

**National Marine Fisheries Service
Endangered Species Act Section 7 Consultation
Biological Opinion FPR-2013-9049**

Agency: Permits and Conservation Division, Office of Protected Resources,
National Marine Fisheries Service, NOAA

Activities Considered: Issuance of Permit No. 18016 for Cook Inlet beluga whale research
in Cook Inlet, Alaska

Consultation Conducted by: Endangered Species Act Interagency Cooperation Division, Office
of Protected Resources, National Marine Fisheries Service, NOAA

Approved by: Perry GAYACDD

Date: MAY 29 2014

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1536(a)(2)), requires Federal agencies to insure that any action they authorize, fund, or carry 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. When a Federal agency's action may affect listed species or critical habitat, formal consultation with National Marine Fisheries Service (NMFS) and/or the U.S. Fish and Wildlife Service (USFWS) is required (50 CFR 402.14(a)).

The National Oceanic and Atmospheric Administration (NOAA) NMFS Office of Protected Resources, Permits and Conservation Division (hereafter referred to as "the Permits Division") proposes to issue a scientific research permit (Permit No. 18016), pursuant to section 104 of the Marine Mammal Protection Act of 1972, as amended (MMPA) (16 U.S.C. 1361 et seq.), and section 10(a)(1)(A) of the Endangered Species Act (ESA), to Tamara McGuire, LGL Alaska Research Associates, Inc. (hereafter referred to as "the Applicant") to count, observe, and photograph beluga whales (*Delphinapterus leucas*) in Cook Inlet, Alaska.

The NOAA NMFS Office of Protected Resources, ESA Interagency Cooperation Division consulted with the Permits Division on their action. This document represents our biological opinion (Opinion) on their action and its effects on ESA-listed species and designated critical habitat. We based our Opinion on the items included in the Permits Division's consultation initiation package and the best scientific and commercial data available, as found in: ESA listing documents, recovery plans, scientific publications, past biological opinions, and other sources of information. We prepared our Opinion in accordance with section 7(a)(2) of the statute (16 U.S.C. 1536(a)(2)), associated implementing regulations (50 CFR 402), and agency policy and guidance (USFWS and NMFS 1998).

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Abbreviations and Acronyms

the Applicant	Tamara McGuire, LGL Alaska Research Associates, Inc.
APPS	Authorizations and Permits for Protected Species
DPS	distinct population segment
ESA	Endangered Species Act
ESU	evolutionarily significant unit
Hz	hertz
kHz	kilohertz
m	meter
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
Opinion	this biological opinion
the Permits Division	the National Marine Fisheries Service's Office of Protected Resources, Permits and Conservation Division
RMS	root mean square
USFWS	U.S. Fish and Wildlife Service
μPa	micropascal
yd	yard
yd^3	cubic yard

1.0 Consultation History

Communication between the Permits Division and the ESA Interagency Cooperation Division regarding this consultation is summarized as follows:

- On August 19, 2013, we received a preliminary section 7 consultation initiation package from the Permits Division containing the permit application, draft permit, the Environmental Assessment prepared for the Applicant's current permit, and annual field reports for the Applicant's current permit.
 - The Permits Division notified us that a memo requesting initiation of formal section 7 consultation would be forthcoming.
- On August 21, 2013, we received a memo requesting initiation of formal section 7 consultation.
- On August 28 and again on September 3, 2013, we sent a list of questions and a request for additional information before section 7 consultation could begin.
- On September 4, 2013, we informed the Permits Division that their initiation package was complete, that we had initiated section 7 consultation, and that we would prepare a final Opinion by January 16, 2014.
 - On January 6, 2014, we mutually agreed to extend the deadline of the final Opinion to February 13, 2014.
 - On February 11, 2014, an extension of the deadline of the final Opinion was mutually agreed upon and set at March 13, 2014.
 - On March 19, 2014, an extension of the deadline of the final Opinion was mutually agreed upon and set at April 9, 2014.
- On January 9, 2014 the Permits Division revised the anticipated impacts of their proposed action.

2.0 Description of the Action

The Permits Division proposes to issue Permit No. 18016 to the Applicant for directed "takes"¹ of the endangered Cook Inlet beluga whale for scientific research purposes under section 104 of the Marine Mammal Protection Act of 1972, as amended (MMPA) (16 U.S.C. 1361 et seq.), and section 10(a)(1)(A) of the ESA.

The purpose of the proposed research is to identify individual Cook Inlet beluga whales and to provide information about movement patterns, habitat use, survivorship, reproduction, and population size. Research would occur between mid-April and mid-November yearly for five consecutive years, with up to 40 surveys per year (200 surveys over the life of the permit). The permit would expire five years from the date of issuance. Table 1, below, shows the estimated proposed take of Cook Inlet beluga whales and harbor seals under the MMPA and take of Cook Inlet beluga whales under the ESA, as presented in the draft permit.

¹ By regulation, "take" under the MMPA is means to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal. This includes, without limitation, any of the following: The collection of dead animals, or parts thereof; the restraint or detention of a marine mammal, no matter how temporary; tagging a marine mammal; the negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in disturbing or molesting a marine mammal; and feeding or attempting to feed a marine mammal in the wild. Under the ESA, a "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to do any of the preceding.

Table 1. Takes of marine mammals over the five-year life of the permit for vessel surveys from April 15th to November 15th, annually, in Cook Inlet, Alaska, as presented in the draft permit.

Species	Life Stage	Sex	Authorized Take	Statute(s)	Procedures
Cook Inlet beluga whale (<i>Delphinapterus leucas</i>)	All	All	120 total, not to exceed 30 in any year	MMPA/ESA	Photo-ID, behavioral observation
Harbor seals (<i>Phoca vitulina</i>)	All	All	1,000 total, not to exceed 200 in any year	MMPA	Incidental harassment

*Takes = the maximum number of animals, not necessarily individuals, that may be targeted for research annually for the suite of procedures in the table.

The applicant calculated take numbers for Cook Inlet beluga whales listed above based on annual takes from similar surveys conducted by the Applicant and other researchers. These numbers represent a “worst-case scenario” (i.e. unexpected high winds causes vessel to drift close to a group of whales). A more detailed discussion about the calculation of take numbers presented here can be found in section 7.2.

The harbor seal is not an ESA-listed or candidate species, thus effects to this species will not be analyzed in this document.

Research activities would include vessel-based photography and behavioral observations. Descriptions of the activities can be found in the following section (2.1).

2.1 Vessel-based Photography and Behavioral Observations

The Applicant would conduct dedicated Cook Inlet beluga whale photo-identification surveys from small vessels and cover a pre-determined route (determined by tidal stage, water depth, and navigational hazards) of a given area within Cook Inlet and would not be line-transect surveys. Surveys would be conducted during ice-free months (mid-April to mid-November) and, based on the combination of season, location, and tide that would provide the greatest likelihood of encountering whales. The primary vessel used would be a Zodiac ProMan9, 4.9-m rigid-hull inflatable with a 4-stroke 50 horsepower Yamaha motor. For safety reasons, a larger vessel (an 8.5-m Munson aluminum hulled landing craft with two 4-stroke 140 horsepower motors) could occasionally be used to access areas of dangerous winds/currents. The survey boat would carry one skipper and one crew member; this two-person team would photograph the whales and record data. If surveys are performed in the Kenai River, then they would be conducted by the two-person team on a Willie Predator, 6.1-m aluminum river boat with a 4-stroke 50 horsepower Yamaha motor, owned and operated by a Kenai River fishing guide.

The survey vessel would approach whale groups at no-wake speed (less than 4 knots). The vessel would parallel the group and match the group's speed and heading in order to obtain images of lateral sides of all individual whales. When possible, researchers would maneuver the vessel to parallel the group towards the leading edge of a traveling group, slowing the vessel to idle and allowing the majority of the group to pass by the vessel. When the researchers have photographed all individuals in the group, or once the researchers determine that they would be unable to photograph all whales in a group, the survey boat would leave the whale group and continue the survey, searching for new whale groups to photograph.

Data collected during beluga whale group encounters would include:

- environmental conditions
- counts of the estimated minimum group size
- minimum number of whales present by color-classes
- number of calves and newborns
- group behavior
- digital photographs for individual whale identification

The researchers would target the right sides of whales for photographs, but they would also take photographs of left sides of whales, if possible. The researchers would use a Nikon D300, 12-megapixel digital SLR camera, with Nikkor 70-300 mm and 80-400 mm zoom telephoto autofocus lenses. The researchers would use a GPS to record positions of whale groups and survey track lines.

2.2 Permit Terms and Conditions

The proposed Permit No. 18016 includes several terms and conditions intended to:

- minimize the potential adverse effects of the research activities on Cook Inlet beluga whales and non- target species
- reduce the number of “takes” of Cook Inlet beluga whales

The following terms and conditions developed by the Permits Division are included in the draft permit (refer to the permit document for a complete list):

- In the event serious injury or mortality² of a protected species occurs, the researchers must:
 - suspend permitted activities and call the Permits Division Chief (301-427-8401) within two business days
 - submit a written incident report within two weeks of the incident
- The Permits Division may grant authorization to resume permitted activities based on review of the incident report and in consideration of the Terms and Conditions of the permit
- If authorized take is exceeded, the researchers must:
 - cease all permitted activities and call the Permits Division Chief (301-427-8401) within two business days
 - submit a written incident report within two weeks of the incident
- Researchers must comply with the following conditions related to the manner of taking:
 - Counting and reporting takes
 - Any “approach”³ of a cetacean constitutes a take and must be counted and reported regardless of whether an animal reacts
 - During an approach, researchers may attempt all procedures in the take table row once (Table 1)
 - No individual animal may be taken more than 3 times in one day
 - General

² The permit does not allow for unintentional serious injury and mortality caused by the presence or actions of researchers. This includes, but is not limited to: deaths of dependent young by starvation following research-related death of a lactating female or death while attempting to avoid researchers. Note that for marine mammals, a serious injury is defined by regulation as any injury that will likely result in mortality.

³ An “approach” is defined as a continuous sequence of maneuvers involving a vessel (including drifting) directed toward a cetacean or group of cetaceans closer than 100 yd (92 m) for baleen and sperm whales and 50 yd (46 m) for all other cetaceans.

- To minimize disturbance of Cook Inlet beluga whales, the researchers must exercise caution when approaching animals and must retreat from animals if behaviors indicate the approach may be interfering with:
 - reproduction
 - feeding
 - other vital functions
 - Where females with calves are authorized to be taken, researchers must:
 - immediately terminate efforts if there is any evidence that the activity may be interfering with pair-bonding or other vital functions
 - not position the research vessel between the mother and calf
 - approach mothers and calves gradually to minimize or avoid any startle response
 - not approach any mother or calf while the calf is actively nursing
 - Non-target species
 - Humpback whales
 - If a humpback whale is seen, researchers must:
 - maintain a distance of at least 100 yd (92 m)
 - Steller sea lions
 - To avoid taking Steller sea lions, researchers must:
 - not approach within 100 yd (92 m) of a Steller sea lion in the water or hauled out on land
 - maintain a vessel distance of at least 3 miles (5.5 km) of a Steller sea lion rookery site listed in 50 CFR 223.202
- Researchers must possess qualifications commensurate with their roles and responsibilities
- Either the Principal Investigator, or Co-Investigator, in Principal Investigator’s absence, must be on-site while permitted activities are conducted
- Persons who require state or Federal licenses to conduct activities authorized under the permit (e.g. veterinarians, pilots) must be duly licensed when undertaking such activities
- The Applicant must submit reports to the Permits Division Chief
 - Annual reports are due each year that the permit is valid⁴
 - A final report is due within 180 days after the permit expires⁵, or, if the research concludes prior to permit expiration, within 180 days of completion of the research
- Research results must be published by the Applicant or otherwise made available to the scientific community in a reasonable period of time and copies of technical reports, conference abstracts, papers, or publications resulting from permitted research must be submitted by the Applicant to the Permits Division
- The Applicant must provide written notification of planned field work to the Assistant Regional Administrator for Protected Resources, Alaska Region, NMFS at least two weeks prior to

⁴ Due date to be determined in final permit.

⁵ Permit expiration date to be determined in the final permit.

initiation of a field trip/season and must include the locations of the intended field study and/or survey routes, estimated dates of research, and number and roles of participants

- To the maximum extent practicable, the researchers must coordinate permitted activities with activities of other researchers conducting the same or similar activities on the same species, in the same locations, or at the same times of year to avoid unnecessary disturbance of animals

2.3 Additional Mitigation Measures

In the permit application, the Applicant has committed to these additional mitigation measures:

- Whale groups would only be approached once per survey day, unless a group is initially difficult to photograph, abandoned by the survey vessel after less than 5 minutes, and encountered again later in the day.
- Whale groups would not be "tracked" (i.e., followed over time) with the survey vessel once photographic samples have been collected
- If whales approach within approximately 2 m of the boat (once the boat has ceased its approach at a distance of at least 50 m), the engine would be put into neutral and/or turned off
- Vessel surveys are not conducted on days when the Applicant is notified that NMFS/National Marine Mammal Laboratory is conducting aerial surveys for Cook Inlet beluga whales
- If groups appear to be sensitive to approach by the vessel, exhibiting behaviors such as tail slaps or "snorkeling behavior" (neither surfacing in the typical arch and roll nor diving, but remaining just at or below the surface to breath), the researchers would:
 - note the behavior
 - leave the group
 - search for other groups to photograph
- Though photographing cow/calf pairs is a research priority, the survey vessel would not approach within 50 m of cow/calf pairs
- The survey vessel would not intentionally split whale groups
- If mating or calving is observed:
 - the behavior would be photographed quickly (beluga mating or calving has never been photographed in Cook Inlet)
 - the survey vessel would move at least 100 m away and turn off the motor
- The survey vessel would take care to avoid approaching groups in shallow areas on a falling tide, in order to avoid the risk of stranding to the whales and to the survey vessel

3.0 Action Area

All vessel and land-based surveys would be confined to waters and shores within or adjacent to Cook Inlet, Alaska (Figure 1). Specific survey areas and schedules would be determined by the combination of seasons, locations, and tides that provide the greatest likelihood of encountering whales. Surveys may occur in some of all of the following areas:

- Vessel surveys
 - Upper Cook Inlet

- Susitna River Delta
 - Knik Arm
 - around the Port of Anchorage
 - Chickaloon Bay/Southeast Fire Island
 - Middle/Lower Cook Inlet
 - Kenai River and Delta
 - Kalgin Island
- Land-based surveys
 - Upper Cook Inlet
 - Turnagain Arm
 - Port of Anchorage



Figure 1. Map of Cook Inlet (from McGuire et al. 2009).

