APPENDIX F

Agency Correspondence
Consultations and Biological
Asssessments

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

August 22, 2019

Colonel Phillip Borders
U.S. Army Corps of Engineers, Alaska District
PO Box 6898
JBER, Alaska 99506-0898

Re: Letter of Concurrence for proposed GCI AU-Aleutian Fiber Optic Cable installation project, Bering Sea, Alaska (NMFS # AKRO-2019-00892) (POA-2019-00021, Gulf of Alaska)

Dear Colonel Borders:

The National Marine Fisheries Service (NMFS) has completed informal consultation under section 7(a)(2) of the Endangered Species Act (ESA) regarding the proposed GCI AU-Aleutian Fiber Optic Cable installation project. The U.S. Army Corps of Engineers (USACE) requested written concurrence that the proposed action may affect, but is not likely to adversely affect, endangered Western Distinct Population Segment (DPS) Steller sea lions (*Eumetopias jubatus*), endangered Western Pacific DPS humpback whales (*Megaptera novaeangliae*), threatened Mexico DPS humpback whales, endangered North Pacific right whales (*Eubalaena japonica*), endangered western North Pacific gray whales (*Eschrichtius robustus*), endangered fin whales (*Balaenoptera physalus*), endangered blue whales (*Balaenoptera musculus*), or endangered sperm whales (*Physeter macrocephalus*). The USACE also determined that the proposed action is not likely to adversely modify or destroy designated critical habitat for the Steller sea lion or North Pacific right whale.

Based on our analysis of the information you provided to us in your revised Biological Assessment, received August 5, 2019, and additional literature cited below, NMFS concurs with your determination. This letter underwent pre-dissemination review in compliance with applicable Data Quality Act guidelines. A complete administrative record of this consultation is on file in this office.

Consultation History

Several meetings were held on this project in late December, 2017 and January 2018. However, on January 31, 2018, NMFS was notified that the project was on hold, because the marine cable route had changed; originally proposed along the northern side of the Aleutian Islands, it was moved to the southern side, to allow for the entire route to be in an ice-free area.

On April 26, 2019, NMFS received a draft Biological Assessment (BA) and a letter indicating that the project was resuming. On August 5, 2019, NMFS received the final BA and consultation was initiated at that time.

Proposed Action
GCI Communication Corp. (GCI) is proposing to provide high speed internet (broadband) service to eleven communities in Alaska by extending broadband service to Kodiak, Larsen Bay, Chignik, Chignik Lake, Chignik Lagoon, Perryville, Sand Point, King Cove, Cold Bay, False Pass, Akutan, and Unalaska and will consist of approximately 1,734 kilometers (km; 1,078 miles [mi]) of submerged fiber optic cable. The primary baseline route initiates from Kodiak, spans southwest down the Shelikof Strait, then parallels the Alaska Peninsula to the south until termination at Unalaska. GCI anticipates initiating terrestrial activities on May 1, 2020, initiating marine activities by April 1, 2021, and completing the project by December 31, 2021. Cable-laying operations will occur 24 hrs/day.

Depending on bottom substrate, water depth, and distance from shore, the fiber-optic cable will either be surface-laid on the sea floor, or buried to protect the cable from ice scour, human activities, or surf action. Where needed, cable will be buried by jet burial using a towed sled, tracked remotely operated vehicle (ROV), or by diver jet burial (in waters less than 15 m). Post-lay inspection and burial will be conducted using an ROV. Average speed (depending on sub-bottom conditions) for buried cable during plow operations is about 1.9 km/hour (1 knot).

In offshore waters >15 m [49 ft] deep) cable-lay operations will be conducted from a lay/burial cable ship. Details of the ship are provided in an appendix to the BA. Average speed for surface laid cable is approximately 1.9 to 5.5 km/hour (1-3 knots). Dynamic positioning, maintained by two 750 kW gill thrusters, will be used only as needed for safety – the frequency depends on weather and currents in the region. Support vessels may include a tug in the vicinity of the main lay/burial vessel.

A barge will be used during cable laying activities occurring in the shallow water landing sites (Chignik Lagoon, Chignik Lake, Cold Bay). The barge will be outfitted with spuds and an anchorage system to allow very shallow water positioning control. Two tugs (<4,000 horsepower [hp]) will be used to propel the barge during lay operations.

Action Area
The action area is defined in the ESA regulations (50 CFR 402.02) as the area within which all direct and indirect effects of the project will occur. The action area is distinct from and larger than the project footprint because some elements of the project may affect listed species some distance from the project footprint. The action area, therefore, extends out to a point where no measurable effects from the project are expected to occur.

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

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

Under the PTS/TTS Technical Guidance, NMFS uses the following thresholds for underwater sounds that cause injury, referred to as Level A harassment under section 3(18)(A)(i) of the MMPA (NMFS 2016b). These acoustic thresholds are presented using dual metrics of cumulative sound exposure level (L_E) and peak sound level (L_{pk}) for impulsive sounds and L_E for non-impulsive sounds:

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

In addition, NMFS uses a threshold of 100 dB re 20 μPa_{rms} for in-air sounds that cause Level B behavioral disturbance to non-harbor seal pinnipeds.

NMFS defines the action area for this project to include the vessel transit routes (Figure 1), bounded by a buffer of 1.8 km (1.1 mi) on each side of the route for areas in which the cable laying ship will be used and a buffer of 2.8 km (1.7 mi) on each side of the route for areas where the cable laying barge will be used.

[1] Sound pressure is the sound force per unit micropascals (μPa), where 1 pascal (Pa) is the pressure resulting from a force of one newton exerted over an area of one square meter. Sound pressure level is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in acoustics is 1 μPa, and the units for underwater sound pressure levels are decibels (dB) re 1 μPa.
[2] Root mean square (rms) is the square root of the arithmetic average of the squared instantaneous pressure values.

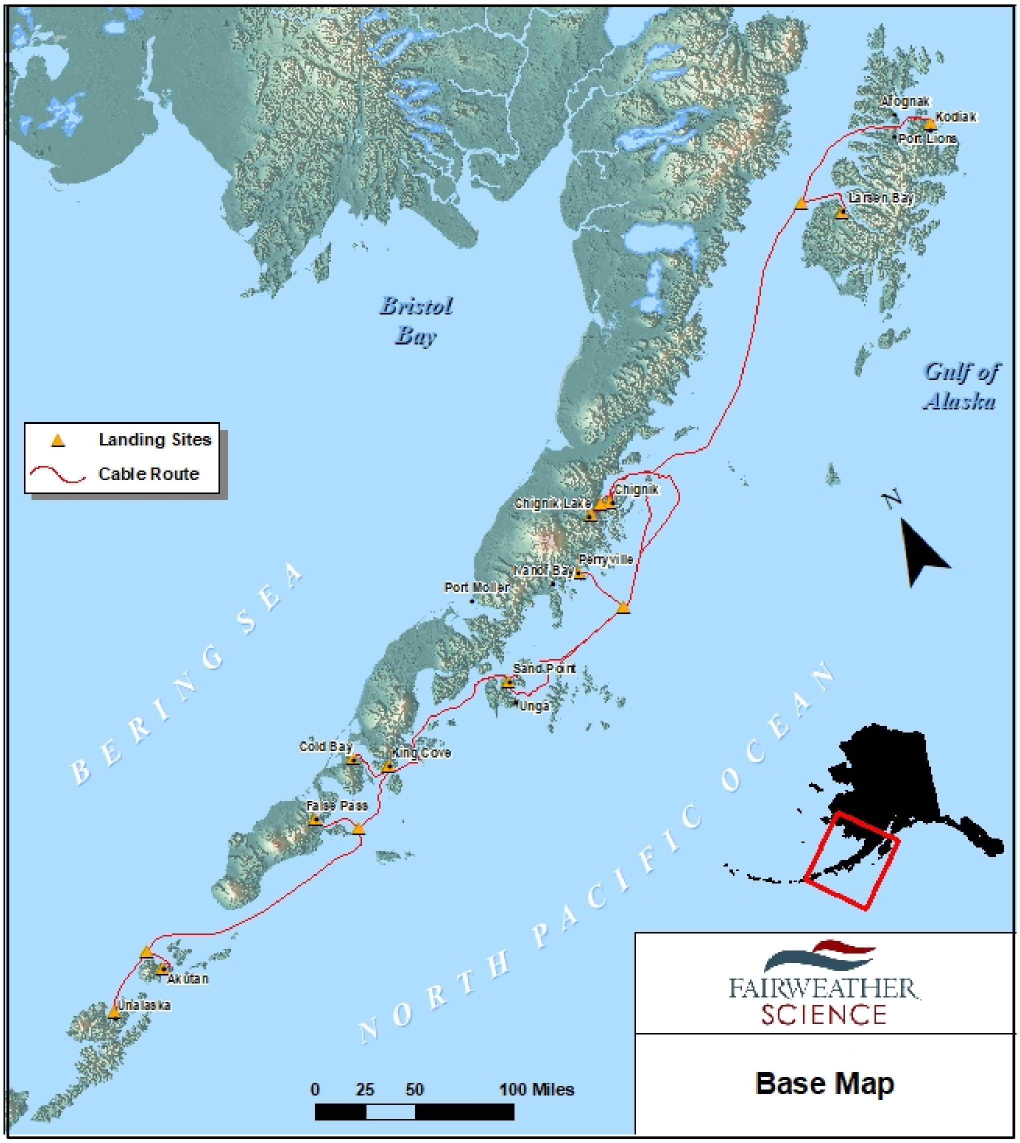


Figure 1. Proposed GCI Aleutian Cable Route. Detailed photographs of each of the landing sites are provided in Figures 2 through 13 of the project BA (Dowl 2019).

Mitigation Measures

In the BA for this project, GCI and the USACE informed NMFS that the project would incorporate the mitigation measures listed below during ship or barge cable-laying activities. We consider these measures to be part of the action.

1. Project vessels will not enter the 5.6 km (3 nm) area surrounding major Steller sea lion rookeries or major haulouts.

In order to facilitate vessel crew compliance with this measure, NMFS has provided GCI, through their contractor, with maps showing all known major and other Steller sea lion rookeries and haulouts along GCI cable route and landing sites, based on the most recent Alaska Fisheries Science Center/Marine Mammal Lab data (Figure 2). There are no major rookeries or haulouts in close proximity to the planned landfall locations or cable laying route (Figure 2).

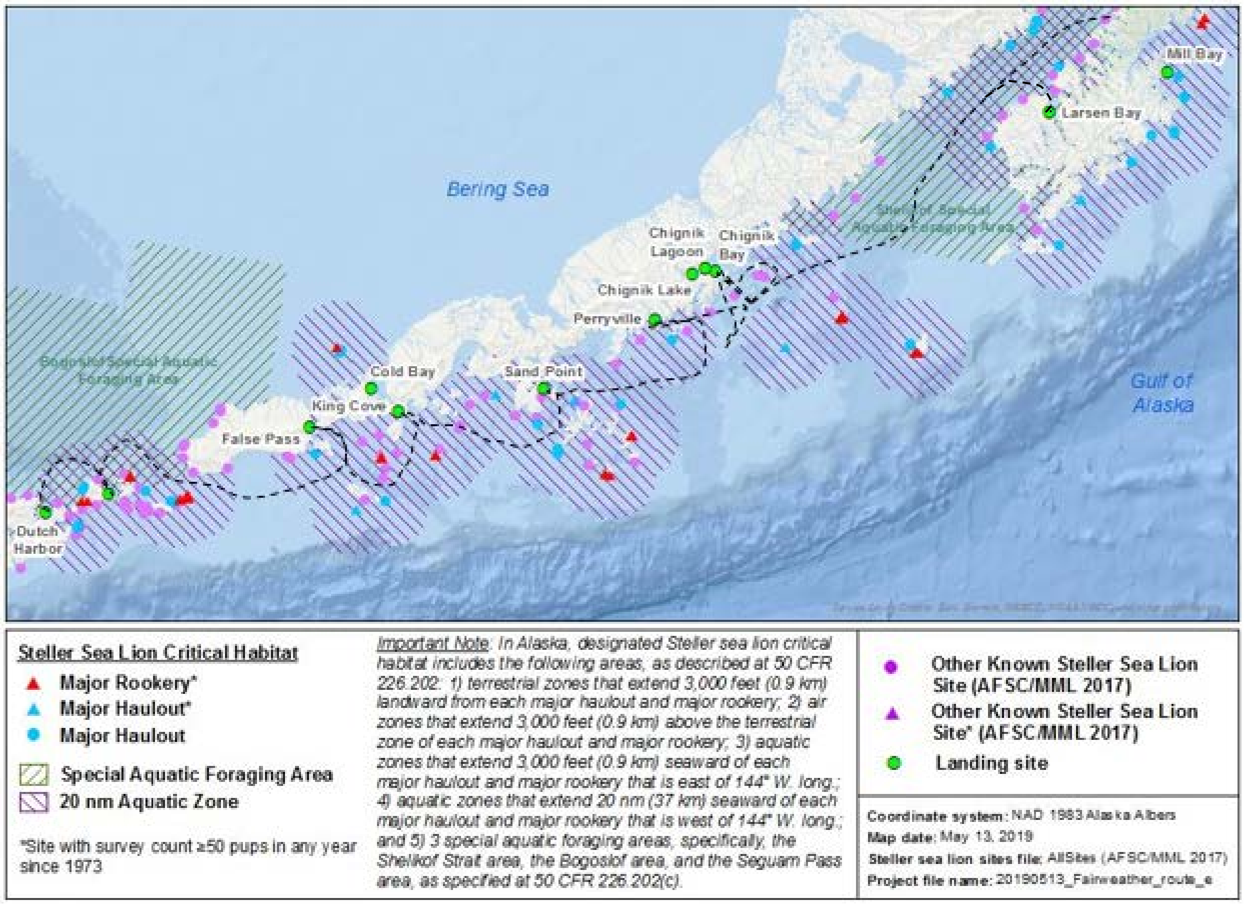


Figure 2. Steller sea lion (western DPS) rookeries and haul out sites in project area. Approximate cable route -- dotted line-- is stylized for comparison only.

2. To the extent it is practicable and safe, vessel operators will be instructed to operate their vessel thrusters (both main drive and dynamic positioning) at the minimum power necessary to accomplish the work.
3. Pre-lay surveys of the cable route have been conducted and the results are currently being evaluated. The results of the surveys will be used to minimize the extent to which trenching is necessary, thereby reducing impact on marine mammal habitat.
4. GCI will contract two protected Species Observers (PSOs), one on watch at a time during all daylight hours. PSOs will:
   - be trained in marine mammal identification and behaviors.
   - have no other primary duty than to watch for and report on events related to marine mammals.
   - work in shifts lasting no longer than 4 hours with at least a 1-hour break between shifts, and will not perform duties as a PSO for more than 12 hours in a 24-hour period (to reduce PSO fatigue).
   - have the following to aid in determining the location of observed listed species, to take action if listed species enter the exclusion zone, and to record these events:

- Binoculars, range finder, GPS, compass
- Two-way radio communication with construction foreman/superintendent
- A log book of all activities which will be made available to NMFS upon request.

5. Prior to the start of cable-laying operations, PSOs will clear the disturbance zone for a period of 30 minutes when activities have been stopped for longer than a 30-minute period. Clearing the zone means no marine mammals have been observed within the zone for that 30-minute period. If a marine mammal is observed in the zone, activities may not start until:
    - It is visually observed to have left the zone or
    - Has not been seen within the zone for 15 minutes in the case of pinnipeds, sea otters, and harbor porpoise, or
    - Has not been seen within the zone for 30 minutes in the case of cetaceans.
6. During cable-laying operations, it is unfeasible and unsafe to stop activities, so there are no shut down procedures for this project. However, GCI has voluntarily agreed that PSOs will monitor disturbance zones that were calculated for the project during all daylight hours and report sightings to NMFS. (Cable-laying activities will take place 24 hrs/day.)

- PSOs will record all marine mammals observed using NMFS-approved observation forms. Sightings of North Pacific right whales will be transmitted to NMFS within 24 hours. These sighting reports will include:
    - Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from the PSO, apparent reaction to activities (e.g., none, avoidance, approach, paralleling, etc.), closest point of approach, and behavioral pace.
    - Time, location, speed, activity of the vessel, sea state, ice cover, visibility, and sun glare.
    - The positions of other vessel(s) in the vicinity of the PSO location.
    - The vessel’s position, speed, water depth, sea state, ice cover, visibility, and sun glare will also be recorded at the start and end of each observation watch, every 30 minutes during a watch, and whenever there is a change in any of those variables.
    - Because sightings of North Pacific right whales are uncommon, and photographs that allow for identification of individual whales from markings are extremely valuable, photographs will be taken if feasible, but in a way that does not involve disturbing the animal (e.g., if vessel speed and course changes are not otherwise warranted, they will not take place for the purpose of positioning a photographer to take better photos. Any photographs taken of North Pacific right whales will be submitted to NMFS.

- Reports will be sent to NMFS on a monthly basis during active in-water work. An end of season report will be sent to NMFS summarizing the sightings and activities.

- PSOs will also assist vessel operators with following NMFS guidelines for reducing impacts to marine mammals (NOAA 2017).

During activities at landing sites, the GCI project will incorporate best management practices designed to minimize effects to the marine environment, including:

- Any work below the ordinary high-water mark will occur during low tide.
- Heavy equipment in intertidal areas and wetlands will be placed on mats, with the exception of beaches with firm sediments (Unalaska, Akutan), such as large boulders.
- All areas will be returned to pre-construction elevations; all trenched areas will be re-graded to original conditions.
- GCI does not intend to re-enter the BMH for 25 years, unless required to address a service or maintenance issue.
- Excavated material will be side-cast next to trenches and be used to bury the cable and BMH.
- No excess material is anticipated to be produced requiring disposal.
- Alterations to shorelines will be temporary and trenches will be constructed and backfilled to prevent acting as a drain (e.g., not backfilled).

Listed Species and Critical Habitat

Western DPS Steller Sea Lions

The Steller sea lion was listed as a threatened species under the ESA on November 26, 1990 (55 FR 49204). In 1997, NMFS reclassified Steller sea lions into two DPSs based on genetic studies and other information (62 FR 24345); 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). Information on Steller sea lion biology and habitat is available at:
http://alaskafisheries.noaa.gov/pr/steller-sea-lions

Endangered Western DPS Steller sea lions range throughout the project action area. During summer Steller sea lions feed mostly over the continental shelf and shelf edge. Females attending pups forage within 20 nm of breeding rookeries (Merrick and Loughlin 1997), which is the basis for designated critical habitat around rookeries and major haulout sites.

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

<u>Steller Sea Lion Critical Habitat</u>
NMFS designated critical habitat for Steller sea lions on August 27, 1993 (58 FR 45269). Designated critical habitat includes the following areas, as described at 50 CFR §226.202:

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

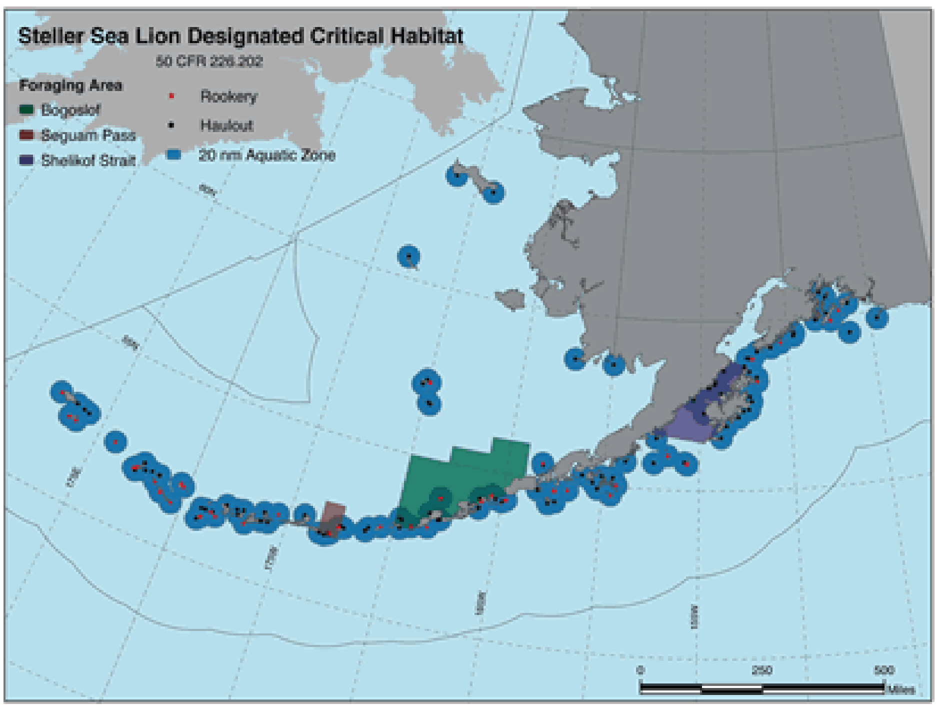


Figure 3. Designated Steller sea lion critical habitat (50 CFR 226.202).

Although there are no major rookeries or haulouts near the planned landfall locations or cable laying route, the cable-laying route is largely within the 20 nm seaward extent of Steller sea lion critical habitat and traverses the Shelikof and Bogoslof Special Aquatic Foraging Areas (Figure 2).

Humpback whales - Western North Pacific DPS and Mexico DPS

In 1970, the humpback whale was listed as endangered worldwide under the Endangered Species Conservation Act of 1969 (ESCA) (35 FR 8491; June 2, 1970), primarily due to decimation from whale harvest. When the ESA was enacted in 1973, humpback whales were included in the List of Endangered and Threatened Wildlife and Plants as endangered and were considered as "depleted" under the MMPA.

Additional information on humpback whale biology and natural history is available at:
http://www.nmfs.noaa.gov/pr/species/mammals/whales/humpback-whale.html
http://alaskafisheries.noaa.gov/pr/humpback
http://www.fisheries.noaa.gov/pr/sars/pdf/stocks/alaska/2015/ak2015_humpback-cnp.pdf

Following the cessation of most legal whale harvest, humpback whale numbers increased. NMFS recently completed a global status review of humpback whales (Bettridge *et al.* 2015) and changed the status of humpback whales under the ESA in 2016 (81 FR 62260; September 8, 2016). The Western North Pacific DPS (which includes a small proportion of humpback whales found in the Aleutian Islands, Bering Sea, and Gulf of Alaska) is listed as endangered; the Mexico DPS (which includes a small proportion of humpback whales found in the Aleutian Islands, Bering Sea, Gulf of Alaska, and Southeast Alaska) is listed as threatened; and the Hawaii DPS (which includes most humpback whales found in the Aleutian Islands, Bering Sea, Gulf of Alaska, and Southeast Alaska) is no longer listed as endangered or threatened. Critical habitat has not been designated for the Western North Pacific or Mexico DPSs.

Based on an analysis of migration between winter mating/calving areas and summer feeding areas using photo-identification, Wade *et al.* (2016) concluded that whales feeding in Alaskan waters belong primarily to the Hawaii DPS (recovered), with small contributions of Western North Pacific DPS (endangered) and Mexico DPS (threatened) individuals. In the action area of the proposed GCI project (Bering Sea/Aleutian Islands), we consider Hawaii DPS individuals to comprise 86.5 percent of the humpback whales present, Mexico DPS individuals to comprise 11.3 percent, and Western North Pacific DPS individuals to comprise 4.4 percent. (These percentages total greater than 100% because for the endangered Western North Pacific DPS they reflect the upper limit of the 95% confidence interval of the probability of occurrence in order to give the benefit of the doubt to the species and to reduce the chance of underestimating potential takes.)

The coastal areas of the Gulf of Alaska and Aleutian Islands/Bering Sea are important foraging areas for humpback whales from June through September (Barlow *et al*. 2011, Friday *et al*. 2013, Ferguson *et al*. 2015). Humpback whales produce a variety of vocalizations ranging from 20 Hz to 10 kHz (Richardson *et al*. 1995, Au *et al*. 2006, Vu *et al*. 2012). NMFS categorizes humpback whales in the low-frequency cetacean functional hearing group, with an applied frequency range between 7 Hz and 35 kHz (NMFS 2016).

North Pacific Right Whales

The northern right whale was listed as an endangered species under the ESCA on June 2, 1970 (35 FR 8491), and continued to be listed as endangered following passage of the ESA. NMFS later divided the listing into two separate endangered species: North Pacific right whales and North Atlantic right whales (73 FR 120424; March 6, 2008). Only the North Pacific right whale occurs in Alaska. Information on biology and habitat of the North Pacific right whale is available at:
https://alaskafisheries.noaa.gov/pr/npr-whale
http://www.adfg.alaska.gov/index.cfm?adfg=rightwhale.main

North Pacific right whales were originally distributed from Baja California to the Bering Sea (Brownell *et al.* 2001). Before right whales in the North Pacific were heavily exploited by commercial whalers, concentrations were found in the Gulf of Alaska, eastern Aleutian Islands, south-central Bering Sea, Sea of Okhotsk, and Sea of Japan (Braham and Rice 1984). Originally, North Pacific right whales numbered at least 11,000 animals and may have been twice that number (AFSC 2010). Currently the population is estimated to number fewer than 100 animals; the minimum population estimate is 24 whales (Wade *et al*. 2011; Muto *et al.* 2017).

