vicinity (within a few meters) of the vessel. Therefore, we expect the acoustic impacts upon this PBF will be insignificant.

Prey species could also be affected by non-acoustic aspects of vessel operation. Prey species could be affected through hull shear, entrainment through the propulsion system, exposure to turbulence in the propeller wash, and wake stranding (Odom, Orth, and Nielsen 1992). However, studies have found it difficult to detect vessel-related mortality (Holland 1986; Odom, Orth, and Nielsen 1992), and have found fish larvae to be relatively resilient to such disturbances. Furthermore, such effects would be limited to a de minimis proportion of prey within critical habitat.

Prey may also be adversely affected by leaks or spills of toxic chemicals. However, as we previously discussed, the probability of leaks or spills of toxic chemicals is very small, and the effects of small fuel spills in Cook Inlet are expected to be minor. We therefore conclude that the effects of this proposed project on PBF 2 are insignificant (small spills, vessel noise, non-acoustic impacts of vessels on fish) or discountable (large spills).

*3. Waters free of toxins or other agents of a type and amount harmful to Cook Inlet beluga whales.*

Cook Inlet beluga whale critical habitat could be contaminated if a leak or spill of toxic chemicals from the vessel. As discussed above, the risk of a spill is considered to be very low, and if a spill occurs, it is likely to be diminutive and to dissipate quickly. We therefore conclude that the effects of this proposed project on PBF 3 are discountable.

*4. Unrestricted passage within or between the critical habitat areas.*

The SWAN surveys in Kachemak Bay are the only project activities that will occur in Cook Inlet beluga critical habitat. Vessel transit is not expected to restrict passage within or between the critical habitat areas. If whales are encountered, researchers will slow the vessel speed to 10 knots or less and redirect the vessel to avoid cutting in front of the whales direction of travel.” (section 2.1.2). Transiting vessels are not novel within Cook Inlet, and we have no information that suggests that belugas are restricted in their movements due to the presence of individual transitory vessels. We have therefore determined that this proposed project is very unlikely to inhibit unrestricted passage of belugas within or between critical habitat areas, and conclude that the proposed project’s effects on PBF 4 are discountable.

*5. Waters with in-water noise below levels resulting in the abandonment of critical habitat areas by Cook Inlet beluga whales.*

Received sound levels associated with the project vessels are anticipated to decline to 120 dB re 1  $\mu$ Pa rms within 251 m. Although some belugas could receive sound levels in exceedance of 120 dB from project vessels, in-water noise is not expected to cause Cook Inlet beluga whales to abandon critical habitat areas. With the possible exception of waters off of the Kenai River during the summer salmon fishing season, we have no information suggesting that any anthropogenic activities have excluded Cook Inlet belugas from any portion of their critical habitat. The transitory nature of project vessels, the relatively low magnitude of acoustic output from the vessels and the small number of surveys per year (1-2) make it very unlikely that this proposed project will result in any abandonment of critical habitat areas by Cook Inlet beluga whales. Therefore, we conclude that the effects of this proposed project on PBF 5 are discountable.

**4.1.3 Humpback whales (western North Pacific and Mexico DPSs)**

The humpback whale was listed as endangered under the Endangered Species Conservation Act (ESCA) on December 2, 1970 (35 FR 18319). Congress replaced the ESCA with the ESA in 1973, and humpback whales continued to be listed as endangered. NMFS recently conducted a global status review and changed the status of humpback whales under the ESA (Bettridge et al. 2015). The Western North Pacific DPS (which includes a small proportion of humpback whales found in the Aleutian Islands, Bering Sea, and Gulf of Alaska) is listed as endangered; the Mexico DPS (which includes a small proportion of humpback whales found in the Aleutian Islands, Bering Sea, Gulf of Alaska, and Southeast Alaska) is listed as threatened; and the Hawaii DPS (which includes most humpback whales found in the Aleutian Islands, Bering Sea, Gulf of Alaska, and Southeast Alaska) is not listed (81 FR 62260; September 8, 2016). Critical habitat has not been designated for the Western North Pacific or Mexico DPSs.

The abundance estimate for humpback whales in the Bering Sea/Aleutian Islands is estimated to be 2,427 (CV= 0.2) animals which includes whales from the Hawaii DPS (86.5%), Mexico DPS (11.3%), and Western North Pacific DPS (4.4%<sup>1</sup>) (NMFS 2016a; Wade et al. 2016). The coastal areas of the Gulf of Alaska and Aleutian Islands/Bering Sea are important foraging areas for humpback whales from June through September (Zerbini et al. 2006; Barlow et al. 2011; Friday et al. 2012; Friday et al. 2013; Ferguson et al. 2015).

Humpback whales produce a variety of vocalizations ranging from 20 Hz to 10 kHz (Winn, Perkins, and Poulter 1970; Tyack and Whitehead 1983; Payne and Payne 1985; Silber 1986; Thompson, Cummings, and Ha. 1986; Richardson et al. 1995; Au and Green 2000; Au 2000; Frazer and Mercado 2000; Erbe 2002; Au et al. 2006; Vu et al. 2012). 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).

### Occurrence in the Action Area

#### *Gulf of Alaska*

The abundance estimate for humpback whales in the Gulf of Alaska is estimated to be 2,089 (CV=0.09) animals which includes whales from the Hawaii DPS (89%), Mexico DPS (10.5%), and Western North Pacific DPS (0.5%<sup>4</sup>) (Wade et al. 2016; Bettridge et al. 2015). Humpback whales occur throughout the central and western Gulf of Alaska from Prince William Sound to the Shumagin Islands. Seasonal concentrations are found in coastal waters of Prince William Sound, Barren Islands, Kodiak Archipelago, Shumagin Islands and south of the Alaska Peninsula. Large numbers of humpbacks have also been reported in waters over the continental shelf, extending up to 100 nm offshore in the western Gulf of Alaska (Wade et al. 2016).

#### *Southeast Alaska*

Relatively high densities of humpback whales occur throughout much of Southeast Alaska and northern British Columbia, particularly during the summer months. The abundance estimate for humpback whales in the Southeast Alaska is estimated to be 6,137 (CV= 0.07) animals which includes whales from the Hawaii DPS (94%) and Mexico DPS (6%) (Wade et al. 2016). Although migration timing varies among individuals, most whales depart for Hawaii or Mexico in fall or winter and begin returning to Southeast Alaska in spring, with continued returns through the summer and a peak occurrence in Southeast Alaska during late summer to early fall. However, there are significant overlaps in departures and returns (Baker et al. 1985; Straley 1990). Given their widespread range and their opportunistic foraging strategies, Mexico DPS humpback whales may be in the vicinity during the proposed project activities.

Additional information on humpback whale biology and natural history is available at:

<http://www.nmfs.noaa.gov/pr/species/mammals/whales/humpback-whale.html>

<http://alaskafisheries.noaa.gov/pr/humpback>

[http://www.fisheries.noaa.gov/pr/sars/pdf/stocks/alaska/2015/ak2015\\_humpback-cnp.pdf](http://www.fisheries.noaa.gov/pr/sars/pdf/stocks/alaska/2015/ak2015_humpback-cnp.pdf)

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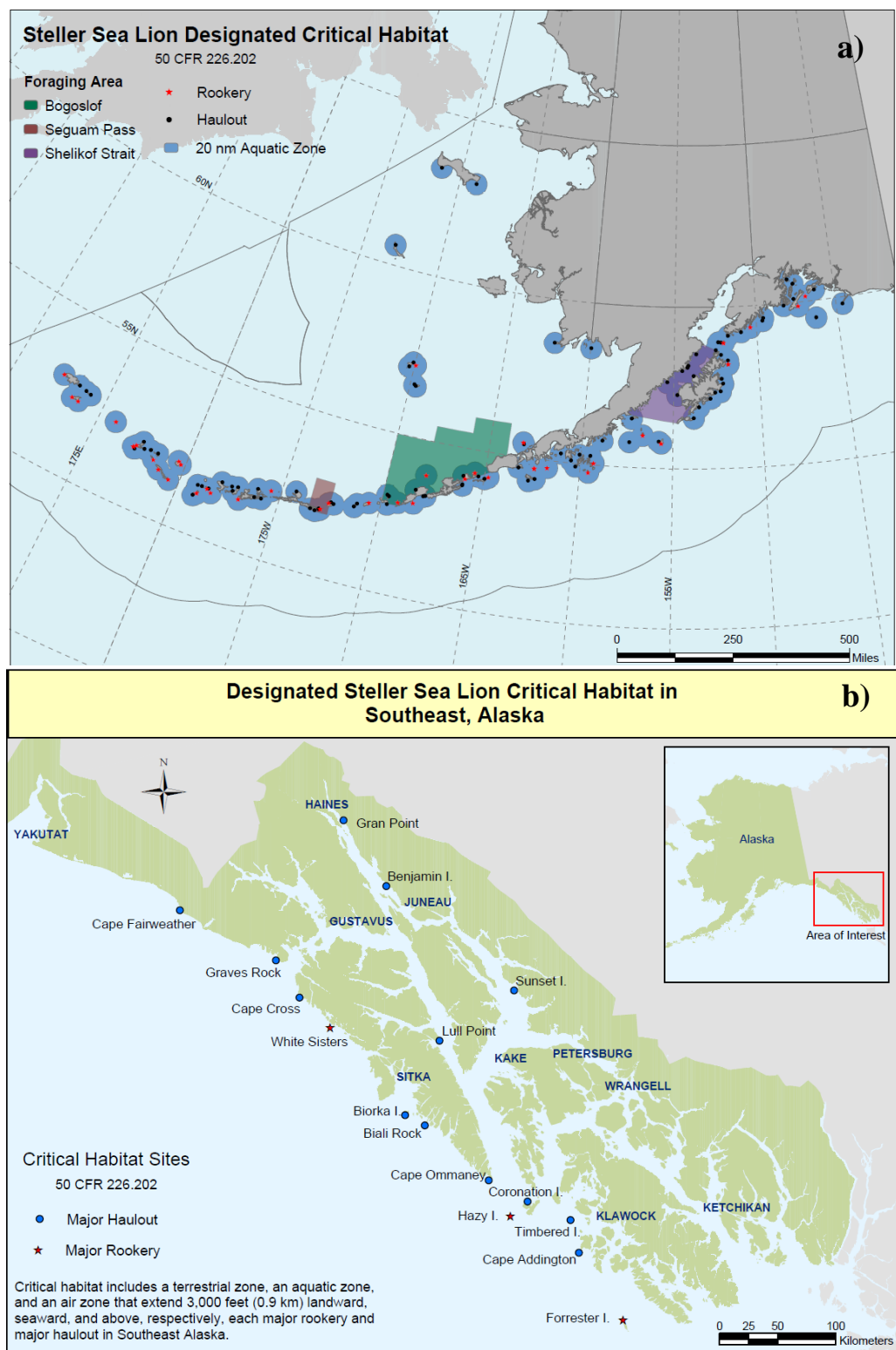
<sup>1</sup> For endangered Western North Pacific DPS we chose the upper limit of the 95% confidence interval from the Wade et al. (2016) estimate in order to be conservative due to their status.

Disturbance due to noise and presence of project vessels is the main effect of concern for humpback whales. The project vessels will emit continuous sound while in transit, which will alert marine mammals before the received sound level exceeds 120 dB. Therefore, a startle response from humpback whales is not expected. Rather, slight deflection and avoidance are expected to be common responses in those instances where there is any response at all. The implementation of mitigation measures, as specified in Section 2.1.2, is expected to further reduce any adverse impacts from the noise and presence of project vessels.