4.0 Approach to the Assessment

Section 7(a)(2) requires every Federal agency, in consultation with and with the assistance of NMFS, to insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. This consultation was initiated because Cook Inlet beluga whales **may be affected** by the permitted action.

During the consultation, we first reviewed information provided by the Permits Division to describe the action. We also described the action area, which includes all areas affected directly and indirectly by the action.

Second, we evaluated the current status of listed species and critical habitat that occur within the action area. We also evaluated the environmental baseline (i.e., past and present anthropogenic impacts within the action area) to determine how species and critical habitat are likely to be affected by the action.

Third, we evaluated the direct and indirect effects of the action on listed species and designated critical habitat. Indirect effects are those that could be caused by the proposed action later in time, but still are reasonably certain to occur. We assessed:

- the exposure to physical, chemical, or biotic stressors produced by the proposed action
- whether such exposure is likely to reduce the survival and reproduction of individuals
- whether fitness reductions would threaten the viability of populations and species
- whether the action is likely to reduce the conservation value of critical habitat

We did not rely on the regulatory definition of “destruction or adverse modification of critical habitat (50 CFR 402.02); instead, we relied upon the statutory provisions of the ESA to complete our critical habitat analysis.⁶ We also evaluated the cumulative effects of non-Federal activities (i.e., State and private) that are reasonably certain to occur within the action area.

For all analyses, we used the best available scientific and commercial data. For this consultation, we relied on:

- information submitted by the action agency
- government reports
- past survey reports for similar research activities
- general scientific literature

During the consultation, we conducted electronic searches of the general scientific literature using the following search engines:

- Agricola
- Aquatic Sciences and Fisheries Abstracts
- BioOne Abstracts and Indexes
- Google Scholar
- IngentaConnect

⁶ Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the “Destruction or Adverse Modification” Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

- JSTOR
- Oceanic Abstracts
- Open Access Journals
- ScienceDirect
- Web of Science

5.0 Status of the Species

Table 2 describes the ESA-listed species, candidate species, and critical habitat that occur in the action area that may be affected by the proposed action.

Table 2. Listed and candidate species and critical habitat (indicated by an asterisk*) that may be affected by the proposed action.

Common Name	Scientific Name	Population (DPS ¹ /ESU ²)	Status ³
Cetaceans			
Beluga whale*	<i>Delphinapterus leucas</i>	Cook Inlet	E
Pinnipeds			
Steller sea lion	<i>Eumetopias jubatus</i>	Western	E
Marine Turtles			
Leatherback sea turtle	<i>Dermochelys coriacea</i>	N/A	E
Anadromous Fishes			
Chinook salmon	<i>Oncorhynchus tshawytscha</i>	Central Valley Spring-run	T
		Upper Columbia River	E
		Puget Sound	T
		Sacramento River Winter-run	E
		California Coastal	T
		Lower Columbia River	T
		Upper Willamette River	T
		Snake River Fall-run	T
		Snake River Spring/summer run	T
		Upper Klamath and Trinity Rivers Basin	C
Chum salmon	<i>O. keta</i>	Hood Canal Summer-run	T
		Columbia River	T
Coho salmon	<i>O. kisutch</i>	Central California Coast	E
		Oregon Coast	T
		Lower Columbia River	T
		Southern Oregon and Northern California Coast	T
Sockeye salmon	<i>O. nerka</i>	Ozette Lake	T
		Snake River	E
Steelhead	<i>O. mykiss</i>	Central California Coast	T
		California Central Valley	T
		Puget Sound	T
		Southern California	E
		Northern California	T
		South Central California Coast	T
		Snake River Basin	T
		Upper Columbia River	T
		Middle Columbia River	T
		Lower Columbia River	T
Upper Willamette River	T		
Marine Fishes			
Pacific Herring	<i>Clupea pallasii</i>	Southeast Alaska	C

¹ DPS = distinct population segment² ESU = evolutionarily significant unit³ ESA status: C = candidate species, E = endangered species, T = threatened species

5.1 Species and Critical Habitat Not Likely to be Adversely Affected by the Action

The proposed action may affect the above species and critical habitat; however, it is not likely to adversely affect all species and critical habitat. If an action's effects on listed species or critical habitat

are insignificant, discountable, or completely beneficial, we conclude that the action is not likely to adversely affect those resources. Insignificant effects relate to the size of impact and do not result in take; discountable effects are unlikely to occur. Here, we describe the species and critical habitat that are not likely to be adversely affected by the proposed action.

5.1.1 Cook Inlet beluga whale Critical Habitat

On April 11, 2011, NMFS designated critical habitat for the Cook Inlet beluga whale. This critical habitat is divided between two areas (see Figure 2):

- Area 1 is 1,909 km² in upper Cook Inlet, bounded by the
 - Municipality of Anchorage
 - Matanuska-Susitna Borough
 - Kenai Peninsula Borough
- Area 2 is 5,891 km² south of Area 1 including:
 - Tuxedni, Chinitna, and Kamishak Bays on the west coast
 - a portion of Kachemak Bay on the east coast
 - an area south of Kalgin Island

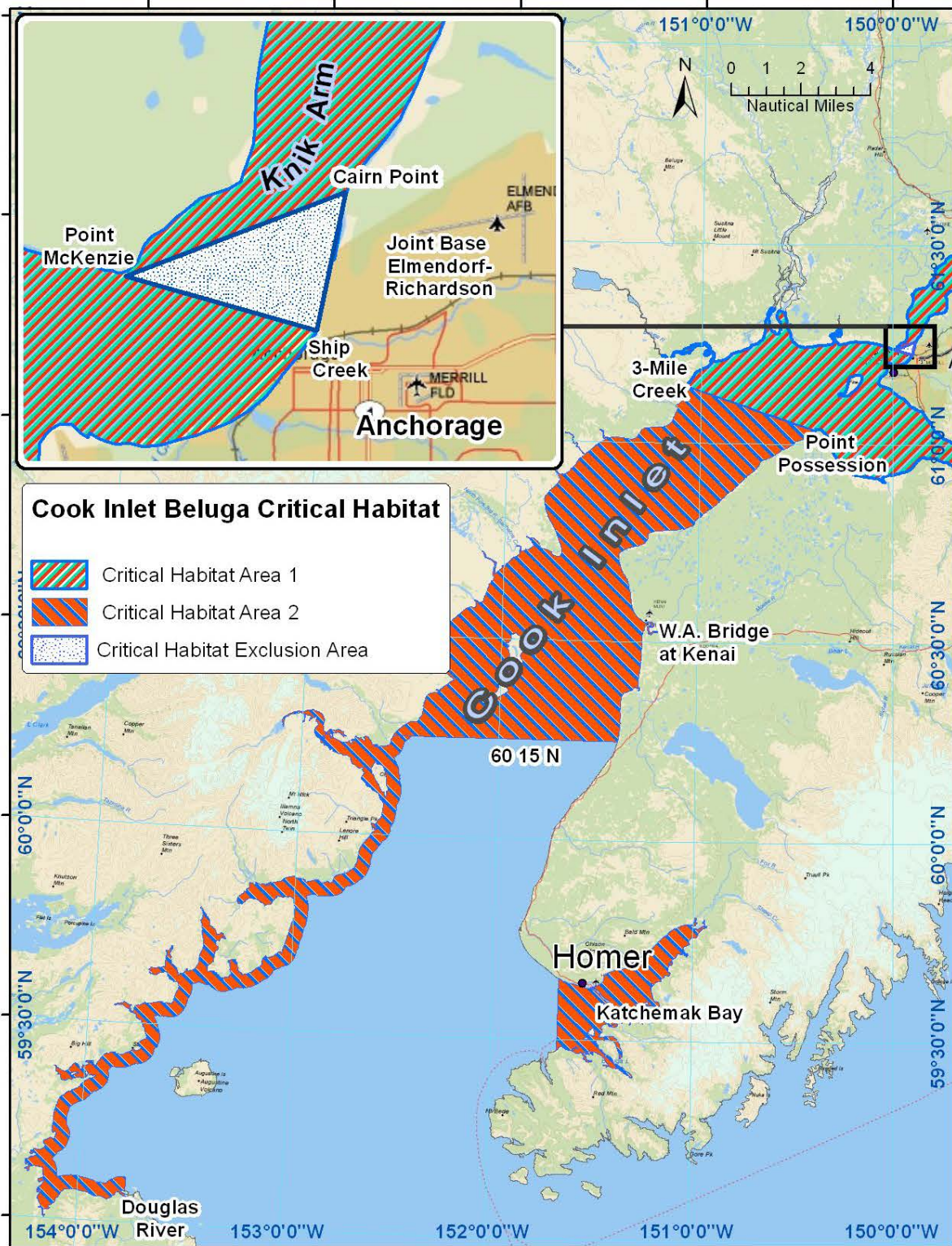


Figure 2. Cook Inlet beluga whale critical habitat.

Area 1 hosts a high concentration of belugas from spring through fall. It provides shallow tidal flats and river mouths or estuarine areas, important to foraging and calving. Mudflats and shallow areas adjacent may allow for molting and escape from predators. Area 2 serves as a feeding and transit area during the fall and winter, where belugas typically occur in smaller densities in deeper waters. Both areas contain the following five primary constituent elements (i.e. physical and biological features essential to the conservation of the species) (76 FR 20180):

- 1) Intertidal and subtidal waters of Cook Inlet with depths less than 30 feet (9.1 m) and within 5 miles (8 km) of high and medium flow anadromous fish streams.
- 2) Primary prey: Pacific salmon (Chinook, sockeye, chum, and coho), Pacific eulachon, Pacific cod, walleye pollock, saffron cod, and yellowfin sole.
- 3) Waters free of toxins or other agents of a type and amount harmful to Cook Inlet beluga whales.
- 4) Unrestricted passage within or between the critical habitat areas.
- 5) Waters with in-water noise below levels resulting in the abandonment of critical habitat areas by Cook Inlet beluga whales.

The proposed action would take place entirely within the designated critical habitat of the Cook Inlet beluga whales. However, because the project would only involve temporary disturbance of the water surface created by the survey vessel, any effect permitted activities may have on prey species and water quality would be insignificant. Additionally, contribution to background noise levels by the survey vessel's motors would be discountable. Therefore, the proposed action is not likely to adversely modify Cook Inlet beluga whale critical habitat and will not be considered further in this Opinion.

5.1.2 Steller Sea Lion

The Steller sea lion was listed as a threatened species in 1990 (55 FR 49204; November 26, 1990). In 1997, NMFS reclassified Steller sea lions as two DPSs under the ESA based on genetic studies and phylogeographical analyses from across the sea lions' range (62 FR 24345; May 5, 1997); at that time the Eastern DPS was listed as threatened and the Western DPS was listed as endangered. On November 4, 2013, the Eastern DPS was removed from the endangered species list (78 FR 66139).

The range of the Steller sea lion extends across the North Pacific Ocean rim from northern Japan, the Kuril Islands and Okhotsk Sea, through the Aleutian Islands and Bering Sea, along Alaska's southern coast, and as far south as the California Channel Islands (Figure 3).

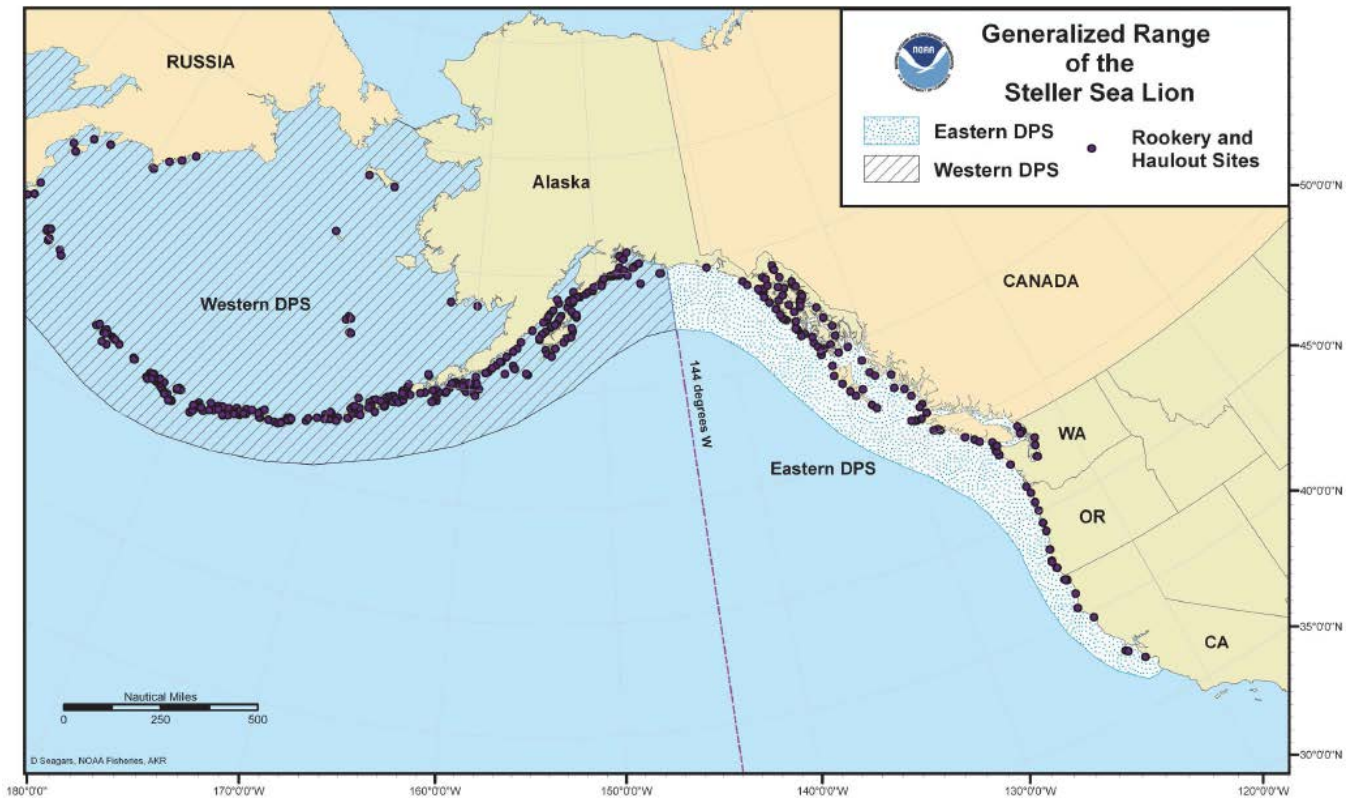


Figure 3. Generalized range of Steller sea lion.