In the past 20 years, most right whale sightings during spring and summer feeding seasons (and most survey effort) have occurred in the southeastern Bering Sea, with a few records in the Gulf of Alaska (Muto *et al.* 2017). Of the 184 recent right whale sightings reported north of the Aleutian Islands, 182 occurred within the area designated as critical habitat in the Bering Sea (Goddard and Rugh 1998, Zerbini *et al*. 2009, Rone *et al*. 2012).

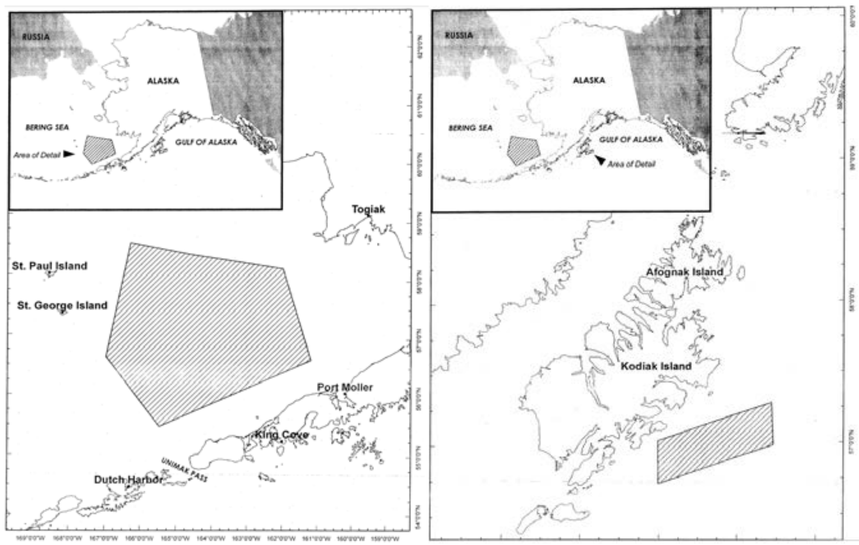
Data from bottom-mounted acoustic recorders deployed in October 2000, January 2006, May 2006, and April 2007 indicate that right whales remain in the southeastern Bering Sea from May through December with peak call detection in September (Munger *et al*. 2008). Additional recorders deployed from 2007 to 2013 indicate the presence of right whales in the southeastern Bering Sea almost year-round, with a peak in August and a sharp decline in detections in early January (Crance *et al*. 2017, Wright *et al*. 2018).

A study of right whale ear anatomy indicates a total possible hearing rage of 10 Hz to 22 kHz (Parks *et al*. 2007). NMFS categorizes right whales in the low-frequency cetacean functional hearing group, with an applied frequency range between 7 Hz and 35 kHz (NMFS 2016).

North Pacific Right Whale Critical Habitat

The North Pacific right whale has two broad areas of critical habitat, designated by NMFS on April 8, 2008 (73 FR 19000). One of these is in the Gulf of Alaska south of Kodiak Island; the other is within Bristol Bay north of the Alaska Peninsula and eastern Aleutian Islands (Figure 8). The physical or biological features (PBFs) deemed necessary for the conservation of North Pacific right whales include:

- the presence of specific copepods (*Calanus marshallae*, *Neocalanus cristatus*, and *N. plumchris*), and euphausiids (*Thysanoessa Raschii*) that are primary prey items for the whales; and
- physical and oceanographic forcing that promotes high productivity and aggregation of large copepod patches.



(a) (b)

Figure 4. North Pacific right whale critical habitat in the Bering Sea (a) and Gulf of Alaska (b). The GCI cable route does not traverse right whale critical habitat.

Fin Whales

The fin whale was decimated by commercial whaling in the 1800s and early 1900s. It was listed as an endangered species under the ESCA on June 2, 1970 (35 FR 8491) and continued to be listed as endangered following passage of the ESA. Information on fin whale biology and habitat is available at:
http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/finwhale.htm
http://www.fisheries.noaa.gov/pr/sars/pdf/stocks/alaska/2014/ak2014_finwhale.pdf

Fin whale sightings are common in the Gulf of Alaska during the summer months (Moore *et al*. 2006). In the southeast Bering Sea, fin whale calls were detected year round, with peaks in September through November, and February-March (Stafford *et al*. 2010). Fin whale calls were detected in the northeastern Chukchi Sea from July through October (Delarue *et al*. 2013), and have also recently been observed during summer feeding in the waters of the northern Bering Sea and southern Chukchi Sea. The acoustic data suggest that several fin whale stocks may feed in the Bering Sea, but only one of the putative Bering Sea stocks appears to migrate north into the Chukchi Sea to feed (Delarue *et al*. 2013).

Fin whales produce a variety of low-frequency sounds in the 10 to 200 Hz range (Watkins 1981, Watkins *et al*. 1987, Edds 1988, Thompson *et al*. 1992). While there is no direct data on hearing in low-frequency cetaceans, the applied frequency range is anticipated to be between 7 Hz and 35 kHz (NMFS 2016). Synthetic audiograms produced by applying models to X-ray computed tomography scans of a fin whale calf skull imply the best hearing for fin whale calves ranges from 20 Hz to 10 kHz, with maximum sensitivities between 1 and 2 kHz (Cranford and Krysl 2015).

Sperm Whales

The sperm whale was listed as an endangered species under the ESCA on June 2, 1970 (35 FR 8491), and continued to be listed as endangered following passage of the ESA. Information on sperm whale biology and habitat is available at:
http://www.fisheries.noaa.gov/pr/species/mammals/whales/sperm-whale.html
http://www.fisheries.noaa.gov/pr/sars/pdf/stocks/alaska/2014/ak2014_spermwhale.pdf

Sperm whales are primarily found in deep waters; sightings of sperm whales in water less than 300 m (984 ft) are uncommon. Sperm whales are unlikely to be present in the shallow waters most potentially affected by the GCI cable project in the Aleutians.

Sperm whales produce a variety of vocalizations ranging from 0.1 to 20 kHz (Weilgart and Whitehead 1993, Goold and Jones 1995, Møhl *et al*. 2003, Weir *et al*. 2007). As odontocetes (toothed whales) sperm whales are considered mid-frequency cetaceans with an applied hearing frequency range of 150 Hz to 160 kHz (NMFS 2016). The only direct measurement of hearing was from a young stranded individual from which auditory evoked potentials were recorded and indicated a hearing range of 2.5 to 60 kHz (Ridgway and Carder 2001).

Blue Whales

The blue whale was listed as an endangered species under the ESCA on June 2, 1970 (35 FR 8491), and continued to be listed as endangered following passage of the ESA. Critical habitat has not been designated for the blue whale. Blue whales may be present in the action area along the marine transit route from Anchorage to Aleutian project sites. Information on blue whale biology and habitat is available at:
https://www.fisheries.noaa.gov/species/blue-whale
https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-species-stock

The eastern North Pacific population of blue whales is believed to range as far north as the Gulf of Alaska (Monnahan *et al*. 2014). Acoustical data of whale calls suggests two populations of North Pacific blue whales found in the eastern and central north Pacific (Stafford 2003, Monnahan *et al*. 2014). The northeastern population feeds during summer off the U.S. West Coast and to a lesser extent in the Gulf of Alaska. Blue whales belonging to the central Pacific stock appear to feed in summer southwest of Kamchatka, south of the Aleutians, and in the Gulf of Alaska (Watkins *et* al. 2000; Muto *et al*. 2017). Individuals from both populations may be present in the GCI action area.

Blue whales produce a variety of vocalizations, ranging from 16 Hz to 31 kHz (Erbe 2002). While there is no direct data on hearing in low-frequency cetaceans, the applied frequency is anticipated to range from 7 Hz to 35 kHz (NMFS 2016).

Western North Pacific Gray Whale

The gray whale was listed as an endangered species under the ESCA on June 2, 1970 (35 FR 8491), and continued to be listed as endangered following passage of the ESA. There are two extant populations in the eastern and western North Pacific. The eastern population was delisted in 1994 (59 FR 31094). The western population remains very low, around 200 individuals, and is listed as endangered under the ESA. Critical habitat has not been designated for the gray whale.

Gray whales may be present in the action area along the marine transit route from Anchorage to the Aleutian Islands.

Information on gray whale biology and habitat is available at:
https://www.fisheries.noaa.gov/species/gray-whale
https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-species-stock

Gray whales produce a variety of vocalizations, which have been reported to range from 20 Hz to 10 kHz (Erbe 2002). While there is no direct data on hearing in low-frequency cetaceans, the applied frequency is anticipated to range from 7 Hz to 35 kHz (NMFS 2016).

Effects of the Action

For purposes of the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is "not likely to adversely affect" listed species or critical habitat is that all of the effects of the action are expected to be insignificant, discountable, or completely beneficial. Insignificant effects relate to the size of the impact and would not be able to be meaningfully measured or detected, and should never reach the scale where take occurs. Discountable effects are those that are extremely unlikely to occur. Beneficial effects are contemporaneous positive effects without any adverse effects to the species.

This consultation includes recent NMFS guidance on the term "harass," which means to: "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016).

The potential effects of the proposed action on listed species and critical habitat include vessel strikes and disturbance from noise generated by vessels during the cable-laying process.

Vessel Strike

Vessels transiting the marine environment have the potential to collide with, or strike, marine mammals (Laist *et al*. 2001, Jensen and Silber 2004). From 1978 to 2012, there were at least 108 recorded whale-vessel collisions in Alaska, with the majority occurring in Southeast Alaska (Neilson *et al*. 2012). Among larger whales, humpback whales were found to be the most frequently documented victims of ship strikes in Alaska, accounting for 86 percent of all reported collisions. Fin whales accounted for 2.8 percent of reported collisions, gray whales 0.9 percent, and sperm whale 0.9 percent.

The probability of strike depends on the frequency, speed, and route of the marine vessels, as well as distribution and density of marine mammals in the area. Vanderlaan and Taggart (2007) used observations to develop a model of the probability of lethal injury based upon vessel speed. They projected that the chance of lethal injury to a whale struck by a vessel travelling at speeds over 15 kts (27.78 km/hr) is approximately 80 percent while for vessels travelling between 8.6 and 15 kts (15.92 km/hr), the probability of lethal injury drops to about 20 percent. The GCI cable-laying vessels are travelling at much slower speeds (ship: 1-3 kts ; barge: 1kt), essentially eliminating the possibility of lethal vessel strike.

Although risk of ship strike has not been identified as a significant concern for Steller sea lions (Loughlin and York 2000), the recovery plan for this species (NMFS 2008) states that Steller sea lions may be more susceptible to ship strike mortality or injury in harbors or near rookeries or haulouts, where animals are concentrated. To minimize this risk, project vessels will avoid travelling within 3 nm (5.6 km) of major Steller sea lion haulouts or rookeries. Even if project vessels encounter Steller sea lions, collisions are extremely unlikely due to sea lions' speed and maneuverability and the slow velocity of project vessels.

Project vessels will not enter North Pacific right whale designated critical habitat. Project vessels will also adhere to NMFS marine mammal viewing guidelines (NOAA 2017). Given the expected effectiveness of these measures, the low density of listed cetaceans along the cable-laying route, and the ability of listed pinnipeds to avoid vessels due to their maneuverability, the probability of a vessel striking a listed marine mammal is very small, and thus adverse effects to these species are extremely unlikely to occur. Therefore, we conclude that adverse effects from vessel strikes related to the GCI cable project are discountable.

<u>Disturbance from Vessels</u>
Auditory or visual disturbance to listed marine mammals could potentially occur along the GCI cable-laying route. The primary underwater noise associated with the proposed vessel operation is the continuous noise produced from propellers, including propeller harmonics (Gray and Greeley 1980) and cavitation. When calculating the action area, the USACE (in their BA) determined a disturbance radius (to the 120 dB isopleth) of 1.8 km (1.1 mi) for the cable-laying ship and 2.8 km (1.7 mi) for the barge.

Marine mammals' reactions to vessel disturbance may include approach or deflection from the noise source, low level avoidance or short-term vigilance behavior, or short-term masking of echolocation or acoustic communication among individuals. Behavioral reactions to vessels can vary depending on the type and speed of the vessel, the spatial relationship between the animal and the vessel, the species, and the behavior of the animal prior exposure. Response also varies between individuals of the same species exposed to the same sound, depending on age and individual whales' past experiences. Vessels moving at slow speeds and avoiding rapid changes in direction or engine speed may be tolerated by some whales. Other individuals may deflect around vessels and continue on their migratory path; these behaviors are not likely to result in significant disruption of normal behavioral patterns. Whales have been known to tolerate slow-moving vessels within several hundred meters, especially when the vessel is not directed toward the animal and when there are no sudden changes in direction or engine speed (Wartzok *et al*. 1989, Richardson *et al*. 1995, Heide-Jørgensen *et al*. 2003).

Although some listed marine mammals could receive sound levels in exceedance of the acoustic threshold of 120 dB from the vessels during this proposed project, take is unlikely to occur. Vessel transit for this proposed project is not likely to acoustically harass listed species, per the steps to assess harassment in the Interim Guidance on the ESA Term "Harass" (Wieting 2016). While listed marine mammals will likely be exposed to vessel noise from this proposed project, the noise will be low-frequency, with much of the acoustic energy occurring below frequencies associated with best hearing for the marine mammals expected to occur in the area. The duration of the exposure will be temporary (a few minutes), because the vessel will be in transit. Project vessels are travelling at very low speeds, and the noise from the vessels will be continuous, alerting marine mammals of their presence before the received level of sound exceeds 120 dB. Therefore, a startle response is not expected. Rather, deflection and avoidance are expected to be common responses in those instances where there is any response at all. The implementation of mitigation measures is expected to further reduce the probability of marine mammals reacting to transiting vessels.

The lack of adverse effects to marine mammals from cable-laying vessels is supported by recent marine mammal observations in the arctic. In 2016, NMFS conducted a formal consultation for Quintillion Subsea Operations, a similar cable-laying project in the arctic. Final marine mammal PSO reports (2016 and 2017) for the Quintillion project (Blees *et al.* 2017; Green *et al*. 2018) provided the following information:

- In 2016, reactionary behaviors were documented during only 3% of all cetacean observations. Reactions included change of direction (2 bowhead whales and 2 gray whales) and swimming speed increase (1 bowhead). One whale was observed swimming under the vessel and continued to swim away. None of the remaining 231 groups or 557 individuals exhibited a reaction to the presence of the cable ship.
- In 2017, reactionary behaviors were documented during only 2.5% of all cetacean observations and included avoidance (moving away from the vessel) by a group of 3 gray whales and a single unidentified whale. None of the remaining 78 groups or 112 individuals exhibited a reaction to the presence of the cable ship.
- In 2016, nearly 62% of pinniped groups and individuals did not react to vessel activities. The most commonly observed reaction was "look", meaning the animal acknowledged the presence of the vessel. Other reactions included diving, increased swimming speed, or clearly changing travel direction. No reactions were indications of the animals exhibiting threat or flee responses, but were rather more curiosity or avoidance behaviors.
- In 2017, 39 percent of the pinniped groups did not react to vessel activities in the Quintillion project area, and another 53% simply noted the presence of the ship by looking at it. Other reactions included altering swimming direction, approaching the vessel, and splashing when diving.

The information from the Quintillion reports provides substantiation that marine mammal response, if any, to these cable-laying vessels is not expected to rise to the level of harassment, or take, of ESA-listed species.

With implementation of the mitigation measures incorporated into the project design, vessel transit is not expected to significantly disrupt normal marine mammal behavioral patterns (breeding, feeding, sheltering, resting, migrating, etc.), making harassment of listed marine mammals very unlikely. Therefore, disturbance from GCI cable-laying vessels is extremely unlikely to harass listed marine mammals, and such effects are discountable.

Effects to Critical Habitat

The proposed project occurs within designated critical habitat for Steller sea lions. Project effects to the physical and biological features of Steller sea lion critical habitat are considered below:

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

   Project activities on land will remain outside the 3,000-foot terrestrial zone of Steller sea lion critical habitat.

   No major haulouts or rookeries occur near the 0.9 km terrestrial buffer of any GCI project landing site (Figure 2 – see also Figures 25-28 in the BA). The probability of terrestrial disturbance from project activities is therefore very small, and thus adverse effects on the terrestrial zones are extremely unlikely to occur. We conclude effects on the terrestrial zones are discountable.

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

   The GCI project includes no aerial activities.

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

   The project will not occur east of 144ºW longitude, and there will be no effects to this PBF of Steller sea lion critical habitat.

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

   Most of the GCI cable route is located within the 20-nautical mile aquatic zones of Steller sea lion critical habitat. However, vessel operations will be transitory and short-term. Therefore, we expect the resulting acoustic impacts on these zones to be too small to meaningfully measure or detect. Minor disturbance of the seafloor will occur where the cable is buried; however, natural current and wave surge processes are expected to quickly dissipate resuspended sediments (on the order of minutes) and fill any depression caused by the temporary cable trench created by the plow (on the order of days). Therefore, we conclude that both acoustic and physical effects of the GCI Aleutians cable project vessel activities on this feature are insignificant.

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

   Project vessels will transit through the Shelikof Strait and Bogoslof special aquatic foraging areas. Vessel operations will be transitory and short-term, and with the implementation of the mitigation measures, we expect that any effects to the special aquatic foraging areas would be immeasurably small, and thus insignificant.

Conclusion

Based on this analysis, NMFS concurs with your determination that the proposed action may affect, but is not likely to adversely affect, endangered Western DPS Steller sea lions, endangered Western Pacific DPS humpback whales, threatened Mexico DPS humpback whales, endangered North Pacific right whales, endangered western North Pacific gray whales, endangered fin whales, endangered blue whales, or endangered sperm whales. NMFS also concurs that the proposed action is not likely to adversely modify or destroy designated critical habitat for the Steller sea lion, or North Pacific right whale.

Reinitiation of consultation is required where discretionary federal involvement or control over the action has been retained or is authorized by law and if

1) take of listed species occurs;
2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter; or
4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16).

Please direct any questions regarding this letter to Judy Jacobs at judy.jacobs@noaa.gov or 907-350-3670.

Sincerely,

Jonathan M. Kurland
Assistant Regional Administrator
for Protected Resources

cc: Andy Gray Andrew.A.Gray@usace.army.mil
Emily Creely ecreely@dowl.com
Sheyna Wisdom sheyna.wisdom@fairweather.com

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

June 11, 2021

Ms. Omololu Dawodu
U.S. Department of Agriculture
Rural Development Agency, Rural Utilities Service
1400 Independence Avenue, SW
Washington, D.C. 20250

Re: Aleutian Telecommunications Project, expedited Letter of Concurrence NMFS AKRO-2021-01264

Dear Ms. Dawodu:

This letter responds to your request for concurrence from the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act for the proposal to install a new 848-mile-long submarine fiber optic cable from Kodiak Island, Alaska, along the Alaska Peninsula, to Unalaska, Alaska. NMFS originally completed informal consultation for the project on August 22, 2019 (AKRO-2019-00892). We received an expedited request for reinitiation of informal consultation on May 19, 2021, due to the designation of humpback whale critical habitat subsequent to completion of our initial consultation for this project. No other aspects of the proposed action or its effects have changed. After receiving NMFS's comments, the USDA submitted a revised request for expedited informal consultation on June 4, 2021 via your non-federal designee DOWL. Your request qualified for our expedited review and concurrence because it met our screening criteria and contained all required information on your proposed action, mitigation measures, and its potential effects to listed species and designated critical habitat. Expedited consultation for this proposed action commenced on June 8, 2021.

We reviewed your consultation request document and related materials. Based on our knowledge, expertise, and the materials you provided, we concur with your conclusions that the proposed action is not likely to adversely affect critical habitat of humpback whales (*Megaptera novaeangliae*), including the endangered Western North Pacific distinct population segment (DPS) critical habitat and the threatened Mexico DPS critical habitat. A complete administrative record of this consultation is on file at the Anchorage NMFS office.

Reinitiation of consultation is required where discretionary federal involvement or control over the action has been retained or is authorized by law and if (1) take of listed species occurs, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter, or (4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16).

Please direct any questions regarding this letter to Ann Erickson, at ann.erickson@noaa.gov or (907) 271-5006.

Sincerely,

Jonathan M. Kurland
Assistant Regional Administrator
for Protected Resources

cc: Emily Creely ecreely@dowl.com

June 4, 2021

Mr. John Kurland
National Marine Fisheries Service
Protected Resources - Juneau
Alaska Regional Office
via email: jon.kurland@noaa.gov

Subject: Section 7 Endangered Species Act – Expedited Informal Consultation Request
AU Aleutian Telecommunications Project
Unalaska, Akutan, King Cove, Sand Point, Chignik Bay, Larsen Bay, Alaska

Dear Mr. Kurland,

On behalf of Unicom, Inc., (Unicom) and the U.S. Department of Agriculture Rural Development and pursuant to the Endangered Species Act (ESA), DOWL requests initiation of expedited informal Section 7 consultation for the proposed project. We have determined the proposed activity may affect, but is not likely to adversely affect Threatened or Endangered Species (T&E) critical habitat. We are requesting concurrence from the National Marine Fisheries Service (the Service) if you agree with our determination.

The project consists of terrestrial and marine elements, as described below. In 2019, Section 7 consultation under the Endangered Species Act (ESA) was completed with USFWS and NMFS. Biological Assessments (BA) were prepared to evaluate marine effects, and the result of the consultations was a formal determination that the proposed project may affect, but is not likely to adversely affect or jeopardize the continued existence of any species listed under the Endangered Species Act.

However, since initiation of this project, NOAA Fisheries issued a final rule to designate critical habitat for the humpback whale (*Megaptera novaeangliae).* Therefore, this letter addresses marine elements of our project that coincide with new humpback whale critical habitat.

PROPOSED PROJECT

Unicom proposes to install a new 848-mile-long submarine fiber connecting six communities to an existing company-owned middle-mile fiber network (Figure 1; Attachment 1).

The federal action triggering our consultation request is funding of the project by the USDA ReConnect grant program; as such, USDA is required to certify the project does not pose a significant environmental effect. The information contained within this letter constitutes an evaluation of potential biological impacts on T&E critical habitat listed under the ESA. We conclude this letter with reason why the telecommunications project is not likely to adversely affect T&E critical habitat and request your concurrence on this matter.

ACTION AREA

From Kodiak, the fiber optic cable would be laid down the Shelikof Strait and then parallel the Alaska Peninsula to the southwest until it reaches Unalaska. The cable would branch off to transmission regeneration sites located at Larsen Bay, Chignik Bay, Sand Point, and King Cove, with an additional branch (without signal regeneration) to Akutan. Services to end users in these five communities will be distributed through underground trenching, requiring the installation of prefabricated communications shelters (approximately 25 feet long, 15 feet wide, and 10 feet high) on new gravel pads measuring 625 ft^2 and 2-feet deep. Each shelter would have a self-contained, diesel-powered generator adjacent to it on the gravel pad. No towers are associated with the project. The Action Area is shown on Figure 1.

PROJECT DESCRIPTION

The following describe project elements that would occur in the marine environment, outside of intertidal areas. The fiber optic cable would either be surface laid on the sea floor or buried via plow (maximum 1-foot width and 5-foot depth) in waters deeper than 50 feet. While it is expected that the temporary cable trench created by the plow would collapse, post-lay inspection and burial would be conducted using the ROVJET 207 series or similar remotely operated vehicle (ROV). In waters less than 50 feet deep, the cable may be buried using either a towed sled or tracked ROV, or use of a hand jet and water lift operated by a diver resulting in an excavation no more than 3 feet deep. In general, equipment in the near shore marine environment may include:

- Small utility boat to run pull line to beach
- Dive boat with hand jetting tools

LISTED CRITICAL HABITAT IN THE ACTION AREA

The AU Aleutian project area coincides with the following new critical habitat areas.

Critical habitat for the humpback whale (*Megaptera novaeangliae)* includes:

- endangered Western North Pacific distinct population segment (DPS)
- threatened Mexico DPS of humpback whales (*Megaptera novaeangliae*)

Critical habitat for the Mexico and Western North Pacific DPS humpback whales was designated April 20, 2021 (86 FR 21082) (Figure 1). Critical habitat for the Western North Pacific DPS includes approximately 59,411 square nautical miles of marine habitat in the eastern Bering Sea and Gulf of Alaska, including the eastern Aleutian Islands, the Shumagin Islands, and around Kodiak Island. Critical habitat for the Mexico DPS includes approximately 116,098 of marine habitat in the eastern Bering Sea, Gulf of Alaska, and California Current Ecosystem, including the same areas as Western North Pacific DPS plus the Prince William Sound area.