The factors discussed above, when considered as a whole, make it extremely unlikely that project vessels would elicit behavioral responses by Western North Pacific or Mexico DPS humpback whales that would rise to the level of harassment as interpreted in NMFS guidance (Wieting 2016) relative to take by harassment under the ESA, and such effects are, therefore, insignificant.

#### ***4.1.4 Steller Sea Lion Critical Habitat***

NMFS designated critical habitat for the Steller sea lion on August 27, 1993 (58 FR 45269), citing the physical and biological habitat features that support reproduction, foraging, rest, and refuge, including terrestrial, air, and aquatic zones (58 FR 45269). Steller sea lion critical habitat in west of 144°W (Figure 7) includes a 20 nautical mile buffer around all major haulouts and rookeries, as well as associated terrestrial, air, and aquatic zones, and three large offshore foraging areas (Shelikof Strait, Bogoslof, and Seguam Pass). The 20-mile critical habitat radii around haulouts and rookeries serve to minimize disturbance around these important areas and also to provide an adequate food supply close to rookeries for lactating females, who alternate foraging trips at sea with nursing their pups on land. East of 144°W, Steller sea lion critical habitat includes aquatic areas 3,000 feet (0.9 km) seaward of each major haulout and major rookery (Figure 7).



**Figure 7.** Designated Steller sea lion critical habitat a) west of 144°W and b) east of 144°W.

The SWAN surveys will overlap with Steller sea lion critical habitat, including the 20-nautical mile buffers of four major haulouts in KATM (Cape Gull, Cape Kuliak, Takli, and Puale Bay) and one major haulout in KEFJ (Chiswell Islands). As noted in Section 2.1.2, SWAN will avoid the transect(s) that would run past a major rookery in KEFJ (Outer [Pye] Island). There are no major haulouts or rookeries in KBAY, or near the proposed activities in GLBA.

NMFS identified physical and biological features essential for conservation of Steller sea lions in the final rule to designate critical habitat (58 FR 45269). The proposed project may affect Steller sea lion critical habitat through vessel disturbance of critical habitat areas and exposure of critical habitat to potentially harmful materials.

*1. Terrestrial zones that extend 3,000 feet (0.9 km) landward from each major haulout and major rookery in Alaska.*

The SWAN surveys will not occur on land, and the GLBA activities that occur on land will occur on a site used by Steller sea lions (South Marble Island) that is not a designated major haulout or rookery. Therefore, we conclude that there will be no effect on the terrestrial zones of Steller sea lion critical habitat.

*2. Air zones that extend 3,000 feet (0.9 km) above the terrestrial zone of each major haulout and major rookery in Alaska.*

The project activities do not include any aircraft, and therefore we conclude that there will be no effect on the air zones of Steller sea lion critical habitat.

*3. Aquatic zones that extend 3,000 feet (0.9 km) seaward of each major haulout and major rookery in Alaska that is east of 144°W longitude.*

GLBA activities are the only project activities that will occur east of 144°W longitude, however they will occur near a site used by Steller sea lions (South Marble Island) that is not a designated major haulout or rookery. Therefore, there are no project activities that will occur within the 3,000 feet aquatic zones of any major haulouts or rookeries east of 144°W longitude, and therefore there will be no effects to this PBF of Steller sea lion critical habitat.

*4. Aquatic zones that extend 20 nautical miles seaward from each major rookery and major haulout west of 144°W longitude.*

The SWAN project activities are located within the 20-nautical mile aquatic zone of Steller sea lion critical habitat. Vessels are small with outboard motors, and operations will be transitory and short-term; therefore, we expect that the resulting acoustic impacts on these zones will be too small to be meaningfully measured or detected. It is possible that potentially harmful materials (e.g., petroleum products) could leak or spill into critical habitat during vessel operations. However, such leaks or spills are unlikely, and if they occur, would be very small. Therefore, we conclude the effects of project activities and vessel transit on this feature are insignificant and discountable.

*5. Three special aquatic foraging areas: the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area, as specified at 50 CFR § 226.202(c).*



The SWAN surveys will occur within the Shelikof Strait special aquatic foraging area. Vessels are small with outboard motors, and operations will be transitory and short-term; therefore, we expect that the resulting acoustic impacts on these zones will be too small to be meaningfully measured or detected. It is possible that potentially harmful materials (e.g., petroleum products) could leak or spill into critical habitat during vessel operations. However, such leaks or spills are unlikely, and if they occur, would be very small. Therefore, we conclude the effects of project activities and vessel transit on this feature are insignificant and discountable.

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

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.

More detailed background information on the status of these species can be found in a number of published documents including stock assessment reports (Muto et al. 2018), and the recovery plan for Steller sea lions (NMFS 2008).

##### **4.2.1 Western DPS Steller sea lion**

###### Description and Status

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

The Steller sea lion was listed as a threatened species under the ESA on November 26, 1990 (55 FR 49204). In 1997, NMFS reclassified Steller sea lions as two DPSs based on genetic studies and other information (62 FR 24345; May 7, 1997). At that time, the eastern DPS (which includes animals born east of Cape Suckling, Alaska, at 144°W longitude) was listed as threatened, and the western DPS (which includes animals breeding west of Cape Suckling) was listed as endangered. On November 4, 2013, the eastern DPS was removed from the endangered species list (78 FR 66140). Information on Steller sea lion biology, threats, and habitat (including critical habitat) is available in the revised [Steller Sea Lion Recovery Plan \(NMFS 2008\)](#).

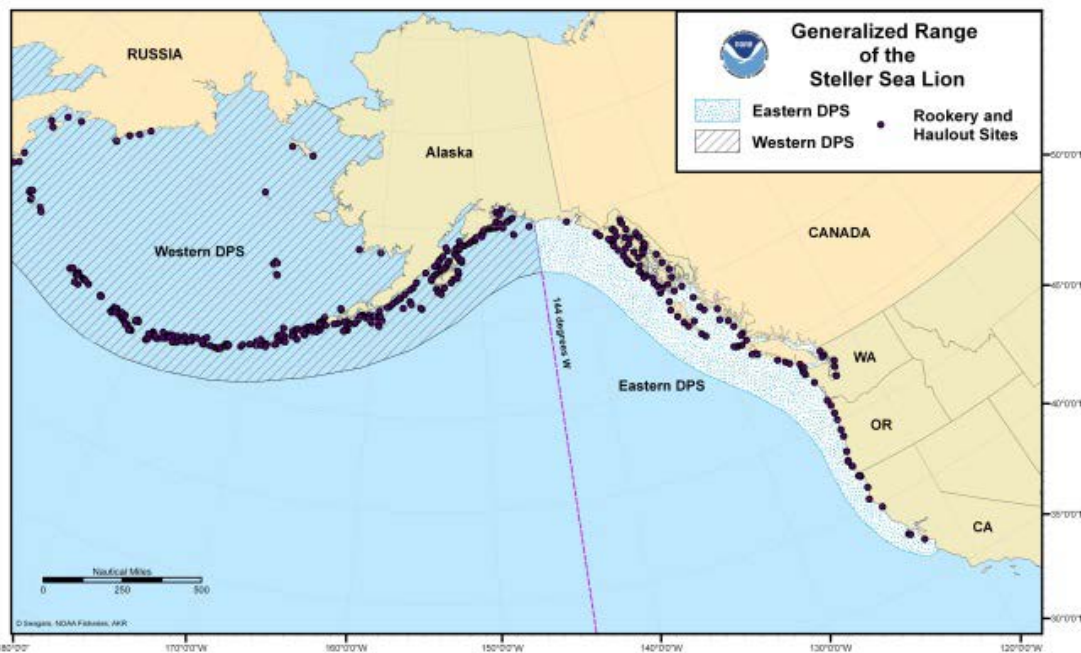
As summarized most recently by Muto et al. (2018), the western stock of Steller sea lions decreased from an estimated 220,000-265,000 animals in the late 1970s to less than 50,000 in 2000. Factors that may have contributed to this decline include incidental take in fisheries, legal and illegal shooting, predation, exposure to contaminants, disease, and ocean regime shift/ climate change (NMFS 2008). The most recent comprehensive aerial photographic and land-based surveys of western Steller sea lions in Alaska (Fritz et al. 2016; Sweeney, Towell, and Gelatt 2018) estimated a total Alaska population (both pups and non-pups) of 53,303 (Muto et al. 2018). There are strong regional differences in trends in abundance of Steller sea lions, with positive trends in the Gulf of Alaska and eastern Bering Sea east of Samalga Pass (~170°W) and



generally negative trends to the west in the Aleutian Islands. The population trends in the action area (central and eastern GOA) were observed to be increasing until 2015 (Sweeney, Towell, and Gelatt 2018), however in 2017, NMFS surveys observed anomalously low pup counts in these areas. Steller sea lion surveys that are focused on the GOA are planned for 2019 (Sweeney, Towell, and Gelatt 2018).

### Range

Steller sea lions prefer the colder temperate to sub-arctic waters of the North Pacific Ocean. They range along the North Pacific Rim from northern Japan to California, with centers of abundance in the Gulf of Alaska and Aleutian Islands (Figure 8) (Loughlin, Rugh, and Fiscus 1984). Although Steller sea lions seasonally inhabit coastal waters of Japan in the winter, breeding rookeries outside of the U.S. are located only in Russia (Burkanov and Loughlin 2005). The eastern DPS includes sea lions born on rookeries from California north through Southeast Alaska; the western DPS includes those animals born on rookeries from Prince William Sound westward, with an eastern boundary set at 144°W. Steller sea lions are not known to migrate annually, but individuals may widely disperse outside of the breeding season (late-May to early-July) (Muto et al. 2018; Jemison et al. 2013).



**Figure 8.** Generalized ranges of WDPS and EDPS Steller sea lions

### Occurrence in the Action Area

Steller sea lions are found throughout the action area. The SWAN surveys will occur west of 144°W, and most Steller sea lions in the SWAN portion of the action area are expected to be from the western DPS, however sea lions from the eastern DPS are also known to be in the area (Jemison et al. 2013).

While the GLBA activities are all occurring east of 144°W, a significant portion of the Steller sea lions in GLBA could be western DPS Steller sea lions (Jemison et al. 2013; Rehberg et al. 2018). Rehberg et al. (2018) found that 52 percent of the Steller sea lion pups sampled in GLBA had maternal origins in the western DPS. In the GLBA portion of the action area, South Marble Island (one of the gull monitoring sites) is the largest haulout inside GLBA. The numbers of animals present vary seasonally, but up to 2,000 Steller sea lions at a time have been observed. Counts by gull researchers during surveys from 2012-2017 ranged from 395 – 900 Steller sea lions at South Marble Island, which likely represent a minimum estimate due to difficulty observing marine mammals from a vessel (NPS 2018).

### Hearing Ability

The ability to detect sound and communicate underwater is important for a variety of Steller sea lion life functions, including reproduction and predator avoidance. NMFS categorizes Steller sea lions in the otariid pinniped functional hearing group, with an applied frequency range between 60 Hz and 39 kHz in water (NMFS 2016c). Studies of Steller sea lion auditory sensitivities have found that this species detects sounds underwater between 1 to 25 kHz (Kastelein et al. 2005), and in air between 250 Hz and 30 kHz (Mulsow and Reichmuth 2010). Sound signals from vessels are anticipated to be within the hearing range of Steller sea lions, whether the animals are in the water or hauled out.