The Western DPS does occur in Cook Inlet, but primarily south of Anchor Point around the offshore islands and along the west coast of the inlet in the bays (Chinitna Bay, Iniskin Bay, etc.; Rugh et al. 2005). The occasional individual animal may wander into Cook Inlet river mouths during summer periods to seek seasonal runs of prey such as salmon or euchalon. No haulouts occur in upper Cook Inlet and Steller sea lions are rarely sighted north of Nikiski (Rugh et al. 2005; Rodrigues et al. 2006). Table 3, below, summarizes recent Steller sea lion sightings in upper Cook Inlet.

Table 3. Steller sea lion sightings in upper Cook Inlet.

Project	Year(s)	Month	Sighting (Y/N/U ¹)	Number of Animals	Source
National Marine Mammal Laboratory aerial surveys	1994 - 2013		N		NMFS, unpubl. data
Opportunistic sightings	2003 - 2013		Y	<5	NMFS, unpubl. data
	2012	May	Y	1	
Alaska Apache 3D seismic monitoring	2012	June	Y	2	Lomac-McNair et al. 2013
	2012	June	U	75	
	2012	August	Y	1	

¹ Y = Yes; N = No; U = Unconfirmed

Since 1994 the National Marine Mammal Laboratory has conducted systematic aerial surveys of Cook Inlet for the purposes of estimating Cook Inlet beluga whale abundance; no Steller sea lions have been documented within the action area during these surveys (NMFS unpubl. data). Opportunistic sightings

reported to NMFS have only sporadically documented single Steller sea lions in Knik or Turnagain Arms (less than five individual Steller sea lions reported since 2003; NMFS unpubl. data).

During vessel-based monitoring associated with Alaska Apache 3D seismic activities in 2012, Steller sea lions were observed on three separate occasions in Cook Inlet. Sightings occurred in May (one animal), June (two animals), and August (one animal) (Lomac-MacNair et al. 2013). These Steller sea lion sightings were made by vessel-based observers when seismic airguns were not active. During aerial surveys for the same project, observers documented approximately 75 pinnipeds hauled out on the banks of the Beluga River (north of the operational area) in June 2012. Because the observers were unable to clearly identify the species from air, the sighting was noted as “unidentified pinnipeds”, but there was some speculation that they could be Steller sea lions given they appeared larger and lighter in color than harbor seals observed in the area at the same time (Lomac-MacNair et al. 2013).

The physical presence of the research vessel may result in visual disturbance to Steller sea lions if Steller sea lions are encountered during the surveys. Sea lions in water tolerate close and frequent approaches by vessels and sometimes congregate around fishing vessels. Those hauled out on land are more responsive but rarely react unless the vessel approaches within 100 to 200 m (Richardson et al. 1995). We expect sea lions on shore to respond to visual disturbance by entering the water and sea lions at sea to dive or swim away. Such behaviors would temporarily interrupt resting, nursing, and foraging behaviors; however the interruption would be isolated and short-lived. Additionally, conditions of the permit require that researchers not approach Steller sea lions within 100 yd (92 m).

The proposed action would take place within the known range of the ESA-listed Western Steller sea lion DPS. However, due to the infrequency of Steller sea lion occurrences in or near the proposed project area, the potential response of Steller sea lions in the unlikely event that they are encountered during a survey, and permit conditions that prevent close approach, we find that the effects would be insignificant. Therefore, the proposed action is **not likely to adversely affect Steller sea lions** and the species will not be considered further in this Opinion.

5.1.3 Leatherback Sea Turtle

The leatherback sea turtle ranges farther than any other sea turtle species. Exhibiting broad thermal tolerances, they are widely distributed throughout the world’s oceans. They are uncommon in the insular Pacific Ocean, but individual leatherback turtles have been encountered in deep water and prominent archipelagoes. While leatherback sea turtles have been documented in the Gulf of Alaska, they are expected to occur offshore in deeper waters than those found in the proposed action area. Researchers in Cook Inlet have not documented encounters with leatherback sea turtles (or any other sea turtles species) in monitoring reports submitted for prior surveys.

The proposed action would take place within the potential range of the leatherback sea turtle; however, because of the unlikelihood of leatherback sea turtle encounters in the proposed project area, the potential effects are considered discountable, therefore, the proposed action is **not likely to adversely affect leatherback sea turtle** and the species will not be considered further in this Opinion.

5.1.4 Anadromous Fish

Several listed DPSs/ESUs of Chinook, coho, chum, and sockeye salmon as well as steelhead trout may occur within Alaska’s coastal and marine waters as these salmonids migrate from the west coast of the United States to forage before returning to their natal streams to spawn. Anadromous fish occurrence in Alaskan waters is generally close to the Alaskan shoreline and around areas of pronounced coastal

upwelling (Emmett et al. 1991; Salo 1991).

The proposed action would take place in areas where anadromous fish may occur; however, because only a single vessel operating on the water's surface would be used during the survey, we conclude that the potential effects of the proposed action on the species are discountable. Therefore, the proposed action is **not likely to adversely affect anadromous fishes** and will not be considered further in this Opinion.

5.1.5 Pacific Herring

On April 2, 2007, the Juneau Group of the Sierra Club, Juneau, Alaska, filed a petition to designate the Lynn Canal stock of Pacific herring as a threatened or endangered DPS. Upon review of the petition, NMFS concluded that, while listing the Lynn Canal stock as threatened or endangered was not warranted, listing a larger Southeast Alaska DPS (that includes the Lynn Canal stock) may be warranted. NMFS ordered an expanded status review of the Southeast Alaska DPS on April 11, 2008 (73 FR 19824). As of the date of this Opinion, no expanded status review or determination on the status of the Southeast Alaska DPS has been published in the Federal Register. While NMFS does not consult on candidate species, candidate species are considered when issuing permits (USFWS and NMFS 1998).

The Southeast DPS of Pacific herring are found in coastal waters of Southeast Alaska during spawning in spring months, and they move to deeper off-shore waters for the remainder of the year. The proposed action would take place in areas where the Southeast Alaska DPS of Pacific herring may occur; however, because it is a candidate species and only a single vessel operating on the water's surface would be used during the survey, we conclude that the potential effects of the proposed action on the Southeast DPS of Pacific herring are discountable and the species **will not be considered** further in this Opinion.

5.1.6 Summary

We conclude that the following ESA-listed species and designated critical habitat are not likely to be adversely affected by the action:

- Cook Inlet beluga whale critical habitat
- Western Steller sea lion DPS
- leatherback sea turtle
- multiple ESU/DPSs of anadromous fishes

In addition, effects to the Southeast Alaska DPS of the Pacific herring, an ESA-candidate species, are considered to be insignificant and/or discountable.

5.2 Species Likely to Be Adversely Affected by the Action

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

- examines the condition of critical habitat throughout the designated area
- evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area
- discusses the current function of the essential physical and biological features that help to form

that conservation value

5.2.1 Cook Inlet Beluga Whale

The beluga whale is a small, toothed, white whale that inhabits Arctic and subarctic waters. The Cook Inlet beluga whale DPS resides year-round within Cook Inlet, in the Gulf of Alaska. It was listed as endangered under the ESA, effective October 22, 2008 (73 FR 62919). We used information available in the final rule, the 2008 Status Review (USFWS and NMFS 1998; Hobbs et al. 2008; Hobbs and Sheldon 2008), and the recent stock assessment reports (Allen and Angliss 2013) to summarize the status of this species.

5.2.1.1 Life History

The Cook Inlet beluga whale is reproductively, genetically, and physically discrete from the four other known beluga populations in Alaska (i.e., those north of the Alaska Peninsula). Its unique habitat experiences large tidal exchanges, with salinities varying from freshwater to marine at either end of the estuary. Belugas occur in mid-Inlet waters in the winter. During spring, summer, and fall, they concentrate in the upper Inlet (a contraction of its range), which offers the most abundant prey, most favorable feeding topography, best calving areas, and best protection from predation.

Cook Inlet beluga whales feed on a wide variety of prey species, focusing on specific species when they are seasonally abundant. During the spring, they focus on eulachon; in the summer, as the eulachon runs diminish, their focus shifts to salmon species. These fatty, energy-rich prey are critical to pregnant and lactating belugas.

Calves are born in the summer and remain with their mothers for about 24 months. The calving interval ranges from two to four years. Females reach sexual maturity at four to 10 years, and males mature at eight to 15 years. Life expectancy exceeds 60 years.

5.2.1.2 Acoustics

Beluga whales have a well-developed sense of hearing and echolocation. They hear over a large range of frequencies, from about 0.04 to 100 kilohertz (kHz), although their hearing is most acute from 10 to 75 kHz (Richardson et al. 1995). They call at frequencies of 0.26 to 20 kHz and echolocate at frequencies of 40 to 60 kHz and 100 to 120 kHz (Blackwell and Greene 2002).

5.2.1.3 Threats to Species

The Cook Inlet beluga whale is endangered as a result of over-exploitation. A brief commercial whaling operation in the 1920s harvested 151 Cook Inlet beluga whales in five years. Cook Inlet beluga whales were harvested by Alaska Natives and for sport prior to the enactment of the MMPA in 1972. Annual subsistence harvests by Alaska Natives during 1995 to 1998 averaged 77 whales, with 20 percent of the population harvested in 1996. Though subsistence removals through the 1990s are sufficient to account for the declines in abundance, other factors now threaten the DPS. Since 1988, 188 dead belugas have been documented in upper Cook Inlet. Twenty deaths were attributed to mass stranding events, but the majority of deaths (168) were reported as “dead stranded” and not attributed to a mass stranding event (NMFS 2008; NMFS, unpubl. data). The causes of stranding are uncertain but may be linked with the extreme tidal fluctuations experienced in Cook Inlet, predator avoidance, or pursuit of prey. Additional threats include: coastal development, oil and gas development, seismic exploration, point and non-point source discharge of contaminants, contaminated waste disposal, water quality standards, activities that involve the release of chemical contaminant and/or noise, vessel operations, and research (73 FR 62919).

5.2.1.4 Abundance and Productivity

The most recent abundance estimate for the Cook Inlet beluga whale is 315 (CV = 0.13) individuals, based on an average of population estimates from 2009 to 2011 (Allen and Angliss 2013). Subsistence removals led to a 47 percent decline from 1994 to 1998 (from 653 to 347 whales). From 1999 to 2008, the population has declined an average of 1.5 percent per year, despite restrictions on subsistence harvest since 1999 (0 to 2 whales harvested annually; 5 total; none harvested since 2004). Hobbs et al. (2012) calculated 5-year birthing average of Cook Inlet beluga whale to be 3.6 percent.

Hobbs and Sheldon (2008) conducted a population viability analysis for Cook Inlet beluga whale and reported a 26 percent probability of extinction in 100 years (for the model assuming one predation mortality per year and a five percent annual probability of an unusual mortality event killing 20 percent of the population).

5.2.1.5 Status Summary

In summary, the Cook Inlet beluga whale is an endangered species that continues to decline in abundance despite removal of the primary cause of endangerment (i.e., over-exploitation). Hobbs and Sheldon (2008) concluded that the population's resilience to future perturbation is low because of the following factors:

- the population has not grown as expected with the cessation of harvest
- as a result of the range contraction, the population range is more vulnerable to catastrophic events
- if the current DPS is extirpated, it is unlikely other belugas would repopulate Cook Inlet

6.0 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). For this Opinion, the action area is Upper Cook Inlet and the northern portion of Lower Cook Inlet (see Figure 1).

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

6.1 Stranding

The extreme tidal fluctuations of upper Cook Inlet, along with Cook Inlet beluga whale preferences for shallow coastal waters, predispose these animals to stranding. Stranding events in Cook Inlet are known to occur in conjunction with high tidal fluctuations ("spring tides") and killer whale sightings. Also, beluga whales in Canada are known to intentionally strand themselves during the molting process, while rubbing their skin against rocky bottoms.

Cook Inlet beluga whale stranding events have been reported throughout the Inlet. Improved

recordkeeping began in 1994, therefore reports prior to 1994 are considered to represent the least amount of stranded whales annually. Table 4 shows

- date, location, and number of individuals involved in mass stranding events
- mortalities associated with mass strandings
- total annual dead strandings
- total annual stranding mortality for Cook Inlet beluga whales

Table 4. Cook Inlet beluga whale stranding records from 1988 to 2013.

Year	Date	Location	Individuals	Associated Mortalities	Other Dead Stranded ¹	Total Annual Mortality
1988	10/23	Turnagain Arm	27	0		
1989	-	-	-	-	4	4
1990	-	-	-	-	2	2
1991	8/31	Turnagain Arm	70 - 80	0	2	2
1992	10/6	Kenai River	2	2	3	5
1993	7/6	Turnagain Arm	10	0	3	3
1994	6/14	Susitna River	186	0	7	7
1995	-	-	-	-	2	2
1996	6/12	Susitna River	63	0	7	12
	8/28	Turnagain Arm	60	4		
	9/2	Turnagain Arm	20 - 30	1		
	9/8	Knik Arm	1	0		
	10/2	Turnagain Arm	10 - 20	0		
1997	-	-	-	-	3	3
1998	5/14	Turnagain Arm	30	0	10	10
	9/7	Turnagain Arm	5	0		
1999	8/29	Turnagain Arm	58	5	7	12
	9/9	Turnagain Arm	12 - 13	0		
2000	8/27	Turnagain Arm	8	0	13	13
	9/24	Turnagain Arm	15 - 20	0		
	10/24	Turnagain Arm	1 - 2	0		
2001	-	-	-	-	10	10
2002	-	-	-	-	13	13
2003	4/18	Turnagain Arm	2	0	15	20
	8/28	Turnagain Arm	46	5		
	9/6	Turnagain Arm	26	0		
	9/14	Turnagain Arm	32	0		
	10/6	Turnagain Arm	9	0		
2004	-	-	-	-	13	13
2005	8/24	Knik Arm	6	1	5	6
2006	9/12	Knik Arm	12	0	8	8
2007	-	-	-	-	15	15

Table 4. Cook Inlet beluga whale stranding records from 1988 to 2013.