For both the Mexico and Western North Pacific DPS humpback whales, the physical and biological features (PBF)s associated with critical habitat include: Prey species, primarily euphausiids (*Thysanoessa*, *Euphausia*, *Nyctiphane*s, and *Nematosc*elis) and small pelagic schooling fishes, such as Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasii*), capelin (*Mallotus villosus*), juvenile walleye pollock (*Gadus chalcogrammus*), and Pacific sand lance (*Ammodytes personatus*) of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth.

MITIGATION MEASURES

As a part of a previous ESA consultation, the applicant has agreed to implement the following standard mitigation measures in order to minimize the risk of harm to listed species for their proposed project:

Vessel Operations

- Project vessels will not enter 3 nautical miles (5.6 kilometer) range of major Steller sea lion rookeries or major haulouts.
- Avoid sea otter critical habitat (map below) when possible.
- If a marine mammal is spotted within 1 mile of the vessel and vessel is not laying cable,

vessels will slow to less than 5 knots. The lay will not exceed 4 kts and burial would be less than 1 kts.

- If a marine mammal is observed, vessels will alter course and reduce speed to avoid disturbance and collision.
- If a group of marine mammals or raft of sea otters is observed, vessels will avoid separating members from the group.

- Operate vessel thrusters (main and dynamic positioning) at minimum power necessary to accomplish the work.
- Lighting on vessels will be minimized and down shielded to avoid attracting avian species.

Protected Species Monitoring Requirements

- Have two trained Protected Species Observers (PSOs) onboard the cable-laying vessel (ship or barge).
- PSOs must watch for marine mammals and avian species during all daylight hours.
- PSOs must not have any other duty on the vessel.
- PSOs collect sighting information on species, environmental parameters, and vessel activities.

Pre-clearance and Safety Zone Measures

- Prior to the start of cable-laying operations each day or if activities have been stopped for longer than 30 minutes, PSOs must "clear" the safety zone (this means no marine mammals have been observed within this zone for 30 minutes).
- If marine mammals are observed within the safety zone, cable-laying must not start until:
    - Mammal has visually observed to have left that zone
    - Has not been seen within the zone for 15 minutes for seals, sea lions, sea otters, or harbor porpoises
    - Has not been seen within the zone for 30 minutes for whales
- Safety Zone Distances (on each side of the vessel)
    - Cable-laying ship: 1.1 miles (1.8 kilometers)
    - Cable-laying barge: 1.7 miles (2.8 kilometers)

EFFECTS OF THE ACTION

Disturbance to Seafloor, Prey Resources, and Prey Resource Habitat

The proposed action will have temporary impacts on water quality (increases in turbidity levels) and on humpback whale prey species distribution. Cable installation may cause temporary and localized turbidity through sediment disturbance. Turbidity plumes during cable laying and burial will be localized around the cable. Due to temporary, localized, and low levels of turbidity increases, it is not anticipated that turbidity would result in immediate or long-term effects to humpback whale prey.

Project vessel use and cable burial equipment (ROV and/or hand jets and water lifts) would produce both intermittent and continuous sounds, introducing noise into the underwater environment that has the potential to negatively impact humpback prey species. Fish react to sounds that are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy.

The most likely impact to fish prey species from project vessel and cable burial activities of the project would be temporary behavioral avoidance of the area. The duration of fish species avoidance of this area after vessel and cable burial activities cease is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated. In general, impacts to humpback fish prey species are expected to be minor and temporary given the small area of cable installation within the action area relative to known feeding areas for humpback whales. In general, we expect fish species will be capable of moving away from project activities to avoid exposure to noise. We expect the area in which stress, injury, temporary threshold shifts, or changes in balance of prey species may occur will be limited to a few meters directly around the cable burial/laying and vessel operations. We consider potential adverse impacts to fish resources from cable burial/laying and vessel operation in the action area to be unlikely.

Studies on euphausiids and copepods, two of the more abundant and biologically important groups of zooplankton, have documented some sensitivity of zooplankton to sound (Chu et al. 1996; Wiese 1996); however, any effects of cable burial/laying activities and vessel traffic on zooplankton would be expected to be restricted to the area within a few feet or meters of the project and would likely be sub-lethal.

No appreciable adverse impact on zooplankton populations will occur due in part to large reproductive capacities and naturally high levels of predation and mortality of these populations. Any mortality or impacts on zooplankton as a result of construction operations is immaterial as compared to the naturally-occurring reproductive and mortality rates of these species. This is consistent with previous conclusions that crustaceans (such as zooplankton) are not particularly sensitive to sound produced by even louder impulsive sounds such as seismic operations (Wiese 1996).

Cable burial/laying activities and associated project vessel traffic will temporarily increase in-water noise and may adversely affect prey in the action area. Adverse effects on prey species populations during the project will be short-term, based on the short duration of the project within an area. After cable burial/laying activities are completed within an area the associated project equipment, noise, and potential turbidity move on along the fiber optic cable route, habitat use and function are expected to return to similar pre-construction levels and fish are expected to repopulate the area.

Given the numbers of fish and other prey species in the vicinity, the short-term nature of effects on fish species, and the mitigation measures to protect fish and marine mammals during construction, the proposed action is not expected to have measurable effects on the distribution or abundance of potential humpback whale prey species. Any behavioral avoidance by fish of the disturbed area would still leave sufficiently large areas of fish and humpback whale foraging habitat outside of the action area.

PBFs of humpback whale prey species will not be adversely affected by the project. The project completed consultation with NMFS under the Magnuson-Stevens Fisheries Conservation and Management Act.Per the EFH database, there are no Habitat Areas of Particular Concern or Habitat Conservation Areas within 1 mile of the proposed cable route. The following species are within one mile from the Proposed Cable Route:

Table 9. Species with Designated EFH Within One Mile from the Proposed Cable Route

Species	Common Name	Designated EFH
Pleuronectes quadrituberculatus	Alaska Plaice	EFH widely distributed
Atheresthes stomias	Arrowtooth Flounder	EFH in eastern project area – False Pass to Unalaska
Pleurogrammus monopterygius	Atka Mackerel	EFH near Unalaska and Akutan
Sebastes melanostictus and Sebastes aleutianus	Blackspotted Rockfish and Rougheye Rockfish	EFH widely distributed

Species	Common Name	Designated EFH
Microstomus pacificus	Dover Sole	EFH in eastern project area – False Pass to Unalaska
Sebastes ciliatus	Dusky Rockfish	EFH near Akutan and Unalaska
Hippoglossoides elassodon	Flathead Sole	EFH widely distributed
Lithodes aequispinus	Golden King Crab	EFH near Unalaska
Reinhardtius hippoglossoides	Greenland Turbot	EFH in eastern project area – False Pass to Unalaska
Atheresthes evermanni	Kamchatka Flounder	EFH widely distributed
Lepidopsetta polyxystra	Northern Rock Sole	EFH widely distributed
Sebastes polyspinis	Northern Rockfish	EFH near Unalaska and Akutan
Octopus sp	Octopus	EFH widely distributed
Gadus macrocephalus	Pacific Cod	EFH widely distributed
Hippoglossus stenolepis	Pacific Halibut	EFH widely distributed
Sebastes alutus	Pacific Ocean Perch	EFH near Akutan and Unalaska
Glyptocephalus zachirus	Rex Sole	EFH in eastern project area – Port Heiden to Unalaska
Lepidopsetta bilineata	Rock Sole	EFH widely distributed
Sebastes sp	Rockfish (various)	EFH widely distributed
Anoplopoma fimbria	Sablefish	EFH False Pass to Unalaska
Oncorhynchus tshawytscha	Chinook	EFH widely distributed
Oncorhynchus keta	Chum	EFH widely distributed
Oncorhynchus kisutch	Coho	EFH widely distributed
Oncorhynchus gorbuscha	Pink	EFH widely distributed
Oncorhynchus nerka	Sockeye	EFH widely distributed
Various species	Sculpin	EFH widely distributed
Sebastes borealis	Shortraker Rockfish	EFH near Akutan and Unalaska
Sebastolobus alascanus	Shortspine Thornyhead Rockfish	EFH widely distributed
Raja binoculata	Skate	EFH widely distributed
Chionoecetes opilio	Snow Crab	EFH between False Pass and Akutan
Doryteuthis sp	Squid	EFH from False Pass to Unalaska
Sebastolobus alascanus	Shortspine Thornyhead Rockfish	EFH near Akutan and Unalaska
Gadus chalcogrammus	Walleye Pollock	EFH widely distributed
Patinopecten caurinus	Weathervane Scallop	EFH from False Pass to Unalaska
Sebastes ruberrimus	Yelloweye Rockfish	EFH near Akutan and Unalaska
Limanda aspera	Yellowfin Sole	EFH widely distributed

An EFH Assessment was prepared to describe the proposed action, existing conditions in the project area, designated EFH in the project corridor, potential effects to EFH, and potential mitigation or conservation measures. The project will adversely affect EFH due to:

- Temporary habitat alteration in the plow or trench path during construction.
- Temporary localized increase in turbidity in the plow or trench path during construction.
- Short term entrainment or mortality of individuals in the plow or trench path during construction.

Although EFH in the action area will be adversely impacted, the Project will not impact EFH to the point of causing major adverse impacts to fish populations. Individuals of a variety of species are expected to move successfully into similar habitats, since the types of habitats that will be affected are not unique or rare. All effects would be temporary during construction and conservation measures will be used to avoid and minimize impacts to the extent possible.

In summary, the effects of disturbance to the seafloor, habitat, and prey resources resulting from the fiber optic cable laying and burial activities are expected to have a negligible impact on the prey species of Mexico and Western North Pacific DPS humpback whales.

CONCLUSION

Critical habitat was created specifically in areas where prey is abundant and focuses on the quality, abundance, and accessibility of such prey. Physical characteristics of the marine and seafloor landscape are not prominent features or characteristics of the critical habitat. The cable-laying will only have minor effects on the seafloor and prey species; therefore, we conclude the project is not likely to adversely affect critical habitat.

Based on the analysis that all effects of the proposed project will be insignificant and/or immeasurable, USDA has determined that the proposed project is not likely to adversely affect any critical habitat under NMFS's jurisdiction. We have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination.

Sincerely,

Emily Creely
Environmental Specialist
DOWL

Attachment 1: Figures
Attachment 2: Biological Assessment and Letter of Concurrence

United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Anchorage Fish and Wildlife Conservation Office
4700 BLM Road
Anchorage, Alaska 99507-2546

IN REPLY REFER TO:
FWS/AFES/AFWCO

July 18, 2019

Mr. Andrew Gray
U.S. Army Corps of Engineers
44669 Sterling Highway, Suite B
Soldotna, Alaska 99669-7915

Subject: Gulf of Alaska Fiber Optic Cable, Kodiak to Unalaska, Alaska (Consultation 07CAAN00-2018-I-0066)

Dear Mr. Gray:

Thank you for requesting informal consultation with the U.S. Fish and Wildlife Service (Service), pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq., as amended; ESA), by correspondence received June 26, 2019. The U.S. Army Corps of Engineers (Corps) has designated Ms. Emily Creely of DOWL as a non-Federal agency representative for this action. The Corps is requesting informal consultation on a proposed fiber optic cable (cable) from Kodiak to Unalaska, Alaska. The Corps has determined the action may affect, but is not likely to adversely affect the federally endangered short-tailed albatross (*Phoebastria albatrus*), federally threatened Alaska breeding population of the Steller's eider (*Polysticta stelleri*), and the federally threatened southwest Alaska distinct population segment of northern sea otter (*Enhydra lutris kenyoni*; hereafter referred to as sea otter) and its designated critical habitat.

General Communications Incorporated (GCI) has applied for a permit from the Corps for activities associated with expanding telecommunication services to remote areas in southwest Alaska. Activities include laying a submerged fiber optic cable in the Gulf of Alaska from Mills Bay on Kodiak Island to Unalaska to connect 12 existing GCI facilities located at Mills Bay (Kodiak), Larsen Bay, Chignik, Chignik Lake, Chignik Lagoon, Perryville, Sand Point, King Cove, Cold Bay, False Pass, Akutan, and Unalaska. Activities would begin in May of 2020 and would continue year-round for approximately 2 years.

Major project components include the following (DOWL 2019):

- 1,078 miles of 1.5-inch diameter fiber optics would be placed on the seafloor by a barge, with speeds up to 2 knots. In waters deeper than approximately 50 feet, the cable would be buried by plow or chaining, where necessary due to physical conditions or human conflicts;
- In shallower water, as the cable approaches the shoreline to connect the existing GCI facilities, it would be buried using backhoes and trenching equipment and a beach manhole with stub of conduit would be set back from the mean high water mark;
- Where possible, onshore cable routes would be co-located with exiting disturbance as they are headed toward the existing GCI facilities; and
- An additional gravel pad structure, 25-square foot by 2-foot deep, would be constructed near each existing GCI facility.

The proposed action is within the range of short-tailed albatross, Steller's eider, and sea otter. Short-tailed albatrosses occur in high populations in the Aleutian Islands and near outer continental shelves where they feed along areas of upwelling. Large concentrations of Steller's eiders overwinter and stage in shallow water along the shorelines of the Aleutian Islands and Alaska Peninsula. Eiders may be in the project area from fall to spring, dates vary depending on gender, nesting success, open water, and timing of ice melt. The most vulnerable time for eiders in the project area is during molting in fall. They molt in several lagoons and bays, mainly along the northwest side of the Alaska Peninsula. Sea otters occur in the area year-round; designated habitat is located along the shorelines of throughout the project area.

The greatest risk to all of these species is direct contact with vessels and equipment. Other stressors include behavioral modification in response to vessels, human presence, and project-generated noise and contaminants. In addition, habitat and prey could be modified by the cable and associated cable-laying activities.

To reduce potential effects, the transit route will avoid sea otter critical habitat, where practicable, and GCI will incorporate the following avoidance and minimization measures, as described in detail in the biological assessment (DOWL 2019):

- GCI will have observers on vessels to monitor for marine mammals and avian species;
- Observers will monitor the disturbance zone to ensure the area is clear of marine mammals prior initiating cable laying;
- Vessels will be traveling at speeds less than 2 knots while laying cable. While not laying cable, vessels will slow to less than 5 knots, if a marine mammal is spotted within 1 mile of the vessel;
- If a marine mammal is observed, vessels will alter course and reduce speed to avoid disturbance and collision;
- If a group or raft of sea otters is observed, vessels will avoid separating members from the group; and

- Lighting on vessels will be minimized and down-shielded to avoid attracting avian species.

After reviewing the proposed action and the applicant's avoidance and minimization measures, the Service concurs with the Corps' determination that activities associated with the project may affect, but are not likely to adversely affect listed species or their critical habitat. Our concurrence relates only to federally listed or proposed species and/or designated or proposed critical habitat under our jurisdiction. It does not address species under the jurisdiction of National Marine Fisheries Service, or responsibilities under the Migratory Bird Treaty Act, Marine Mammal Protection Act, Clean Water Act, Fish and Wildlife Coordination Act, National Environmental Policy Act, Bald and Golden Eagle Protection Act, or other legislation.

Based on your request and our concurrence, requirements of section 7 of the ESA have been satisfied. However, this letter does not authorize take of listed species. Injured or dead Steller's eiders and sea otters must be reported within 24 hours, unless there are extenuating circumstances, to the Service's Office of Law Enforcement at 877-535-1795 and to the Anchorage Fish and Wildlife Conservation Office at 907-271-2888. Obligations under section 7 of the ESA must be reconsidered if new information reveals project impacts that may affect listed species or critical habitat in a manner not previously considered, if this action is subsequently modified in a manner which was not considered in this assessment, or if a new species is listed or critical habitat is designated that may be affected by the proposed action.

Thank you for your cooperation in meeting our joint responsibilities under the ESA. For more information or if you have any questions please contact Ms. Jennifer Spegon at 907-271-2768 or at jennifer_j_spegon@fws.gov and refer to consultation number 07CAAN00-2018-I-0066.

Sincerely,

Douglass M. Cooper
Chief, Ecological Services Branch

cc: Emily Creely
Sheyna Wisdom
Sharee Tserlentakis

Literature Cited

DOWL. 2019. U.S. Fish and Wildlife Service biological assessment for GCI AU-Aleutian fiber optic cable installation project Bering Sea, Alaska. Prepared for GCI Communications Corporation. April 11, 2019, revised June 2019. Available from the Anchorage Fish and Wildlife Conservation Office, Anchorage, Alaska. 90 pp.

In Reply Refer to:
FWS/IR11/AFWCO

April 2, 2021

Ms. Emily Creely
Environmental Specialist
DOWL
4041 B Street
Anchorage, Alaska 99507

Subject: AU-Aleutian Telecommunications Project, Unalaska, Akutan, King Cove, Sand Point, Chignik Bay, Larsen Bay, Alaska (Consultation *07CAAN00-2021-I-0196*)

Dear Ms. Creely:

Thank you for requesting consultation with the U.S. Fish and Wildlife Service (Service), pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq., as amended; ESA). DOWL is initiating informal section 7 consultation on behalf of Unicom, Inc. (Unicom) and the U.S. Department of Agriculture Rural Development. They propose installing an 848-mile-long submarine fiber connecting six communities to an existing company-owned fiber network. DOWL seeks consultation with the Service on the terrestrial elements of this project, as the marine elements have already been evaluated in a prior consultation (USFWS Consultation 07CAAN00-2018-I-0066, July 2019).

DOWL has evaluated the potential effects of the terrestrial components of the proposed action and has determined that the terrestrial activities of the proposed project may affect but are not likely to adversely affect the federally endangered short-tailed albatross (*Phoebastira albatrus*) and the federally threatened Steller's eider (*Polysticta stelleri*). The terrestrial components of the project do not overlap with critical habitat for threatened and endangered species.

Project Description (terrestrial portion only)
The proposed fiber optic cable from Mill Bay (Kodiak) to Unalaska branches off to transmission regeneration sites at Larsen Bay, Chignik Bay, Sand Point, and King Cove. An additional branch without signal regeneration would go to Akutan. At these locations, Unicom will install prefabricated communications shelters (approximately 25 feet long, 15 feet wide, and 10 feet high) on new gravel pads measuring 625 square-feet and 2 feet deep. In total, the terrestrial components of this project involve 246,856.6 linear feet of trenching. No towers are associated with this project.

Listed Species and Potential Effects
This project overlaps with the range of the ESA-listed Steller's eider and short-tailed albatross. Alaska-breeding Steller's eiders nest on the tundra wetlands of the North Slope, migrate to the Chukchi Sea, and continue along the western coast of Alaska to and from wintering and molting areas further south. Pacific-wintering Steller's eiders disperse throughout the Aleutian Islands, Alaska Peninsula, and western Gulf of Alaska. Eiders spend the majority of their lives in the marine environment, occupying terrestrial habitat only during the nesting season (USFWS, 2019).

The endangered short-tailed albatross breeds on two islands off the coast of Japan but forages widely across the temperate and subarctic North Pacific to the Gulf of Alaska, along the Aleutian Islands. Short-tailed albatross are primarily observed near and over deep-water canyons in the Gulf of Alaska, Aleutian Islands, and Bering Sea (USFWS, 2020).

The presence of either bird in the proposed project area would be incidental to flyover and is therefore discountable. The project lacks towers or other elements associated with bird strikes; therefore, in the unlikely event that a listed bird should be in the project area, the effects are likely to be insignificant. Thus, DOWL concludes that the project may affect but is not likely to affect ESA-listed species.

Conclusion
After reviewing the proposed actions and their anticipated effects, the Service concurs with DOWL's determination that the proposed terrestrial activities are not likely to adversely affect short-tailed albatross and Steller's eiders. Based on your request and our concurrence, requirements of section 7 of the ESA have been satisfied. However, if new information reveals project impacts that may affect listed species or critical habitat in a manner or to an extent not previously considered, or if this action is subsequently modified in a manner which was not considered in this assessment, or if a new species is listed or critical habitat designated that may be affected by the proposed action, section 7 consultation must be reinitiated.

This letter relates only to federally listed or proposed species and/or designated or proposed critical habitat under jurisdiction of the Service. It does not address species under the jurisdiction of the National Marine Fisheries Service, or other legislation or responsibilities under the Fish and Wildlife Coordination Act, Migratory Bird Treaty Act, Marine Mammal Protection Act, Clean Water Act, National Environmental Policy Act, or Bald and Golden Eagle Protection Act.

If you have any questions or need additional information, please contact Ms. Sabrina Farmer at (907) 271-2778 or sabrina_farmer@fws.gov and reference consultation number *07CAAN00-2021-I-0196.*

Sincerely,

DOUGLASS COOPER
Digitally signed by DOUGLASS COOPER
Date: 2021.04.02 08:34:57 -08'00'

Douglass M. Cooper
Ecological Services Branch Chief

References

[USFWS] U.S. Fish and Wildlife Service. 2019. Status assessment of the Alaska-breeding population of Steller's eiders. March 2019. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska.

[USFWS]. 2020. Short-tailed albatross 5-year review: summary and evaluation. June 2020. Anchorage Fish and Wildlife Conservation Office, Anchorage, Alaska.

March 12, 2021

Mr. Douglass Cooper
U.S. Fish and Wildlife Service
Anchorage Field Office
4700 BLM Road
Anchorage, AK

Subject: Section 7 Endangered Species Act Consultation Request
AU Aleutian Telecommunications Project
Unalaska, Akutan, King Cove, Sand Point, Chignik Bay, Larsen Bay, Alaska

Dear Mr. Cooper:

On behalf of Unicom, Inc., (Unicom) and the U.S. Department of Agriculture Rural Development and pursuant to the Endangered Species Act (ESA), DOWL is initiating informal Section 7 consultation and requesting concurrence from the U.S. Fish and Wildlife Service (the Service) that the proposed telecommunications facilities in six communities in southwest Alaska are not likely to adversely affect Threatened or Endangered Species (T&E).

Unicom proposes to install a new 848-mile-long submarine fiber connecting six communities to an existing company-owned middle-mile fiber network (Figure 1; Attachment 1).

From Kodiak, the fiber optic cable would be laid down the Shelikof Strait and then parallel the Alaska Peninsula to the southwest until it reaches Unalaska. The cable would branch off to transmission regeneration sites located at Larsen Bay, Chignik Bay, Sand Point, and King Cove, with an additional branch (without signal regeneration) to Akutan.

Services to end users in these five communities will be distributed through underground trenching, requiring the installation of prefabricated communications shelters (approximately 25 feet long, 15 feet wide, and 10 feet high) on new gravel pads measuring 625 ft^2 and 2-feet deep. Each shelter would have a self-contained, diesel-powered generator adjacent to it on the gravel pad. No towers are associated with the project.

The federal action triggering our consultation request is funding of the project by the USDA ReConnect grant program; as such, USDA is required to certify the project does not pose a significant environmental effect. The information contained within this letter constitutes an evaluation of potential biological impacts on T&E species listed under the ESA. We conclude this letter with reason why the telecommunications project is not likely to adversely affect T&E species (ESA, Section 7(a)(2)), and request your concurrence on this matter.

PROJECT AREA

The project consists of terrestrial and marine elements. Marine elements have already been evaluated by USFWS through a Biological Assessment and Letter of Concurrence and are not likely to adversely affect species. Therefore this letter addresses just terrestrial elements which occur within the known range of the Steller's eider *(Polysticta stelleri*) and the Short-tailed Albatross *(Phoebastria albatrus*), but not within any designated critical habitat areas. The Project Area varies between each community but is described in Table 1 and Figure 2 (Attachment 1).

Table 1: Project Elements by Community

Community	Number of Vaults	Terrestrial Trenching (linear feet)
Mill Bay (Kodiak)	0	0
Larsen Bay	12	9,725.3
Chignik Bay	18	18,145.7
Sand Point	24	34,426.6
King Cove	20	21,468.4
Akutan	10	4,894.7
Unalaska	172	158,195.9
Total	**256**	246,856.6

LISTED SPECIES AND POTENTIAL EFFECTS

Steller's Eider

The Service listed the Alaska-breeding population of Steller's eiders on June 11, 1997 (62 FR 31748). Alaska-breeding Steller's eiders nest on the North Slope, migrate to the Chukchi Sea, and continue along the western coast of Alaska to and from wintering and molting areas further south. Eiders primarily make use of marine waters, shallow lagoons, and occasionally deep-water habitats in instances where ice cover prohibits the use of shallow waters (ABR, 2003); such that, normal eider flight patterns rarely go inland more than ½ mile. Steller's eiders are diving ducks and spend most of the year in shallow-near-shore marine waters. In summer, eiders nest in tundra adjacent to small ponds or wetland habitats outside the project area.

Short-tailed Albatross

The service listed the Short-tailed albatross as endangered (throughout its range) on July 31, 2000, (65 FR 46643). While breeding habitats for the species is restricted to two island colonies in Japan, the Short-tailed albatross do forage widely across the temperate and subarctic North Pacific to the Gulf of Alaska, along the Aleutian Islands. Threats to albatross result exclusively from human-induced impacts such as hunting at breeding colonies, hooking/drowning on commercial longline gear, ingestion of plastic debris, contamination from oil spills, and/or collision with vessel rigging and entanglement in derelict fishing gear.