## 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).

In the revised Steller sea lion recovery plan (NMFS 2008), the recovery team identified and described 11 factors that may be threats to the recovery of the species (NMFS 2008). **Error! Reference source not found.**8 in the recovery plan shows the age class and sex most vulnerable to, and the frequency of occurrence of, each threat; the amount of uncertainty about each threat’s influence on Steller sea lion population dynamics; and the relative impact of each threat to the recovery of the species.

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

- “Alaska Marine Mammal Stock Assessments, 2017” (Muto et al. 2018) Available at <https://www.fisheries.noaa.gov/webdam/download/77013044>
- “[Status Review of the Humpback Whale \(\*Megaptera novaeangliae\*\) under the Endangered Species Act](#)” (Bettridge *et al.* 2015). Available at [www.nmfs.noaa.gov](http://www.nmfs.noaa.gov).
- “Recovery plan for the Cook Inlet Beluga Whale (*Delphinapterus leucas*)” (NMFS 2016). Available at <https://repository.library.noaa.gov/view/noaa/15979>
- “[Recovery plan for the Steller sea lion \(\*Eumetopias jubatus\*\). Revision.](#)” (NMFS 2008). Available at [alaskafisheries.noaa.gov](http://alaskafisheries.noaa.gov)

### Climate and Environmental Change

Since the 1950s the atmosphere and oceans have warmed, snow and sea ice have diminished, sea levels have risen, and concentrations of greenhouse gases have increased (IPCC 2013). There is little doubt that human influence has been the dominant cause of the observed warming since the mid-20<sup>th</sup> century (IPCC 2013). The impacts of climate change are especially pronounced at high latitudes and in polar regions. Average temperatures have increased across Alaska at more than twice the rate of the rest of the United States (EPA 2017). In the past 60 years, average air temperatures across Alaska have increased by approximately 3°F, and winter temperatures have increased by 6°F (Chapin et al. 2014). Some of the most pronounced effects of climate change in Alaska include disappearing sea ice, shrinking glaciers, thawing permafrost, and changing ocean temperatures and chemistry (Chapin et al. 2014).

The impacts of these changes and their interactions on listed species in Alaska are hard to predict. A recent period of especially warm water in the North Pacific Ocean, referred to as “the blob,” is likely responsible for poor growth and survival of Pacific cod, an important prey species for endangered Steller sea lions. The preliminary 2017 estimate of Pacific cod biomass is approximately 28% of the average biomass since 1984. Biologists also attribute increases in bird

die-offs, whale strandings, toxic algae blooms, and poor salmon survival to warmer water conditions (Bernton 2017).

The world's oceans have absorbed approximately one-third of the anthropogenic CO<sub>2</sub> released, which has curtailed the increase in atmospheric CO<sub>2</sub> concentrations (Sabine et al. 2004). Despite the oceans' role as large carbon sinks, in 2016, the mean monthly average CO<sub>2</sub> level exceeded 400 ppm and continues to rise (NOAA 2018). As the oceans absorb more CO<sub>2</sub>, ocean acidification is occurring, which reduces the amount of calcium carbonate minerals that many organisms use to form and maintain shells (Reisdorph and Mathis 2014). Shelled zooplankton such as pteropods are prey for many species of carnivorous zooplankton, fishes including salmon, mackerel, herring, and cod, and baleen whales (Orr et al. 2005). Under increasingly acidic conditions, pteropods may not be able to grow and maintain shells, and are often considered an indicator species for ecosystem health. It is uncertain if they may be able to evolve quickly enough to adapt to changing ocean conditions (Fabry et al. 2009). Marine mammals in the GOA area were likely impacted by the low prey availability associated with warm ocean temperatures that occurred in the GOA during 2014-2016 (Bond et al. 2015; Sweeney, Towell, and Gelatt 2018; Peterson, Bond, and Robert 2016).

Additionally, as the ocean becomes more acidic, low frequency sounds (1-3 kHz and below) travel farther because the concentrations of certain ions that absorb acoustic waves decrease with decreasing pH (Brewer and Hester 2009).

### **Fisheries**

Commercial, subsistence, and recreational fisheries may harm or kill listed marine species through direct bycatch, gear interactions (entrapments and entanglements), vessel strikes, contaminant spills, habitat modification, competition for prey, and behavioral disturbance or harassment. Worldwide, more than 97 percent of whale entanglements are caused by derelict fishing gear (Baulch and Perry 2014), and this is likely an underestimate, as many marine mammals that die from entanglement tend to sink rather than strand ashore. Entanglement may also make marine mammals more vulnerable predation and ship strikes by restricting agility and swimming speed.

Additionally, commercial fisheries may indirectly affect whales and seals by reducing the amount of available prey or affecting prey species composition. In Alaska, commercial fisheries target known prey species of ESA-listed whales, sea lions, and seals, such as pollock and cod, and bottom-trawl fisheries may disturb habitat for bottom-dwelling prey species of ESA-listed species.

The NMFS Bycatch Report estimates bycatch of marine mammals (NMFS 2016d). Additionally, under the MMPA, NMFS maintains an annual list of fisheries that categorizes U.S. commercial fisheries according to the level of interactions that result in incidental mortality or serious injury of marine mammals. Detailed information on U.S. commercial fisheries in Alaska waters, including observer programs and coverage and observed incidental takes of marine mammals, is presented in the Alaska Stock Assessment Reports (Muto et al. 2018). Overall, the estimated mean annual mortality and serious injury rate from U.S. commercial fisheries is 31 western DPS sea lions per year, which is likely an underestimate of the actual level because no observers have been assigned to several fisheries that are known to interact with this stock (Muto et al. 2018). Of

this total estimated mean annual mortality, 16 sea lions are taken in federally managed groundfish fisheries and 15 in the state-managed Prince William Sound salmon drift gillnet fishery (based on the only available data from observations of that fishery, in 1990-91). An additional 1.4 animals per year are taken in unknown fisheries, 2 are taken by marine debris, including active and derelict fishing gear, and 2.6 are taken by other human causes (Muto et al. 2018).

Groundfish fisheries (including pollock, cod, flatfish, sablefish, rockfish, and other species) in Alaska are managed under fishery management plans (FMPs) developed by the North Pacific Fishery Management Council (NPFMC). In 2017, more than 535,000 metric tons of groundfish were authorized for harvest in the Gulf of Alaska (GOA), which is where the proposed action will take place. Nearly 80% of the halibut apportioned to Alaska is allocated to fisheries in the GOA (including Southeast Alaska).

In 2010, NMFS conducted a formal ESA section 7 consultation on the continued authorization of the groundfish fisheries of the GOA, including the state parallel fisheries. In that opinion, NMFS concluded that the groundfish fisheries, as proposed, would result in takes of animals from the Central North Pacific stock of humpback whales, Western North Pacific stock of humpback whales, Northeast Pacific stock of fin whales, North Pacific stock of sperm whales, and both DPSs of Steller sea lions. Take for these stocks and species was authorized, subject to reasonable and prudent measures and the terms and conditions outlined in that opinion (NMFS 2010). NMFS reinitiated consultation in 2013 for only the western DPS of Steller sea lion to evaluate a new suite of management measures. The resulting Biological Opinion concluded that the groundfish fisheries under the revised sea lion protection measures was not likely to result in jeopardy or adverse modification of critical habitat (NMFS 2014).

Commercial fisheries' interactions with Steller sea lions in the GOA are mitigated by various protection measures put in place to reduce competition for prey and other stressors associated with fishing. These measures aim to protect Steller sea lion prey from potential effects of groundfish fishing by temporally and geographically dispersing commercial catches through a variety of harvest limitations and closure areas. Many of these measures apply specifically to Atka mackerel, Pacific cod, and pollock, which are important prey for Steller sea lions. To protect Steller sea lion prey availability, these measures use a precautionary approach to the management of Steller sea lion prey species by spatially and temporally dispersing catch, particularly in critical habitat, to prevent localized prey depletion. The protection measures regulate fishing through a combination of closed areas, harvest limits, and seasons that reduce fishery competition for Steller sea lion prey when and where Steller sea lions forage.

### **Entanglement**

Entanglement of pinnipeds and cetaceans in fishing gear and other human-made material is a threat to their survival worldwide. Other materials also pose entanglement risks including marine debris, mooring lines, anchor lines, and underwater cables. While in many instances, marine mammals may be able to disentangle themselves (Jensen et al. 2009), other entanglements result in lethal and sublethal trauma to marine mammals including drowning, injury, reduced foraging, reduced fitness, and increased energy expenditure (van der Hoop et al. 2016).

Entangled marine mammals may drown or starve due to being restricted by gear, suffer physical

trauma and systemic infections, and/or be hit by vessels due to an inability to avoid them. Entanglement can include many different gear interaction scenarios, but the following have occurred with listed species covered in this opinion:

- Ingestion of gear and/or hooks can cause serious injury depending on whether the gear works its way into the gastrointestinal (GI) tract, whether the gear penetrates the GI lining, and the location of the hooking (e.g., embedded in the animal's stomach or other internal body parts)(Andersen et al. 2008).
- Gear loosely wrapped around the marine mammal's body that moves or shifts freely with the marine mammal's movement and does not indent the skin can result in disfigurement.
- Gear that encircles any body part and has sufficient tension to either indent the skin or to not shift with marine mammal's movement can cause lacerations, partial or complete fin amputation, organ damage, or muscle damage and interfere with mobility, feeding, and breathing. Chronic tissue damage from line under pressure can compromise a whale's physiology. Fecal samples from entangled whales had extremely high levels of the stress hormone cortisol (Rolland et al. 2017). Extended periods of pituitary release of cortisol can exhaust the immune system, making a whale susceptible to disease and infection.

Entanglement of pinnipeds in marine debris is common worldwide, and (Laist 1997) reported that 79% of otariid species and 42% of phocid species have been entangled.

### **Vessel Activity in the Gulf of Alaska**

Ferries, cruise ships, tankers, ore carriers, commercial fishing vessels, and recreational vessels transit or operate within Alaska state and EEZ waters (Figure 9). Much of the vessel traffic in Alaskan waters is concentrated in coastal areas of southeastern and southcentral Alaska during the summer months, where recreational vessels, charter vessels, commercial whale watch vessels, tour boats, and cruise ships are prevalent. Traffic from large vessels is more likely to occur year-round statewide, in both near shore and offshore waters, and includes commercial fishing vessels, freighters/tankers, passenger ferries, etc.