Year	Date	Location	Individuals	Associated Mortalities	Other Dead Stranded ¹	Total Annual Mortality
2008	8/7	Knik Arm	28 - 30	2	9	11
2009	-	-	-	-	4	4
2010	8/21	Knik Arm	11	0	5	5
	8/29	Knik Arm	2	0		
2011	8/1	Not reported	2	0	2	2
2012	8/21	Turnagain Arm	23	0	2	2
	8/29	Turnagain Arm	3	0		
2013	-	-	-	-	4	4
TOTAL			780 - 819	20	168	188

¹ These are annual totals of dead stranded whales not associated with mass stranding events.

Table adapted from stranding information presented in NMFS (2008) and from NMFS (unpubl. data).

Most mass strandings (strandings involving two or more whales) are reported in Turnagain Arm (20 of 28 reported mass strandings, or 71 percent). Large numbers of mortalities associated with mass stranding events are rare: between 780 and 819 whales have stranded in upper Cook Inlet since 1988, but only 20 deaths were associated with mass strandings. Since 1988, 168 Cook Inlet beluga whales have been reported dead, unassociated with a live mass stranding event (“dead stranded”). There have been 188 total stranding mortalities (both mortalities associated with mass strandings and dead stranded) in Cook Inlet from 1988 to December 2013 (NMFS 2008; M. Migura, NMFS Alaska Region, pers. comm. to B. Crokus, contractor for ESA Interagency Cooperation Division, December 17, 2013).

The NMFS 2006 status review (Hobbs et al. 2006) recognized that stranding was a constant threat to the Cook Inlet beluga whale recovery and determined this declining population could not easily recover from multiple mortalities that resulted from a mass stranding event. Of significant concern is the loss of reproductive females: in 2009, four female Cook Inlet beluga whales stranded, including two pregnant whales. This has a greater impact to recovery than had all four been male. The annual abundance estimates continue to confirm a declining population trend and stranding events may represent a significant threat to the conservation and recovery of these whales.

6.2 Predation

The Cook Inlet beluga whale stock is preyed upon by killer whales, their only known natural predator. NMFS has received reports of killer whales throughout Cook Inlet. Based on opportunistic data, Sheldon et al. (2003) estimated that at least one beluga whale is killed each year due to killer whale predation. The effects of killer whale predation were addressed in the 2006 status review for the species (Hobbs et al. 2006); the models used demonstrated killer whale predation could significantly impact recovery when combined with unusual mortality events occurring every 20 years. Thus, NMFS considers killer whale predation to be a potentially significant threat to the population.

6.3 Diseases and Parasitic Infections

A variety of pathogens may affect the health of marine mammals. Bacterial pneumonia, either alone or in conjunction with a parasitic infection, is a common cause of beach stranding and death of marine

mammals (Howard et al. 1983); therefore, it may affect Cook Inlet beluga whales. Viruses such as morbilliviruses, influenza, and the herpes virus are also widespread in marine mammals and are recognized as key causes of individual and mass mortalities. Viruses can compromise an animal's immune system and render it susceptible to secondary invaders such as bacterial agents and parasitic protozoa. Pulmonary aspergillosis is the most common mycotic infection in marine mammals and has been isolated in a captive beluga whale, harbor seal, and killer whale samples collected (Reidarson et al. 2001). See Hobbs et al. (2008) for an expanded discussion of pathogens in the Cook Inlet beluga whale population.

Reidarson et al. (2001) postulated that exposure of free ranging belugas to fungal organisms is expected to be lower compared to captive animals. However, because Cook Inlet beluga whales are found throughout the inlet during all months of the year, the threat of an outbreak affecting the population is expected to be higher than for species with much broader distributions. Hobbs et al. (2008) considered disease and parasitic introduction to be a potentially catastrophic event in the formulation of their Cook Inlet beluga whale population viability analysis. For the purposes of this consultation, we expect that Cook Inlet beluga whales are periodically exposed to parasites as well as bacterial, viral, and fungal diseases.

6.4 Climate Change

The climate in Cook Inlet is driven by the Alaska Coastal Current and the Pacific decadal oscillation. Phase changes of the Pacific decadal oscillation have been correlated with changes in marine ecosystems in the northeast Pacific. Warm phases have been accompanied by increased biological productivity in coastal waters off Alaska and decreased productivity off the west coast of Canada and the U.S. with the opposite effect happening during cold phases (Mantua et al. 1997; Jin et al. 2009; Litzow 2006). Cold phases may negatively affect zooplankton biomass and composition in the action area (Batten and Mackas 2007), which in turn may influence changes in fish composition and alter the quality and types of fish available for Cook Inlet beluga whales.

Recent sampling of oceanographic conditions (via oceanographic station GAK-1) just south of Seward, Alaska, has revealed anomalously cold conditions in the Gulf of Alaska from 2006 to 2009 suggesting a shift to a colder Pacific decadal oscillation phase; however, the most recent sampling season in 2010 yielded a return to near average temperatures thus running counter to these results (Hopcroft et al. 2011). Seasonal movement of Cook Inlet beluga whales appears to be influenced by water temperature, ice cover, and river discharge (Ezer et al. 2013), all of which may be linked to fluctuations of the Pacific decadal oscillation.

A shift to a colder phase would be expected to impact prey populations available within the action area over the five year duration of the proposed permit.

6.5 Whaling

As discussed in the Status of the Species section of this Opinion (Sections 5.2.1.4 and 5.2.1.5), prior commercial and subsistence whaling continues to threaten the ability of Cook Inlet beluga whales to recover and is expected to continue to impact the DPS. The beluga whale population declined as much as 14 percent annually from 1994 to 1998 throughout Cook Inlet due to subsistence whaling (Hobbs et al. 2000). The current harvest plan sets five year harvest limits based on the estimated population abundance over the previous five-year period as well as population growth rates from abundance estimates for the most recent ten-year period. Because the five-year average abundance was below 350

whales for the 2008 to 2012 assessment period, the allowable harvest during the subsequent five-year period, 2013 to 2017, is set at zero (73 FR 60976).

While we do not anticipate that direct subsistence whaling would have a significant effect on beluga whales over the proposed permit period, prior exploitation may have altered the population structure and social cohesion of these species such that effects on abundance and recruitment may continue for years. Also, past whaling pressure significantly lowered population numbers such that their ability to resist the effects of deleterious phenomena such as demographic stochasticity, inbreeding depression, and Allee effects, is decreased. This decreased resistance to deleterious phenomena has greatly affected the ability of this species to recover to pre-exploitation levels.

6.6 Poaching and Harassment

Poaching is a possible threat, though no poaching incidents have been confirmed to date. Due to their approachable nature and the juxtaposition of people and Cook Inlet beluga whales in and near coastal waters, there is potential for poaching Cook Inlet beluga whales. Though suspected harassment incidents have been investigated, to date there have been no convictions. NOAA Office of Law Enforcement officers are present in upper Cook Inlet, though the area they cover is extensive.

6.7 Fisheries

Commercial and recreational fishing activities occurring within and around the action area pose multiple threats to Cook Inlet beluga whales including possible ship strikes, entanglement in fishing gear, and/or direct competition with prey resources. Given that Cook Inlet beluga whales typically congregate in the upper portions of Cook Inlet during the summer months (Rugh et al. 2010), fisheries occurring in upper Cook Inlet would have a higher likelihood of interacting with Cook Inlet beluga whales than those occurring in lower Cook Inlet.

The state-managed fisheries operating in the upper and middle portions of the Inlet include:

- salmon (both set and drift gillnet)
- herring (gillnet)
- eulachon (dip net)
- razor clam

Incidental take rates by commercial salmon gillnet (both set and drift) fisheries in the Inlet were estimated at three to six beluga whales per year during the period 1981 to 1983 (Burns and Seaman 1986). There have been two reports during the past twenty years where a single beluga whale was entangled in fishing nets (drift net and set gillnet); however, mortalities could not be confirmed. NMFS placed observers in the Cook Inlet salmon drift net and upper and lower Inlet set gillnet fisheries in 1999 and 2000. During the two years of observations, only three beluga whale sightings occurred and no beluga whale injuries or mortalities were reported. During the period 1990 to 2000, fishermen's voluntary self-reports did not indicate any interactions resulting in mortalities. NMFS is unaware of any beluga whales injured or killed in Cook Inlet due to personal use, subsistence, or recreational fisheries.

Aside from direct mortality and injury from fishing activities, commercial fisheries may also compete with Cook Inlet beluga whales for salmon and other prey species. There is strong indication that Cook Inlet belugas are dependent on access to relatively dense concentrations of high value prey throughout the summer months. Native hunters often stated that beluga whales appear thin in early spring (due to utilizing the fat stores in their blubber layer during winter), and tend to sink rather than float when

struck. The largest fisheries in terms of participant numbers and landed biomass are the State-managed salmon drift and set gillnet fisheries (NMFS 2008), with most fisheries occurring “upstream” of the river mouths and estuaries where beluga whales typically feed. Any diminishment in the ability for beluga whales to reach or utilize spring/summer feeding habitat, or any reductions in the amount of available prey, could impact the energetics of these animals and delay recovery.

In summary, though the extent to which commercial fisheries affect Cook Inlet beluga whales is uncertain, we would expect that commercial and recreational fishing activities (i.e., ship strike, entanglement, and vessel noise) result in harassment of Cook Inlet beluga whales. However, the current literature suggests that the possibility for serious injury and/or mortality as a result of fishing activities is extremely rare. While the degree to which commercial and recreational fisheries impact the energetics of individual whales is unknown, we assume, for the purposes of this consultation, that commercial and recreational fisheries represent an ongoing threat to the ability of these species to survive and recover given the direct competition between beluga whales and fisherman for similar prey resources. Additional research into whale energetics as well as the impact of fishing on predator-prey dynamics should further inform the impact that commercial and recreational fishing has on Cook Inlet beluga whales.

6.8 Pollution

Moore et al. (2000) and Burkholder et al. (2007) described the following sources degrading nearshore and offshore coastal waters in the action area:

- discharges from industrial activities that do not enter municipal treatment systems
- discharges from municipal wastewater treatment systems
- runoff from urban, mining, and agricultural areas
- accidental spills or discharges of petroleum and other products

This section includes a brief discussion of a few of the prominent pollutant sources in Cook Inlet that have the potential to contribute pollutants and degrade habitat in and around the action area.

6.8.1 Industrial Activities

Dredging, runoff, and ballast water discharges from industrial activities have the potential to affect Cook Inlet beluga whales in the action area.

6.8.1.1 Dredging

Port of Anchorage (“Port”) maintenance dredging has occurred annually since 1965. The current operations and maintenance plan at the Port authorizes the U.S. Army Corps of Engineers to dredge to 35 feet below the water surface (-35 mean lower low water). The footprint dredged at the Port fluctuates annually, varying from 95 acres in 1999 to 117 acres in 2004. Over the past several years the average size of the dredged footprint has been about 100 acres. The amount of dredging required to maintain the Port varies from year to year, with a maximum of about 2.1 million cubic yards (yd³) of material dredged in 2004. Maintenance dredging is conducted by one or more dredges and lasts from mid-May through November, depending on the weather. Two to five barge trips per day transport about 1,500 yd³ of material from each dredge to the disposal site (U.S. Army Corps of Engineers 2008). Dredging along coastal waterways has been identified as a concern with respect to the Saint Lawrence beluga whales (Department of Fisheries and Oceans, Canada 1995). There, dredging of up to 784,770 yd³ of sediments re-suspended contaminants into the water column and seriously impacted the beluga whales. The Saint Lawrence beluga whale recovery plan contains recommendations to reduce the dredge amount and to

develop more environmentally sound dredging techniques (Department of Fisheries and Oceans, Canada 1995). While the volume of dredging in Cook Inlet is comparable to St. Lawrence, the material in Cook Inlet does not appear to contain harmful levels of contaminants (U.S. Army Corps of Engineers 2008). NMFS concluded that dredging and disposal may affect, but are not likely to adversely affect primary constituent elements 1, 2, and 3 of Cook Inlet beluga whale critical habitat and that effects to primary constituent element 4 would be insignificant and discountable (see Section 5.1.1 for descriptions of primary constituent elements) (NMFS 2011d).

6.8.1.2 Runoff

Numerous releases of petroleum hydrocarbons have been documented from the Port, Joint Base Elmendorf-Richardson (formerly Elmendorf Air Force Base), and the Alaska Railroad Corporation. The Port transfers and stores petroleum oils as well as other hazardous materials. Since 1992, all significant spills and leaks have been reported. Past spills have been documented at each of the bulk fuel facilities within the Port and also on Joint Base Elmendorf-Richardson's property (Port of Anchorage 2003a,b). Joint Base Elmendorf-Richardson is listed on the National Priorities List because of its known or threatened releases of hazardous substances, pollutants, or contaminants. Spills have also been reported at the Alaska Railroad Corporation rail yard. In 1986, petroleum seeped into Ship Creek from the nearby rail yard. In 2001, several oil spills occurred (U.S. Army 2010). Freight handling activities have historically caused numerous surface stains and spills at the rail yard.

6.8.1.3 Ballast Water Discharges`

Discharges of wastes from vessels are regulated by the U.S. Coast Guard. Potential discharges include oily waste, sewer water, gray water (e.g., shower water), and garbage. Gray water and sewer water, provided that they are free from oil waste, may be discharged in the open sea. However, by law, no discharges of any kind are allowed within three miles of land.

Ships can release pollutants and non-indigenous organisms into Cook Inlet through the discharge of ballast water. From February 2004 to August 2013, 209,258 metric tons of ballast water was released in Cook Inlet (National Ballast Information Clearinghouse 2013). Invasive species were found in Cook Inlet in a 2000 survey by the Smithsonian Environmental Research Center (Hines and Ruiz 2001).

6.8.2 Wastewater

Currently, the treated municipal wastes of ten communities are being discharged into Cook Inlet waters. Levels of treatment of these waste waters range from primary (only materials easily collected from the wastewater [i.e., oils, fats, greases, sand, gravel, rocks, human waste] are removed) to secondary (further treated to substantially degrade the biological content of the discharge) to tertiary (employing additional technologies to increase quality of discharge).