CONCLUSION

The presence of either bird in the project area would be incidental to flyover. The project lacks towers or other elements associated with bird strikes and is largely buried. As such, we conclude the project will have no effect on listed species or any designated critical habitat.

Sincerely,

Emily Creely
Environmental Specialist
DOWL

Attachment 1: Figures
Attachment 2: Biological Assessment and Letter of Concurrence

From:	Klein, Kimberly
To:	Gray, Andrew A CIV USARMY CEPOA (USA)
Subject:	[Non-DoD Source] USFWS sound thresholds for sea otters
Date:	Tuesday, February 12, 2019 2:09:11 PM

Andrew,
Thank you for the call today regarding the GCI fiber optic project.
It is our understanding that the contractor for the project, Fairweather Science, has proposed an alternative to the the thresholds identified in the USACE/USFWS programmatic consultation for coastal development projects issued under ESA Section 7. Guidance provided in the programmatic consultation documents recommend the use of a 120-db threshold of exposure to continuous sources of underwater noise before "take" will occur. Fairweather has proposed a 160-db threshold for exposure to both continuous and impulsive sound.

The US Fish and Wildlife Service agrees that if no sea otters are exposed to sound pressure levels above 160-db(rms) during either continuous or impulsive underwater noise-generating work, the risk of take will be very low. We will seek to incorporate updated and revised thresholds into the programmatic consultation documents in the near future, and look forward to working with you on this effort.

I have contacted the Washington USFWS staff to determine if there are any available updates to thresholds as they apply to Steller's eiders and other water birds and will let you know what they say.

Thank you, and don't hesitate to reach out if there are any questions.

Kimberly Klein
Incidental Take Coordinator
US Fish and Wildlife Service
907-786-3621
Kimberly_Klein@fws.gov

From:	Klein, Kimberly
To:	Sheyna Wisdom
Cc:	Jennifer Spegon; Christopher Putnam; Gray, Andrew A CIV USARMY CEPOA (US); Emily Creely; Sharee Tserlentakis; Bruce Rein
Subject:	Re: [EXTERNAL] Re: GCI TERRA-Aleutian North BA for your reference
Date:	Monday, October 29, 2018 5:03:09 PM

Sheyna,
Thank you for providing details for the Terra Aleutian cable project and for sending the BA for the Bristol Bay
portion of the project as an example for the evaluation. I agree with Jenny in that this evaluation represents a useful approach to the project and will help you determine what the impacts are likely to be. I took from our teleconference that the same cable laying vessel will be used for work on the south side of the Aleutians. For that vessel, the distance to the 160 dB threshold for sea otters in water over 15 m was 6 m, as described in the Bristol Bay BA. This is a small hazard area and can certainly be argued to be a low risk of Level B take as defined by the Marine Mammal Protection Act and a low risk of take under ESA, but the project will be in some high-density sea otter areas near Akutan and Unalaska. We would like to see inclusion of a monitoring plan with mitigation measures describing how otters will be avoided within the hazard zone or what will be done to prevent take. The specifics in a mitigation plan usually include clearing the area prior to starting up, reducing engine noise when otters are near the hazard zone, etc. We are happy to work with you on the specific details and can provide examples as well. If this can be included, then I don't see the need for an authorization (IHA) under MMPA. Of course, there will remain some potential for take, and an IHA is available for MMPA coverage on a voluntary basis if the applicant desires this coverage.

Thanks again.

Kimberly Klein
Incidental Take Coordinator
US Fish and Wildlife Service
907-786-3621
Kimberly_Klein@fws.gov

On Mon, Oct 29, 2018 at 2:57 PM Spegon, Jennifer <jennifer_j_spegon@fws.gov> wrote:

> Hi Sheyna,
>
> Other than what I just talked we just talked about on spectacled eider, the draft BA looks like you're headed in the right direction for avian species..
>
> Thank you,
> Jennie Spegon
>
> Jennifer Spegon
> Ecological Services
> Anchorage Fish and Wildlife Field Office
> U.S. Fish and Wildlife Service
> 4700 BLM Rd
> Anchorage, AK 99507
> Phone: (907) 271-2768
> FAX: (907) 271-2786

jennifer_j_spegon@fws.gov

On Mon, Oct 29, 2018 at 10:09 AM Sheyna Wisdom <sheyna.wisdom@fairweather.com> wrote:

> Good morning all,
>
> We will have the project description to you by the end of this week, just going through the last set of reviews. I wanted to check in to see if you had a chance to review the previous BA version for overall comments to be included on this new version. We are still working hard to get this document to USACE and then over to you by Thanksgiving, per our conversation, so your comments would be very much appreciated.
>
> Thank you and enjoy the snow!
>
> sheyna
>
> ___________________
>
> Sheyna Wisdom
> General Manager
> Fairweather Science
> 301 Calista Court, Anchorage, AK 99518
> O: 907-267-4611 | C: 907-748-5864
> www.fairweathersciencellc.com
>
> On Fri, Oct 12, 2018 at 3:56 PM Sheyna Wisdom <sheyna.wisdom@fairweather.com> wrote:
>
>> Good afternoon,
>>
>> Thank you for the call this afternoon. I am having the meeting notes reviewed by GCI right now, so I will send out as soon as they are approved. In the meantime, my action items are:
>>
>> - send out meeting invite for Dec 13 10 am (just sent invite)
>> - send BA from North project (attached to this email)
>> - send project description with mitigation measures for South project to discuss MMPA authorization - will be sending in next few weeks
>>
>> We look forward to working with you on this!
>>
>> Have a great weekend.
>> Sheyna
>>
>> ___________________
>>
>> Sheyna Wisdom
>> General Manager
>> Fairweather Science
>> 301 Calista Court, Anchorage, AK 99518
>> O: 907-267-4611 | C: 907-748-5864

From:	Bruce Rein
To:	Emily Creely; Sharee Tserlentakis (Marin)
Subject:	FW: [EXTERNAL] RE: GCI Locations - TAS Anilca stuff with Alaska Maritime
Date:	Wednesday, October 24, 2018 9:57:43 AM
Attachments:	Gulf of Alaska Unit Map 16 (Whale - 01-0483).pdf Gulf of Alaska Unit Map 17 (Spruce -01-0490).pdf Gulf of Alaska Unit Map 18 (Raspberry - 01-0491).pdf Gulf of Alaska Unit Map 11 (Karluk - 01-0478).pdf Alaska Peninsula Unit Map 16 (Chiachi - 01-0445).pdf Aleutian Islands Unit Map 9 (Akutan - 01-0416).pdf Aleutian Islands Unit Map 13 (Unalaska north - 01-0399).pdf Alaska Peninsula Unit Map 23 (Semidi - 01-0452).pdf

Emily,

The TERRA –A route does not pass through any of the ANILCA areas depicted on the attached maps.

Bruce Rein
GCI
Dir. OSP D&C

From: Sharee Tserlentakis (Marin)
Sent: Thursday, October 04, 2018 5:16 PM
To: Bruce Rein <brein@gci.com>
Subject: FW: [EXTERNAL] RE: GCI Locations - TAS Anilca stuff with Alaska Maritime

Bruce, can you please review the enclosed email and send Emily an official GCI response (via email)

Thanks!
Sharee

From: Emily Creely [mailto:ecreely@dowl.com]
Sent: Thursday, October 04, 2018 12:22 PM
To: Sharee Tserlentakis (Marin) <smarin@gci.com>
Subject: FW: [EXTERNAL] RE: GCI Locations

[**EXTERNAL EMAIL** - CAUTION: Do not open unexpected attachments or links.]

Sharee,

We took a careful look at our route and the guidelines that Jeff sent (attached and below) and our route avoids all areas that would instigate any action related to ANILCA.

However, Bruce should also verify this and then respond.

Let me know if you have any questions!
Em

From:	Williams, Jeff
To:	Emily Creely
Cc:	Colligan, Mary
Subject:	Re: [EXTERNAL] RE: GCI Locations
Date:	Thursday, September 27, 2018 4:56:04 PM
Attachments:	Gulf of Alaska Unit Map 16 (Whale - 01-0483).pdf Gulf of Alaska Unit Map 17 (Spruce -01-0490).pdf Gulf of Alaska Unit Map 18 (Raspberry - 01-0491).pdf Gulf of Alaska Unit Map 11 (Karluk - 01-0478).pdf Alaska Peninsula Unit Map 16 (Chiachi - 01-0445).pdf Aleutian Islands Unit Map 9 (Akutan - 01-0416).pdf Aleutian Islands Unit Map 13 (Unalaska north - 01-0399).pdf Alaska Peninsula Unit Map 23 (Semidi - 01-0452).pdf

Hi Emily,

I had to deal with a few high priority items since we last talked.

Your permitting hassles are much less if you avoid placing the GCI Terra fiber optic cable on refuge managed lands or submerged lands, if possible. Please check this online land status database for details of land status as you refine your project location

https://fws.maps.arcgis.com/apps/webappviewer/index.html?id=3eed8d6b30ea443dafe4380d70d0fa5e

Besides offshore islets and islands managed by the refuge (no indication you would route on these lands) the primary areas to look at are around Afognak, Karluk and the Semidi Islands. Here are some suggestions and information:

The refuge-managed submerged waters around Afognak go out to 3nm except when the passes are less then that and then just to mid channel.   This includes mid-channel on the north side of Raspberry Island and Afognak straight around Afognak Island. Stay south of Raspberry and Whale Island and you are fine. The maps I am attaching should show that well for you to site your route.

Larsen bay: Avoid placing the cable in submerged waters off Karluk as it heads SW. Submerged lands go offshore to 1 mile from Sturgeon Bay to Wolcott reef. See maps.

Semidi Islands: Route the cable outside the extensive submerged waters surrounding the Semidi islands. These waters are designated wilderness which have additional protection.

Chignik Bay. No refuge lands around the town, but the islands of Nakchamik, Kak and unnamed are all refuge. There is an additional unnamed islet immediately to the north of the entrance to Anchorage Bay. Refer to online land status database for island location. No submerged waters in the area. Alaska Peninsula NWR has lands in this vicinity, but they don't appear to be affected.

Perryville. Chiachi, Shapka, and Pinusuk islands off of town are refuge. No submerged lands under refuge management in the area.

Sand Point. Islands in general vicinity, but not to this project. See online land status database. No submerged lands under refuge management in the area.

King Cove. Outer Iliasik and Deer island in area. No refuge lands affected.   No submerged lands under refuge management in the area.

Cold Bay. Components of the Izembek NWR are near your landfall and depending how it is proposed to be routed once ashore, you might need to coordinate with the Izembek NWR in Cold Bay. Consult online land status database.

False pass. Izembek and Alaska Maritime NWR lands in area, but likely not an issue.   No submerged lands under refuge management in the area.

Akutan. Alaska Maritime NWR lands in area, but likely not an issue.   No submerged lands under refuge management in the area.

Unalaska.   Alaska Maritime NWR lands in area, but likely not an issue.   No submerged lands under refuge management in the area.

That is my initial read on your proposal as it might affect the Alaska Maritime NWR.   Feel free to consult with me if it is about refuge-related matters. Our Regional Ecological Services office will consult with you on species and Service -administered resources outside the refuge. I will copy them so they are aware of your project request.

Jeff Williams
Assistant Refuge Manager
Alaska Maritime NWR
95 Sterling Highway, Ste. 1
Homer, AK 99603

tel:907-226-4612
cell: 907-299-5820
http://alaskamaritime.fws.gov/

R/V Tiglax schedule https://absilcc.org/science/amnwr

On Thu, Sep 20, 2018 at 3:44 PM Emily Creely <ecreely@dowl.com> wrote:

> Jeff,
>
> I'd love to confirm that the 1-mile submerged land boundary is around Afognak Island – not Raspberry Island.
>
> Em
>
> **Emily Creely, PWS**
> Environmental Specialist

DOWL
907.562.2000 | office
907.865.1216 | direct

From: Emily Creely
Sent: Thursday, September 20, 2018 9:58 AM
To: Williams, Jeff <jeff_williams@fws.gov>
Subject: GCI Locations

Jeff,

I got this 60 MB report down to 5! All the pertinent pages/maps are now here for you to track.

Thank you so much for the call!
Em

Emily Creely, PWS
Environmental Specialist

DOWL
907.562.2000 | office
907.865.1216 | direct
4041 B Street
Anchorage, Alaska 99503

who we are | what we do
www.dowl.com

From:	Spegon, Jennifer
To:	Gray, Andrew A CIV USARMY CEPOA (US); Sheyna Wisdom; Sharee Tserlentakis; Emily Creely
Cc:	Kimberly
Subject:	Gulf of Alaska Fiber Optic Cable, Kodiak to Unalaska, Alaska (Consultation 07CAAN00-2018-I-0066)
Date:	Monday, July 22, 2019 5:14:30 PM
Attachments:	2018-I-0066 Corps GCI Gulf of Alaska Fiber Optics Cable.pdf

Mr. Andrew Gray:

Please see the attached letter from the U.S. Fish and Wildlife Service regarding the project in the subject line. This letter describes and documents our review of potential impacts to threatened and endangered species under section 7 of the Endangered Species Act (ESA).

Thank you for your cooperation in meeting our joint responsibilities under the ESA. For more information or if you have any questions please contact me at the number below.

Thank you,

Jennie Spegon

Jennifer Spegon
Ecological Services
Anchorage Fish and Wildlife Field Office
U.S. Fish and Wildlife Service
4700 BLM Rd
Anchorage, AK 99507
Phone: (907) 271-2768
FAX: (907) 271-2786
jennifer_j_spegon@fws.gov

To expedite requests for U.S. Fish and Wildlife Service consultations and project reviews, send new requests to our central mailbox at: ak_fisheries@fws.gov and copy douglass_cooper@fws.gov

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Anchorage Fish and Wildlife Conservation Office
4700 BLM Road
Anchorage, Alaska 99507

In Reply Refer to:
FWS/IR11/AFWCO

April 2, 2021

Ms. Emily Creely
Environmental Specialist
DOWL
4041 B Street
Anchorage, Alaska 99507

Subject: AU-Aleutian Telecommunications Project, Unalaska, Akutan, King Cove, Sand Point, Chignik Bay, Larsen Bay, Alaska (Consultation *07CAAN00-2021-I-0196*)

Dear Ms. Creely:

Thank you for requesting consultation with the U.S. Fish and Wildlife Service (Service), pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq., as amended; ESA). DOWL is initiating informal section 7 consultation on behalf of Unicom, Inc. (Unicom) and the U.S. Department of Agriculture Rural Development. They propose installing an 848-mile-long submarine fiber connecting six communities to an existing company-owned fiber network. DOWL seeks consultation with the Service on the terrestrial elements of this project, as the marine elements have already been evaluated in a prior consultation (USFWS Consultation 07CAAN00-2018-I-0066, July 2019).

DOWL has evaluated the potential effects of the terrestrial components of the proposed action and has determined that the terrestrial activities of the proposed project may affect but are not likely to adversely affect the federally endangered short-tailed albatross (*Phoebastira albatrus*) and the federally threatened Steller's eider (*Polysticta stelleri*). The terrestrial components of the project do not overlap with critical habitat for threatened and endangered species.

Project Description (terrestrial portion only)

The proposed fiber optic cable from Mill Bay (Kodiak) to Unalaska branches off to transmission regeneration sites at Larsen Bay, Chignik Bay, Sand Point, and King Cove. An additional branch without signal regeneration would go to Akutan. At these locations, Unicom will install prefabricated communications shelters (approximately 25 feet long, 15 feet wide, and 10 feet high) on new gravel pads measuring 625 square-feet and 2 feet deep. In total, the terrestrial components of this project involve 246,856.6 linear feet of trenching. No towers are associated with this project.

Listed Species and Potential Effects

This project overlaps with the range of the ESA-listed Steller's eider and short-tailed albatross. Alaska-breeding Steller's eiders nest on the tundra wetlands of the North Slope, migrate to the Chukchi Sea, and continue along the western coast of Alaska to and from wintering and molting areas further south. Pacific-wintering Steller's eiders disperse throughout the Aleutian Islands, Alaska Peninsula, and western Gulf of Alaska. Eiders spend the majority of their lives in the marine environment, occupying terrestrial habitat only during the nesting season (USFWS, 2019).

The endangered short-tailed albatross breeds on two islands off the coast of Japan but forages widely across the temperate and subarctic North Pacific to the Gulf of Alaska, along the Aleutian Islands. Short-tailed albatross are primarily observed near and over deep-water canyons in the Gulf of Alaska, Aleutian Islands, and Bering Sea (USFWS, 2020).

The presence of either bird in the proposed project area would be incidental to flyover and is therefore discountable. The project lacks towers or other elements associated with bird strikes; therefore, in the unlikely event that a listed bird should be in the project area, the effects are likely to be insignificant. Thus, DOWL concludes that the project may affect but is not likely to affect ESA-listed species.

Conclusion

After reviewing the proposed actions and their anticipated effects, the Service concurs with DOWL's determination that the proposed terrestrial activities are not likely to adversely affect short-tailed albatross and Steller's eiders. Based on your request and our concurrence, requirements of section 7 of the ESA have been satisfied. However, if new information reveals project impacts that may affect listed species or critical habitat in a manner or to an extent not previously considered, or if this action is subsequently modified in a manner which was not considered in this assessment, or if a new species is listed or critical habitat designated that may be affected by the proposed action, section 7 consultation must be reinitiated.

This letter relates only to federally listed or proposed species and/or designated or proposed critical habitat under jurisdiction of the Service. It does not address species under the jurisdiction of the National Marine Fisheries Service, or other legislation or responsibilities under the Fish and Wildlife Coordination Act, Migratory Bird Treaty Act, Marine Mammal Protection Act, Clean Water Act, National Environmental Policy Act, or Bald and Golden Eagle Protection Act.

If you have any questions or need additional information, please contact Ms. Sabrina Farmer at (907) 271-2778 or sabrina_farmer@fws.gov and reference consultation number *07CAAN00-2021-I-0196.*

Sincerely,

Douglass M. Cooper
Ecological Services Branch Chief

References

[USFWS] U.S. Fish and Wildlife Service. 2019. Status assessment of the Alaska-breeding population of Steller's eiders. March 2019. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska.

[USFWS]. 2020. Short-tailed albatross 5-year review: summary and evaluation. June 2020. Anchorage Fish and Wildlife Conservation Office, Anchorage, Alaska.

March 30, 2021

Mr. Douglass Cooper
U.S. Fish and Wildlife Service
Anchorage Field Office
4700 BLM Road
Anchorage, AK

Subject: Section 7 Endangered Species Act Consultation Request
AU Aleutian Telecommunications Project
Unalaska, Akutan, King Cove, Sand Point, Chignik Bay, Larsen Bay, Alaska

Dear Mr. Cooper:

On behalf of Unicom, Inc., (Unicom) and the U.S. Department of Agriculture Rural Development and pursuant to the Endangered Species Act (ESA), DOWL is initiating informal Section 7 consultation and requesting concurrence from the U.S. Fish and Wildlife Service (the Service) that the proposed telecommunications facilities in six communities in southwest Alaska are not likely to adversely affect Threatened or Endangered Species (T&E).

Unicom proposes to install a new 848-mile-long submarine fiber connecting six communities to an existing company-owned middle-mile fiber network (Figure 1; Attachment 1).

From Kodiak, the fiber optic cable would be laid down the Shelikof Strait and then parallel the Alaska Peninsula to the southwest until it reaches Unalaska. The cable would branch off to transmission regeneration sites located at Larsen Bay, Chignik Bay, Sand Point, and King Cove, with an additional branch (without signal regeneration) to Akutan.

Services to end users in these five communities will be distributed through underground trenching, requiring the installation of prefabricated communications shelters (approximately 25 feet long, 15 feet wide, and 10 feet high) on new gravel pads measuring 625 ft^2 and 2-feet deep. Each shelter would have a self-contained, diesel-powered generator adjacent to it on the gravel pad. No towers are associated with the project.

The federal action triggering our consultation request is funding of the project by the USDA ReConnect grant program; as such, USDA is required to certify the project does not pose a significant environmental effect. The information contained within this letter constitutes an evaluation of potential biological impacts on T&E species listed under the ESA. We conclude this letter with reason why the telecommunications project is not likely to adversely affect T&E species (ESA, Section 7(a)(2)), and request your concurrence on this matter.

PROJECT AREA

The project consists of terrestrial and marine elements. Marine elements have already been evaluated by USFWS through a Biological Assessment and Letter of Concurrence and are not likely to adversely affect species. Therefore this letter addresses just terrestrial elements which occur within the known range of the Steller's eider *(Polysticta stelleri*) and the Short-tailed Albatross *(Phoebastria albatrus*), but not within any designated critical habitat areas. The Project Area varies between each community but is described in Table 1 and Figure 2 (Attachment 1).

Table 1: Project Elements by Community

Community	Number of Vaults	Terrestrial Trenching (linear feet)
Mill Bay (Kodiak)	0	0
Larsen Bay	12	9,725.3
Chignik Bay	18	18,145.7
Sand Point	24	34,426.6
King Cove	20	21,468.4
Akutan	10	4,894.7
Unalaska	172	158,195.9
Total	**256**	246,856.6

LISTED SPECIES AND POTENTIAL EFFECTS

Steller's Eider

The Service listed the Alaska-breeding population of Steller's eiders on June 11, 1997 (62 FR 31748). Alaska-breeding Steller's eiders nest on the North Slope, migrate to the Chukchi Sea, and continue along the western coast of Alaska to and from wintering and molting areas further south. Eiders primarily make use of marine waters, shallow lagoons, and occasionally deep-water habitats in instances where ice cover prohibits the use of shallow waters (ABR, 2003); such that, normal eider flight patterns rarely go inland more than ½ mile. Steller's eiders are diving ducks and spend most of the year in shallow-near-shore marine waters. In summer, eiders nest in tundra adjacent to small ponds or wetland habitats outside the project area.

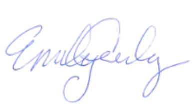
Short-tailed Albatross

The service listed the Short-tailed albatross as endangered (throughout its range) on July 31, 2000, (65 FR 46643). While breeding habitats for the species is restricted to two island colonies in Japan, the Short-tailed albatross do forage widely across the temperate and subarctic North Pacific to the Gulf of Alaska, along the Aleutian Islands. Threats to albatross result exclusively from human-induced impacts such as hunting at breeding colonies, hooking/drowning on commercial longline gear, ingestion of plastic debris, contamination from oil spills, and/or collision with vessel rigging and entanglement in derelict fishing gear.

CONCLUSION

The presence of either bird in the project area would be incidental to flyover. The project lacks towers or other elements associated with bird strikes and is largely buried. As such, we conclude the project is not likely to adversely affect listed species or any designated critical habitat.

Sincerely,



Emily Creely
Environmental Specialist
DOWL

Attachment 1: Figures
Attachment 2: Biological Assessment and Letter of Concurrence

UNITED STATES FISH AND WILDLIFE SERVICE
BIOLOGICAL ASSESSMENT
FOR
GCI AU-ALEUTIAN FIBER OPTIC CABLE INSTALLATION PROJECT
BERING SEA, ALASKA

Prepared for

GCI Communication Corporation

2550 Denali Street, Suite 1000

Anchorage, AK 99503

Prepared by

DOWL

4041 B Street

Anchorage, AK 99503

April 11, 2019

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ACRONYMS AND ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
ANT	Aids to Navigation Team
Area M	Alaska Peninsula and Aleutian Islands Management Area
BA	Biological Assessment
BMH	beach man hole
CFR	Code of Federal Regulations
CMA	Chignik Management Area
CWA	Clean Water Act
dB re 1 μPa	decibels referenced to one microPascal
DOT&PF	Department of Transportation and Public Facilities
DPS	distinct population segment
EPA	Environmental Policy Act
ESA	Endangered Species Act
ft	feet
GCI	GCI Communication Corp.
hp	horsepower
Hz	Hertz
kHz	kiloHertz
km	kilometer
KKFL	Kodiak Kenai Fiber Link
km	kilometer
KMA	Kodiak Management Area
kW	kiloWatt
m	meter
mi	miles
MHW	Mean High Water
MLW	Mean Low Water
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PCE	Principal Constituent Element
PLGR	pre-lay grapnel run
PTS	permanent threshold shift
rms	root mean square
ROV	remotely operated vehicle
TTS	temporary threshold shift
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UXO	unexploded ordnances
WWM	Waterways Management Division

1.0 EXECUTIVE SUMMARY

GCI Communication Corp. (GCI) is proposing to provide high speed internet (broadband) service to 12 communities in Alaska by extending broadband service from Kodiak to Unalaska. The AU-Aleutian Project (Project) will consist of approximately 1,734 kilometers (km; 1,078 miles [mi]) of submerged fiber optic cable, some of which will be buried where physical conditions warrant or where human activities affect the seafloor (e.g., oil exploration, trawling, anchoring). The primary baseline route initiates from Kodiak, spans southwest down the Shelikof Strait, then parallels the Alaska Peninsula to the south until termination at Unalaska. Additionally, broadband service will be routed to transmission sites which include Larsen Bay, Chignik, Chignik Lake, Chignik Lagoon, Perryville, Sand Point, King Cove, Cold Bay, False Pass, and Akutan. GCI anticipates initiating terrestrial activities on May 1, 2020, initiating marine activities by April 1, 2021, and completing the project by December 31, 2021.