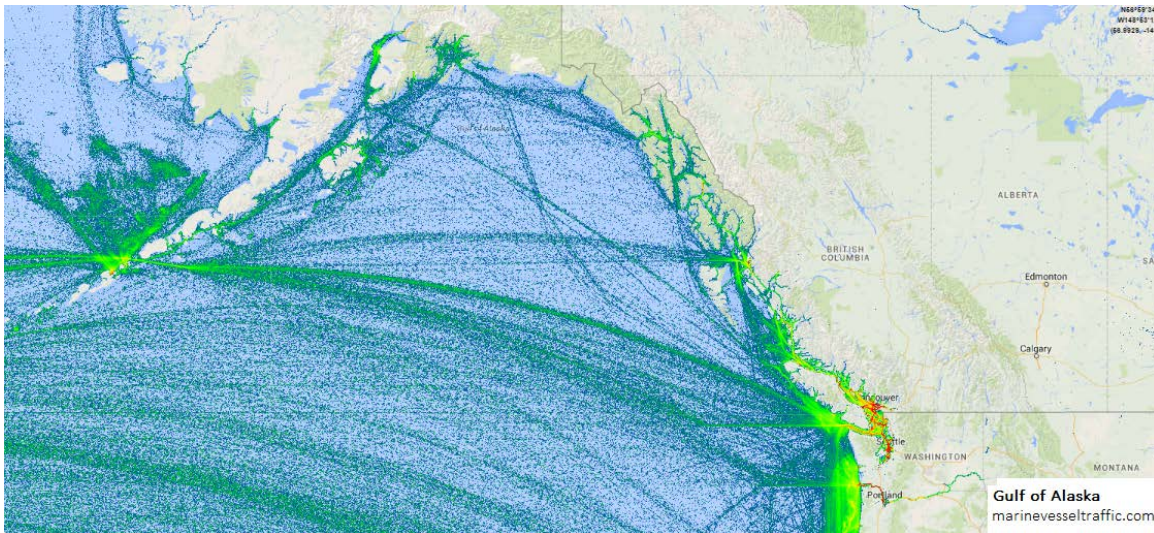
Figure 9 depicts shipping vessel density provided by the automated identification system data for the area from Alaska to the Pacific Northwest in 2013. As evident from the graphic, commercial vessel use is highest in the U.S. EEZ, at straits and passages, and along least-distance line routes between ports.

Statewide, marine vessels are a known source of injury and mortality to marine mammals in Alaska (Laist et al. 2001; Neilson et al. 2012). Vessel traffic may affect listed species through collisions (strikes), increased ocean noise, pollution from discharges and spills, and behavioral disruption (e.g., interference with foraging or migration, disturbance while resting or hauled-out).

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).



Vessels in GLBA include cruise ships, recreational vessels, and administrative/research vessels. Vessel traffic in GLBA is managed by vessel quotas and operating requirements aimed at protecting park resources (including marine mammals) and access by all user groups (71 FR 69328; November 30, 2006). Although Shelikof Strait (where KATM is located) is a main shipping route, these vessels are not transiting close shore (i.e., in the action area). Similarly, vessels in Kachemak Bay and KEFJ include tour vessels, commercial ship traffic, and commercial fishing, but are not likely to be operating as close to shore as the vessels associated with the proposed action.



**Figure 9.** 2013 Shipping Traffic Density Map for the GOA.

### **Ocean Noise**

In addition to vessel noise described above, ESA-listed species in the Gulf of Alaska (and therefore the action area) are exposed to several other sources of natural and anthropogenic noise. Natural sources of underwater noise include sea ice, wind, waves, precipitation, and biological noise from marine mammals, fishes, and crustaceans. Anthropogenic sources of underwater noise of concern to listed species in Alaska include vessels, in-water construction activities such as drilling, dredging, and pile driving; oil, gas, and mineral exploration and extraction; Navy sonar and other military activities; geophysical seismic surveys; and ocean research activities. Noise impacts to listed marine mammal species from many of these activities are mitigated through ESA Section 7 consultations.

Levels of anthropogenic (human-caused) sound can vary dramatically depending on the season, type of activity, and local conditions. The combination of anthropogenic and natural noises contributes to the total noise at any one place and time.

Noise is of particular concern to marine mammals because many species use sound as a primary sense for navigating, finding prey, avoiding predators, and communicating with other individuals. Noise may cause marine mammals to leave a habitat, impair their ability to communicate, or to cause stress. Noise can cause behavioral disturbances, mask other sounds including their own vocalizations, may result in injury and, in some cases, may result in behaviors that ultimately lead to death. The severity of these impacts can vary greatly.

Because responses to anthropogenic noise vary among species and individuals within species, it is difficult to determine long-term effects. Habitat abandonment due to anthropogenic noise exposure has been found in terrestrial species (Francis and Barber 2013). Clark et al. (2009) identified increasing levels of anthropogenic noise as a habitat concern for whales because of its potential effect on their ability to communicate (i.e., masking). Some research (Parks 2003, 2009; McDonald, Hildebrand, and Wiggins 2006) suggests marine mammals compensate for masking by changing the frequency, source level, redundancy, and timing of their calls. However, the long-term implications of these adjustments, if any, are unknown.

### **Subsistence Harvest of Steller sea lions**

Subsistence harvest by Alaska Natives is another source of injury or mortality for Steller sea lions in Alaskan waters. Annual statewide data on community subsistence harvest of Steller sea lions are no longer collected as of 2009. Based on data collected from seven communities around Kodiak in 2011, the minimum mean annual statewide subsistence take from the western DPS stock of Steller sea lions is 204 per year (Muto et al. 2018).

### **Illegal Shooting**

Illegal shooting of listed species occurs to an unknown extent in the action area. 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. The NMFS Alaska Marine Mammal Stranding Program documented 60 Steller sea lions with suspected or confirmed firearm injuries from 2000–2016 in Southeast Alaska (Wright and Savage 2016).

### **Marine Debris**

Marine debris degrades marine habitat quality, poses ingestion and entanglement risks to marine life, and may introduce invasive species. Marine debris may also leach or absorb hazardous materials which are harmful to marine life. Worldwide, about 80% of marine debris is now made up of plastic items. Plastics are non-biodegradable and persist in the environment. Marine debris entanglement of pinnipeds and whales is described in the section on entanglements above.

### **Scientific Research**

NMFS issues scientific research permits that are valid for five years for ESA-listed species. NMFS conducts section 7 consultations on the issuance of these permits. When permits expire, researchers often apply for a new permit to continue their research. Additionally, applications for new permits are issued on an on-going basis; therefore, the number of active research permits is subject to change. There are more than 30 active permits for research on cetaceans and pinnipeds throughout Alaska, including the Gulf of Alaska. The NMFS database of authorizations and permits for protected species (APPS) is available online at <https://apps.nmfs.noaa.gov/>.

Species considered in this opinion also occur in Canadian waters. Although we do not have specific information about any permitted research activities in Canadian waters, we assume they are similar to those described below.

Some of these research activities require close vessel approach. The permits also include incidental harassment takes to cover such activities as tagging, where the research vessel may come within 100 yards of other whales while in pursuit of a target whale. These activities may



cause stress to individual whales and cause behavioral responses. In some cases, take could occur and is authorized.

Steller sea lions are exposed to research activities documenting their population status and trends, health, movements, habitat use, foraging ecology, response to recovery activities, distribution and movements throughout their ranges. These include behavioral observations, counting/surveying, photo-identification, and capture and restraint for the purposes of performing the following procedures: sample/data collection (blood, clipped hair, urine and feces, nasal and oral swabs, vibrissae (pulled), skin, blubber, or muscle biopsies, weight and body measurements), injection of sedative, administration of drugs (intramuscular, subcutaneous, or topical), attachment of instruments to hair or flippers, including flipper tagging, and ultrasound. Activities may harass or harm individuals by stressing them during handling, and rarely, animals subjected to research activities may die.

### **Oil and Gas Development**

Offshore oil and gas development in Alaska poses a number of threats to listed marine species, including increased ocean noise, risk of hydrocarbon spills, production of waste liquids, habitat alteration, increased vessel traffic, and risk of ship strike. NMFS reviewed the potential effects of oil and gas development in a Final Environmental Impact Statement for the effects of oil and gas activities in the Arctic Ocean (NMFS 2013). NMFS has conducted numerous Section 7 consultations on oil and gas activities, including activities in Cook Inlet.

Geophysical seismic survey activity has been described as one of the loudest man-made underwater noise sources, with the potential to harass or harm marine mammals (Richardson et al. 1995). The noise generated from seismic surveys has been linked to behavioral disturbance of wildlife, masking of cetacean communication, and potential auditory injury in the marine environment (Smith et al. 2017). Seismic surveys are often accompanied by test drilling. Test drilling involves fewer direct impacts than seismic exploration, but the potential risks of test drilling, such as oil spills, may have broader consequences (Smith et al. 2017).

The vast majority of oil and gas exploration and development in Alaska occurs in the Arctic, however oil and gas development also occurs within Cook Inlet in the GOA. Information about current lease sales in Alaska is available from the Bureau of Ocean Energy Management at <https://www.boem.gov/>.

### **Pollutants and Discharges**

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

The Environmental Protection Agency (EPA) issued a National Pollutant Discharge Elimination System (NPDES) vessel general permit that authorizes several types of discharges incidental to the normal operation of vessels, such as grey water, black water, coolant, bilge water, ballast, and deck wash (EPA (U.S. Environmental Protection Agency) 2013). The permit applies to owners and operators of non-recreational vessels that are at least 24 m (79 ft) in length, as well as to owners and operators of commercial vessels less than 24 m that discharge ballast water.

The US Coast Guard has regulations related to pollution prevention and discharges for vessels carrying oil, noxious liquid substances, garbage, municipal or commercial waste, and ballast water (33 CFR Part 151). The State of Alaska regulates water quality standards within three miles of the shore.

NMFS conducted Section 7 consultation on the effects of activities associated with the Alaska Federal/State Preparedness Plan for Response to Oil & Hazardous Substance Discharge/Releases (Unified Plan)(NMFS 2015). The Unified Plan Biological Opinion includes a detailed review of oil and other hazardous materials spills in Alaska marine waters from 1995-2012, which helps identify high risk areas and shows that spills have occurred throughout the marine waters of Alaska, but primarily in coastal, nearshore areas.

### **Military Operations**

The Department of Defense conducts joint training exercises in the Joint Pacific Alaska Range Complex between April and October. The training area encompasses 42,146 square nm (145,458 km<sup>2</sup>) south of Prince William Sound and east of Kodiak Island. Most Navy training activities occur in this area and include gunnery, bombing, sinking, and tracking exercises. Sonar, active acoustic sources, airguns, weapons firing, explosives, and vessel and aircraft noise could result in Level A or Level B harassment of marine mammals. NMFS conducted a Section 7 consultation that analyzed the effects of military activities on listed species in the Gulf of Alaska (NMFS 2017). Incidental take was authorized for seven listed species of marine mammals and several stocks of listed salmonids (NMFS 2017).

## 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 (50 CFR 402.02).

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

Section 3(18) of the MMPA defines Level A harassment (for non-military activities) as “any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild.” Level B harassment means any such act that “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.”

While the ESA does not define “harass,” NMFS recently issued guidance interpreting the term “harass” under the ESA as a means to: “create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering” (Wieting 2016).

The proposed rule for the LOA (NMFS 2018) identifies acoustic and visual stimuli generated by motorboat operations and notes that the presence of researchers has the potential to cause Level B harassment during vessel surveys in KATM, KEFJ, and KBAY. In this biological opinion, we try to estimate the responses of exposed listed marine mammals to these harassing elements (“stressors”) and to assess the risk of “take,” as defined by the ESA, from exposure to the stressors. We rely on the best scientific and commercial information available, noting areas of uncertainty, or situations where data are not available.

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

A stressor is defined as any physical, chemical, or biological entity that can induce an adverse response. All potential stressors from the proposed action were considered, individually and cumulatively, in developing the analysis and conclusions in this opinion regarding the effects of the proposed action on western DPS Steller sea lions. Based on our review of the IHA

application (NPS 2018), proposed rule (NMFS 2018), personal communications, literature and data available, we identified the following stressors from the proposed project:

- vessel noise,
- risk of vessel strike, and
- behavioral disturbance due to vessel and human presence.