Wastewaters entering these plants may contain a variety of organic and inorganic pollutants, metals, nutrients, sediments, bacteria, viruses, and other emerging pollutants of concern (e.g., endocrine disruptors [substances that interfere with the functions of hormones], pharmaceuticals, personal care products, and prions [proteins that may cause an infection]). Samples from Cook Inlet beluga whales contained less of a contaminant burden than samples taken from other stocks (URS Corporation 2010). NMFS concluded that the U.S. Environmental Protection Agency's proposed approval of the State of Alaska's mixing zone regulations would not jeopardize the continued existence of the Cook Inlet beluga whale (NMFS 2010b).

6.8.3 Runoff

The U.S. Environmental Protection Agency approved the State of Alaska to administer National Pollution Discharge Elimination System permits on October 31, 2008 (FR 66243). Alaska's Department of Environmental Conservation fully assumed authority to administer the wastewater and discharge permitting and compliance program (Alaska Pollutant Discharge Elimination System) on October 31, 2012 (Alaska Department of Environmental Conservation 2013a).

The Municipality of Anchorage operates under a National Pollutant Discharge Elimination System storm water permit to discharge storm water into Cook Inlet (U.S. Environmental Protection Agency 2009a).

Deicing and anti-icing operations occur from October through May at many airports. Depending on the application, deicing activities use different chemicals. For instance, ethylene glycol and propylene glycol are used on aircraft for anti-icing and deicing purposes, whereas potassium acetate and urea are used to deice tarmacs and runways (U.S. Environmental Protection Agency 2000). Deicing materials or their break down products are discharged to waterbodies as stormwater runoff. The following airports near Cook Inlet are required to maintain a Storm Water Pollution Prevention Plan as part of the Multi-sector General Permit for Storm Water Discharges Associated with Industrial Activity (U.S. Environmental Protection Agency 2009b):

- Ted Stevens Anchorage International Airport
- Merrill Field
- Joint Base Elmendorf Richardson
- Lake Hood Seaplane Base

Deicing activities at airports in Alaska were permitted under the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System Multi-sector General Permit from September 29, 2008 to September 29, 2013 (U.S. Environmental Protection Agency 2009b). Administrative extension of permit coverage was granted to previously covered activities (Alaska Department of Environmental Conservation 2013b). The Alaska Department of Environmental Conservation expects a new Multi-sector General Permit to be issued in 2014 (Alaska Department of Environmental Conservation 2013b).

6.8.4 Oil Spills and Petroleum Products

There are 16 oil and gas platforms in Cook Inlet, 14 of which were active as of November 2013 (J. Hunt, Alaska Oil and Gas Conservation Commission, pers. comm. to B. Crokus, contractor for ESA Interagency Cooperation Division, January 6, 2014). Offshore oil production facilities support over 200 wells (including active, inactive, and plugged and abandoned wells) in the upper and middle portions of Cook Inlet. In 2011, Furie Operating Alaska, LLC (previously known as Escopeta Oil of Alaska) began drilling the first of four proposed exploratory wells in upper Cook Inlet within Area 2 of Cook Inlet beluga whale critical habitat. NMFS concurred that the proposed project may affect, but is not likely to adversely affect, Cook Inlet beluga whales or their critical habitat (NMFS 2011c). Drilling started on the final well in August 2013 (Bailey 2013).

We searched for current information relating to oil and gas production, spills, and blowouts in Cook Inlet, and also reached out to various State of Alaska agencies during the course of this consultation. The Alaska Department of Environmental Conservation does maintain the Statewide Oil and Hazardous

Substance Spills Database; however, data for large areas and multiple events are not easily extracted from the online database. The Alaska Department of Environmental Conservation provided us with Cook Inlet spill data in spreadsheet format so that we could more easily search spill events, with the following caveats:

- Records earlier than July 1, 1995, may not be accurate or complete
- One event may be represented by many lines in the spreadsheet (i.e., one event involves multiple substances, causes, affiliated parties, etc.)
- Records for recent spills may not be complete
- Data quantity and quality is variable among records, especially in database fields where data entry is not required or where database fields may be interpreted differently among users
- Geographic coordinates may be highly imprecise and are not recommended for use in a GIS
- The data are provisional and subject to ongoing quality assurance/quality control; ongoing reviews may further refine data accuracy

Though the database contains information for all spills in Cook Inlet, not all are marine spills. To better ensure that only marine spills were being represented in the data, we restricted our search to facility types: offshore, barge, and tanker. Table 5 shows hazardous substances and number of gallons spilled by facility type.

Table 5. Gallons of hazardous substances spilled in Cook Inlet from April 4, 1994 to January 4, 2014.

Substance Type	Gallons Released by Facility Type			Total
	Barge	Offshore	Tanker	
Aviation fuel	563	-	-	563
Ballast water (containing oil)	-	-	22	22
Crude	-	2,777	471	3,248
Diesel	2,863	9,160	3	12,026
Drilling muds	-	1,810	-	1,810
Engine lube oil	36	179	1	216
Gasoline	345	-	75	420
Grease	-	<1	-	<1
Hydraulic oil	74	1,048	-	1,122
Natural gas	-	11	-	11
Natural gas liquids	-	1	-	1
Process water	-	90	-	90
Produced water	-	1,037	-	1,037
Synthetic oil	-	2	-	2
Transmission oil	-	1	-	1
Turbine fuel	-	18	-	18
Used oil (all types)	3	8	-	11
Total	3,884	16,142	572	20,598

In addition to liquid spills in Cook Inlet, the database showed 202 pounds of natural gas were released offshore.

NMFS (2008) identified the following impacts to Cook Inlet beluga whales exposed to spills:

- death or injury from swimming through oil
 - skin contact
 - ingestion of oil
 - respiratory distress from hydrocarbon vapors
- contaminated food sources
- displacement from foraging areas

The greatest potential threat to Cook Inlet beluga whales from an oil spill is the inhalation of toxic vapors that concentrate above oil slicks, which, in extreme cases, could result in sudden death (Geraci 1990). NMFS, in cooperation with numerous agencies, developed an area oil spill contingency plan (a.k.a. Unified Plan), which has been operational since 1994. This plan is reviewed and updated as needed to ensure its applicability to ever-changing oil spill risks and to integrate experience gained from response in other regions.

In addition to oil spills (which are low-probability events), water pollution from oil and gas activities may include:

- marine discharge of drilling fluids (muds and cuttings)

- produced waters (the water phase of liquids pumped from oil wells)
- gray waters
- sanitary wastes

Drilling fluids discharged into Cook Inlet average 89,000 barrels (2,803,500 gallons) annually and contain several pollutants (NMFS 2008). On October 31, 2012, the State of Alaska assumed administration and enforcement of the discharges from these offshore platforms under the Alaska Pollutant Discharge Elimination System program in lieu of the U.S. Environmental Protection Agency.

While it is expected that implementation of the contingency plan would be expected to reduce overall impacts from oil spills as they occur, we still expect that major oil spill events would significantly impact the Cook Inlet beluga whale population's ability to survive and recover.

6.9 Coastal Development

Southcentral Alaska is the State's most populated and industrialized area. The Upper Cook Inlet region, specifically, is the major population center of Alaska. In 2012, the U.S. Census Bureau estimated populations for:

- Anchorage (298,610 people)
- Matanuska-Susitna Borough (93,925 people)
- Kenai Peninsula Borough (56,900 people)

Many cities, villages, ports, airports, treatment plants, refineries, highways, and railroads are situated on or very near to Cook Inlet. Cook Inlet beluga whales are not uniformly distributed throughout Cook Inlet; instead, they are predominantly found in nearshore waters, and concentrate in the upper Inlet in summer. Though large portions of beluga habitat in Cook Inlet remain intact, extensive sections have been developed:

- Turnagain Arm and Anchorage shorelines (e.g., rip rap, road, and railroad construction)
- Knik Arm supports the largest port and military base in the state
- numerous offshore oil and gas platforms ranging between the Forelands to just north of Tyonek

6.10 Shipping and Vessels

Multiple classes of vessels ranging from large shipping vessels and tankers to small fishing boats and jet skis operate year round within Cook Inlet and can temporarily harass Cook Inlet beluga whales or cause serious injury or death due to ship strikes. Few, if any, of these activities are subject to consultation under section 7 of the ESA. There are eight port facilities located in Cook Inlet (Anchorage, Point MacKenzie, Tyonek, Drift River, Nikiski, Kenai, Anchor Point, and Homer) and commercial shipping occurs year round. While no ship strikes have been definitively confirmed in Cook Inlet for any of the three species affected by the proposed action, a dead beluga whale washed ashore with "wide, blunt trauma along the right side of the thorax" in October 2007 (NMFS 2008), suggesting a ship strike may have caused the injury.

Due to their slower speed and straight line movement, ship strikes from large vessels are not expected to pose a significant threat to Cook Inlet beluga whales. However, smaller boats that travel at high speed and change direction often present a greater threat. Beluga whales often concentrate near river mouths, which predispose them to strikes by high speed watercraft that have access to shallow, nearshore areas. The mouths of the Susitna and Little Susitna Rivers, in particular, are areas where small vessel traffic

and whales commonly occur. Vessels that operate near these whales have an increased probability of striking a whale, as evidenced by observations of Cook Inlet beluga whales with propeller scars (McGuire et al. 2011a, 2011b). In addition to small boats, jet skis are becoming more abundant in the inlet. Small vessels, especially jet skis, are capable of navigating waters not available to other mariners. Jet skis have added to the competition for the few sites in upper Cook Inlet that are heavily used by Cook Inlet beluga whales during the summer months.

6.11 Sound

Marine mammals use sound in the ocean environment to find prey, locate mates, rear young, navigate, and avoid predators (Bradley and Stern 2008). Underwater sound generated in the marine environment has the potential to increase stress levels, alter behavior, result in temporary or permanent hearing loss, and/or, in extreme cases, result in direct injury and even death (Richardson et al. 1995; National Resource Council 2003; National Research Council 2005; Nowacek et al. 2007; Southall et al. 2007; Wright et al. 2008).

Within the action area and in the surrounding waters of Cook Inlet, Cook Inlet beluga whales must compete acoustically with many natural and anthropogenic sounds. Moore et al. (2000) identified the following man-made sources of sound in Cook Inlet:

- large and small vessels, aircraft
- oil and gas drilling
- marine seismic surveys
- pile driving
- dredging

The effects of man-made sound and associated increased background noise depend on several factors including:

- intensity, frequency and duration of the sound
- location and behavior of the whales upon exposure
- acoustic nature of the environment

High frequency sound diminishes more rapidly than lower frequency sound. Sound also dissipates more rapidly in shallow waters and over soft bottoms (sand and mud). Much of upper Cook Inlet is generally a poor acoustic environment because of its shallow depth, sand/mud bottoms, and high background noise from currents and glacial silt (Blackwell and Greene 2002).

6.11.1 Vessels

Commercial shipping traffic is a major source of low frequency anthropogenic sound in the action area. Although large vessels emit predominantly low frequency sound (lower than 2 kHz), studies report broadband sound from large cargo ships at levels exceeding 2 kHz, which may interfere with important biological functions of cetaceans (Holt 2008). However, the primary concern of incidental shipping sound is not related to acute exposures, but rather to the general increase in continuous background ambient noise and the potential masking of marine animals' communication systems, their ability to hear mating calls, and their ability to pick up acoustic environmental cues that animals use to navigate and/or sense their surroundings, including sounds that are used to detect predators (OSPAR Commission 2009).

Another concern of increased sound from shipping traffic and recreational vessels is the gradual

habituation of listed whales to these types of sound sources. Habituation may increase the risk of vessel strikes since the whales do not actively avoid the sounds generated by an oncoming vessel. Beluga whales may habituate to vessel sounds as evidenced by recent studies that show that belugas still inhabit areas with high disturbance and heavy boat traffic such as the Port of Anchorage (Rugh et al. 2010). This study indicates that increased vessel traffic in the action area will continue to affect the ability of cetaceans to perceive threats as well as to communicate with mates and other conspecifics in and around the action area.

6.11.2 Construction

Source sound pressure levels vary widely among construction activities and range from relatively low source levels (drilling operations) to very high source levels (pile-driving and use of explosives) (OSPAR 2009). While studies documenting the effects of marine construction and industrial activities on cetaceans are limited, it's expected that given the comparatively low source levels, injuries from either dredging or drilling operations are unlikely in marine mammals, except those located very close to the source (Southall et al. 2007). Underwater explosions, on the other hand, have the ability to permanently injure the auditory systems of marine mammals, as Ketten et al. (1993) reported injury in the ears of two humpback whales stranded after underwater explosions.

Construction associated with the Port of Anchorage's current Marine Terminal Development Project has been ongoing on a seasonal basis since 2006, and has included both in-water and out-of-water activities. The Port Intermodal Expansion Project will add 135 acres of usable land to the current 129-acre Port (total area of 264 acres). The Project will:

- rebuild and enlarge docking facilities
- improve loading/unloading facilities
- provide additional working space to handle shipped fuel, freight, and other materials
- improve access by road and rail transportation serving the Port

The new expanded Port will provide efficient transport of goods into and out of Anchorage for over 50 years. In 2009, NMFS consulted with the U.S. Department of Transportation, Maritime Administration and the U.S. Army Engineer District, Alaska, on the Marine Terminal Development Project. NMFS concluded that exposure to construction and operational noise and other sound sources associated with the project have the potential to harass Cook Inlet beluga whales, although such takes is expected to be temporary and not to affect the reproduction, survival, or recovery of the species (NMFS 2009b). Annual take by harassment was authorized for 34 beluga whales. Take has been reported annually for this project:

- 23 beluga whales were taken in 2009
- 13 were taken in 2010
- 4 were taken in 2011

These takes were determined by the presence of belugas within the designated harassment zones, and not behavioral criteria. No in-water work was conducted in 2012 or 2013.

In a subsequent consultation related to the Marine Terminal Development Plan, NMFS concluded that noise from the project may adversely affect primary constituent element 5 of critical habitat for Cook Inlet beluga whales (see 5.1.1 for descriptions of primary constituent elements); however it is not

believed that belugas would alter their behavior in a way that prevents them from entering and/or transiting throughout Knik Arm, causing abandonment of critical habitat (NMFS 2011d). No incidental take statement was issued in the biological opinion because the consultation analyzed only effects to Cook Inlet beluga whale critical habitat.