The project requires a permit from the United States Army Corps of Engineers (USACE), Alaska District under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act (CWA) with the United States Army Corps of Engineers acting as lead federal agency for purposes of compliance with the National Environmental Policy Act and the Endangered Species Act. Under Section 7 of the Endangered Species Act, the USACE and GCI are required to consult with the United States Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) to ensure that any federal action will not jeopardize the existence of any species listed under the ESA or result in the destruction or adverse modification of its critical habitat.

This Biological Assessment (BA) was prepared by GCI on behalf of the USACE to assess the potential impacts on listed species and critical habitat from the project. Table 1 summarizes the listed species and critical habitat under the USFWS jurisdiction and determination of effects under the ESA. The detailed discussion of the effects determination is provided in Section 6.

Table 1. Determination of effects from the proposed subsea cable installation AU-Aleutian project.

Species	Status	Critical Habitat	Determination of Effects
Northern sea otter (*Enhydra lutris*)	Threatened	Yes	May Affect and is Not Likely to Adversely Affect Species
Steller's eider (*Polysticta stelleri*) Alaska region	Threatened	Yes	May Affect and is Not Likely to Adversely Affect Species
Short-tailed albatross *(Phoebastria albatrus)*	Endangered	No	May Affect and is Not Likely to Adversely Affect Species No Critical Habitat

2.0 PROJECT DESCRIPTION

2.1 INTRODUCTION

GCI is proposing to provide high speed internet (broadband) service to eleven communities in Alaska by extending broadband service from Kodiak to Unalaska by placing 1,734 km (1,078 [mi]) of fiber optic cable on the ocean floor (Figure 1). The AU-Aleutian Project (Project) is comprised of a fiber optic cable from Kodiak laid down the Shelikof Strait and then parallel to the Alaska Peninsula to the south until terminating at Unalaska. The cable will branch off to transmission sites located at Larsen Bay, Chignik, Chignik Lake, Chignik Lagoon, Perryville, Sand Point, King Cove, Cold Bay, False Pass, and Akutan. The fiber optic cable will have a diameter between 1.9 to 3.8 centimeters (cm; 0.75 and 1.5 inches), similar to what GCI has deployed in Southeast Alaska, Prince William Sound, Lake Iliamna, and Cook Inlet. In areas where physical conditions warrant or where human activities affect the seafloor, the fiber optic cable will be buried. GCI anticipates initiating terrestrial activities on May 1, 2020, initiating marine activities by April 1, 2021, and completing the project by December 31, 2021.

The project requires a permit from the USACE, Alaska District under Section 10 of the Rivers and Harbors Act and Section 404 of the CWA with the USACE acting as lead federal agency for purposes of compliance with NEPA and ESA. Under Section 7 of the ESA, the USACE and GCI are required to consult with the USFWS and NMFS to ensure that any federal action will not jeopardize the existence of any species listed under the ESA or result in the destruction or adverse modification of its critical habitat. A BA is required if the listed species or its critical habitat is present in the Action Area. This BA was prepared by GCI on behalf of the USACE.

2.2 PROJECT PURPOSE

The Project will provide broadband services to Larsen Bay, Chignik, Chignik Lake, Chignik Lagoon, Perryville, Sand Point, King Cove, Cold Bay, False Pass, Akutan, and Unalaska by extending the main base line from the Kodiak Kenai Fiber Link (KKFL) Network at Mill Bay, Kodiak, which is the primary source for external data communication beyond this network. Unalaska, the largest community in the Aleutian Islands and a "Port of Refuge," currently lacks broadband service which limits economic development, as well as the efficiency of services by health care providers, schools, tribal entities, businesses, and residents.

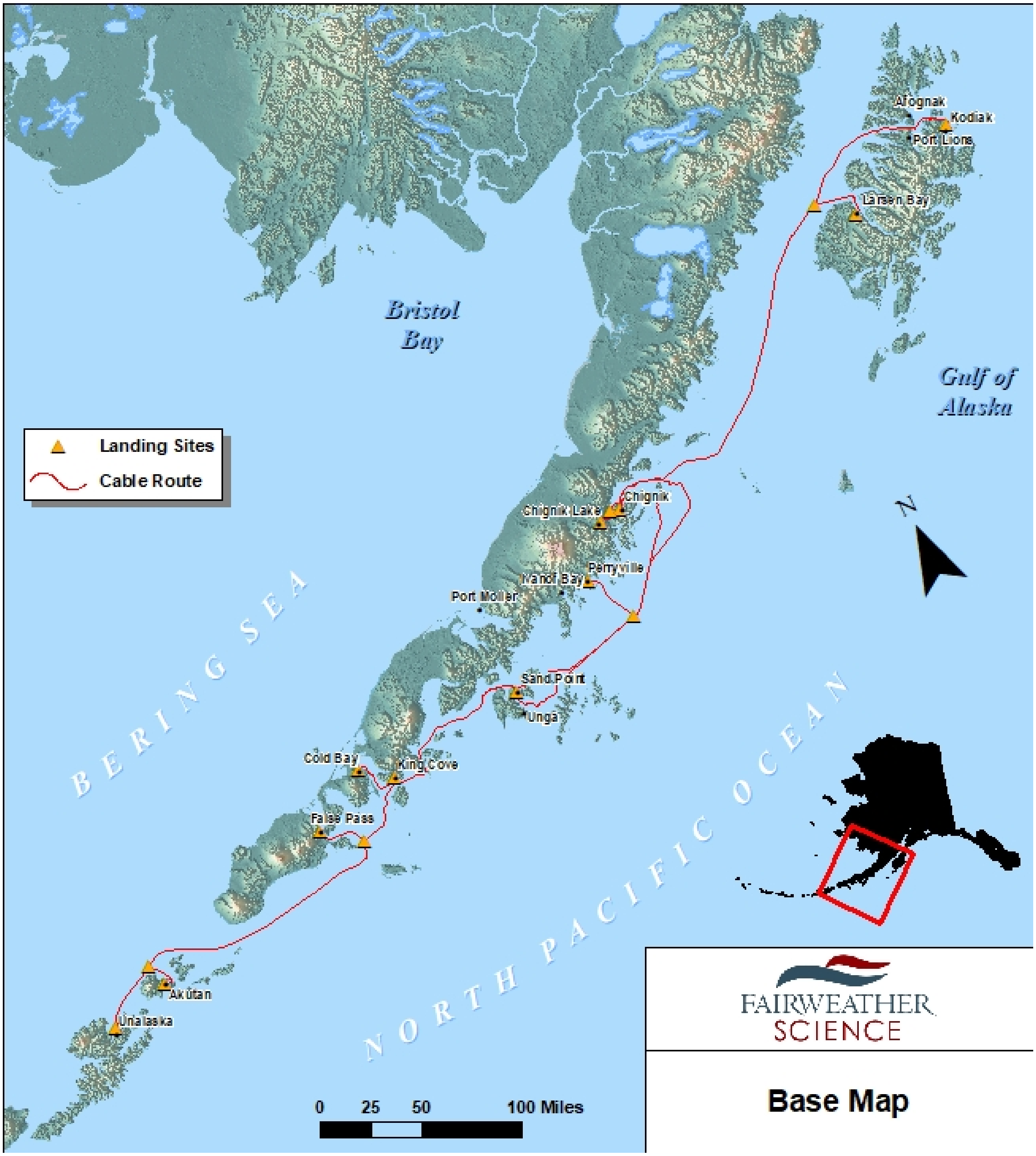

Figure 1. Project vicinity map.

2.3 LOCATION

The project is located in the Gulf of Alaska, south of the Aleutians Islands (Figure 1). The fiber optic cable will extend from Kodiak to Unalaska with cable landfalls at 12 sites. The Project lies within the boundaries of the Kodiak Island Borough, Lake and Peninsula Borough, and Aleutians East Borough.

2.4 DEFINITION OF ACTION AREA

The Action Area defined by the ESA includes all areas affected directly or indirectly by the proposed project, not just the immediate area involved in the action (50 Code of Federal Regulations [CFR] 402.02). The Action Area generally extends outside the project footprint to the point where there are no measurable effects from project activities. For the purposes of this BA, the Action Area for sea otters has been defined as the estimated distance to the USFWS acoustic harassment disturbance threshold for continuous noise sources of 160 decibels referenced to one microPascal root mean square (dB re 1 μPa rms). The Action Area for Steller's eiders and short-tailed albatross has been defined as the potential area for disturbance from presence of the vessel.

For the cable laying barge installing cable in shallow waters at Chignik Lagoon, Chignik Lake, and Cold Bay, the distance to the 160 dB re 1 μPa rms threshold was estimated using measurements conducted of a similar vessel size and class in Cook Inlet. Blackwell and Greene (2003) measured the tug *Leo* pushing a full barge *Katie II* near the Port of Anchorage and recorded 149 dB re 1 μPa rms at 100 m when the tug was using its thrusters to maneuver the barge during docking.

For the cable laying ship installing cable for all waters except those listed above, the distance to the 160 dB re 1 μPa rms threshold was estimated using measurements taken from a vessel of similar size and class in the Chukchi Sea. In 2011, Statoil conducted geotechnical coring operations in the Chukchi Sea using the vessel *Fugro Synergy*. Measurements were taken using bottom founded recorders at 50 m, 100 m, and 1 km away from the borehole while the vessel used dynamic positioning thrusters (Warner and McCrodan 2011). Sound levels measured at the recorder 1 km away ranged from 119 dB re 1 μPa rms to 127 dB re 1 μPa rms with most acoustic energy in the 110 to 140 Hertz (Hz) range. A sound propagation curve equation fit to the data and encompassing 90 percent of all measured values during the period of strongest sound emissions provided an estimate that sound levels would drop below 160 dB re 1 μPa rms at 6 m.

Underwater sound propagation depends on many factors including sound speed gradients in water, depth, temperature, salinity, and bottom composition. In addition, the characteristics of the sound source such as frequency, source level, type of sound, and depth of the source, will also affect propagation. For ease in estimating distances to thresholds, simple transmission loss (TL) can be calculated using the logarithmic spreading loss with the formula:

TL = B * log10(R), where TL is transmission loss, B is logarithmic loss, and R is radius.

The three common spreading models are cylindrical spreading for shallow water (10 log R); spherical spreading for deeper water (20 log R); and, practical spreading (15 log R). Assuming spherical spreading (20 log R), the distance to the 160 dB re 1 μPa rms threshold would be 28 m.

For the purposes of this BA, the Action Area for the eiders and albatross has been defined as the potential area for disturbance from the presence of the vessel. This distance is estimated to be 500 m.

The Action Area for sea otters is defined as the route length plus a buffer of 100 m on each side of the route (200 m total) within the species known range. This distance is conservatively larger than the calculated distances to the 160 dB re 1 μPa rms levels of 6 and 28 m for the cable-laying ship and barge, respectively. The total Action Area for sea otters encompasses approximately 333.7 km^2 (128.8 mi^2). The Action Area for Steller's eiders and short-tailed albatross is defined as the potential area for disturbance from the presence of the vessel, estimated to be 500 m on each side of the route (1 km total width). The total Action Area for eiders encompasses approximately 1,570 km^2 (606.2 mi^2) within Steller's eider range and does not occur within Spectacled Eider range. The total Action Area within short-tailed albatross range encompasses approximately 1,626 km^2 (628 mi^2).

Table 2. Calculated action area.

Description	Buffer (m)	Area (in km^2)	Area (in mi^2)
Sea otters	200	333.7	128.8
Steller's eiders	1,000	1,570.1	606.2
Short-tailed albatross	1,000	1,626.4	N/A
Total		1,903.8	735.1

2.5 PROPOSED ACTION

The Project will extend broadband service from Kodiak to Unalaska by placing 1,734 km (1,078 mi) of fiber optic cable on the ocean floor (Figure 1). The Project is comprised of a fiber optic cable from Kodiak laid down the Shelikof Strait and then parallel to the Alaska Peninsula to the south until Unalaska. The cable will branch off to transmission sites located at Larsen Bay, Chignik, Chignik Lake, Chignik Lagoon, Perryville, Sand Point, King Cove, Cold Bay, False Pass, and Akutan. The fiber optic cable will have a diameter between 1.9 to 3.8 cm (0.75 and 1.5 inches). In areas where physical conditions warrant or where human activities affect the seafloor, the fiber optic cable will be buried. GCI anticipates initiating terrestrial activities on May 1, 2020, initiating marine activities by April 1, 2021 and completing the project by December 31, 2021. Figure 1 shows the project location and Table 3 shows the coordinates of each of the landing sites.

Table 3. Coordinates of landing sites.

Location	Latitude	Longitude
Mill Bay	N 57.82031º	W 152.354361°
Larsen Bay	N 57.53827017º	W 153.98366315º
Chignik Bay	N 56.29778153º	W 158.40865666º
Chignik Lagoon	N 56.31084328º	W 158.54006013º
Chignik Lake	N 56.26037124º	W 158.70402045º
Perryville	N 55.91007222º	W 159.14428056º
Sand Point	N 55.3409987º	W 160.49990739º
King Cove	N 55.05906483º	W 162.31368478º
Cold Bay	N 55.19574691º	W 162.69750980º
False Pass	N 54.85574800º	W 163.40956004º
Akutan	N 54.13311401º	W 165.77585178º
Dutch Harbor	N 53.91552847º	W 166.50294680º

2.5.1 Description of Landfall Locations

The following describe operations that occur between Mean Low Water (MLW) and existing GCI facilities, including intertidal areas. All landfall sites have existing GCI facilities. The fiber optic cable will be trenched with a maximum width of 3 ft and depth of 18 inches between Mean High Water (MHW). In areas above MHW, trenching will have a maximum width of 3 ft and depth of 36 inches. The landfall locations are provided in Figure 2 through Figure 13, after the descriptions.

For all landfall locations, the following construction methods apply:

- The fiber optic cable will be linked to a new beach manhole (BMH), setback from MHW of the adjacent waterbody with a stub of conduit. The BMH measures 0.9 to 1.2 meters (m; 3 x 4 feet [ft]) or 3.6 m^2 (12 ft^2) and 1.2 m (4 ft) high. The stub of conduit will be placed above MLW.
- From the beach to the BMH, two 10.1-cm (4-inch) conduits will be buried at a depth no deeper than 91 cm (36 inches).
- Excavation to accommodate the BMH measures will not exceed 1.5 by 1.5 m (5 x 5 ft) and 1.5 m (5 ft) deep that will vary by shoreline/bank contours and substrate.
- From the BMH, cable will be taken to existing GCI facilities where the fiber optic cable will terminate at a shelter. Between the BMH and existing facilities, the terrestrial cable will be placed in a trench, approximately 0.5 m wide by 0.9 m deep (1.5 ft wide by 3 ft deep). The trench width will be less if cable can be plowed or a chain trencher is available for placement. Additional vaults may be used to provide slack loops along the route and at the termination point (communications shelter).
- The cable between BMH and existing GCI facilities will be trenched adjacent to existing roads. This may include trenching in areas near the toe of slope.
- Shelters will be constructed adjacent to existing GCI facilities; they require shelter pads that measure approximately 9.1-m wide by 9.1-m long by 0.6-m deep (25-ft by 25-ft by 2-ft). Terrestrial installation crews will use backhoes and standard trenching techniques to set the BMH flush with the original ground.
- Any work below the ordinary high-water mark will occur during low tide.
- Heavy equipment in intertidal areas and wetlands will be placed on mats, with the exception of beaches with firm sediments (Unalaska, Akutan), such as large boulders.
- All areas will be returned to pre-construction elevations; all trenched areas will be re-graded to original conditions.
- GCI does not intend to re-enter the BMH for 25 years, unless required to address a service or maintenance issue.
- Excavated material will be side-cast next to trenches and be used to bury the cable and BMH.
- No excess material is anticipated to be produced requiring disposal.
- Alterations to shorelines will be temporary and trenches will be constructed and backfilled to prevent acting as a drain (e.g., not backfilled).

Any trenching work in vegetated areas are temporary impacts of jurisdictional resources and all fill (BMH, shelter pads) are permanent impacts of jurisdictional resources.

In general, equipment used at each landfall location includes:

- Rubber wheel backhoe
- Tracked excavator or backhoe (medium to large excavator required at Unalaska)
- Small tracked excavator
- Utility truck and trailer to deliver materials
- Chain trencher (optional)
- Hand tools, shovels, rakes, pry bars wrenches
- Survey equipment

- Winch or turning sheave
- Utility truck and trailer to deliver materials
- Small utility boat to run pull line to beach
- Dive boat with hand jetting tools
- Splicing equipment, small genset and tent

Permanent fill associated with the project includes:

- Construction of a gravel pad (7.6 m x 7.6 m x 0.6 m [25 ft x 25 ft x 2 ft]) for shelters
- BMH installation (0.9 m x 1.2 m [3 ft x 4 ft]) in (locations) (excavation limits 7.6 m x 7.6 m x 7.6 m [5 ft x 5 ft x 5 ft]).

Temporary fill associated with the project includes:

- Trenching of cable (maximum width of 0.9 m [3 ft] and depth of 91 cm [36 inches]) between mean and low high water and in waters less than 15 m (49.2 ft) deep
- Trenching of cable (maximum width of 0.9 m [3 ft] and depth of 45.7 cm [18 inches]) in coastal wetlands
- The fiber optic cable will either be surface laid on the seafloor or buried via plow (maximum width of 30.5 cm [12 inches] and depth of 1.5 m [5 ft]) in waters more than 15 m (49.2 ft) deep

2.5.1.1 Site Specific Operations and Conditions

Kodiak

- Landfall is located on a beach at Mill Bay (Figure 2). The landing is existing and designated a required landing along the trunk route. The beach consists mostly of poorly sorted compacted aggregate ranging in size from silt to boulder. Visible bedrock outcrops are present in the near vicinity to the landing and massive blocks are erratically distributed around the bay shoreline.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 7 m (23 ft).
- The landfall of the cable will use an open trench in the intertidal area to expose the previous buried conduit stub and provide a safe path for the submarine cable. Once the new cable is tied into the existing stub, no further work will be done at this site.
- The nearest receiving body is Mill Bay.

Larsen Bay

- Landfall is located within Larsen Bay (Figure 3). Bedrock outcrops precede the shore, which is comprised of poorly sorted aggregate ranging in size from silt to cobble.
- Distance from MHW to BMH is approximately 18 m (60 ft), and distance to existing GCI facilities from the BMH is approximately 214 m (701 ft).
- The BMH will be installed in vegetation and assumed coastal wetlands.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 9.1 m (30 ft).
- The project area above MHW consists of vegetated coastal wetlands. The BMH will be installed within this area, along with approximately 185 m (610 ft) of trenching. The shelter will be located within a disturbed area cleared of vegetation.
- The nearest receiving body is Larsen Bay.

Chignik

- Landfall is located within Anchorage Bay (Figure 4). The landing will cross perpendicularly through a waste water pipeline operated by the fish processing plant before terminating at the BMH.

Additionally, the approach consists mostly of banded well sorted unconsolidated aggregate ranging in size from sand to cobble. The beach is comprised of well worked cobble with a steep termination incline.

- Distance from MHW to BMH is approximately 27 m (90 ft), and the distance to existing GCI facilities from the BMH is approximately 0.72 km (0.45 mi).
- The BMH will be installed within coastal wetland.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 17.7 m (58 ft).
- Approximately 701 m (2,300 ft) of cable will be trenched along an existing road.
- The nearest receiving body is Anchorage Bay.

Chignik Lagoon

- Landfall is located at the end of a designated Utility Easement (Figure 5). The approach to the landing is comprised of poorly sorted aggregate ranging in size from glacial flour to boulder.
- Distance from MHW to BMH is approximately 7.6 m (25 ft), and the distance to existing GCI facilities from the BMH is approximately 152 m (500 ft).
- The BMH will be installed in within a disturbed landing.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 7 m (23 ft).
- Jurisdictional areas above MHW will be impacted by the BMH and portions of the trenched areas between the BMH and existing facilities. The project area above MHW consists of vegetated coastal wetlands. The first BMH will be installed within this area, along with approximately 152 m (500 ft) of trenching. The shelter will be located within a disturbed area cleared of vegetation.
- The nearest receiving body is Chignik Lagoon.

Chignik Lake

- Landfall is located on a small, informal boat launch at the end of the main access road (Figure 6). The beach consists mostly of well sorted compacted aggregate ranging in size from silt to gravel.
- Distance from MHW to BMH is approximately 34 m (113 ft), and the distance to existing GCI facilities from the BMH is approximately 5.3 km (3.3 mi).
- The BMH will be installed within a disturbed landing.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 1.5 m (5 ft).
- The nearest receiving body is Chignik Lake.

Perryville

- The landfall in Perryville is on the west side of the sand road above the MHW demarcation (Figure 7). The approach is expected to be trenchable as the sediment consists mostly of fine black sand.
- Distance from MHW to BMH is approximately 128 m (420 ft), and the distance to existing GCI facilities from the BMH is approximately 120 m (394 ft).
- The BMH will be installed alongside a road. Trenching may disturb vegetation.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 8.5 m (28 ft).
- The nearest receiving body is Anchor Bay.

Sand Point

- Landfall is located within vegetation on City property (Figure 8). The approach consists mostly of poorly sorted compacted aggregate ranging in size from sand to boulders.
- Distance from MHW to BMH is approximately 19 m (63 ft), and the distance to existing GCI facilities from the BMH is approximately 1.3 km (0.8 mi).
- The BMH will be installed within a developed roadway though the cable will initially travel through 11.9 m (39 ft) of coastal wetland.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 10 m (33 ft).
- The project area above MHW consists of vegetated coastal wetlands. The first BMH will be installed within this area, along with approximately 1.3 km (0.8 mi) of trenching. The cable route will then join with pre-existing hardware.
- The nearest receiving body is Unga Strait.

King Cove

- The landfall in King Cove is adjacent to the King Cove Corporation (Figure 9). There is existing conduit infrastructure which is expected to reduce the impact upon asphalt disturbance.
- Distance from MHW to BMH is approximately 16.8 m (55 ft), and the distance to existing GCI facilities from the BMH is approximately 320 m (1050 ft).
- The BMH will be installed in a disturbed area though the cable will initially travel through 10.4 m (34 ft) of coastal wetland.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 2.4 m (8 ft).
- The nearest receiving body is Cold Bay.

Cold Bay

- The landfall in Cold Bay is adjacent to the Landing Craft Pad (Figure 10). The approach is unconsolidated sandy muds with the beach being well sorted and comprised of fine to medium sized sand with gravel.
- Distance from MHW to BMH is approximately 29.6 m (97 ft), and the distance to existing GCI facilities from the BMH is approximately 1.6 km (1 mi).
- The BMH will be installed on disturbed land though the cable will be initially routed through 17.4 m (57 ft) of coastal wetland.
- Intertidal trenching (linear distance between mean high and MLW) is approximately 12.5 m (41 ft).
- The project area above MHW consists of vegetated coastal wetlands; however, the BMH will be installed in a disturbed area. The first BMH will be installed within this area, along with approximately 1.9 km (1.2 mi) of trenching. The shelter will be located within a disturbed area cleared of vegetation.
- The nearest receiving body is Cold Bay.

False Pass

- Landfall in False Pass is approximately 5.6 km (3.5 mi) from Ikatan Bay in Bechevin Bay/Isanotski Straight (Figure 11). The landing is located in the middle of the village just north of the abandoned cannery and south of a small, unnamed stream and estuary.

- Landing will be completed by the shallow water marine installation vessel as a pre-laid shore end out to a point near the False Pass branching unit.
- Distance from MHW to BMH is approximately 33.5 m (110 ft), and the distance to existing GCI facilities from the BMH is approximately 0.8 km (0.5 mi).
- Intertidal trenching (linear distance between mean high and MLW) is approximately 5.2 m (17 ft).
- The BMH will be installed above MHW within an area previously disturbed that was historically a small roadway, outside of jurisdictional areas.
- The shelter will be located within a wetland.
- The nearest receiving body is the unnamed stream that discharges into Bechevin Bay/Isanotski Straight.

Akutan

- Landfall is approximately 19 km (12 mi) from the Bering Sea in Akutan Bay (Figure 12). The landing is located in the middle of the village just west of the village outfall pipe. The water off the Akutan landing is deep enough to allow a direct shore end landing from the main submarine lay burial vessel.
- Distance from MHW to BMH is approximately 22.2 m (73 ft), and the distance to existing GCI facilities from the BMH is approximately 86.6 m (284 ft).
- The connection between BMH and existing facilities is through approximately 50 m (164 ft) of coastal wetlands and approximately 36 m (118 ft) of cable along the road.
- Intertidal trenching (linear distance between mean high and MLW) is approximately 6.4 m (21 ft).
- The project area above MHW consists of vegetated coastal wetlands. The BMH will be installed within this area, along with approximately 42.7 m (140 ft) of trenching. The shelter will be located within a coastal wetland.
- The nearest receiving body is Akutan Bay.