### 6.1.1 Acoustic Thresholds

Since 1997, NMFS has used generic sound exposure thresholds to determine whether an activity produces underwater and in-air sounds that might result in impacts to marine mammals (70 FR 1871). NMFS recently developed comprehensive guidance on sound levels likely to cause injury to marine mammals through onset of permanent and temporary thresholds shifts (PTS and TTS; Level A harassment), also known as permanent or temporary hearing loss (81 FR 51694). NMFS is in the process of developing guidance for behavioral disruption (Level B harassment). However, until such guidance is available, NMFS uses the following conservative thresholds of underwater sound pressure levels<sup>2</sup>, expressed in root mean square<sup>3</sup> (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  $\mu\text{Pa}_{\text{rms}}$
- continuous sound: 120 dB re 1  $\mu\text{Pa}_{\text{rms}}$

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). While there is no risk to Level A harassment in this proposed action, Table 2 is presented for reference, showing the Level A acoustic thresholds 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 2.** PTS Onset Acoustic Thresholds for Level A Harassment (NMFS 2016c).

Hearing Group	PTS Onset Acoustic Thresholds* (Received Level)	
	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	$L_{pk,flat}$ : 219 dB $L_{E,LF,24h}$ : 183 dB	$L_{E,LF,24h}$ : 199 dB
Mid-Frequency (MF) Cetaceans	$L_{pk,flat}$ : 230 dB $L_{E,MF,24h}$ : 185 dB	$L_{E,MF,24h}$ : 198 dB

<sup>2</sup> Sound pressure is the sound force per unit micropascals ( $\mu\text{Pa}$ ), 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  $\mu\text{Pa}$ , and the units for underwater sound pressure levels are decibels (dB) re 1  $\mu\text{Pa}$ .

<sup>3</sup> Root mean square (rms) is the square root of the arithmetic average of the squared instantaneous pressure values.

Hearing Group	PTS Onset Acoustic Thresholds* (Received Level)	
	Impulsive	Non-impulsive
High-Frequency (HF) Cetaceans	$L_{pk,flat}$ : 202 dB $L_{E,HF,24h}$ : 155 dB	$L_{E,HF,24h}$ : 173 dB
Phocid Pinnipeds (PW) (Underwater)	$L_{pk,flat}$ : 218 dB $L_{E,PW,24h}$ : 185 dB	$L_{E,PW,24h}$ : 201 dB
Otariid Pinnipeds (OW) (Underwater)	$L_{pk,flat}$ : 232 dB $L_{E,OW,24h}$ : 203 dB	$L_{E,OW,24h}$ : 219 dB
<p>* 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.</p> <p><u>Note:</u> Peak sound pressure (<math>L_{pk}</math>) has a reference value of 1 <math>\mu</math>Pa, and cumulative sound exposure level (<math>L_E</math>) has a reference value of 1 <math>\mu</math>Pa<sup>2</sup>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>i.e.</i>, 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.</p>		

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

- 100 dB re 20 $\mu$ Pa<sub>rms</sub> for non-harbor seal pinnipeds

## 6.2 Exposure and Response 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.

Following the exposure analysis is the response analysis. The 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.

### 6.2.1 ESA-listed Species Exposure Estimates

For our exposure analyses, NMFS generally considers an action agency’s (NPS and the Permits Division, in this case) estimates of the number of marine mammals that might be “taken” over the duration of the proposed action. The proposed rule for the LOA states that “due to the likely constant combination of visual and acoustic stimuli resulting from the presence of vessels and

researchers, we do not consider impacts from acoustic and visual stimuli separately,” therefore the takes in the proposed rule are not attributed to specific stressors. While this opinion analyzes individual stressors, similar to the LOA, the incidental take statement does not attribute take to specific stressors.

#### *Numbers of Steller sea lions exposed to stressors*

The Permits Division estimated number of takes by Level B harassment (Table 3) based on numbers of pinnipeds observed from a similar survey of KATM and KEFJ in 2013. In this survey, researchers observed an estimated 100 Steller sea lions during each of the KATM and KEFJ surveys (NPS 2018). Data from 2013 surveys were used to estimate take because in 2013, most of the transects were able to be completed, thus, the 2013 data offers the most conservative count-based estimate. Based on pinnipeds observed in 2013, NPS estimates that each year, across the three survey sites and two seasons of potential sampling, SWAN’s activities will result in take by Level B harassment of 400 Steller sea lions: 200 each in KATM and KEFJ, but no takes by Level B harassment in KBAY because there are no known Steller sea lions haulouts or rookeries in KBAY, and Steller sea lions that are present in KBAY are unlikely to be adversely affected by the surveys. Across the 5 years of this work that would result in an estimated 2000 Steller sea lion takes by Level B harassment. Due to the implementation of mitigation measures, Steller sea lions in GLBA are unlikely to be exposed to stressors that would elicit effects that rise to the level of take from project activities, and therefore the Permits Division proposes to authorize no takes of Steller sea lions for activities in GLBA.

Because these estimates are based on observations of pinnipeds and not harassments, NMFS considers the estimated numbers of take by Level B harassment presented in Table 3 to be conservative.

**Table 3.** Proposed takes by Level B harassment due to SWAN’s research and monitoring activities.

Species	Stock	Proposed Level B Take (annual) <sup>1</sup>	Total Level B Takes in 5 Years	Percentage of Population over 1 year <sup>2</sup>
Steller sea lion	Western	400	2000	0.7%
<sup>1</sup> 200 each in KATM and KEFJ.				
<sup>2</sup> Based on the population size reported in Muto et al. 2018.				

#### *Life stage and gender of exposed Steller sea lions*

It is difficult to estimate the number of individuals by age or gender that maybe affected by the project. However, the mitigation measures that will be implemented by SWAN include avoiding known rookery beaches, therefore it is likely that the Steller sea lions exposed to these stressors will be juveniles and adults.

#### 6.2.2 Noise Exposure

Vessel surveys will be conducted from small vessels (5-20 m), which produce broad-band sounds of around 156 dB re 1  $\mu\text{Pa}_{\text{rms}}$  underwater (Richardson et al 1995) and 55 – 89 dBA re

20  $\mu$ Pa in air (Rodino and Masson 2015). The underwater noise is expected to attenuate to ambient ocean noise levels (assumed to be 120 dB re 1  $\mu$ Pa<sub>rms</sub>) at 251 m from the vessels, assuming practical spreading, therefore the action area includes the marine waters along the vessel transit paths out to 251 m. Project activities will use small vessels (5-12 m), which produce broad-band sounds of around 156 dB re 1  $\mu$ Pa<sub>rms</sub> underwater (Richardson et al 1995) and 55 – 89 dBA re 20  $\mu$ Pa in air (Rodino and Masson 2015). The underwater noise is expected to attenuate to the threshold of Level B harassment for otariid pinnipeds (120 dB re 1  $\mu$ Pa<sub>rms</sub>) at 251 m from the vessels, assuming practical spreading.

Based on estimated ambient airborne noise levels of 65 dB (WSDOT 2018), and using the upper range (89 dBA), vessel noise will attenuate to ambient noise levels at about 50 meters from the vessel. Therefore, the in-air portion of the action area is defined as 50 meters from the source. The airborne noise is below the threshold for in-air sound pressure levels from broadband sounds that cause Level B disturbance (100 dB re 20  $\mu$ Pa<sub>rms</sub> for non-harbor seal pinnipeds).

Steller sea lions are curious and are known to investigate small vessels, especially near haulouts and rookeries (see “Behavioral Disturbance,” below), which may increase their risk of exposure to vessel noise. It is possible that the sea lions may enter the area ensonified by the vessels; however, the vessels in the proposed action will be constantly moving and the sea lions are not likely to remain in the ensonified area for more than a few minutes.

Vessel noise can also mask their underwater communications, mask received noises, and cause marine mammals to avoid noisy areas. The effects of vessel presence on sea lions in open water will be temporary and transient in nature as the vessel approaches and passes sea lions. Increases in ambient noise, however temporary, have the potential to mask communication between mammals (Richardson and Malme 1993), and some marine mammals have been known to alter their own signals to compensate for increased ambient noise levels (Di Lorio and Clark. 2010; Au et al. 1974; BOEM 2017). Richardson et al. (1995) found vessel noise does not seem to strongly affect pinnipeds in the water, and that seals on haulouts often respond more strongly to the presence of vessels, including responding by flushing (stampeding) into the water. Thus, the sea lions in the action area are more likely to respond to vessel noise when a survey vessel passes a haulout than when a survey vessel passes a sea lion in the water. This is discussed further in section 6.2.4. However, with the mitigation measures in place, survey vessels are not as likely to pass close to haulouts when Steller sea lions are observed to be present, minimizing the harassment response.

### 6.2.3 Risk of vessel strike

As noted in section 5, 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).

In GLBA, the probability of vessel and marine mammal interactions (*i.e.*, motorboat strike) occurring during the proposed research activities is unlikely due to the motorboat’s slow operational speed, which is typically 2 to 3 kn (2.3 to 3.4 mph) and the researchers continually scanning the water for marine mammals presence during transit to the islands. Thus, NMFS does not anticipate that strikes or collisions would result from the movement of the motorboat.



SWAN's survey vessels move at higher speeds, 8 to 12 kn, than those used in the proposed GLBA NP activities, but vessel and marine mammal interactions are still unlikely because the on board researchers are constantly scanning the water for marine mammal presence. For SWAN's activities, NMFS does not anticipate any strikes or collisions between vessels and marine mammals.

#### 6.2.4 Behavioral Disturbance

Behavioral reactions from vessels can vary depending on the type and speed of the vessel, the spatial relationship between the animal and the vessel (including whether they are in the water or hauled out), the species, and the behavior of the animal prior to the disturbance from the vessel. Response also varies between individuals of the same species exposed to the same sound.

If a marine mammal does react briefly to human presence by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if visual stimuli from human presence displaces marine mammals from an important foraging or breeding behaviors for a prolonged period, impacts on individuals and populations could be significant (Lusseau and Bejder 2007; Weilgart 2007).

##### *Steller sea lions in the water*

An individual animals' past experience(s) with vessels appear to be important in determining an individual's response. If Steller sea lions that are already in the water are exposed to vessel noise they may exhibit deflection from the noise source, engage in low level avoidance behavior, exhibit short-term vigilance behavior, or experience and respond to short-term acoustic masking behavior, but these behaviors are not likely to result in significant disruption of normal behavioral patterns. Due to the noise of the vessel alerting the animal to its presence from a distance, a startle response is not expected. Vessels moving at slow speeds and avoiding rapid changes in direction or engine RPM may be tolerated by some species, and even may attract Steller sea lions that become curious. Other individuals may deflect around vessels and continue on their path.

##### *Hauled out Steller sea lions – Startled Response*

The response of Steller sea lions that are hauled out can depend on various factors, including the movements/speed of the vessel. If vessels appear suddenly, are moving at a fast speed, and/or approach a haulout or rookery too closely, Steller sea lions could respond by flushing (stampeding) into the water. NMFS (2007) evaluated the potential effects on sea lions due to researcher presence in view of animals from skiffs and estimated that of non-pups exposed to vessel-based surveys, 100% would become alert, 10% would enter the water, and 0.01% would react strongly enough to become injured.