In 2010, the U.S. Department of Transportation, Federal Highways Administration consulted with NMFS on a proposed bridge crossing in Knik Arm (NMFS 2010a). The biological opinion concluded that the proposed project was likely to adversely affect Cook Inlet beluga whales due to:

- vessel operations
- noise from pile driving and other construction equipment
- operational noise, including traffic on the elevated crossing structure

No incidental take statement was included with the biological opinion because no incidental take of marine mammals had been authorized under section 101(a)(5) of the MMPA. Construction has not begun on the bridge.

6.11.3 Sonar

Commercial sonar systems are used on recreational and commercial vessels. Sonar is a lesser contributor to the overall ocean noise budget than other sources of anthropogenic sound (OSPAR 2009). Also, the distribution of these sounds would be small because of their short durations and the fact that the high frequencies of the signals attenuate quickly in sea water (Richardson et al. 1995). Sonar emanating from multiple sources may increase effects of masking and cause short-term behavioral effects of Cook Inlet beluga whales.

In 2013 NOAA's National Ocean Service, Office of Coast Survey consulted with NMFS on proposed nationwide hydrographic surveys of coastal waters (NMFS 2013a). The proposed hydrographic surveys would use single beam (greater than or equal to 30 kHz) and multibeam systems (greater than or equal to 50 kHz) that could be heard by Cook Inlet beluga whales. The biological opinion concludes that exposure of Cook Inlet beluga whales to single beam sonar noise would be unlikely, but, if exposure occurred, it would not likely result in the reduced fitness of any individual. For multibeam exposures, the biological opinion concludes that any interruption of vital behaviors would be expected to be temporary and easily avoidable by Cook Inlet beluga whales because of the short duration of disturbance (from several hours to several days) and the small size of the area in which the stressor would occur (less than 1 km in two areas of Cook Inlet). Therefore, due to the small likelihood of exposure, the protective measures (i.e., avoiding whales, ceasing transmission, etc.), and the small magnitude of potential responses, it is not expected that any Cook Inlet beluga whales would experience reduced fitness as a result of multibeam surveys in Cook Inlet. No incidental take statement was included with the biological opinion because no incidental take of marine mammals had been authorized under section 101(a)(5) of the MMPA. To date, no Office of Coast Survey hydrographic surveys have been conducted in Cook Inlet.

6.11.4 Seismic Surveys

Seismic surveys using towed airguns is the primary exploration technique for oil and gas deposits, fault structure, and other geological hazards and surveys that have occurred within Cook Inlet. Airguns generate intense low-frequency sound pressure waves capable of penetrating the seafloor and are fired repetitively at intervals of 10 to 20 seconds for extended periods (National Research Council 2003).

Most of the energy from the guns is directed vertically downward, but significant sound emission also extends horizontally. Peak sound pressure levels from airguns usually reach 235 to 240 dB re: 1 micropascal (μPa) at dominant frequencies of 5 to 300 Hz (National Research Council 2003). Most of the sound energy is at frequencies below 500 Hz. Very little data exists on the effects of seismic surveys on cetaceans beyond short-term behavioral responses. However, where responses have been observed, it is not known whether these reactions were significant at the population level (OSPAR 2009).

In the United States, all seismic surveys for oil and gas exploration, and most research activities involving the use of airguns with the potential to take marine mammals, are covered by incidental harassment authorizations under the MMPA and undergo consultation under section 7 of the ESA if there is potential to take endangered or threatened species. In 2012 and 2013, incidental harassment authorizations of Level B harassment for up to 30 individual Cook Inlet beluga whales were issued for the Apache Alaska Corporation's Cook Inlet 3D Seismic Program (77 FR 27720; 78 FR 12720). In February 2012, a biological opinion authorizing non-lethal incidental take (exposure to impulsive sounds with received levels greater than or equal to 160 dB re: 1 μPa -root mean square for up to 30 Cook Inlet beluga whales per year for three years was issued for the project (NMFS 2012). Seismic activities were conducted in 2012 and no takes of Cook Inlet beluga whales occurred (Lomac-MacNair et al. 2013). No seismic activities occurred in 2013, and it is unknown if the Applicant will seek an incidental harassment authorization for 2014. Other seismic activities that have occurred in Cook Inlet include:

- a seismic program near Anchor Point in 2005
- geophysical seismic operations in 2007 near:
 - Tyonek
 - the Forelands area
 - Anchor Point
 - areas west of Clam Gulch
- other small seismic surveys in 2012

6.11.5 Aircraft

Though sound from aircraft is attenuated by the water surface, Blackwell and Greene (2002) found aircraft noise can be loud underwater when jet aircraft are directly overhead. Moore et al. (2002) classify aerial overflights in Cook Inlet as one of the factors contributing to negative noise influences on Cook Inlet beluga whales. However, Cook Inlet beluga whale survey aircraft flying at approximately 244 meters (800 feet) in Cook Inlet observed little or no change in beluga swim directions (Rugh et al. 2000). This behavior is likely because beluga whales in Cook Inlet have habituated to routine small aircraft over flights.

Cook Inlet experiences significant levels of aircraft traffic from multiple sources. Since the date of listing of Cook Inlet beluga whales (October 22, 2008) to October 31, 2013, the Ted Stevens Anchorage International Airport has experienced 1,312,954 takeoffs and landings of cargo, commercial passenger, military, private, and other aircraft (U.S. Department of Transportation, Federal Aviation Administration 2013). There is considerable seaplane traffic primarily based out of Lake Hood and Spenard Lake. Nearby Joint Base Elmendorf Richardson has an airfield which is regularly used. There are also eight public runways nearby:

- Birchwood

- Goose Bay
- Merrill Field
- Girdwood
- Kenai Municipal Airport
- Ninilchik
- Homer
- Seldovia

Though Cook Inlet beluga whales may be less sensitive to aircraft noise than vessel noise, individual responses may be highly variable.

6.11.6 Weapon Training

The Eagle River Flats Impact Area at Fort Richardson, Alaska, was used for year-round weapons training from the 1940s to 1990 and for winter-only firing from 1991 to present (NMFS 2011b). A wide range of live-fire weapons has been used at this site, including:

- mortars
- howitzers
- missiles
- rockets
- grenades
- illumination flares
- smoke rounds
- small arms (20 mm caliber and smaller)

In 2011, the U.S. Army consulted with NMFS on the resumption of year-round firing at the Eagle River Flats Impact Area (NMFS 2011b). The biological opinion concluded that Cook Inlet beluga whales may be exposed to explosions, at less than 180 but more than 160 dB re: 1 μ Pa-root mean square, in Eagle Bay and possibly Eagle River. No incidental take statement was included with the biological opinion because no incidental take of marine mammals had been authorized under section 101(a)(5) of the MMPA.

6.11.7 Summary of Sound

Blackwell and Greene (2002) collected underwater and in-air recordings of various sound sources in Cook Inlet to quantify the acoustic environment. Sounds were analyzed with respect to their broadband and one-third octave band levels as well as their spectral composition. In the study, four types of sound sources were analyzed:

- overflights of planes landing at Anchorage International Airport and Joint Base Elmendorf-Richardson
- the Phillips A oil platform
- large and small vessels in Anchorage harbor
- ambient sounds in areas removed from industrial activities

In-air sound levels ranged from 30 to 95 dB re: 20 μ Pa and underwater sound levels ranged from 95 to 149 dB re: 1 μ Pa. Because Cook Inlet has experienced population growth and increased aircraft and vessel traffic, the current sound levels in Cook Inlet are likely higher than those recorded in the study.

In summary, Cook Inlet beluga whales are regularly exposed to several sources of anthropogenic sound sources, the effects of which are not well understood. Short-term exposure to high-energy sound sources such as underwater explosions, pile driving, and other marine construction have the potential to result in direct injury or even death to individuals located near the sound source. Effects of exposure to more moderate, but generally increasing, background noise from vessel traffic, seismic surveys, sonar pings, etc., may increase the effects of masking in Cook Inlet beluga whales as well as the long term-habitat quality in Cook Inlet. Increasing levels of background noise has the potential to lead to population level effects, but, because Cook Inlet beluga whales currently occur in areas experiencing increasing background noise, it is not clear at what threshold population level effects would manifest.

6.12 Scientific Research

Cook Inlet beluga whales are exposed to research activities documenting their distribution and movements within Cook Inlet. If research activities are expected to result in take of Cook Inlet beluga whales, the Permits Division issues the appropriate permits under the MMPA and ESA. The Permits Division currently houses information relating to past and current MMPA and ESA scientific research permits on NOAA's web-based permit application site "Authorizations and Permits for Protected Species" (APPS), available online since 2008. Prior to the creation of NOAA APPS, permit-related information was housed in a different system. Because of differences in information management between the two systems, it is possible that take information associated with research activities prior to 2008 may be incomplete in the NOAA APPS system (A. Hapeman, Permits Division, pers. comm. to B. Crokus, contractor for ESA Interagency Cooperation Division, December 17, 2013). Therefore, it is assumed information relating to scientific research activities obtained from NOAA APPS reflects the least amount of authorized takes of Cook Inlet beluga whales to date and it is probable that other permitted activities occurred prior to 2008 that are not reflected in NOAA APPS data. At the time of writing this Opinion, eight research permits have been issued authorizing takes of Cook Inlet beluga whales, four of which are active (NOAA APPS 2013). Table 6 shows types of previous and current permitted research activities, number of takes authorized, and details of type and method of take.

Table 6. Past and present scientific research permits for Cook Inlet beluga whale research activities authorizing take in Cook Inlet, Alaska.

Permit Number	Organization	Annual Authorized Take ¹	Authorized Take Per Animal ²	Method of Take	Authorized Activity	Authorized Actions	Effective Date	End Date
P77171	Allied Whale, College of the Atlantic	10 500		Capture/ handle Harass	Capture Unknown	Suction-cup or intrusive satellite tagging; flipper tagging; core sampling Incidental harassment	5/31/1995	12/31/1999
P77172	National Marine Mammal Laboratory	40 667		Harass/ sampling Harass	Unknown Unknown	Biopsy Incidental harassment	7/25/1995	11/30/1997
0782-1438	National Marine Mammal Laboratory			Harass	Survey, aerial	Count/survey; incidental harassment	12/1/1997	6/30/2004
14210	LGL Alaska Research Associates, Inc.	54	3	Harass	Survey, vessel	Photo-ID	5/28/2009	5/30/2014
782-1719	National Marine Mammal Laboratory	585	20	Harass	Survey, aerial	Count/survey; incidental harassment	5/28/2009	4/25/2011
14245	National Marine Mammal Laboratory	670 11700 300		Harass/ sampling Harass/ sampling	Survey, vessel Survey, vessel	Collection of: remains, sloughed skin, fecal sample; count/survey; observations: monitoring, behavioral; photography/videography: photo-ID, photogrammetry; underwater photo/videography Count/survey; observation: monitoring, behavioral; photography/videography: photo-ID, photogrammetry Collection of: remains, sloughed skin; sample: skin, fecal; blubber biopsy; tagging: suction-cup ³ ; count/survey; observations: monitoring, behavioral; photography/videography: photo-ID, photogrammetry; underwater photo/videography	4/25/2011	5/1/2016
15750	ABR, Inc.	50	52	Incidental	Survey, aerial	Count/survey	11/16/2011	11/30/2016

Table 6. Past and present scientific research permits for Cook Inlet beluga whale research activities authorizing take in Cook Inlet, Alaska.

Permit Number	Organization	Annual Authorized Take ¹	Authorized Take Per Animal ²	Method of Take	Authorized Activity	Authorized Actions	Effective Date	End Date
	Environmental Research and Services			take				
16239	HDR EOC	62	3	Harass	Survey, aerial/vessel	Collection of: sloughed skin, fecal sample; count/survey; observations: monitoring, behavioral; photography/videography: photo-ID, photogrammetry; underwater photo/videography; incidental harassment	9/11/2013	9/30/2018

¹ Blanks assume take is “unlimited” for authorized actions.

² Blanks indicate no specific take information given for “takes per animal” in permit.

³ Permit amended April 25, 2011 to allow tags to be mounted using a modified pneumatic launcher (ARTS system).

Table adapted from permit information obtained from NOAA APPS (2013).

Current research activities include:

- the opportunistic collection of sloughed skin and fecal samples
- population counts
- behavioral and monitoring observations
- photography and videography (including underwater activities)
- photogrammetry
- blubber biopsy sampling
- suction-cup tagging

These research activities require close vessel and/or aircraft approach. Many permits also include "incidental harassment" takes to cover such activities as tagging, where one whale is the target for tagging, but the research vessel may come within 50 m of other whales while in pursuit of the target whale. These activities may cause stress to individual whales and cause behavioral responses, but harassment is not expected to rise to the level where injury or mortality would be expected to occur. For currently permitted research projects, the number of takes reported to the Permits Division has been substantially less than authorized take:

- Permit No. 14210 has 54 annual authorized takes, but only 18 takes have been reported over the course of four years
- Permit No. 14245 has 12,670 annual authorized takes for all of their research activities, but only 5,672 takes have been reported over the course of two years
- No other takes have been reported for the remaining currently permitted activities

Previous permits for research actions similar to those proposed by the Applicant have analyzed and authorized higher numbers of take. Because substantially less take has been occurring under those permits, both the Permits Division and the we will use reported take numbers to assess instances of take of Cook Inlet beluga whales that are reasonably expected to occur. Therefore, less take is expected to be authorized in the future for similar research activities.

Prior to the listing of Cook Inlet beluga whales (October 22, 2008), MMPA-permitted research activities included more invasive activities such as intrusive satellite and flipper tagging that required the capture, handling, and attachment of intrusive equipment and tags. This harassment can cause injury or mortality. It is assumed that three whales died as a result of stresses from satellite tagging activities in 2002 (NMFS 2008).

All currently permitted research activities are non-lethal and no mortality is currently exempted under the MMPA for Cook Inlet beluga whales. Individual Cook Inlet beluga whales may exhibit short-term behavioral responses during the course of currently permitted research activities, and these stresses may exacerbate behavioral responses from other contemporaneous threats. We concluded that currently-permitted research activities are not likely to jeopardize the continued existence of the Cook Inlet beluga whale (NMFS 2009a, 2011a, 2011e, 2013b).