Dutch Harbor

- Landfall is approximately 16 km (10 mi) from the Bering Sea within Unalaska Bay (Figure 13). The water off the Unalaska landing is deep enough to allow a direct shore end landing from the main submarine lay burial vessel.
- The cable landing is located outside the port area at a fishing gear storage yard. The beach consists of large boulders which will require a larger excavator to move material when placing cable and conduit.
- Distance from MHW to BMH is approximately 15.5 m (51 ft), and the distance to existing GCI facilities from the BMH is approximately 3.2 km (2 mi).
- Intertidal trenching (linear distance between mean high and MLW) is approximately 8.8 m (29 ft).
- Distance to existing GCI facilities is approximately 0.8 km (0.5 mi) along existing road. The connection between the BMH and existing facilities will be via trenched cables along the road and/or existing disturbance.
- The BMH will be installed above MHW within an area consisting of a cleared area adjacent to the existing road. However, the cable will travel through 7.3 m (24 ft) of coastal wetland between the MHW and BMH. The shelter will be located within a disturbed area cleared of vegetation.
- The nearest receiving body is Unalaska Bay.

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Figure 2. Kodiak landing site.

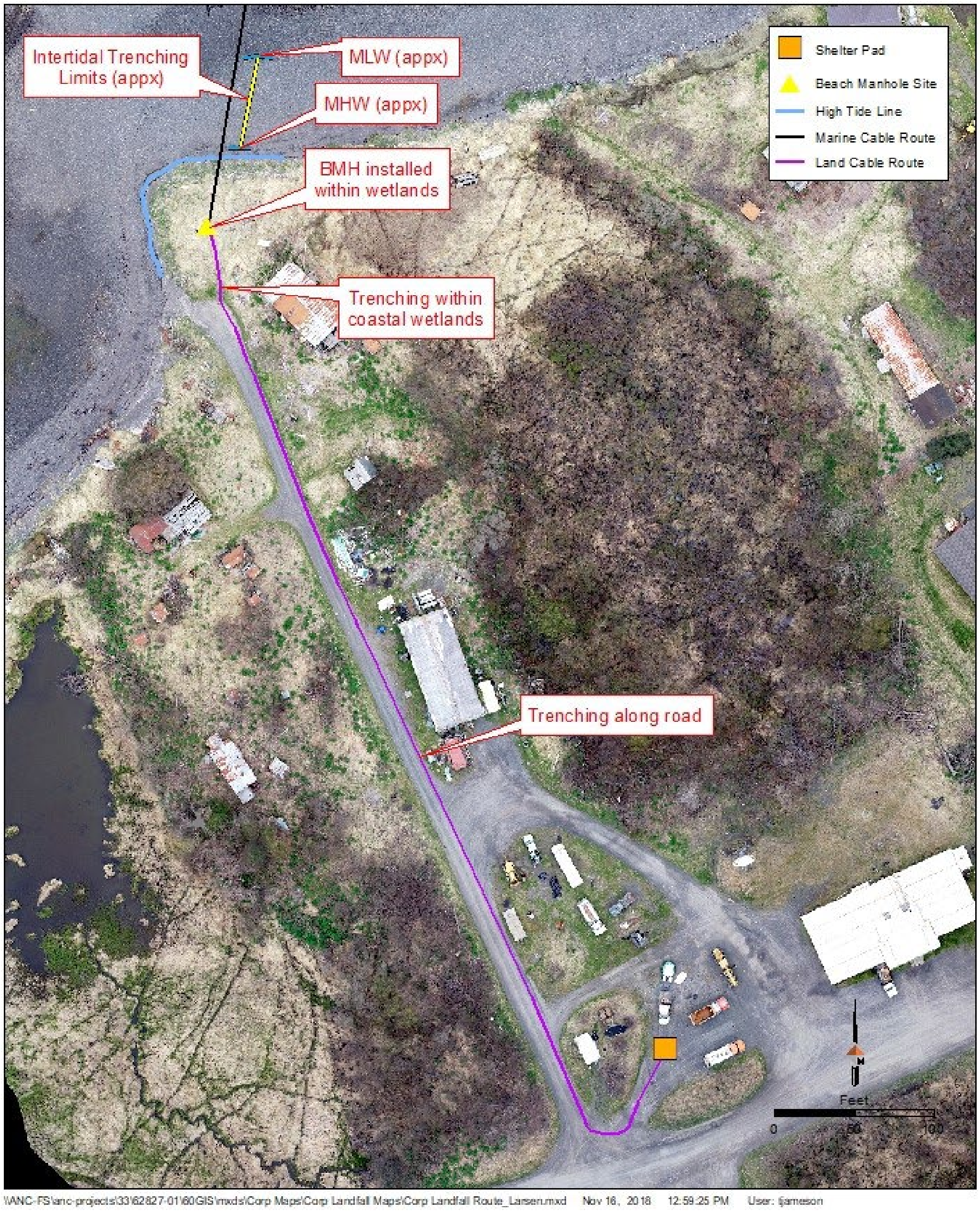

Figure 3. Larsen Bay landing site.

Figure 4. Chignik landing site.

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Figure 5. Chignik Lagoon landing site.

Figure 6. Chignik Lake landing site.

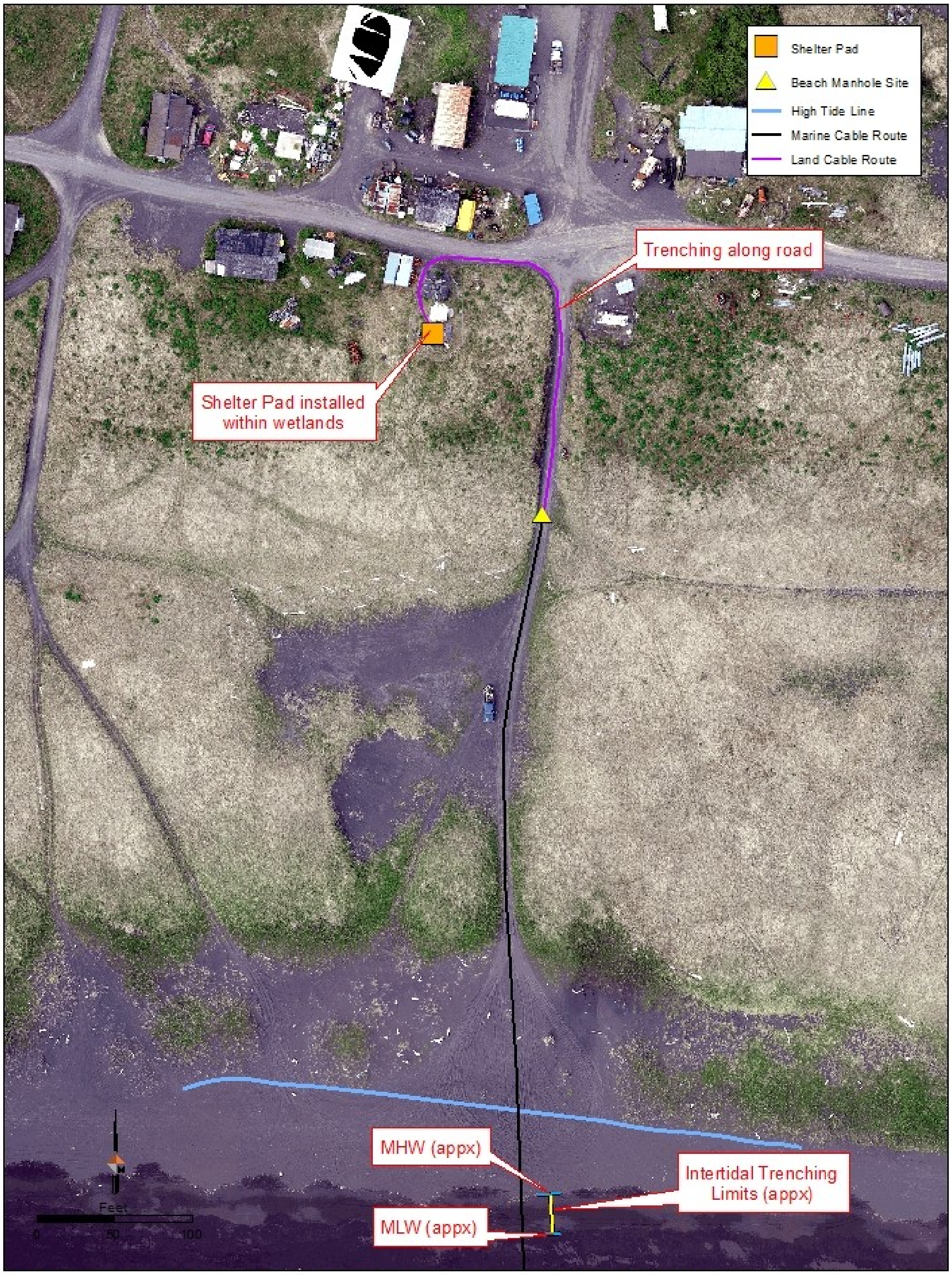

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Figure 7. Perryville landing site.

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Figure 8. Sand Point landing site.

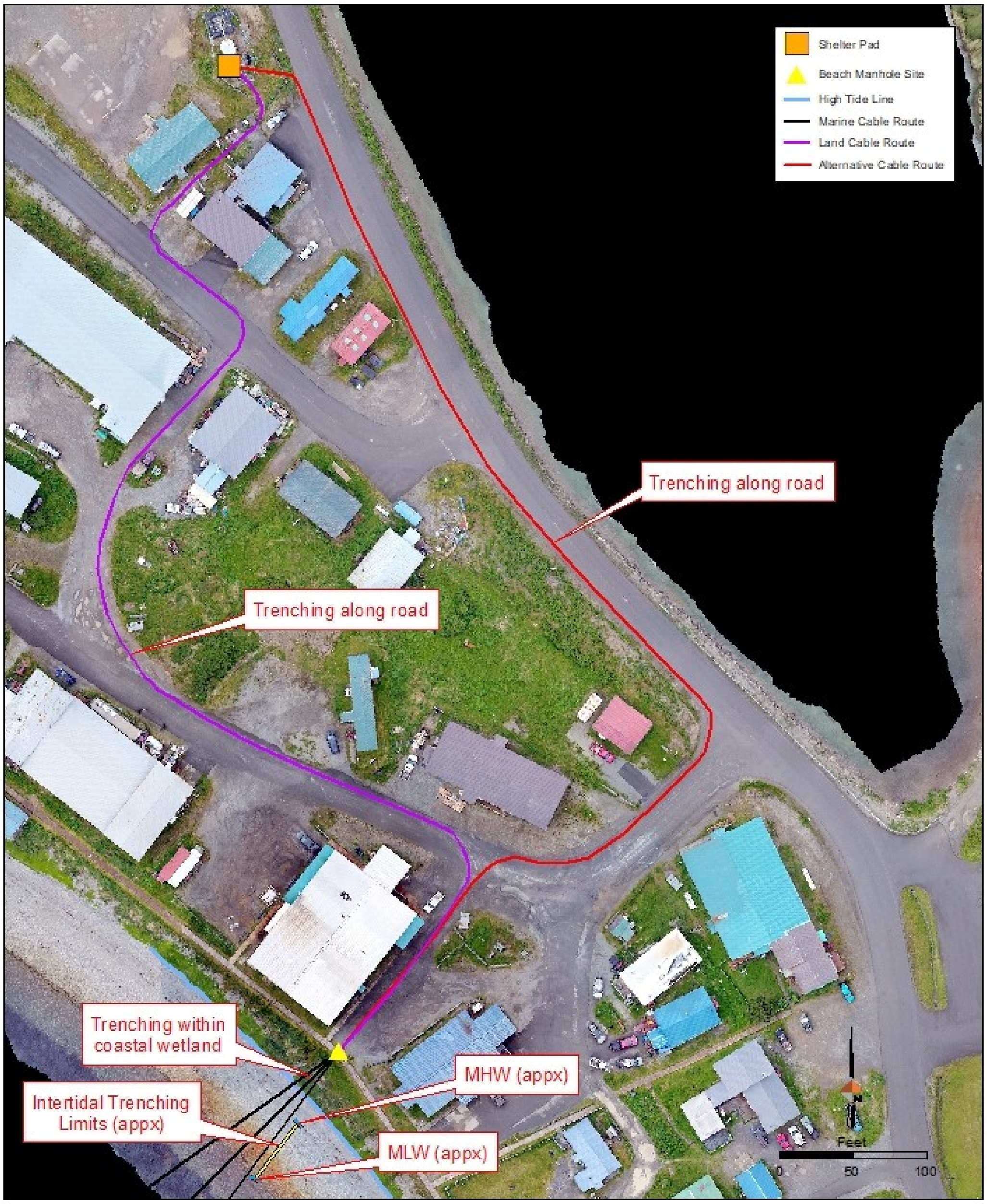

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Figure 9. King Cove landing site.

Figure 10. Cold Bay landing site.

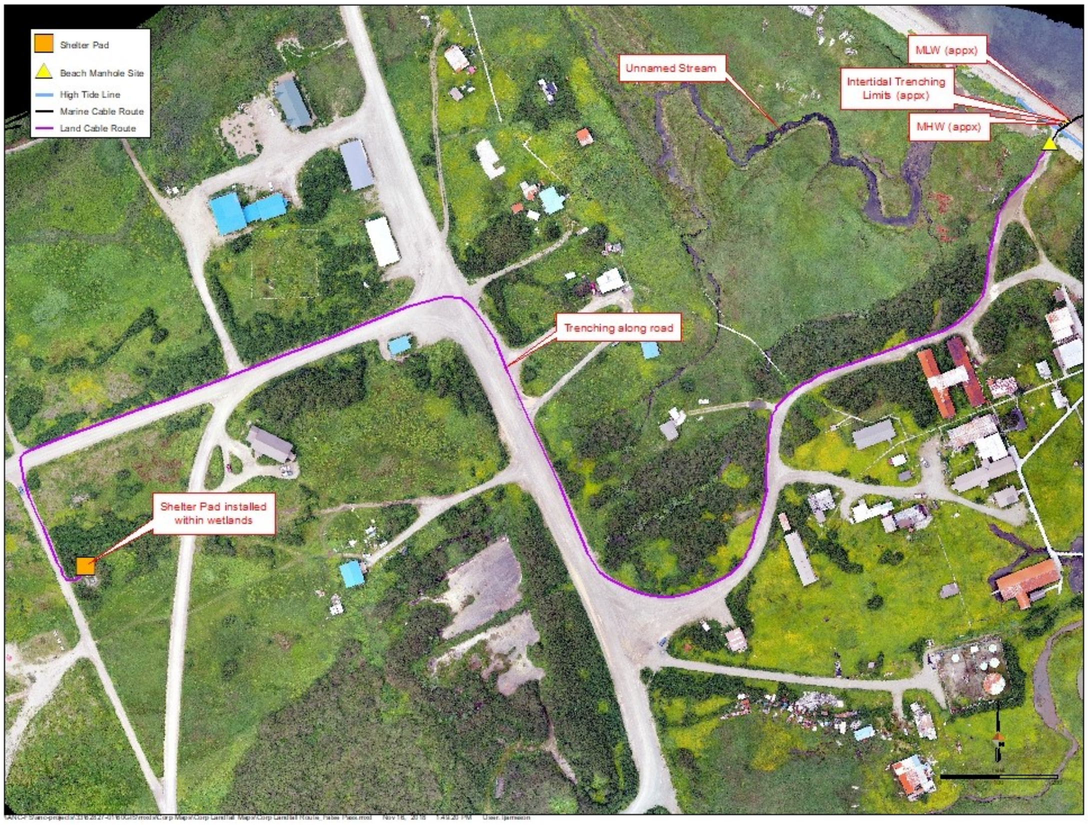

Figure 11. False Pass landing site.

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Figure 12. Akutan landing site.

Figure 13. Unalaska landing site.

2.5.2 Description of Marine Operations

The following describe operations that will occur in the marine environment, outside of intertidal areas. The fiber optic cable will either be surface laid on the sea floor or buried via plow (maximum width of 30.5 cm [12 inches] and depth of 1.5 m [5 ft]), in waters deeper than 15 m (49.2 ft). While it is expected that the temporary cable trench created by the plow collapses immediately, natural current and wave surge processes will further fill any depression caused by the plow. Post-lay inspection and burial will be conducted using a remotely operated vehicle (ROV). In waters less than 15 m (49.2 ft) deep, the cable may be buried using a towed sled, tracked ROV, diver hand jet, and/or water lifts.

The offshore (waters >15 m [49 ft] deep) cable-lay operations will be conducted from a main lay/burial cable ship, similar to CS *Intrepid* (Figure 14). Details of the ship are provided in Appendix A. The ship is 115 m (377 ft) in length and 18 m (59 ft) in breadth, with berths for a crew of 76. The ship is propelled by two 2,200 kiloWatt (kW) main engines. Dynamic positioning is maintained by two 750 kW gill thrusters, one aft and one forward. DP is used only as needed for safety – the frequency depends on weather and currents in the region. Support vessels may include a tug in the vicinity of the main lay/burial vessel.

Figure 14. Photo of cable-laying ship, CS *Intrepid*.

A cable-lay barge will be used during cable laying activities occurring in the shallow water landing sites (Chignik Lagoon, Chignik Lake, Cold Bay). The cable-lay barge will be outfitted with spuds and an anchorage system to allow very shallow water positioning control. Two tugs (<4,000 horsepower [hp]) will be used to propel the barge during lay operations. The utility tugs and barge to be used have not yet been identified. The proposed barge is flat deck and provides few accommodations for additional crew or supernumeraries. An additional vessel certified to accommodate up to 30 personnel will work in tandem with the cable-lay barge for crew berths, meals, and sanitation.

Average speed for surface laid cable is approximately 2 to 3 km/hour (1-2 knots), and the average speed (depending on sub-bottom conditions) for buried cable during plow operations will be about 0.5 km/hour (1 knot).

Depending on bottom substrate, water depth, and distance from shore, the cable will either lay on the ocean floor or will be buried using a plow or an ROV equipped for burial by water jetting. Trenching equipment (plow) is 4.5 m (15-ft) wide and can bury the cable up to 1.5 m (5 ft) in depth.

Before cable is laid, a pre-lay grapnel run (PLGR) will be carried out along the proposed cable route where burial is required. The objective of the PLGR operation is to identify and clear any seabed debris (e.g., wires, hawsers, fishing gear) that may have been deposited along the route. Any debris recovered during the PLGR operations will be discharged ashore on completion of the operations and disposed of in accordance with local regulations. If any debris cannot be recovered, then a local re-route will be planned to avoid the debris. The PLGR operation will be conducted to industry standards employing towed grapnels (the type of grapnel being determined by the nature of the seabed). The PLGR operation will be conducted by the cable vessel or a local tug boat ahead of the cable-lay activities.

Where deemed necessary in shallow waters, to protect the cable from light ice scour, human activities, or surf action, the cable will be buried by jet burial using a towed sled, tracked ROV, or by diver jet burial. Methods will be subject to seabed conditions in the area. The planned ROV will be similar to ROVJET 207 series, which is 2.8 m (9.0 ft) long and 3.4 m (11.2 ft) wide and has a jet tool capable of trenching to 1.5 m (4.9 ft) depth (Figure 15). In water depths greater than 15 m (49.2 ft), the plow has a submerged weight of 17 tonnes (18.6 tons). The plow is pulled by the tow wire and the cable is fed through a cable depressor that pushes it into the trench (Figure 16). Burial depth is controlled by adjusting the front skids. The normal tow speed is approximately 600 meters per hour (m/hr) (less than 1 knot). Specifications of the ROV and plough are found in Appendix A.

Figure 15. Photo of the ROVJET 207 remotely operated vehicle.

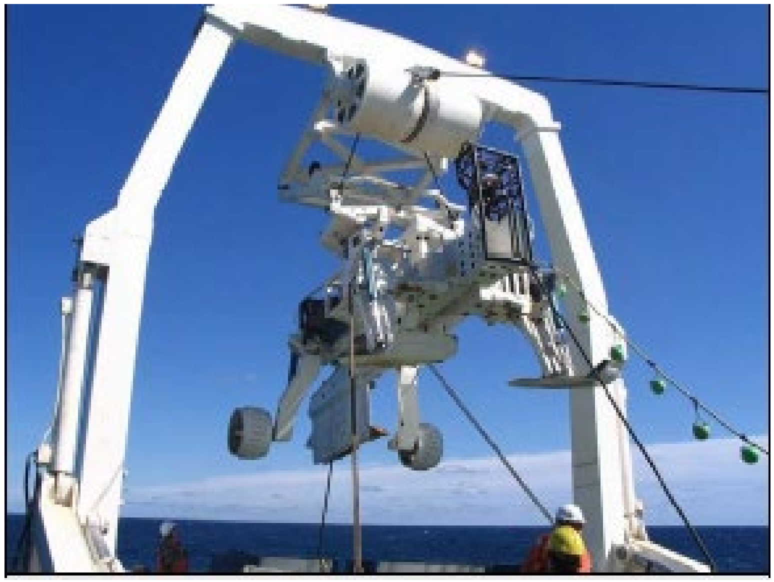

Figure 16. Photo of the IT Plough.

2.6 DATES AND DURATION

GCI anticipates initiating terrestrial activities May 1, 2020, initiating marine activities by April 1, 2021; and completing the project by December 31, 2021.

3.0 DESCRIPTION OF THE SPECIES AND THEIR HABITAT

The species identified and discussed in this BA are listed in Table 4 and discussed in the following text.

Table 4. USFWS listed species in the project area.

Species	Status	Population Estimate
Northern Sea Otter (*Enhydra lutris*)	Threatened	54,771[1]
Steller's Eider (*Polysticta stelleri*) Alaska region	Threatened	500[2] (Breeding population)
Short-tailed Albatross *(Phoebastria albatrus)*	Endangered	2,887[3] (Breeding population)

[1]USFWS 2014
[2]USFWS 2011; Stehn et al. 2013
[3]USFWS 2018

3.1 NORTHERN SEA OTTER (SOUTHWEST ALASKA STOCK)

3.1.1 Population

There are three stocks of northern sea otter in Alaska: Southeast, Southcentral, and Southwest (USFWS 2014b). Individuals that could occur in the proposed action area are from the *threatened* Southwest Alaska distinct population segment (DPS). The current estimated population size for the Southwest Alaska stocks is 54,771 (USFWS 2014b).

The Southwest Alaska sea otter population has declined by 56–68% since the mid-1980s (Burn and Doroff 2005). In the Aleutian archipelago, sea otters have declined by as much as 70% since 1992 (Doroff et al. 2003). Unlike the declines observed in the Aleutian Islands, Shumagin Islands, and the western Alaska Peninsula, other portions of the Southwest Alaska stock have not shown signs of decline, including the Kodiak Archipelago, the eastern coast of the Alaska Peninsula from Castle Cape to Cape Douglas, and Kamishak Bay in lower Cook Inlet (Burn and Doroff 2005; USFWS 2014b). Surveys conducted from 2003–2005 show continued declines in the Aleutian Islands (Estes et al. 2005). The main threat to sea otter recovery, and the primary reason for the declines, is likely attributable to increased predation, particularly by killer whales (Estes et al. 1998, 2005; USFWS 2010).

3.1.2 Distribution

The Southwest Alaska Stock includes the Alaska Peninsula and Bristol Bay coasts, and the Aleutian, Barren, Kodiak, and Pribilof Islands (Figure 17). Sea otters in Alaska are generally not migratory and do not disperse over long distances. However, individual sea otters are capable of long-distance movements of >100 km (Garshelis and Garshelis 1984), although movements are likely limited by geographic barriers, high energy requirements of animals, and social behavior.

3.1.3 Foraging Habitat

Sea otters generally occur in shallow (<35 m), nearshore waters in areas with sandy or rocky bottoms, where they feed on a wide variety of sessile and slow moving benthic invertebrates (Rotterman and Simon-Jackson 1988), including sea urchins, abalone, clams, mussels, and crabs (Riedman and Estes 1990). They can also feed on epibenthic fish in areas where otter populations are near equilibrium density (Riedman and Estes 1990).

3.1.4 Breeding and Pupping Habitat

Sea otters do not have specific breeding and pupping habitat; rather, they appear to conduct all aspects of their life history in the same places (USFWS 2009). In Alaska, most pups are born in late spring (Bodkin and Monson 2002). Assuming a 6 to 8-month gestation, including 2 to 4 months of delayed implantation, breeding likely occurs in late summer or fall.

3.1.5 Hearing

In-air vocalizations of sea otters have most of their energy concentrated at 3–5 kiloHertz (kHz; McShane et al. 1995; Thomson and Richardson 1995). Sea otter vocalizations are considered to be most suitable for short-range communication among individuals (McShane et al. 1995). However, Ghoul and Reichmuth (2012) noted that the in-air "screams" of sea otters are loud signals (source level up to 113 dB re 20 µPa) that may be used over larger distances; screams have dominant frequencies of 4 to 8 kHz. Ghoul and Reichmuth (2012) examined the hearing abilities of sea otters using a behavioral approach. They found that the in-air upper-frequency hearing limit was at least 32 kHz and the lower-frequency limit was <0.125 kHz. Ghoul and Reichmuth (2016) reported that sea otter hearing is most sensitive underwater at 8–16 kHz; however, their hearing is not specialized to detect sounds in background noise.