Pups may be injured if flushing occurs because pups may be trampled or abandoned, knocked into the water and not be able to climb cliffs to return, and pups that return may suffer hypothermia or respiratory complications from aspirating water. Juveniles/adults may be injured by sliding/crashing into cliff facings or underwater rocks. All age classes of sea lions may experience excessive metabolic heat from flight response. Additionally, flushing can cause aggressive interactions resulting in injury to adults and/or pups.

These likelihood of injuries to Steller sea lions due to startle responses to vessel presence from the proposed action will be greatly reduced due to the implementation of mitigation measures, such as avoiding approaching Steller sea lions closer than 100 m (GLBA), avoiding landing on beaches where sea lions are hauled out (GLBA), maintaining vessel speed and distance from the haulout (SWAN), and avoidance of known rookery beaches (SWAN).

*Hauled out Steller sea lions - Non-startle Response*

As mentioned previously, Steller sea lions are known to be curious, and sea lions that are hauled out may enter the water to investigate small vessels near haulouts and rookeries. In this case, sea lions are unlikely to be injured while leaving the haulout. The sea lions are expected to return to the haulout, or normal behavioral patterns, quickly after the vessel has left the area. Therefore the impact of the behavioral change is not likely to cause long-term effects to either individual animals or the population.

## 7. CUMULATIVE EFFECTS

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

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

We searched for information on non-Federal actions reasonably certain to occur in the action area. We did not find any information about non-Federal actions other than what has already been described in the Environmental Baseline (Section **Error! Reference source not found.** of this Opinion). We expect subsistence harvest of Steller sea lions and vessel traffic will continue into the future. We expect bans on commercial harvest will remain in place. We also expect that with commercial and private vessels operating in the Gulf of Alaska, the risk of non-permitted oil and pollutant discharges will continue.

## 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.

Based on the results of the exposure analysis, we expect a maximum of 400 WDPS Steller sea lions per year (200 per year in KATM, 200 per year in KEFJ; a total of 2000 over five years) will be exposed to vessel noise, risk of vessel strike, and disturbance from vessel and human presence. Exposure from vessel noise and the potential for vessel strike may occur, but adverse effects from vessel disturbance and noise are likely to be inconsequential due to the small marginal increase in such activities relative to the environmental baseline, short duration of vessel activity, and implementation of mitigation measures (section 2.1.2). Adverse effects from vessel strike are extremely unlikely because of the few additional vessels introduced by the action and the unlikelihood of these type of interactions.

Steller sea lions' response to the presence of vessels and humans near haulouts and rookeries depends largely on whether the sea lions are already in the water or are hauled out on land. Responses of sea lions in the water may include investigation of the vessels due to curiosity, and short-term behavioral modifications. 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).

The responses of Steller sea lions that are hauled out are more likely to include startle reactions which could lead to flushing from haulouts. Flushing of haulouts can include risk of injury, although these risks are greater to pups, and the implementation of mitigation measures includes avoidance of rookery beaches. Additional implementation of vessel mitigation measures, such as maintaining speed and distance from haulouts, will minimize the risk of flushing of Steller sea lions from haulouts.

The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to reduce the energy budgets of western DPS Steller sea lions, and their probable exposure to vessels are not likely to reduce their fitness. Therefore, the proposed activities 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.

## 9. CONCLUSION

This Biological Opinion has considered the direct, indirect, and cumulative effects of this action on western DPS Steller sea lions. The proposed action is expected to result in direct and indirect impacts to this species. We expect that harassment of 2000 WDPS Steller sea lions may occur during the five-year term of the MMPA authorization (*i.e.*, LOA). 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, it is NMFS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the western DPS Steller sea lion. In addition, we concur that the action is not likely to adversely affect Western North Pacific DPS humpback whales, Mexico DPS humpback whales, or Cook Inlet beluga whales, nor is it likely to destroy or adversely modify designated critical habitat for Cook Inlet beluga whales or Steller sea lions.

## 10. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA prohibits the take of endangered species unless there is a special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct (16 USC 1532(19)). “Incidental take” is defined as take that 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, the Permits Division and NPS anticipate that any take will be by Level B 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 Permits Division and NPS have a continuing duty to regulate the activities covered by this ITS. In order to monitor the impact of incidental take, the Permits Division and NPS 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 Permits Division and NPS (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)(i); see also 80 FR 26832 (May 11, 2015)).

This section provides an estimate of the number of incidental takes proposed for authorization through the LOA. Harassment is the only type of take expected to result from these activities.

Authorized takes would be by Level B harassment only, in the form of disruption of behavioral patterns for individual marine mammals resulting from exposure to motorboats and the presence of NPS personnel. Based on the nature of the activity and proposed mitigation measures, Level A harassment is neither anticipated nor proposed to be authorized. As described previously, no mortality is anticipated or proposed to be authorized for this activity. Below we describe how the take is estimated.

The estimated number of takes by Level B harassment (**Error! Reference source not found.**) are based on numbers of pinnipeds observed from a similar survey of KATM and KEFJ in 2013. In this survey, researchers observed an estimated 100 Steller sea lions during each of the KATM and KEFJ surveys (NPS 2018). Data from 2013 surveys were used to estimate take because in 2013, most of the transects were able to be completed, thus, the 2013 data offers the most conservative count-based estimate. Based on pinnipeds observed in 2013, NPS estimates that each year, across the three survey sites and two seasons of potential sampling (summer and winter), we are reasonably certain SWAN's activities will result in take by Level B harassment of 400 Steller sea lions: 200 in KATM and KEFJ, but no takes by Level B harassment in KBAY because there are no known Steller sea lions haulouts or rookeries in KBAY, and Steller sea lions that are present in KBAY are unlikely to be adversely affected by the surveys. Across the 5 years of this work, we are reasonably certain that would result in an estimated 2000 Steller sea lion takes by Level B harassment. Due to the mitigation measures, harassment takes of Steller sea lions in GLBA are unlikely to occur.

**Table 4.** Proposed takes by Level B harassment due to SWAN's research and monitoring activities.

Species	Stock	Proposed Level B Take (annual) <sup>1</sup>	Total Level B Takes in 5 Years	Percentage of Population over 1 year <sup>2</sup>
Steller sea lion	Western	400	2000	0.7%
<sup>1</sup> 200 each in KATM and KEFJ				
<sup>2</sup> Based on the population size reported in Muto et al. 2018				

## 10.2 Effect of the Take

In this Opinion, NMFS has determined that the level of anticipated incidental take is not likely to jeopardize the continued existence of any ESA-listed species.

The authorized takes from the proposed action are associated with behavioral harassment from vessel and human disturbance. Although the biological significance of behavioral responses remains unknown, this consultation has assumed that exposure to vessels and human presence might disrupt one or more behavioral patterns that are essential to an individual animal's life history. However, any behavioral responses of western DPS Steller sea lions to vessels and any associated disruptions are not expected to affect the fitness of any individuals of this species, the viability of the population, or the species' survival or recovery.



### **10.3 Reasonable and Prudent Measures (RPMs)**

“Reasonable and prudent measures” are those actions necessary to minimize the amount or extent of incidental take (50 CFR 402.02). These measures are nondiscretionary.

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 western DPS Steller sea lions resulting from the proposed action.

The Permits Division must require NPS to implement and monitor the effectiveness of mitigation measures and Standard Operating Procedures (SOPs) incorporated as part of the proposed authorization for the incidental taking of ESA-listed marine mammals pursuant to section 101(a)(5)(D) of the MMPA, as specified below.

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. NPS will document and report relevant aspects of its research to verify implementation of monitoring, mitigation measures, and SOPs; comply with permits; and improve future environmental assessments.
3. The taking of western DPS Steller sea lions will be by incidental harassment only. The take of listed marine mammals by serious injury or mortality, whether authorized or unauthorized will be immediately reported to NMFS AKR.
4. Observations of dead, injured, contaminated, or entangled marine mammals will be reported to NMFS AKR.

### **10.4 Terms and Conditions**

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

In order to be exempt from the prohibitions of section 9 of the ESA, the Permits Division and NPS, 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. The Permits Division, NPS, or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14(i)).

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 the RPMs, the Permits Division and NPS must undertake the following:

1. Require the permitted operators to possess a current and valid Letter of 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.

2. Conduct the action as described in this Opinion (Section 2) including all mitigation measures.
3. 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 907-586-7636.
4. If operations conducted under the proposed action cause a take of a marine mammal that results in a serious injury or mortality, or other unauthorized take, all operations will immediately cease, and NPS will follow the reporting requirements described in the Mitigation Measures.

## 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).

- NMFS recommends that NPS researchers obtain and submit photos of flukes from humpback whales to NMFS (Jill Prewitt at [jill.prewitt@noaa.gov](mailto:jill.prewitt@noaa.gov)) whenever possible. This information will help inform NMFS on movements and distribution of humpback whales from the Mexico and Western North Pacific DPSs within the action area.
- NMFS recommends that NPS researchers report any sightings of North Pacific right whales, including photos if possible, to the North Pacific right whale recovery coordinator (Verena Gill at [verena.gill@noaa.gov](mailto:verena.gill@noaa.gov)). Due to the highly endangered status of this species, any sightings are valuable information on the presence of these whales in the action area, and the overall status and recovery of this species.

In order to keep NMFS's Protected Resources Division informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the NPS 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 the National Marine Fisheries Service, the National Park Service, 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.

## REFERENCES

- ADFG. 2018. 'Anadromous Waters Catalog. Interactive Mapping', Accessed October 17, 2018. <<https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=main.interactive>>.
- Andersen, M. S., K. A. Forney, T. V. N. Cole, T. Eagle, R. Angliss, K. Long, L. Barre, L. Van Atta, D. Borggaard, T. Rowles, B. Norberg, J. Whaley, and L. Engleby. 2008. "Differentiating serious and non-serious injury of marine mammals: Report of the Serious Injury Technical Workshop, 10-13 September 2007, Seattle, Washington, NOAA Technical Memorandum NMFS-OPR-39. 94 p." In.
- Au, W. W. L. , and M. Green. 2000. 'Acoustic interaction of humpback whales and whale-watching boats', *Marine Environmental Research*, 49: 469-81.
- Au, W. W. L., R. W. Floyd, R. H. Penner, and Murchiso. Ae. 1974. 'Measurement of echolocation signals of the Atlantic bottlenose dolphin, *Tursiops truncatus* Montagu, in open waters ', *Journal of the Acoustical Society of America*, 56: 1280-90.
- Au, W. W. L., A. A. Pack, M. O. Lammers, L. M. Herman, M. H. Deakos, and K. Andrews. 2006. 'Acoustic properties of humpback whale songs', *Journal of the Acoustical Society of America*, 120: 1103-10.
- Au, Whitlow W. L. 2000. 'Hearing in whales and dolphins: An overview.' in W. W. L. Au, A. N. Popper and R. R. Fay (eds.), *Hearing by Whales and Dolphins* (Springer-Verlag: New York).
- Baker, C.S., L.M. Herman, A. Perry, W.S. Lawton, J.M. Straley, and J.H. Straley. 1985. 'Population characteristics and migration of summer and late-season humpback whales (*Megaptera novaeangliae*) in southeastern Alaska', *Marine Mammal Science*, 1: 304-23.
- Barlow, Jay, John Calambokidis, Erin A Falcone, C Scott Baker, Alexander M Burdin, Phillip J Clapham, John KB Ford, Christine M Gabriele, Richard LeDuc, and David K Mattila. 2011. 'Humpback whale abundance in the North Pacific estimated by photographic capture-recapture with bias correction from simulation studies', *Marine Mammal Science*, 27: 793-818.
- Baulch, Sarah, and Clare Perry. 2014. 'Evaluating the impacts of marine debris on cetaceans', *Marine Pollution Bulletin*, 80: 210-21.
- Bernton, H. 2017. 'Climate change preview? Pacific Ocean 'blob' appears to take toll on Alaska cod', *Seattle Times*, November 4, 2017.
- Bettridge, Shannon, C Scott Baker, J. Barlow, P Clapham, M. Ford, D. Gouveia, D. Mattila, RM Pace, P. E. Rosel, G. K. Silber, and P. Wade. 2015. "Status review of the humpback whale (*Megaptera novaeangliae*) under the Endangered Species Act." In, edited by NOAA Department of Commerce, NMFS, SWFSC.
- BOEM. 2017. "Liberty Development and Production Plan Biological Assessment." In, 235. Anchorage, AK.
- Bond, Nicholas A, Meghan F Cronin, Howard Freeland, and Nathan Mantua. 2015. 'Causes and impacts of the 2014 warm anomaly in the NE Pacific', *Geophysical Research Letters*, 42: 3414-20.
- Brewer, Peter G., and Keith Hester. 2009. 'Ocean acidification and the increasing transparency of the ocean to low-frequency sound', *Oceanography*, 22: 86-93.
- Burkanov, V.N., and T.R. Loughlin. 2005. 'Distribution and abundance of Steller sea lions, *Eumetopias jubatus*, on the Asian coast, 1720's-2005', *Marine Fisheries Review*, 67: 1-62.