6.13 Environmental Baseline Summary

While a number of known and potential threats are discussed in the sections above, the actual levels of impact of these threats has not been determined. NMFS recognizes that not enough is known about the effects of each specific threat, and, as such, we do not definitively know the level of impact each threat

has on Cook Inlet beluga whales. Even though threats are discussed individually in the previous sections, Cook Inlet beluga whales may be affected by multiple threats at any given time, compounding the impacts of the threats. For instance, a Cook Inlet beluga whale fleeing from a killer whale may swim through polluted, high noise waters, and across a ship channel in an effort to get to shallower, coastal areas, which are frequented by recreational boaters. Given our limited knowledge of the impacts of known and potential threats, we have broadly addressed factors with the potential to impact Cook Inlet beluga whales.

Table 7 estimates and combines all environmental baseline threats and presents a structured approach to assessing the current relative impacts of each threat on the Cook Inlet beluga whale population. This approach displays the potential frequency of occurrence and the potential impact to the population. It should be noted that this threat assessment is based on a review of the available information, taking into account gaps in information and unknown effects.

Table 7. Potential frequency and impact of threats to the Cook Inlet beluga whale population, Cook Inlet, Alaska.

Threat	Potential Frequency of Occurrence¹	Potential Impact to Population¹
<i>Natural</i>		
Strandings	H	H
Predation	H	H
Parasitism	H	L
Disease	U/L	H
Environmental change	M	U
<i>Anthropogenic</i>		
Subsistence harvest	L	L
Poaching and illegal harassment	U	H
Personal use, subsistence, and recreational fishing	H	L
<i>Commercial fishing</i>		
Lethal incidental take	L	M
Prey reduction	H	H
Pollution	H	U
Oil and gas	H	U
Coastal development/habitat loss	H	M
<i>Vessel traffic</i>		
Strikes - large vessel	L	L
Strikes - small vessel	M	M
Sound	H	H
Research	L ²	L ³

¹ H = High, M = Moderate, L = Low, U = Unknown

² Prior to listing, research activities were rated as having a high potential to occur.

³ Prior to listing, research activities were rated as having a high potential to impact the population, however, since listing, no research activities have been permitted that have a high potential to impact the population.

Table adapted from NMFS (2008).

The environmental threats discussed in the baseline and presented in Table 7 have varying probabilities of occurrence. Some are guaranteed to occur as they are ongoing events (i.e., pollution), while others have occurred in the past and have a low chance of occurrence in the future (i.e., subsistence harvests). Threats also vary in duration. Some threats are pulse events that occur only sporadically (i.e., strandings, disease outbreaks, oil spills), while other threats are chronic events and could have long-term impacts to the population (i.e., parasites, environmental change, and noise). Because it is hard to ascertain cumulative impacts of environmental baseline threats, and because the effects of many of these threats on Cook Inlet beluga whales remains unknown, Table 7 presents a broad overview of the environmental baseline threats to Cook Inlet beluga whales.

7.0 Effects of the Action

Under Section 7(a)(2) of the ESA, Federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The proposed activities authorized by Permit No. 18016 would expose Cook Inlet beluga whales to close vessel approaches for photo-identification. In this section, we describe the:

- potential physical, chemical, or biotic stressors associated with the proposed action
- probability of individuals of listed species being exposed to these stressors based on the best scientific and commercial evidence available
- probable responses of those individuals (given probable exposures) based on the available evidence

Any responses that would be expected to reduce an individual's fitness (i.e., growth, survival, annual reproductive success, and lifetime reproductive success) would be assessed to consider the risk posed to the viability of the listed population. The purpose of this assessment is to determine if it is reasonable to expect the proposed studies to have to affect the listed population that could appreciably reduce their likelihood of surviving and recovering in the wild.

The proposed action involves non-lethal harassment of listed Cook Inlet beluga whales. The ESA does not define harassment nor has NMFS defined this term, pursuant to the ESA, through regulation. However, the MMPA defines harassment as "any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild or 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" [16 U.S.C. 1362(18)(A)]. The latter portion of this definition ("...causing disruption of behavioral patterns including...migration, breathing, nursing, breeding, feeding, or sheltering") is almost identical to the USFWS' regulatory definition of harass.⁷ For the following sections, we define harassment as "an intentional or unintentional act or omission that creates the probability of injury to an individual animal by disrupting one or more behavioral patterns essential to the animal's life history or its contribution to the population the animal represents." If we find that the proposed research causes behavioral disruptions that may result in animals that fail to feed or breed successfully, or die, then we will discuss the likely consequences of these disruptions for the population.

7.1 Stressors

During the course of this consultation, we identified the following potential stressors from vessel activity:

- vessel approach
- vessel strike
- vessel noise
- vessel discharge

⁷ An intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.4).

The Applicant has conducted photo-identification vessel-based research on Cook Inlet beluga whales since 2005, observed Cook Inlet beluga whale behavior from research vessels, and produced multiple reports on this research. Thus, as summarized below, we determined the following possible stressors would be negligible:

- vessel strike
- vessel noise
- vessel discharge

The possibility of vessel strike is remote and would pose a negligible risk to Cook Inlet beluga whales, given the experience of the Applicant in detecting these species and conducting these surveys. We expect the Applicant would be able to locate, identify, and avoid Cook Inlet beluga whales during transit. We expect the Applicant to comply with the permit terms and conditions that prohibit approach at full throttle and require reduced vessel speed, remaining in neutral or turning off engine when close to Cook Inlet beluga whale individuals and groups as well as positioning the vessel behind or alongside individuals or groups.

Vessel noise is also expected to pose only a negligible risk to the Cook Inlet beluga whale population. Belugas are known to move away from the erratically approaching noise and exhibit avoidance responses in the presence of small vessels, but are rather tolerant of frequent passages by larger vessels (see Richardson et al. 1995). Therefore, Cook Inlet beluga whales would, at most, exhibit short-term avoidance responses to the Applicant's small vessel. Behavioral responses to the vessel are analyzed further in the Response (section 7.3) of this Opinion. The larger concern, with regard to vessel noise, is the cumulative effects of the Applicant's vessel in contributing to the totality of Cook Inlet noise. Cumulative noise is discussed in the Cumulative Effects (section 8.0) and integrated into the Exposure Analysis (section 7.2) of this Opinion.

Vessel discharges in the form of fuel/contaminant spills is expected to be negligible, as well. Given the experience of the researcher in conducting these surveys and navigating Cook Inlet, the availability of high resolution bathymetric maps of the research area, and the choice of a small inflatable research vessel with a strapped down onboard gas tank as the primary research vessel, it is unlikely the researcher would run aground in shallow areas of Cook Inlet and discharge fuel/contaminants into the water.

In conclusion, based on a review of available information, we determined vessel strike, vessel noise, and vessel discharge would pose a negligible risk to the Cook Inlet beluga whale population. The following sections analyze the remaining stressor, vessel approach.

7.2 Exposure

Our exposure analyses identify the co-occurrence of ESA-listed species with the action's effects in space and time as well as the nature of that co-occurrence. When possible, we identify the number, age or life stage, and gender of the individuals likely to be exposed to the action's effects as well as the population(s) or subpopulation(s) those individuals represent. For the exposure analysis conducted for this consultation, we estimated the number of individual whales likely to be exposed to the effects of the proposed research activities using the best information available to us including:

- recent population estimates
- the maximum survey effort expected from the researchers over the life of the permits

- past take numbers reported from permits issued to the same researchers or others that have performed similar types of research in nearby areas

We reviewed the Applicant's past survey data, provided to us by the Permits Division, in order to estimate the mean total exposure events expected per survey (0.56 takes per survey). We then multiplied the mean take rate (0.56) by the maximum level of research effort that could possibly occur (40 surveys annually) to determine the maximum exposure over the course of each year (23 individuals, rounded to the nearest whole number) and over the five-year life of the permit (113 individuals, rounded to the nearest whole number).

Based on this analysis, the maximum exposure assessed deviated significantly from the take numbers proposed by the Permits Division as part of their initiation package (72 takes per year; 360 takes over the five-year life of the permit). The Permits Division had presented a worst-case scenario of Cook Inlet beluga whale takes by using the highest take rate from the Applicant's past survey efforts (1.8 takes per survey) and multiplying that take rate by 40 surveys annually to arrive at 72 takes per year. However, we felt that using a worst-case scenario would not accurately reflect the amount of takes that would be expected in the future. In 2008, the Applicant reported 30 takes of Cook Inlet beluga whales for similar photo-identification studies; however, no more than seven takes have been reported since 2009. This low number of takes most likely reflects the Applicant's expertise conducting these surveys. It is assumed the Applicant would continue to take low numbers of Cook Inlet beluga whales annually and any large number of takes would reflect an unusual event.

After analysis of previous survey data, we reached agreement with the Permits Division that a five-year take limit of 120 individuals, with no more than 30 allowed to be taken in any year would more accurately represent the number of whales likely to be taken while also considering a worst-case scenario. Individuals may be male or female and any age. We expect that each whale approached within 50 m during a survey may exhibit behavioral responses due to the presence of the research vessel. The duration of this exposure could range from a few minutes to hours, depending on the size of the whale group being documented, how much time is taken to photograph each whale, and how much time individual whales remain in the general area of the research vessel. We expect individuals could be exposed multiple times throughout the course of the year.

7.3 Response

As discussed in the Approach to the Assessment (section 4.0), response analyses determine how listed resources are likely to respond after being exposed to an action's effects either on the environment or directly on the listed species themselves. For the purposes of consultation, our assessment try to detect potential lethal, sub-lethal (or physiological), or behavioral responses that might reduce the fitness of individuals. Our response analyses consider and weigh evidence of adverse consequences as well as evidence suggesting the absence of such consequences.

Several researchers have reported short-term responses of beluga whales to research vessel presence. Sheldon (1994) reports behaviors observed by Cook Inlet beluga whales during "tagging bouts" which consist of vessel approach, isolation from the group, and tagging. Head lifts (correlated with disturbance) rather than slow rolls (undisturbed) were seen upon the approach sequence during a tagging bout. When the vessel approached within 10 meters of a whale, the whale moved rapidly away, sometimes creating a whitecap wave. The initial burst of speed would last from one to two minutes, after which the Cook Inlet beluga whales would surface more frequently. After the tagging bout, the Cook

Inlet beluga whales would move away from the vessel and would transition from head lifting to slow rolling once they were more than ten meters from the vessel. Individuals from the Cook Inlet beluga whales group that were not pursued and tagged only reacted strongly (fleeing, head lifting) to the vessel when it was within 10 to 20 meters of the group. Lerczak et al. (2000) worked on the study with Shelden observed that some older whales evading tagging vessels rested at the bottom for several minutes giving no clues to their location, which was possibly a learned response to evade what they perceived as native hunters. Ferrero et al. (2000) observed Cook Inlet beluga whales move toward deeper water during pursuit, capture, and tagging operations, possibly to resist being herded to shallower locations. This study also found Cook Inlet beluga whales to change response behaviors during the field season, depending on their current behavior (e.g., feeding). Beluga whales in the St. Lawrence Estuary (Canada) changed their calling behavior when exposed to a slow moving ferry and a fast haphazardly-moving motor boat (Lesage et al. 1999). Beluga whales in the Canadian Arctic were observed to move rapidly along ice edges away from approaching ice-breaking ships (Finley et al. 1990). In addition to behavioral responses, experiments with captive belugas show their ability to adapt echolocation by shifting to higher echolocation frequencies in response to increased ambient noise, possibly to reduce masking (Au et al. 1985).

There are repeated records of Cook Inlet beluga whales exhibiting site tenacity after vessel approaches. This site tenacity may prevent Cook Inlet beluga whales from being displaced by vessel activities, or it may influence them to respond (or not respond) more strongly during certain seasons. Cook Inlet beluga whales display a high degree of seasonal site fidelity, which may influence their immediate responses to vessels during certain seasons (Funk et al. 2005). Shelden (1994) pursued Cook Inlet beluga whales for tagging activities in the northwest corner of Cook Inlet. Despite the pressures of being chased by a vessel and tagged, tagged individuals (as well as belugas in proximity) never abandoned the study area. Animals moved 300 to 500 m away from the vessel's tagging operation, but when the vessel ceased approaching whales, they would return to within 100 meters of the vessel in a short period of time. Lerczak et al. (2000) also participated in the study and reported that Cook Inlet beluga whales returned to their group within approximately 15 minutes after vessel pursuit was terminated. Shelden (1994) reported that approximately four minutes after pursuing and tagging a Cook Inlet beluga whale, the whale began to make longer dives, but it is not known when normal surfacing behaviors resumed or how long it took the animal to recover from tagging. Orr et al. (2001) pursued beluga whales in the Canadian Arctic for capture, restraint, tagging, and release. After exposure to these activities, the researchers stated that the beluga whales rapidly returned to apparent normal behavior patterns.

There are reports of beluga habituation to vessels and also reports of belugas fleeing moving vessels. Ferrero et al. (2000) state that Cook Inlet beluga whales are not easily approached, possibly as a result of many years of human pursuit for harvest. Lerczak et al. (2000) and Shelden (1994) pursued Cook Inlet beluga whales for tagging activities in the northwest corner of Cook Inlet and found the whales to move away from the vessel rapidly when being pursued, while also exhibiting "head lifts" instead of "slow rolls," indicating high stress. The initial burst of speed by the whales at the start of each tagging bout lasted for a short duration (less than two minutes). However, when vessel engines were off, whales surfaced as close as five meters to the vessel and approached within two meters or went under the vessel, as evidenced by bubbles, footprints at the surface, or the vessel's depth sounder. Cook Inlet beluga whales appear to be habituated to some vessel traffic (Shelden 1994; Funk et al. 2005; Markowitz 2005; Nemeth et al. 2007; McGuire 2008) and often are reported to show no response to fishing boats. In lower Knik Arm, Stewart (2012) observed a variety of responses (diving, course

change, increased transit speed, and no response) of Cook Inlet beluga whales to inflatable boat, skiff, and hovercraft presence at distances of 50 to over 400 m.

In previous field activity reports submitted by the Applicant, the most frequently observed primary and secondary behaviors of Cook Inlet beluga whales varied among years and locations and included traveling, feeding (including suspected feeding), milling, and diving (McGuire et al. 2008; McGuire and Kaplan 2009; McGuire et al. 2011; McGuire and Bourdon 2012; McGuire et al. 2013; McGuire et al. 2013).