3.1.6 Critical Habitat

Critical habitat for the Southwest Alaska DPS of the northern sea otter was designated in November 2009 and includes an area of 15,164 km^2 (USFWS 2009). The critical habitat primarily consists of shallow-water areas <20 m deep and nearshore water within 100 m of the mean tide line. The critical habitat units relevant to the project are Unit 2: Eastern Aleutian, Unit 3: South Alaska Peninsula, and Unit 5: Kodiak, Kamishak, Alaska Peninsula (Figure 17. Northern sea otter critical habitat defined in Unit 4 does not overlap with the landing site at False Pass.

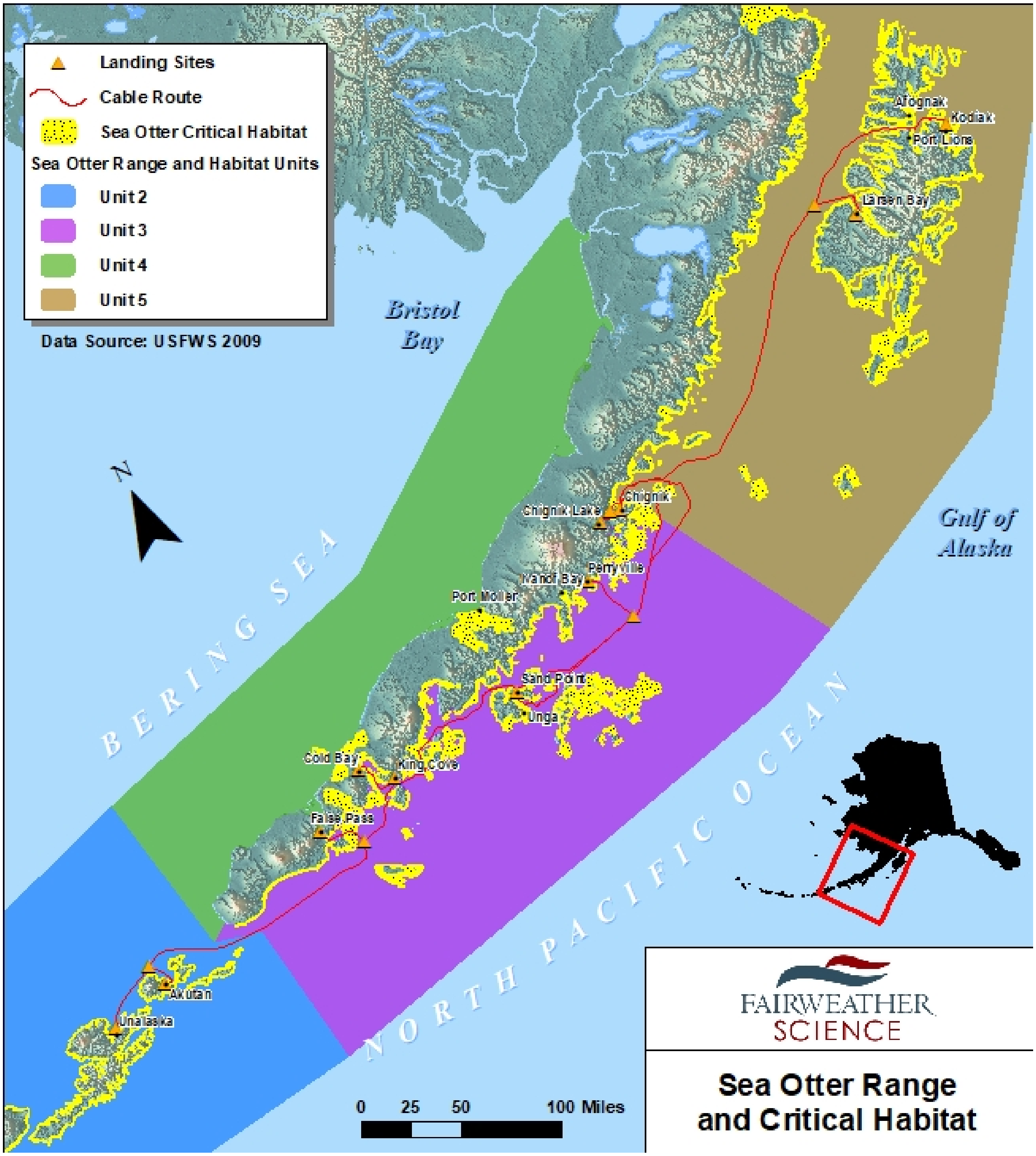

Figure 17. Northern sea otter southwest Alaska stock distribution in the project area.

3.1.6.1 Primary Constituent Elements

USFWS considers Primary Constituent Elements (PCE) when designating critical habitat. PCEs are characterized by "physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection" and may include 1) space for individual and population growth (normal behavior), 2) nutritional and physiological requirements (food, water, air, light, minerals, etc.), 3) cover or shelter, and 4) breeding sites (e.g., reproduction, rearing of offspring) habitat protected from disturbance or of historic geographical and ecological distributions of species (50 CFR 424.11).

Table 5. Primary Constituent Elements (PCE) for species and the status of each PCE in the Action Area.

PCE	PCE is present and "healthy" in the Action Area	PCE is present but at risk within the Action Area	PCE requirement cannot be met in the Action Area
Shallow, rocky areas where waters are less than 2 m (6.6 ft) in depth	Yes	No	No
Nearshore waters within 100 m (328.1 ft) from the mean high tide line	Yes	No	No
Kelp forests, which occur in waters less than 20 m (65.6 ft) in depth	Yes	No	No
Sufficient quantities of prey resources within PCEs 1, 2, and 3	Yes	No	No

3.1.6.2 Analysis of Each PCE and effect of project

In designating critical habitat for the Southwest Alaska DPS, the USFWS determined that habitats providing protection from marine predators were likely the most essential to the conservation of the DPS (USFWS 2009). Three separate, but often overlapping, habitat characteristics that offer such protection were identified as PCEs. Shallow rocky areas where waters are less than 2 m (6.6 ft) in depth are considered a PCE because marine predators are less likely to forage in these very shallow locations. Similarly, sea otters may be able to escape predation by hauling out on land when within 100 m (328.1 ft) of the mean high tide line, making the second defined PCE. Kelp forests, which occur in waters less than 20 m (65.6 ft) in depth, are considered the third PCE because they provide resting habitat and protection from marine predators. Lastly, prey resources in sufficient quantities to support the energetic requirements of sea otters within the areas identified in the above three PCEs are considered the fourth PCE (USFWS 2009).

The Action Area overlaps these PCEs within designated critical habitat along short portions of most segments of the proposed cable route (TerraSond Limited 2018; Figure 17). The currently proposed route would overlap with 17.8 km^2 of sea otter critical habitat, which is approximately 0.1% of the Southwest Alaska DPS critical habitat (15,164 km^2). Potential effects of the project could involve temporary displacement of sea otters from the immediate vicinity due to the presence of, or sounds produced by, the vessel and cable-laying activities. However, impacts from vessel presence or introduced sounds would only occur while the activities were actually taking place and have no lasting effects on PCEs. Laying or trenching of the cable at landing locations could temporarily disturb the seafloor habitat and prey resources within the first three PCEs. Potential effects on PCEs are described further in Section 5.

3.2 STELLER'S EIDER

3.2.1 Population

The worldwide population of Steller's eider is thought to be 130,000–150,000 individuals (BirdLife International 2017). There are three breeding populations of Steller's eider worldwide: two in Arctic Russia and one in Alaska. The largest population breeds across coastal eastern Siberia and may number >128,000 (Hodges and Eldridge 2001). Smaller numbers breed in western Russia and on the Arctic Coastal Plain of Alaska. Steller's eider was listed as *threatened* under the ESA in July 1997 because of the reduction in the number of breeding birds and suspected reduction in the breeding range in Alaska (USFWS 1997). The estimates of the breeding population in Alaska averaged 4,800 pairs between 1990-1998 (Frederickson 2001), but is now thought to number less than 500 individuals (USFWS 2011; Stehn et al. 2013).

3.2.2 Distribution

Steller's eider breeds along the Arctic coast of Russia from the Yamal Peninsula to the Kolyma Delta and along the Arctic Coastal Plain of Alaska, with a very small subpopulation also breeding on the Yukon-Kuskokwim Delta (BirdLife International 2017; USFWS 2002). After breeding, Steller's eiders move to marine waters to molt; in Alaska, they concentrate in large numbers along the north side of the Alaska Peninsula. The estuaries and lagoons along the Alaska Peninsula are used by Steller's eider for molting and staging during spring and fall migration. Some may remain here for the winter if ice conditions allow, but many also disperse to the south side of the Alaska Peninsula, the Aleutian Islands, and the western Gulf of Alaska including Kodiak Island and lower Cook Inlet (USFWS 2002). Steller's eiders from both Alaska and eastern Russia migrate to these areas for molting and wintering (Rosenberg et al. 2016).

There are four locations along the north coast of the Alaska Peninsula that are particularly important for molting and staging Steller's eiders: the Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands. Photographic surveys in spring migration in late April of 2012 recorded 24,108 in the Izembek Lagoon, 5,767 in Nelson Lagoon, 5,960 in the Seal Islands Lagoon and 6,127 in Port Heiden (Larned 2012). Surveys of molting Steller's eider from 26 August to 2 September 2016 recorded 6,457 at the Izmebek Lagoon, 24,716 at Nelson Lagoon, 8,484 at Seal Islands Lagoon, and 368 at Port Heiden (Williams et al 2016).

3.2.3 Breeding Habitat

In Alaska, Steller's eiders nest on tundra habitats often associated with polygonal ground both near the coast and at inland locations (e.g., Quakenbush et al. 2004); nests have been found as far inland as 90 km (USFWS 2002). Emergent *Carex* and *Arctophila* provide import areas for feeding and cover. The young Steller's eiders hatch in late June. Male departure from the breeding grounds begins in late June or early July. Females that fail in breeding attempts may remain in the Barrow area into late summer. Females and fledged young depart the breeding grounds in early to mid-September. Steller's eiders move to nearshore marine habitats after breeding (Fredricksen 2001).

3.2.4 Molting Habitat

The molting period occurs from late July to late October (USFWS 2002). Molting occurs throughout southwest Alaska, but is concentrated at four areas along the north side of the Alaska Peninsula; molting areas tend to be shallow areas with eelgrass beds and intertidal sand flats and mudflats (USFWS 2002). In these areas, Steller's eiders feed on marine invertebrates such as crustaceans and mollusks (e.g., Petersen 1980, 1981).

3.2.5 Wintering Habitat

The wintering period occurs from December to late April (Frederickson 2001). Many Steller's eiders winter in the molting areas along the north side of the Alaska Peninsula; however, many also disperse to the south side of the Alaska Peninsula, the Aleutian Islands, and the western Gulf of Alaska including Kodiak Island and lower Cook Inlet (USFWS 2002). Wintering habitat includes shallow lagoons with extensive mudflats but deep bays and water up to 30m are used exclusively at night. (Frederickson 2001; Martin et al. 2015).

3.2.6 Critical Habitat

3.2.6.1 Description

The final designation of critical habitat for Steller's eider was issued in 2001 (USFWS 2001a). The USFWS has established Steller's eider critical habitat in the Yukon-Kuskokwim (Y-K) Delta nesting area (2,561 km^2), the Kuskokwim Shoals (3,813 km^2), and at the Seal Island (63 km^2), Nelson Lagoon (533 km^2), and Izembek Lagoon (363 km^2) units on the Alaska Peninsula (USFWS 2001a; Figure 18). These areas were designated as critical habitat as they are used by large numbers of Steller's eiders during breeding, molting, wintering, or staging for spring migration (USFWS 2002).

The Y-K Delta nesting area and the Kuskokwim Shoals are well removed from the project area and will not be considered further. The Seal Islands unit covers the Seal Island lagoon and the mouth of the Ilnik River, out to the line of mean high tide of Bristol Bay. The Nelson Lagoon unit begins 5.5 km north of Harbor Point, on Moller Spit at longitude of 160º32' W and runs northwest to Wolf Point in the Kudobin Islands and east along the line of mean high tide to 161º24' W, encompassing the Nelson Lagoon, portions of Hague Channel and Herendeen Bay south to 55 º51' N. The Izembek Lagoon unit begins at 162º30' approximately 9 km northeast of Moffet Point and then continues along the line of mean high tide inside the boundary of the Izmebek National Wildlife Refuge, encompassing the Moffet Lagoon, Izembek Lagoon, Norma Bay, and Applegate Cove (USFWS 2001a).

3.2.6.2 Primary Constituent Elements

USFWS considers PCE when designating critical habitat. PCEs are characterized by "physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection" and may include 1) space for individual and population growth (normal behavior), 2) nutritional and physiological requirements (food, water, air, light, minerals, etc.), 3) cover or shelter, and 4) breeding sites (e.g., reproduction, rearing of offspring) habitat protected from disturbance or of historic geographical and ecological distributions of species (50 CFR 424.11; USFWS 2001a).

The PCEs for the Izembek Lagoon, Nelson Lagoon, and Seal Islands units are marine waters up to 9 m (30 ft) deep and including the invertebrates in the water column, the benthic community, the underlying substrate and, when present; eelgrass beds and associated flora (USFWS 2001a). The Action Area for this proposed project does not occur in designated critical habitat of Steller's eider and therefore will not impact any of the defined PCEs (Figure 18).

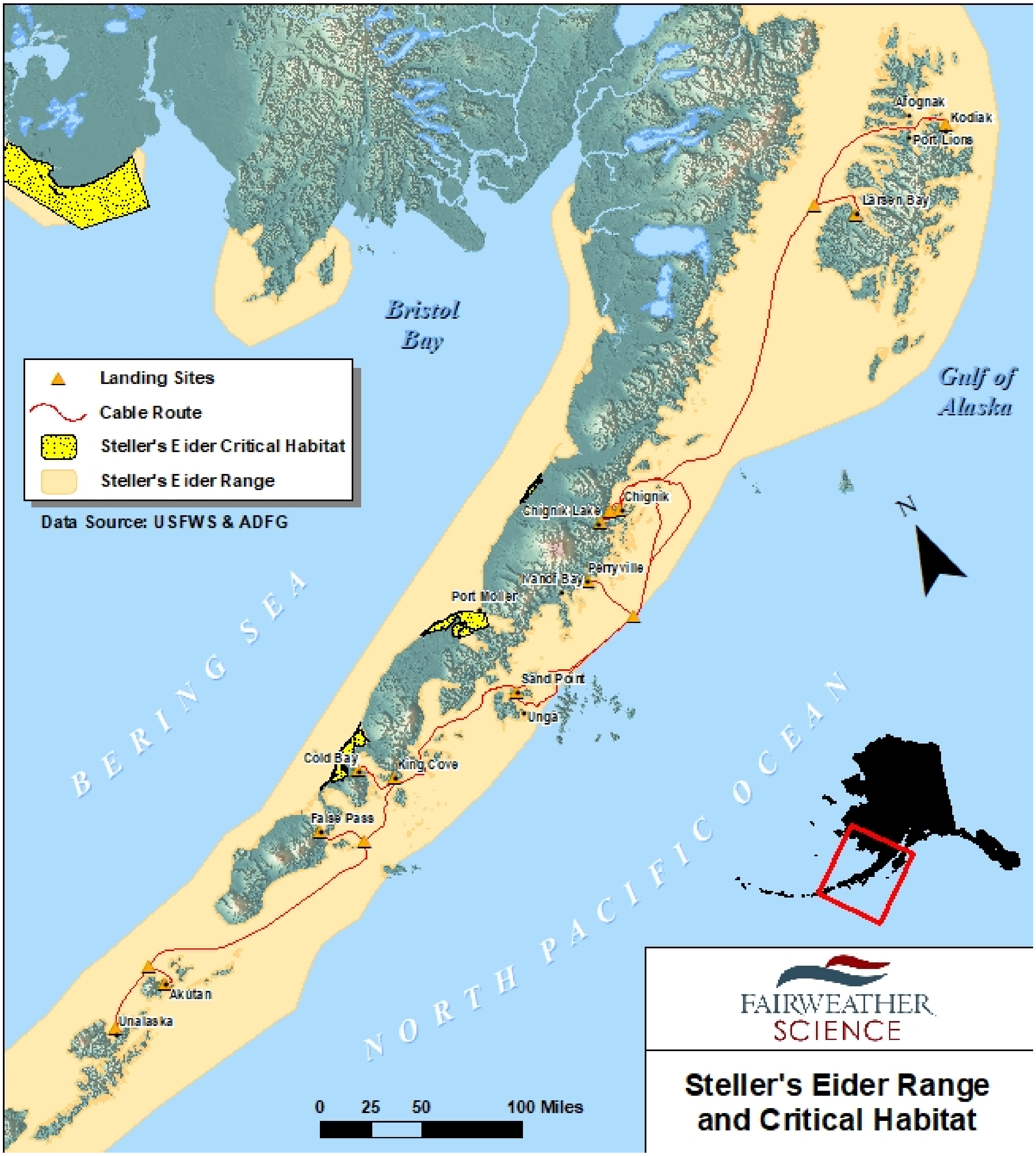

Figure 18. Steller's eider distribution in the project area.

3.3 SHORT-TAILED ALBATROSS

3.3.1 Population

From the late 1800s through as late as the 1930s, millions of short-tailed albatross were hunted for feathers, oil, and fertilizer, and by 1949 the species was thought to be extinct (USFWS 2008). A few breeding pairs were reported at Torishima Island, Japan, in the early 1950s, and with habitat management projects, stringent protect measures, and the absence of any significant volcanic eruptions, the population has continued to increase (USFWS 2008). The species was listed as endangered as a foreign species under the Endangered Species Conservation Act of 1969, and on July 31, 2000, the short-tailed albatross was listed as endangered throughout its range under the ESA (USFWS 2014a). The short-tailed albatross population is increasing at an average annual rate of 8.5%, and the population, following the 2016 to 2017 breeding season, is estimated at 5,856 individuals (USFWS 2018). The species is making progress toward meeting some of the recovery criteria for delisting.

3.3.2 Distribution

Historically, the species had 14 known breeding colonies in the northwestern Pacific and potentially in the North Atlantic; however, current breeding colonies exist primarily on two small islands in the North Pacific, with 80-85% of short-tailed albatross nesting on Torishima Island, Japan (USFWS 2008). Most of the remaining population of breeding birds are believed to use the Senkaku Islands; however, nest searches have not occurred since 2002 (USFWS 2014a). China, Japan, and Taiwan all claim ownership of the islands, which are, therefore, politically difficult to access. There have been early successes in establishing a colony at Mukojima in the Ogasawara (Bonin) Islands, Japan, after translocation efforts from 2008-2012, and a pair breeding at the Midway Atoll, Hawaii, fledged a chick in 2011, 2012, and 2014.

Satellite tagging of breeding adults in 2006-2008 and juveniles in 2008-2012 provided marine distribution information for the species (Figure 19). Both adult and juvenile short-tailed albatross used areas of the western Pacific east of Japan extensively, as well as the waters surrounding the Kurile Islands, Aleutian Islands, and the outer Bering Sea Continental shelf (USFWS 2014a). The outer Bering Sea shelf was used most during the summer and fall, moving to the northern submarine canyons in late summer and fall (USFWS 2014a). The birds moved south during the winter, but continued to utilize the southeastern Bering Sea, Aleutian Islands, and Gulf of Alaska. Juveniles traveled much more widely throughout the North Pacific than adults, spending more time in the Sea of Okhotsk, western Bering Sea, the transition zone between Hawaii and Alaska, and Arctic regions of the Bering Strait (USFWS 2014a). Distribution patterns and habitat use of sub-adult birds become similar to adult birds by age three.

3.3.3 Breeding Habitat

Short-tailed albatross nest on isolated, windswept, offshore islands that have limited human access. Nest sites may be flat or sloped, with sparse or full vegetation. The majority of birds on Torishima Island nest on a steep site with loose volcanic ash; however, a new, growing colony on the island is situated on a vegetated gentle slope. The vegetation consists of clump-forming grass (*Miscanthus sinensis* var. *condensatus*) that helps stabilize the soil, provides protection from the weather, and acts as a visual barrier between nesting pairs. The limited vegetation allows for safe, open takeoffs and landings (USFWS 2008). Nests have a concave scoop shape about 0.61 m (2 ft) in diameter on the ground, and are lined with sand and vegetation. Females will lay a single egg in October or November, and eggs hatch in late December through early January. The chicks are nearly full grown by late May to early June and the adults begin to leave the colony, with the chicks heading out to sea soon thereafter. By mid-July the colony is empty (USFWS 2001b). Non-breeders and failed breeders disperse during the late winter through spring (USFWS 2018).

3.3.4 Marine Habitat

Short-tailed albatross rely upon waters of the North Pacific that are characterized by upwelling and high productivity, in particular the regions along the northern edge of the Gulf of Alaska, along the Aleutian chain, and along the Bering Sea shelf break from the Alaska Peninsula out towards St. Matthew Island. Strong tidal currents combined with the abrupt, steep shelf break promote upwelling, and primary production remains high throughout the summer in these areas. Tagged adult and subadult birds frequented waters >1,000 m (3,280 ft) more than 70% of the time, and juveniles spent approximately 80% of their time in these shallower waters. Adults spent less than 20% of their time over waters exceeding 3,000 m (9,842 ft) deep (USFWS 2008). Waters around the Aleutian Islands also appear to be important for feeding while the species is undergoing an extensive molt (USFWS 2014a).

3.3.5 Critical Habitat

Critical habitat has not been designated for the short-tailed albatross. The USFWS determined that it was not prudent to designate critical habitat due to the lack of habitat-related threats, the lack of specific areas that could be identified as meeting the definition of critical habitat in U.S. jurisdiction, and the lack of recognition or educational benefits to the American public as a result of such a designation (USFWS 2008).

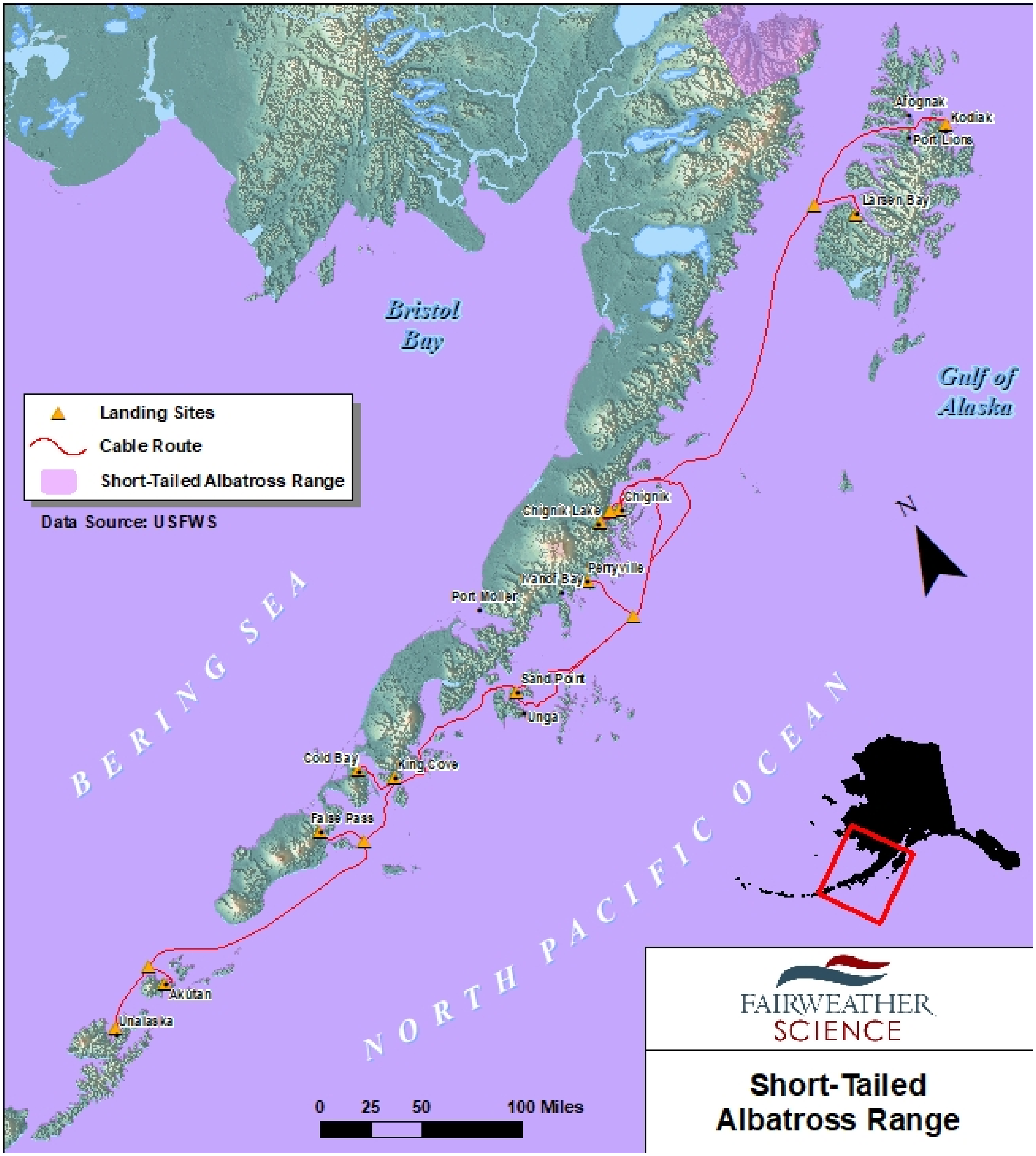

Figure 19. Short-tailed albatross distribution in the project area.