- Calkins, DG, and KW Pitcher. 1982. 'Population assessment, ecology, and trophic relationships of Steller sea lions in the Gulf of Alaska. US Department of Commerce, NOAA. Final Report Outer Continental Shelf Environmental Assessment Program', *Contract: 022-69*.
- Calkins, Donald G. 1989. 'Status of belukha whales in Cook Inlet.' in Jarvela LE and Thorsteinson LK (eds.), *Gulf of Alaska, Cook Inlet, and North Aleutian Basin information update meeting*. (USDOC, NOAA, OCSEAP: Anchorage, AK).
- Chapin, F. S., III, S. F. Trainor, P. Cochran, H. Huntington, C. Markon, M. McCammon, A. D. McGuire, and M. Serreze. 2014. 'Ch. 22: Alaska.' in J. M. Melillo, T.C. Richmond and G. W. Yohe (eds.), *Climate Change Impacts in the United States: The Third National Climate Assessment* (U.S. Global Change Research Program).
- Clark, Christopher, William T. Ellison, Brandon Southall, Leila Hatch, Sofie M. Van Parijs, Adam S. Frankel, Dimitri Ponirakis, and George C. Gagnon. 2009. "Acoustic masking of baleen whale communications: potential impacts from anthropogenic sources." In *Eighteenth Biennial Conference on the Biology of Marine Mammals*, 56. Quebec City, Canada.
- Colletti, H.A., and T.A. Wilson. 2018. "Nearshore marine bird surveys: Data synthesis, analysis and recommendations for sampling frequency and intensity to detect population trends. Exxon Valdez Oil Spill Long-Term Monitoring Program (Gulf Watch Alaska) Final Report " In *Exxon Valdez Oil Spill Trustee Council Project 12120114-F*. Anchorage, AK: Exxon Valdez Oil Spill Trustee Council.
- Di Lorio, Lucia, and Christopher W. Clark. 2010. 'Exposure to seismic survey alters blue whale acoustic communication.', *Biology Letters*, 6: 51-54.
- EPA. 2017. 'Climate Impacts in Alaska', Accessed December 5, 2017.  
<https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-alaska .html>.
- EPA (U.S. Environmental Protection Agency). 2013. "Vessel general permit for discharges incidental to the normal operation of vessels (VGP): authorization to discharge under the National Pollutant Discharge Elimination System." In.: U.S. Environmental Protection Agency.
- Erbe, C. 2002. "Hearing abilities of baleen whales. Report CR 2002-065." In, 40. Ottawa, Ontario, Canada: Defence R&D Canada--Atlantic.
- Fabry, V. J., J. B. McClintock, J. T. Mathis, and J. M. Grebmeier. 2009. 'Ocean acidification at high latitudes: the Bellweather.', *Oceanography*, 22: 160-71.
- Ferguson, Megan C, Janice M Waite, Corrie Curtice, Janet T Clarke, and Jolie Harrison. 2015. '7. Biologically Important Areas for Cetaceans Within US Waters-Aleutian Islands and Bering Sea Region', *Aquatic Mammals*, 41: 79.
- Fiscus, Clifford H. 1961. 'Growth in the Steller sea lion', *Journal of Mammalogy*, 42: 218-23.
- Francis, Clinton D., and Jesse R. Barber. 2013. 'A framework for understanding noise impacts on wildlife: An urgent conservation priority', *Frontiers in Ecology and the Environment*, 11: 305-13.
- Frazer, L. N., and E. Mercado. 2000. 'A sonar model for humpback whale song', *IEEE Journal of Oceanic Engineering*, 25: 160-82.
- Friday, Nancy A, Janice M Waite, Alexandre N Zerbini, and Sue E Moore. 2012. 'Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf: 1999–2004', *Deep Sea Research Part II: Topical Studies in Oceanography*, 65: 260-72.
- Friday, Nancy A, Alexandre N Zerbini, Janice M Waite, Sue E Moore, and Phillip J Clapham.



2013. 'Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf, June and July of 2002, 2008, and 2010', *Deep Sea Research Part II: Topical Studies in Oceanography*, 94: 244-56.
- Fritz, L., K. Sweeney, R Towell, and T. Gelatt. 2016. "Aerial and Ship-Based Surveys of Steller Sea Lions (*Eumetopias jubatus*) Conducted in Alaska in June-July 2013 through 2015, and an Update on the Status and Trend of the Western Distinct Population Segment in Alaska." In, edited by NOAA U.S. Dep. Commer., NMFS. Seattle, WA: Alaska Fisheries Science Center.
- Hansen, DJ, and JD Hubbard. 1999. 'Distribution of Cook Inlet beluga whales (*Delphinapterus leucas*) in winter (Final Report OCS Study, MMS 99-0024)', *Anchorage: US Department of the Interior, Mineral Management Service Alaska, OCS Region*.
- Hobbs, Roderick C, Kristin L Laidre, DJ Vos, BA Mahoney, and M Eagleton. 2005. 'Movements and area use of belugas, *Delphinapterus leucas*, in a subarctic Alaskan estuary', *Arctic*: 331-40.
- Holland, Leslie E. 1986. 'Effects of barge traffic on distribution and survival of ichthyoplankton and small fishes in the Upper Mississippi River', *Transactions of the American Fisheries Society*, 115: 162-65.
- IPCC. 2013. *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, United Kingdom and New York, NY).
- Jemison, Lauri A., Grey W. Pendleton, Lowell W. Fritz, Kelly K. Hastings, John M. Maniscalco, Andrew W. Trites, and Tom S. Gelatt. 2013. 'Inter-population movements of Steller sea lions in Alaska with implications for population separation', *PLoS One*, 8: e70167.
- Jensen, A., M. Williams, L. Jemison, and K. Raum-Suryan. 2009. 'Somebody untangle me! Taking a closer look at marine mammal entanglement in marine debris.' in M. Williams and E. Ammann (eds.), *Marine Debris in Alaska: coordinating our efforts* (Alaska Sea Grant College Program, University of Alaska Fairbanks).
- Kastelein, R. A., Robbert Van Schie, W. C. Verboom, and Dick de Haan. 2005. 'Underwater hearing sensitivity of a male and a female Steller sea lion (*Eumetopias jubatus*)', *Journal of the Acoustical Society of America*, 118: 1820-29.
- Laist, David W. 1997. 'Impacts of marine debris: entanglement of marine life in marine debris including a comprehensive list of species with entanglement and ingestion records.' in J. M. Coe and D. B. Rogers (eds.), *Marine Debris - sources, impacts, and solutions* (Springer-Verlag: New York).
- Laist, David W, Amy R Knowlton, James G Mead, Anne S Collet, and Michela Podesta. 2001. 'Collisions between ships and whales', *Marine Mammal Science*, 17: 35-75.
- Loughlin, Thomas R, and Anne E York. 2000. 'An accounting of the sources of Steller sea lion, *Eumetopias jubatus*, mortality', *Marine Fisheries Review*, 62: 40-45.
- Loughlin, Thomas R., David J. Rugh, and Clifford H. Fiscus. 1984. 'Northern sea lion distribution and abundance: 1956-80', *Journal of Wildlife Management*, 48: 729-40.
- Lusseau, D., and L. Bejder. 2007. 'The long-term consequences of short-term responses to disturbance: experiences from whalewatching impact assessment', *International Journal of Comparative Psychology*, 20: 228-36.
- McDonald, M.A., J.A. Hildebrand, and S.M. Wiggins. 2006. 'Increases in deep ocean ambient noise in the Northeast Pacific west of San Nicolas Island, California', *Journal of the Acoustical Society of America*, 120: 711-18.

- Moore, S. E., K. W. Shelden, L. K. Litzky, B. A. Mahoney, and D. J. Rugh. 2000. 'Beluga, *Delphinapterus leucas*, habitat associations in Cook Inlet, Alaska', *Marine Fisheries Review*, 62: 60-80.
- Mortenson, Joseph. 1996. *Human interference with harbor seals at Jenner, CA, 1994-1995* (Stewarts of Slavianska, Sonoma Coast State Beaches, Russian River/Mendocino ...).
- Mulsow, J., and C. Reichmuth. 2010. 'Psychophysical and electrophysiological aerial audiograms of a Steller sea lion (*Eumetopias jubatus*)', *The Journal of the Acoustical Society of America*, 127: 2692-701.
- Muto, Marcia, VT Helker, Robyn P Angliss, Brian A Allen, Peter Laurens Boveng, Jeffrey Mark Breiwick, Michael Foley Cameron, Phil Clapham, Shawn Patrick Dahle, and Marilyn E Dahlheim. 2018. "Alaska marine mammal stock assessments, 2017. NOAA Technical Memorandum NMFS-AFSC-378." In. Seattle, WA: Alaska Fisheries Science Center.
- National Park Service [NPS]. 2018. "Request for Marine Mammal Protection Act Incidental Take Authorization (LOA): Monitoring activities in Alaska's National Parks." In.
- Neilson, Janet L., Christine M. Gabriele, Aleria S. Jensen, Kaili Jackson, and Janice M. Straley. 2012. 'Summary of reported whale-vessel collisions in Alaskan waters', *Journal of Marine Biology*: 106282.
- NMFS. 1991. "Final recovery plan for the humpback whale (*Megaptera novaeangliae*).". In. Silver Spring, Maryland: National Marine Fisheries Service, Office of Protected Resources.
- . 2007. "MMPA/ESA Research/Enhancement Permit Application: Determination of population trends, vital rates, movements and foraging ecology of Steller sea lions in Alaska and the Pacific Northwest." In, edited by NOAA Department of Commerce, NMFS, AFSC, MML. Seattle, WA.
- . 2008. 'Recovery plan for the Steller sea lion (*Eumetopias jubatus*). Revision.', *National Marine Fisheries Service, Silver Spring, MD*: 325 p.
- . 2010. "Endangered Species Act Section 7 Consultation Biological Opinion for the authorization of groundfish fisheries under the Fishery Management Plan for Groundfish for the Bering Sea and Aleutian Islands Management Area and the Fishery Management Plan for groundfish of the Gulf of Alaska." In, edited by Alaska Region National Marine Fisheries Service. Juneau, AK.
- . 2013. "Effects of oil and gas activities in the Arctic Ocean: supplemental draft Environmental Impact Statement." In. Silver Spring, Maryland: Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.
- . 2014. "Endangered Species Act section 7 consultation biological opinion for authorization of the Alaska groundfish fisheries under the proposed revised Steller sea lion protection measures." In. Juneau, Alaska: Alaska Region, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.
- . 2015. "Endangered Species Act section 7 consultation biological opinion for the Alaska Federal/State Preparedness Plan for Response to Oil & Hazardous Substance Discharges/Releases (Unified Plan)." In. Juneau, Alaska: Alaska Region, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.
- . 2016a. "Occurrence of Distinct Population Segments (DPSs) of Humpback Whales off