For Cook Inlet beluga whale photo-identification studies conducted by LGL Alaska Research Associates, Inc. in 2006, they reported that, in 11 instances, primary group behavior changed from the first behavioral observation to the last or from the first to the best observation (Nemeth et al. 2007). Upon analysis, it appeared that, in nine of the instances, behavior did not appear to change or reflected a less-disturbed state. In the remaining two instances, it was not clear if the change to an apparently more disturbed state (from feeding to remaining submerged and from feeding to circling group) was due to the presence of the survey vessel or if this was normal feeding behavior. Photo-identification researchers have observed Cook Inlet beluga whales to be exceptionally vocal and playful with survey boats, which may indicate that some whales have become habituated to the researcher's presence (Nemeth et al. 2007; McGuire 2008), though they have also observed some whale groups to be difficult to approach (McGuire and Kaplan 2009).

The Applicant's methodologies and the Permits Division's permit design are intended to minimize disturbance to Cook Inlet beluga whales. Data collected by the Applicant is dependent on the ability to successfully observe Cook Inlet beluga whales; therefore, every effort would be made to prevent avoidance and other behaviors. The Applicant states that the study design is created to maximize probability of encountering whale groups and photographing all whales in a group, while minimizing the amount of time the Applicant spends with any single group of whales. Thus, exposure to the vessel is minimized. The permit would also require that no individual animal may be approached more than three times in one day. To minimize disturbance to Cook Inlet beluga whales, the Applicant must exercise caution when approaching animals and must retreat from animals if behaviors indicate the approach is interfering with reproduction, feeding, or other vital functions. If females with calves are taken, the Applicant must:

- terminate efforts if there is evidence of interference with active nursing, pair-bonding, or other vital functions
- not position the research vessel between the mother and calf
- approach mothers and calves gradually to minimize or avoid startle response
- coordinate with other researchers in the area, specifically aerial surveys conducted by National Marine Mammal Laboratory, to minimize harassment to Cook Inlet beluga whales

Although we expect either no visible responses or short-term behavioral responses during the proposed activities, we cannot be certain Cook Inlet beluga whales are not disturbed by the activity. Clapham and Mattila (1993) note that human observation of a whale's behavioral response may not reflect an individual whale's actual experience. Gill et al. (2001) also note that changes in animal behavior do not necessarily reflect consequences of disturbance at the population level. Therefore, our use of behavior as an indicator of a whale's response to a close approach may or may not be accurate. We cannot definitively know whether such behavioral responses have long-term consequences, which would be

primarily sub-lethal for individual whales (i.e., affect growth, health, or reproductive success). The associated consequences on the whale population would be delayed in time and concealed by any imprecision in population estimates. Likewise, the affected whales may not respond behaviorally to close approaches or experience stress responses if they have habituated to an activity. Whales may not perceive repeated close vessel approaches as potential threats (Romero and Wikelski 2001). Recently, Norman (2011) conducted a Cook Inlet beluga whale literature review and concluded that data gaps exist in vessel traits (e.g., type, activity, size, distance from Cook Inlet beluga whales, etc.) and their level of disturbance on Cook Inlet beluga whale behaviors (e.g., resting, foraging, socializing, etc.).

In summary, behaviors exhibited by Cook Inlet beluga whales and other beluga whale populations to vessel approaches appear to be non-visible or short-term and are significantly influenced by the way in which the vessel approach is conducted. There are no known physiological reactions of beluga whales to close vessel approach; however, each resulting behavior may have biological implications as a result of close vessel approach. Based upon the available information regarding close vessel approach research, beluga whales have exhibited:

- avoidance
- attraction
- possible habituation
- site tenacity
- changes in calling behavior
- apparent returns to normal behavior within the range of two to 15 minutes

Vessel avoidance behaviors such as bursts of speed, swimming away, head lifting (breathing changes), and resting at the bottom all increase metabolic demand for the duration of the avoidance sequence. Avoidance behaviors also temporarily remove belugas from their immediate activities, such as feeding or traveling with a group. Attraction and possible habituation to vessels could have long-term negative implications in terms of vessel strikes, proximity to poachers, and incidental interactions with the fishing industry. Changes in calling behavior reveal the belugas' ability to adapt their echolocation skills, but also shows that masking is a likely occurrence. Site tenacity and returning to normal behaviors potentially indicate that vessels do cause short-term responses, but do not modify long-term beluga behaviors or remove belugas from important habitat areas. Although all of these biological implications are likely, actual effects to the Cook Inlet beluga whale population from close vessel approaches remains unknown and unquantified.

8.0 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered by this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation, per section 7 of the ESA.

During this consultation, NMFS searched for information on future state, tribal, local, or private 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, which we expect will continue into the future. Anthropogenic effects include commercial fishing, vessel traffic, ocean noise, pollution, discharged contaminants, and coastal development. An increase in these activities could result

in an increased effect on ESA-listed species; however, the magnitude and significance of any anticipated effects remain unknown at this time.

9.0 Integration and Synthesis of Effects

The proposed issuance by the Permits Division of scientific research Permit No. 18016 to Tamara McGuire would authorize scientific research of Cook Inlet beluga whales in Cook Inlet, Alaska. The proposed activities under this permit include close vessel approaches to whales for photo-identification and behavioral observations.

The narrative that follows integrates and synthesizes the information contained in the Status of the Species (section 5.0), the Environmental Baseline (section 6.0) and the Effects of the Action (section 7.0) sections of this Opinion to assess the risk that the proposed activities pose to Cook Inlet beluga whales.

The whale population that may be affected by the proposed action is the Cook Inlet beluga whale. As discussed in the Status of the Species (section 5.0), this population is listed as endangered, primarily as a result of historical native subsistence whaling. Information on trends in abundance estimate the population at 315 individuals. The most recent NMFS Supplemental Status Review and Extinction Assessment of Cook Inlet beluga whales (Hobbs and Sheldon 2008) conducted a population viability analysis. The most realistic model (average of one predation mortality per year and five percent annual probability of an unusual mortality event killing 20 percent of the population) resulted in a one percent probability of extinction in 50 years, 26 percent in 100 years, 70 percent in 300 years, and an 80 percent probability of population decline. The model was shown to be sensitive to changes, or underestimation of, predation mortalities and that the population at its current size of 375 would be near the threshold population size (200-300 animals), even if the population was otherwise healthy but suffered occasional unusual mortality events. The model with no threshold effects (i.e., Allee or predation) resulted in a 68 percent probability of decline and 29 percent probability of extinction within 300 years. Even with this most optimistic scenario, with no harvest after 2008, the probability that the population would be larger than 500 animals in 2108 (within 100 years) was only 24 percent.

At present, several factors (see Environmental Baseline, section 6.0) may be affecting Cook Inlet beluga whale survival and recovery in the action area. Natural factors in Cook Inlet include environmental changes affecting prey distribution and habitat quality as well as sources of natural mortality, which we assume includes strandings, predation, disease, and parasites. Vessel traffic may affect Cook Inlet beluga whales in Cook Inlet and is known to contribute to background noise in Cook Inlet and possible small vessel ship strike injuries. Other anthropogenic effects potentially affecting Cook Inlet beluga whales in the action area include:

- poaching and illegal harassment
- personal use, subsistence, and recreational fishing
- commercial fishing
- pollution
- oil and gas
- coastal development
- noise
- scientific research

After reviewing the available information, we determined the proposed activities to be conducted under Permit No. 18016 are likely to produce one potential stressor for Cook Inlet beluga whales: close approach by research vessels and corresponding behavioral reactions (negligible stressors were determined in the Effects of the Action, Stressors section (7.1) to be: vessel strike, vessel noise, and vessel discharges). It is expected that Cook Inlet beluga whales would not be exposed to close vessel approaches (“taken”) more than 120 times over the five-year life of the permit and no more than 30 times in any year. It is possible individuals could be taken more than once per year and/or over the life of the 5-year permit. Table 8 compares total proposed takes with currently authorized takes of Cook Inlet beluga whales in Cook Inlet.

Table 8. Currently authorized takes of Cook Inlet beluga whales for research activities in Cook Inlet, Alaska.

Permit Number	Organization	Authorized Annual Take	Total Authorized Take	Method of Take	Authorized Activity	Effective Date	End Date
<i>Current</i>							
14210	LGL Alaska Research Associates, Inc.	54	270	Harass	Survey, vessel	5/28/2009	5/30/2014
		670	3,350	Harass/sampling	Survey, vessel		
14245	National Marine Mammal Laboratory	11,700	58,500	Harass	Survey, aerial	4/25/2011	5/1/2016
		300	1,500	Harass/sampling	Survey, vessel		
15750	ABR, Inc. Environmental Research and Services	50	250	Incidental take	Survey, aerial	11/16/2011	11/30/2016
16239	HDR EOC	62	310	Harass	Survey, aerial/vessel	9/11/2013	9/30/2018
Subtotal		12,836	64,180				
<i>Proposed</i>							
18016	Tamara McGuire, LGL Alaska Research Associates, Inc.	Not to exceed 30	120	Harass	Survey, vessel	2014	2018
TOTAL		12,866	64,300				

Based on the available estimates of abundance for whales in Cook Inlet (315 individuals), there is enough currently permitted research activity to take all members of the population 40 times annually. However, the currently-permitted researchers have reported far fewer annual takes than have been authorized (see Environmental Baseline, Scientific research section). All currently permitted scientific research activities are non-lethal. Due to multiple approach possibilities and lack of available information, it is difficult to quantify and assess the effects of possible repeat disturbance by these research parties on Cook Inlet beluga whales. The Permits Division limits repeated harassment by requiring (to the extent practicable) coordination among permitted researchers as a permit condition and specifying daily and yearly exposure limits for individuals during research activities. The Applicant and

the National Marine Mammal Laboratory have coordinated research efforts in the past to avoid conducting their research on the same days and the Applicant committed to coordinating with the National Marine Mammal Laboratory in her permit application. We recommend that the Applicant also coordinate with HDR EOC and ABR, Inc. Environmental Research and Services prior to conducting photo-identification surveys.

Any age and either sex of Cook Inlet beluga whale may be exposed to activities under the proposed permit. The action area includes foraging, calving, and migration areas for Cook Inlet beluga whales. Proposed research activities would occur in Cook Inlet between mid-April and mid-November annually for five years. Given the location and timing of proposed research activities, we expect foraging, calving, nursing, and migrating whales to be present in the action area. The duration of each exposure may range from a few minutes to hours.

The anticipated responses of Cook Inlet beluga whale to activities conducted under proposed Permit No. 18016 were described in detail in the Effects of the Action, Response Analysis section (section 7.3). Possible responses resulting from exposure to close vessel approaches range from no response to sub-lethal, short-term behavioral responses.

Based on the available information, we conclude the way a close vessel approach is conducted influences Cook Inlet beluga whale response. With slow, careful approaches and alert observers, we expect fewer Cook Inlet beluga whales to exhibit responses that indicate stress, but that some of these approaches might still be stressful for some individuals and may interrupt behaviors such as foraging or migration. To limit disturbance to mothers and calves, the permit contains the following conditions: where females with calves are authorized to be taken, researchers must:

- immediately terminate efforts if there is any evidence that the activity may be interfering with pair-bonding or other vital functions
- not position the research vessel between the mother and calf
- approach mothers and calves gradually to minimize or avoid any startle response
- not approach any mother or calf while the calf is actively nursing

Available evidence, as discussed in Section 7.3, suggests any behavioral responses would be short-lived. Assuming an animal is no longer disturbed after it returns to its pre-approach behavior, we do not anticipate that brief disruption of foraging behaviors or migration would result in reduced foraging opportunities for individuals, or result in any long-term consequences to Cook Inlet beluga whales from the proposed approaches.

In summary, we expect that any individuals exposed to the proposed research activities in Permit No. 18016 would experience stress responses or exhibit behavioral responses to that exposure, including temporary disruption of foraging or migration. However, available evidence indicates that responses would be short-lived and generate no long-term responses that might result in fitness consequences for individual Cook Inlet beluga whales. Thus, we conclude that exposure to close vessel approaches conducted under proposed Permit No. 18016 are not likely to cause a reduction in fitness. As a result, we do not expect activities authorized under either permit to have an effect on the extinction risk of the distinct population segment these individuals represent.

10.0 Conclusion

After reviewing the current status of species, the environmental baseline for the action area, the anticipated effects of the proposed activities and the possible cumulative effects, it is NMFS's Opinion that the Permits Division's proposed action of issuing Permit No. 18016 to Tamara McGuire, LGL Alaska Research Associates, Inc., **is not likely to jeopardize** the continued existence of the Cook Inlet beluga whale.

11.0 Incidental Take Statement

Section 9 of the ESA and Federal regulation under section 4(d) of the ESA prohibit the "take" of endangered and threatened species, respectively, without 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. NMFS further defines "harm" to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Sections 7(b)(4) and 7(o)(2), taking that is incidental and not intended as part of the 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 this Incidental Take Statement. However, as discussed in this Opinion, only the species targeted by the proposed research activities would be significantly harassed as part of the intended purpose of the proposed action. Therefore, NMFS does not expect the proposed action would incidentally take threatened or endangered species.

12.0 Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to:

- minimize or avoid adverse effects of a proposed action on listed species or critical habitat
- help implement recovery plans
- develop information

We recommend the following conservation recommendation, which would provide information for future consultations involving the issuance of permits that may affect listed whales as well as reduce harassment related to the authorized activities:

- **Programmatic consultation.** We recommend that the Permits Division consider programmatic consultations for research permits on a species-specific basis, geographic basis, or other programmatic approach. A programmatic approach to research permit consultations would allow for a better understanding of all proposed research efforts and their effects to populations and would expedite issuance of individual research permits.

In order for NMFS's ESA Interagency Cooperation Division to be kept informed of actions minimizing or avoiding adverse effects on, or benefiting, listed species or their habitats, the Permits Division should notify the ESA Interagency Cooperation Division of any conservation recommendations they implement in their final action.

13.0 Reinitiation Notice

This concludes formal consultation on the proposal to issue scientific research Permit No. 18016 to the Applicant, Tamara McGuire, LGL Alaska Research Associates, Inc., for research on the Cook Inlet beluga whale in Cook Inlet, Alaska. 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:

- the amount or extent of proposed take is exceeded
- new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion
- the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion
- a new species is listed or critical habitat designated that may be affected by the action

In instances where the amount or extent of authorized take is exceeded, the Permits Division must immediately request reinitiation of section 7 consultation.

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