- Alaska. National Marine Fisheries Service, Alaska Region. Revised December 12, 2016." In.
- . 2016b. "Recovery Plan for the Cook Inlet beluga whale (*Delphinapterus leucas*).". In. Juneau, AK: National Marine Fisheries Service, Alaska Region, Protected Resources Division.
- . 2016c. "Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-55, 178 p." In.
- . 2016d. "U.S. National Bycatch Report First Edition Update 2." In, edited by L.R. Benaka, D. Bullock, J. David, E. E. Seney and H. Winarsoo, 90 p.: U.S. Dep. Commer.
- . 2017. "Biological Opinion on the U.S. Navy's proposed training activities in the Gulf of Alaska Temporary Maritime Training Area from April 2017 through April 2022 including Letter of Authorization of take under the MMPA." In, edited by Office of Protected Resources National Marine Fisheries Service. Silver Spring, MD.
- . 2018. "Taking Marine Mammals Incidental to National Park Service's Research and Monitoring Activities in Southern Alaska National Parks: Issuance of Letters of Authorization " In, edited by NOAA Department of Commerce, NMFS, OPR. Silver Spring, MD.
- NOAA. 2018. 'Earth System Research Laboratory, Global Monitoring Division. Recent Monthly Average Mauna Loa CO2', Accessed September 7, 2018.  
<https://www.esrl.noaa.gov/gmd/ccgg/trends/index.html>.
- Normandeau Associates, Inc. 2012. "Effects of noise on fish, fisheries, and invertebrates in the US Atlantic and Arctic from energy industry sound-generating activities." In.: A Literature Synthesis for the US Dept. of the Interior, Bureau of Ocean Energy Management. Contract# M11PC00031.
- Odom, Michael C, Donald J Orth, and Larry A Nielsen. 1992. 'Investigation of barge-associated mortality of larval fishes in the Kanawha River', *Virginia Journal of Science*, 43: 41-46.
- Orr, J. c. , V. J. Fabry, O. Aumont, L. Bopp, S. C. Doney, R. A. Feely, A. Gnanadesikan, N. Gruber, A. Ishida, F. Joos, R. M. Key, K. Lindsay, E. Maier-Reimer, R. Matear, P. Monfray, A. Mouchet, R. G. Najjar, G.-K. Plattner, K. B. Rodgers, C. L. Sabine, J. L. Sarmiento, R. Schlitzer, R. D. Slater, I. J. Totterdell, M.-F. Weirig, Y. Yamanaka, and A. Yool. 2005. 'Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms', *Nature*, 437: 681-86.
- Parks, Susan E. 2003. 'Response of North Atlantic right whales (*Eubalaena glacialis*) to playback of calls recorded from surface active groups in both the North and South Atlantic', *Marine Mammal Science*, 19: 563-80.
- . 2009. "Assessment of acoustic adaptations for noise compensation in marine mammals." In, 3. Office of Naval Research.
- Payne, Katharine, and Roger Payne. 1985. 'Large scale changes over 19 years in songs of humpback whales in Bermuda', *Zeitschrift für Tierpsychologie*, 68: 89-114.
- Peterson, William, Nicholas Bond, and Marie Robert. 2016. 'The blob (part three): Going, going, gone?', *PICES Press*, 24: 46.
- Rehberg, Michael, Lauri Jemison, Jamie N Womble, and Gregory O Corry-Crowe. 2018. 'Winter movements and long-term dispersal of Steller sea lions in the Glacier Bay region of Southeast Alaska', *Endangered Species Research*, 37: 11-24.

- Reisdorph, S. C., and J. T. Mathis. 2014. 'The dynamic controls on carbonate mineral saturation states and ocean acidification in a glacially dominated estuary', *Estuarine, Coastal and Shelf Science*, 144: 8-18.
- Richardson, W. J., C. R. Greene, Jr., C. I. Malme, and D. H. Thomson. 1995. *Marine mammals and noise* (Academic Press, Inc.: San Diego, CA).
- Richardson, W. John, and Charles I. Malme. 1993. 'Man-made noise and behavioral responses.' in John J. Burns, J. Jerome Montague and Cleveland J. Cowles (eds.), *The bowhead whale* (Society for Marine Mammology: ).
- Rodino, Leandro, and Florent Masson. 2015. "Noise control aboard a recreational craft powered by an outboard motor: measurement protocol and systematic errors." In *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*, 5997-6007. Institute of Noise Control Engineering.
- Rolland, Rosalind M, William A McLellan, Michael J Moore, Craig A Harms, Elizabeth A Burgess, and Kathleen E Hunt. 2017. 'Fecal glucocorticoids and anthropogenic injury and mortality in North Atlantic right whales *Eubalaena glacialis*', *Endangered Species Research*, 34: 417-29.
- Rugh, David J, Kim EW Shelden, and Roderick C Hobbs. 2010. 'Range contraction in a beluga whale population', *Endangered Species Research*, 12: 69-75.
- Rugh, David J, Kim EW Shelden, and Barbara A Mahoney. 2000. 'Distribution of Belugas, *Delphinapterus leucas*, in Cook Inlet, Alaska, During June/July 1993–2000', *Marine Fisheries Review*, 62: 6-21.
- Sabine, C. L., R. A. Feely, N. Gruber, R. M. Key, K. Lee, J. L. Bullister, R. Wanninkhof, C. S. Wong, D. W. R. Wallace, B. Tilbrook, F. J. Millero, T. H. Peng, A. Kozyr, T. Ono, and A. F. Rios. 2004. 'The oceanic sink for anthropogenic CO<sub>2</sub>', *Science*, 305: 367-71.
- Shelden, Kim EW, Christy L Sims, Linda Vate Brattström, Kimberly T Goetz, and Roderick C Hobbs. 2015. 'Aerial surveys of beluga whales (*Delphinapterus leucas*) in Cook Inlet, Alaska, June 2014'.
- Silber, Gregory K. 1986. 'The relationship of social vocalizations to surface behavior and aggression in the Hawaiian humpback whale (*Megaptera novaeangliae*).', *Canadian Journal of Zoology*, 64: 2075-80.
- Smith, M. A., M. S. Goldman, E. J. Knight, and J. J. Warrenchuk. 2017. *Ecological Atlas of the Bering, Chukchi, and Beaufort Seas, 2nd Ed.* (Audubon Alaska: Anchorage, AK.).
- Speckman, Suzann G, and John F Piatt. 2000. 'Historic and current use of lower Cook Inlet, Alaska, by belugas, *Delphinapterus leucas*', *Marine Fisheries Review*, 62: 22-27.
- Straley, Janice M. 1990. 'Fall and winter occurrence of humpback whales (*Megaptera novaeangliae*) in southeastern Alaska', *Report of the International Whaling Commission*, Special Issue 12: 319-23.
- Sweeney, K., R Towell, and T. Gelatt. 2018. "Results of Steller Sea Lion Surveys in Alaska, June-July 2018." In, edited by NOAA Department of Commerce, NMFS, AFSC, MML. Seattle, WA.
- T.M., McGuire, Stephens A., and Lauren Bisson. 2014. "Photo-identification of Cook Inlet Beluga Whales in the Waters of the Kenai Peninsula Borough, Alaska: Final Report of Field Activities and Belugas Identified 2011-2013." In, edited by Inc. LGL Alaska Research Associates. Anchorage, Alaska.
- Thompson, Paul O., William C. Cummings, and Samuel J. Ha. 1986. 'Sounds, source levels, and associated behavior of humpback whales, Southeast Alaska.', *Journal of the Acoustical*

- Society of America*, 80: 735-40.
- Tyack, Peter, and Hal Whitehead. 1983. 'Male competition in large groups of wintering humpback whales.', *Behaviour*, 83: 132-54.
- van der Hoop, Julie M., Peter Corkeron, John Kenney, Scott Landry, David Morin, Jamison Smith, and Michael J. Moore. 2016. 'Drag from fishing gear entangling North Atlantic right whales', *Marine Mammal Science*, 32: 619-42.
- Vu, Elizabeth T, Denise Risch, Christopher W Clark, Shonda Gaylord, Leila T Hatch, Michael A Thompson, David N Wiley, and Sofie M Van Parijs. 2012. 'Humpback whale song occurs extensively on feeding grounds in the western North Atlantic Ocean', *Aquatic Biology*, 14: 175-83.
- Wade, P.R., T.J. Quinn II, J. Barlow, C.S. Baker, A.M. Burdin, J. Calambokidis, P.J. Clapham, E. Falcone, J.K.B. Ford, C.M. Gabriele, R. Leduc, D.K. Mattila, L. Rojas-Bracho, J. Straley, B.L. Taylor, J. Urbán R., D. Weller, B.H. Witteveen, and M. Yamaguchi. 2016. "Estimates of abundance and migratory destination for North Pacific humpback whales in both summer feeding areas and winter mating and calving areas. Paper SC/66b/IA21 submitted to the Scientific Committee of the International Whaling Commission, June 2016, Bled, Slovenia." In, 42 p.: International Whaling Commission.
- Weilgart, Linda S. 2007. 'A Brief Review of Known Effects of Noise on Marine Mammals', *International Journal of Comparative Psychology*, 20: 159-68.
- Wieting, D. 2016. "Interim Guidance on the Endangered Species Act Term "Harass". National Marine Fisheries Service, Office of Protected Resources. Silver Spring, MD. October 21, 2016." In.
- Winn, Howard E., Paul J. Perkins, and Thomas C. Poulter. 1970. "Sounds of the humpback whale." In *7th Annual Conference on Biological Sonar and Diving Mammals*, 39-52. Stanford Research Institute, Menlo Park.
- Winship, Arliss J, Andrew W Trites, and Donald G Calkins. 2001. 'Growth in body size of the Steller sea lion (*Eumetopias jubatus*)', *Journal of Mammalogy*, 82: 500-19.
- Wright, S. , and K Savage. 2016. "2016 Copper River Delta Carcass Surveys, Annual Report." In. Juneau, AK: National Marine Fisheries Service, Alaska Region Protected Resources Division.
- WSDOT. 2018. "WSDOT Biological Assessment Preparation Manual." In.
- Zerbini, Alexandre N, Janice M Waite, Jeffrey L Laake, and Paul R Wade. 2006. 'Abundance, trends and distribution of baleen whales off Western Alaska and the central Aleutian Islands', *Deep Sea Research Part I: Oceanographic Research Papers*, 53: 1772-90.