4.0 ENVIRONMENTAL BASELINE

Environmental baseline, as defined under the ESA, consists of past and present impacts of all Federal, State, or private actions and other human activities in action areas, the anticipated impacts of all the proposed Federal projects in an action area that have already undergone formal or early Section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation process (50 CFR §402.02). The following section describes the environmental baseline accounting for past and ongoing natural and anthropogenic factors that exist in action areas associated with the cable laying route.

4.1 EXISTING CONDITIONS

The Project region is composed of a variety of landforms, channels, and coastlines extending from the mainland of southwest Alaska to the Aleutian Islands. The Kodiak Island Archipelago is comprised of 16 separate islands, of which Kodiak Island is the largest by area, and the Aleutian Islands consist of 55 islands spanning approximately 1,770 km (1,100 mi) from the termination of the Alaska Peninsula to the southwest. Coastal and offshore waterways throughout the entire area typically remain ice-free throughout the year, and any coastal sea-ice which occurs is generally constricted to False Pass, east of Unimak Island.

Due to its position above the Alaska-Aleutian subduction zone and proximity to a highly active section of the Pacific Ring of Fire, much of the region is home to many active volcanoes and experiences frequent earthquakes. Extreme weather systems occur in the Gulf of Alaska, including high and shifting winds, wave action, snow, and rain. These events occur throughout the year, however inclement weather is usually magnified during winter months (December-February). During the summer (May-August), gale force wind and sea states >6 m occur less than 15% of the time. Weather events also influence coastal flooding and erosion, which are known to affect the project region (TerraSond Limited 2018).

Ocean basin topography, currents, water temperature, and other environmental characteristics influence the high productivity of the region's salt water environments, which support many species of fish, marine mammals, crustaceans, and birds. A pre-history of glaciation throughout the region has also significantly influenced its current seafloor morphology and sediment composition. The dominant current in the area is the Alaska Coastal Current, which passes through the Shelikof Strait and southward along the Alaska Peninsula and Aleutian Islands. Each project segment area is additionally influenced by local tidal currents.

4.1.1 Coastal Development

The Project route commences at the port city of Kodiak on Kodiak Island, passes west through Larsen Bay, then spans southwest along the Alaska Peninsula to the Aleutian Islands, terminating at Dutch Harbor, Unalaska Island. The route passes through three Alaskan boroughs including the Kodiak Island Borough, Lake and Peninsula Borough, and Aleutians East Borough, as well as the Aleutians West Census Area.

The Kodiak Island Borough encompasses the Kodiak Island Archipelago, Shelikov Strait waterbody, and 177 mi of the Katmai Coast along the southeastern Alaska Peninsula (Figure 20; Kodiak Island Borough 2018). The borough has a total population of approximately 13,287 residents (Alaska Department of Labor 2017), of which nearly 11,000 live in or near the city of Kodiak (Kodiak Island Borough 2018). Additionally, seven villages are located within the borough; Old Harbor (302 residents), Port Lions (240 residents), Ouzinkie (189 residents), Akhiok (74 residents), Larsen Bay (47 residents), and Karluk (45 residents; DataUSA 2018). Chiniak (Figure 20) is not listed on the Kodiak Island Borough community page, but the village has a population of 47 per the most recent U.S. census in 2010 (United States Census Bureau 2010).

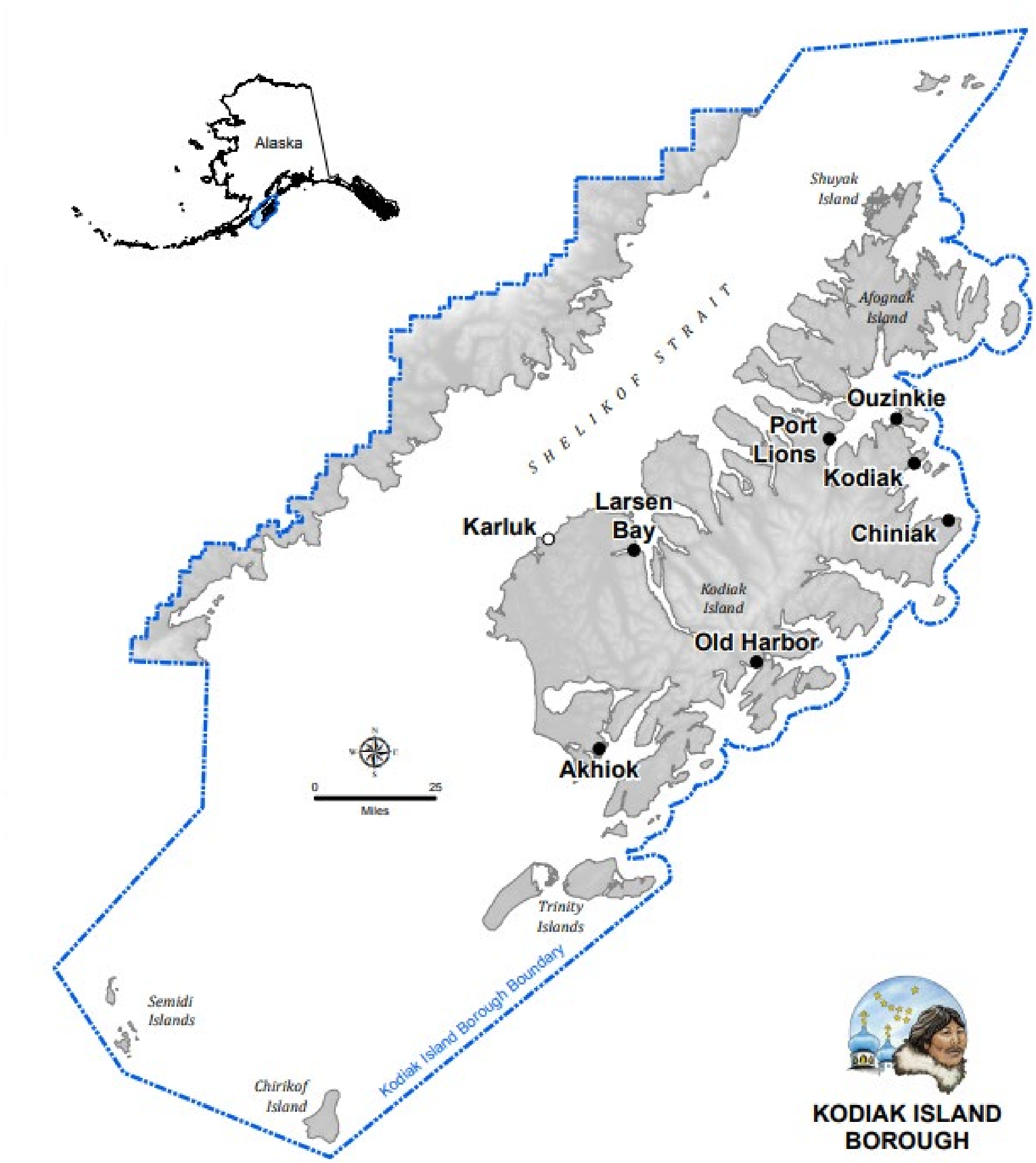

Figure 20. Kodiak Island Borough Boundary and Villages (Source: Kodiak Island Borough 2018)

The Lake and Peninsula Borough has a total population of 1,712 residents (Alaska Department of Labor 2017) comprising 17 communities across three distinct regional areas; Lakes Area, Upper Peninsula Area, and Chignik Area (Figure 21; Lake and Peninsula Borough 2018). The Lakes Area is the northernmost region, and includes 8 villages; Nondalton (186 residents), Port Alsworth (156 residents), Kokhanok (145 residents), Newhalen (143 residents), Levelock (97 residents), Iliamna (86 residents), Igiugig (47 residents), and Pedro Bay (13 residents; DataUSA 2018). The villages in the Upper Peninsula Area include; Egegik (80 residents), Port Heiden (73 residents), Pilot Point (49 residents), and Ugashik (14 residents; DataUSA 2018). The southernmost area, Chignik Area, contains 5 villages; Perryville (94 residents), Chignik Lagoon

(59 residents), Chignik Lake (71 residents), Chignik (40 residents), and Ivanof Bay (<5 residents; DataUSA 2018).

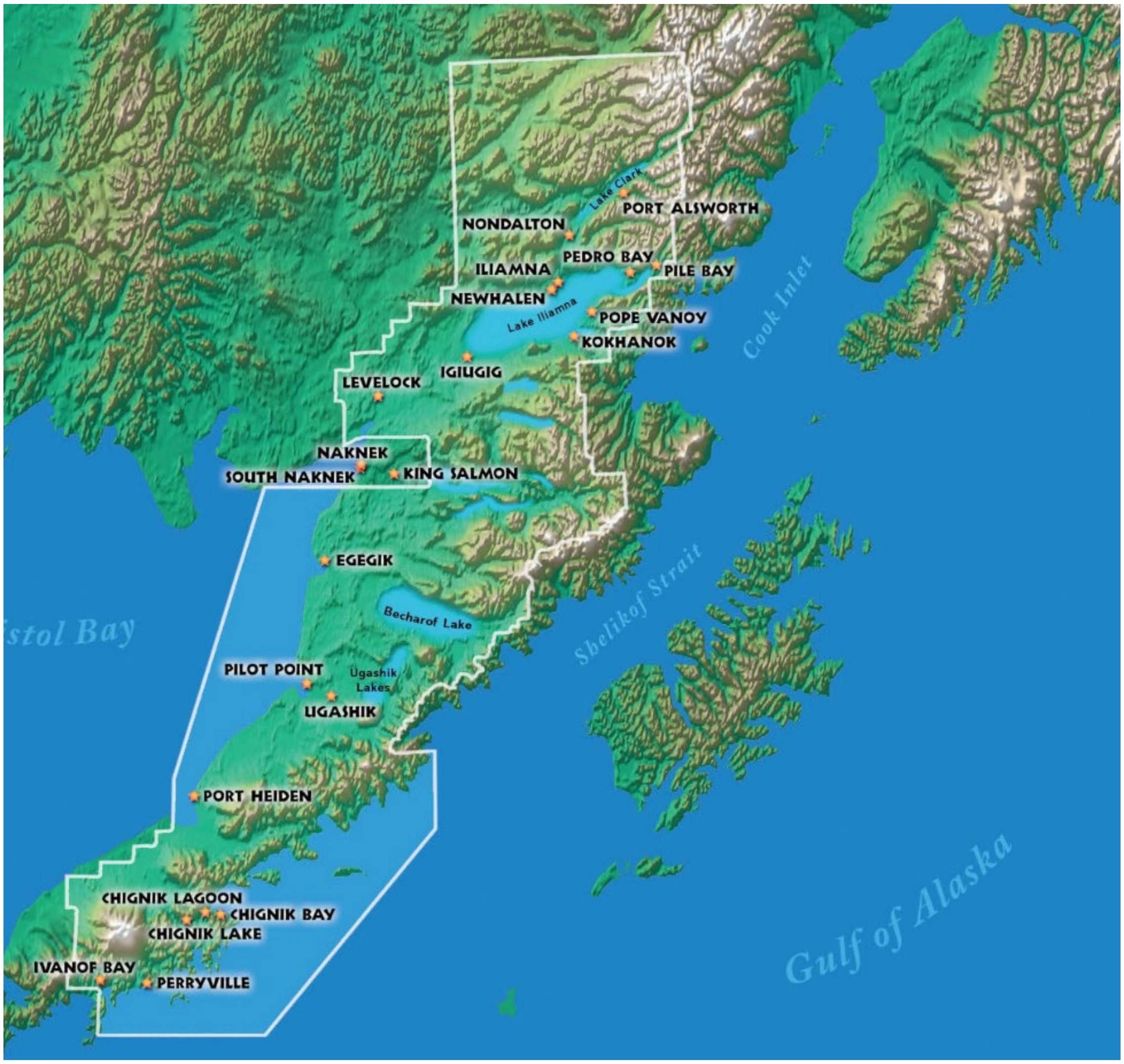

Figure 21. Lake and Peninsula Borough Boundary and Villages (Source: Lake and Peninsula Borough 2018)

The Aleutians East Borough includes the westernmost landmass of the Alaska Peninsula, and spans southwest from Mud and Herendeen Bays to Akutan Island (Figure 22). The borough is home to a total of approximately 2,977 residents (Alaska Department of Labor) who reside within 6 coastal communities; Sand Point (1,248 residents), King Cove (1,080 residents), Akutan (782 residents), False Pass (64 residents), Cold Bay (60 residents), and Nelson Lagoon (46 residents; DataUSA 2018).

Figure 22. Aleutians East Borough Boundary and Villages (Source: Aleutians East Borough 2018)

The Aleutians West Census Area includes the Aleutian Islands west of Akutan Island (Figure 23), and has a population of approximately 5,357 residents (Alaska Department of Labor 2017). Seven villages are established in the census area, including; Unalaska (4,710 residents), St. Paul (525 residents), Adak (122 residents), St. George (74 residents), and Atka (51 residents; DataUSA 2018)

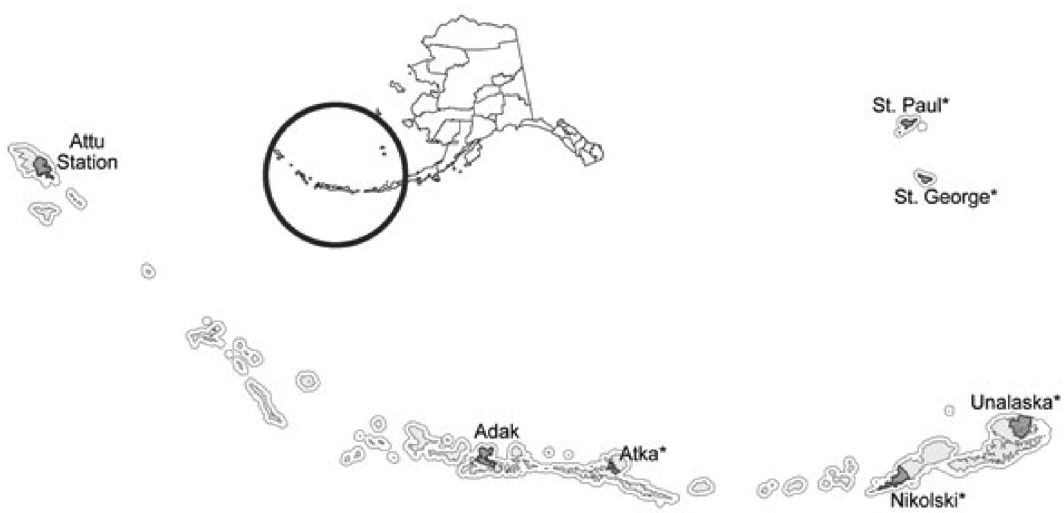

Figure 23. Aleutians West Census Area and Villages (Source: Southwest Alaska Municipal Conference 2018)

The primary economic activity in the Project region is commercial fishing for salmon, Pacific halibut, crab, and Pacific cod. Salmon and Pacific cod processing occurs at Peter Pan Seafoods (King Cove), Trident

Seafoods (Sand Point and Akutan), and Bering Pacific (False Pass). The Peter Pan cannery in King Cove is one of the largest operations under one roof in Alaska. Additional economic activities in the overall area include sightseeing and wildlife tours (See Section 4.1.4 Tourism), however many villages in the proposed project region are remote and have few economic opportunities.

4.1.2 Transportation

The Alaska Peninsula, Kodiak Island, and Aleutian Islands are not accessible to the rest of the state by road. The existing road network is discontinuous and limited to the areas surrounding a few communities, therefore water and air are the primary modes of inter-community transportation. Unalaska's deep-water port is one of the most productive cargo ports in the United States, for both regional fishing as well as domestic and international cargo. The Alaska Marine Highway system serves the Kodiak hub year-round, and the southern Aleutian Chain as far west as Unalaska during the summer service months (May-September); no scheduled marine services are available for communities west of Unalaska. Aviation is the principal means of transporting people to communities throughout the region. There are 30 airports controlled by the Alaska Department of Transportation and Public Facilities (DOT&PF) in the Alaska Peninsula, Kodiak Island, and Aleutian Islands combined, as well as numerous additional FAA-registered public and private runways (DOT&PF 2017).

4.1.3 Fisheries

Fishing is a major industry in Alaska. A wide range of vessels, from small skiffs to large catcher-processors, participate in federally managed commercial and charter fisheries in Alaskan waters. In 2010, there were 2,736 vessels participating in federal managed fisheries, and this does not include vessels that only participate in Alaska state managed fisheries (e.g., salmon, herring, and shellfish fisheries). Witherell et. al (2012), categorized these vessels into 16 commercial fleets and one charter fleet based on target species, gear type, licenses, or catch share program eligibility. Some of these vessels, however, engage in multiple fisheries and fall into more than one fleet (Figure 24).

Fleet Crossover

Fleet	A80	AFA Catcher Processors	AFA Motership	AFA Catcher Vessels	Other BSAI Trawl	Freezer Longline	Longline Catcher Vessels	Groundfish Pot	Jig	Central Gulf Trawl	Western Gulf Trawl	Halibut IFQ	Halibut CDQ	Sablefish	BSAI Crab	Scallop
A80	21	1	0	0	0	0	0	0	0	8	15	0	0	0	0	0
AFA Catcher Processors	1	17	0	0	0	0	0	0	0	0	1	0	0	0	0	0
AFA Motership	0	0	15	7	0	0	0	0	0	2	0	0	0	0	0	0
AFA Catcher Vessels	0	0	7	81	0	0	0	0	0	22	2	2	0	0	3	0
Other BSAI Trawl	0	0	0	0	17	0	0	1	0	8	5	1	0	1	1	1
Freezer Longline	0	0	0	0	0	35	0	2	0	0	0	2	0	13	2	0
Longline Catcher Vessels	0	0	0	0	0	0	80	2	6	0	0	65	3	47	0	0
Groundfish Pot	0	0	0	0	1	2	2	130	4	4	8	57	4	33	32	1
Jig	0	0	0	0	0	0	6	4	244	0	0	47	3	14	0	0
Central Gulf Trawl	8	0	2	22	8	0	0	4	0	70	30	12	0	5	0	0
Western Gulf Trawl	15	1	0	2	5	0	0	8	0	30	45	8	0	3	0	0
Halibut IFQ	0	0	0	2	1	2	65	57	47	12	8	991	36	339	8	0
Halibut CDQ	0	0	0	0	0	0	3	4	3	0	0	36	238	11	1	0
Sablefish	0	0	0	0	1	13	47	33	14	5	3	339	11	382	5	0
BSAI Crab	0	0	0	3	1	2	0	32	0	0	0	8	1	5	83	2
Scallop	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	4

Figure 24. Alaska federally managed commercial fisheries fleet crossover (Source: Fey and Ames 2013)

Several fisheries occur in the western Gulf of Alaska that have the potential to compete with marine mammals and seabirds for resources. Subsistence and personal use fishing are only permitted for Alaskan residents, and recreational fishing is open to residents and non-residents. The Project action areas are located within the Western Region fisheries unit, which is managed by the Alaska Department of Fish and Game (ADF&G) Division of Commercial Fisheries. Within the Western Region, the Project route spans three fishery management areas; Kodiak Management Area (KMA), Chignik Management Area (CMA), and Alaska Peninsula and Aleutian Islands Management Area (Area M). Numerous shore-based and floating processors operate within these areas and employ both residents and non-residents during peak fishing seasons.

Fishing and commercial seafood processing has occurred on Kodiak Island since the late 1800s (ADFG 2018a), and today Kodiak is home to Alaska's largest fishing port. The Kodiak Management Area includes the marine waters surrounding the Kodiak Archipelago, as well as drainage from the southeastern portion of the Alaska Peninsula into the Shelikof Strait. Several commercial fisheries occur in these highly productive waters, including salmon, herring, Pacific halibut, Pacific cod, rockfish, scallops, and crab. Catch is processed in local facilities, with the bulk of KMA's processing capacity located in Kodiak and Larsen Bay.

The Chignik Management Area is located southwest of the KMA, and fishery effort focuses primarily on sockeye salmon, which is essential to the local economy (ADF&G 2018c). One land-based salmon processing plant operates seasonally in Chignik.

The Alaska Peninsula and Aleutian Islands Management Area is located west of the CMA and extends southwest to Atka Island. Fisheries in this area include salmon, Pacific cod, crab, herring, Pacific halibut, and other groundfish, and major fish processing operations are located at Sand Point, King Cove, Dutch Harbor, and Akutan (ADFG 2018b). The Port of Dutch Harbor is the largest fishing port in the United States in terms of volume, and second largest in terms of value.

4.1.4 Tourism

The Alaska Peninsula, Kodiak Archipelago, and Aleutian Islands are components of the Southwest Alaska tourism region, which as a whole receives approximately 4% of the state's annual visitors (ADCCED 2017). This low percentage is due to high travel costs and limited tourism infrastructure and development in the area. Aviation is the most common means by which people visit Southwest Alaska. Kodiak and Dutch Harbor are the project area's only towns with active tourism development, and receive occasional cruise ship and day tour visitation for purposes including fishing, wildlife viewing, and sightseeing (TerraSond Limited 2018). The majority of visitors to the project region include those who identified business as a primary objective for travel (ADCCED 2017), which could likely be attributed to employment of seasonal laborers throughout the region. Overall, visitation rate to the Southwest has remained relatively low over the past decade (Figure 25).

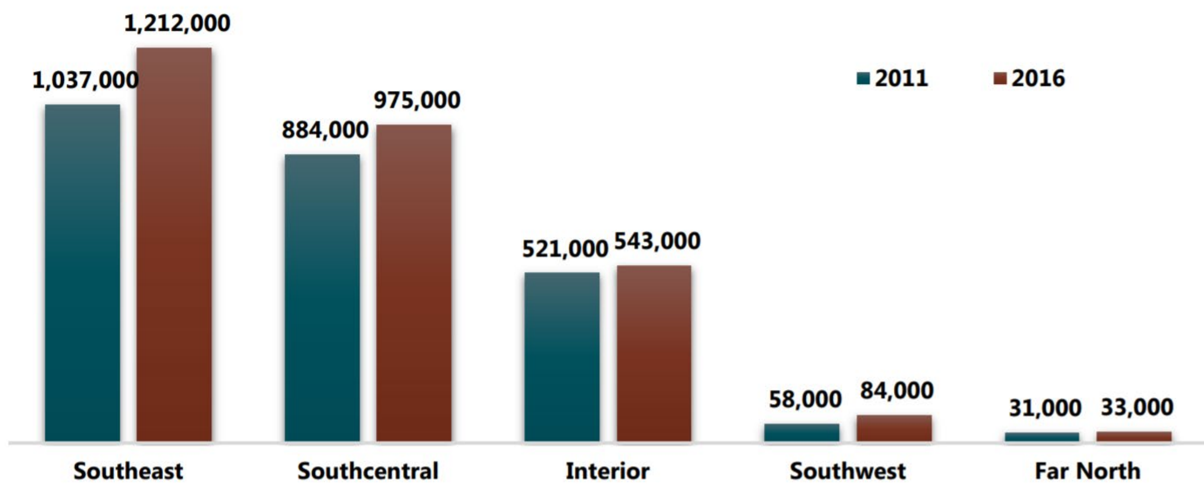

Figure 25. Estimated Visitor Volume to Alaska Regions, Summer 2011 and 2016 (Source: ADCCED 2017)

4.1.5 Vessel Traffic

Waters adjacent to the Alaskan Peninsula, Kodiak Island, and the Eastern Aleutian Islands experience high levels of annual vessel traffic (Figure 26) due to freight, fishing, and general transportation including interstate commerce and occasional tourism. In particular, Umiak Pass is a primary transit point for vessels headed west to Asia or the Arctic, and logs approximately 4,500 commercial vessel transits per year (Transportation Research Board 2008). Due to lack of interconnecting roads, the region's local communities rely on vessels for local commerce and shipment of items not feasible to transport by air.

The region supports highly productive fisheries, and vessel traffic during peak fishing months (April-November) is especially heavy at landing sites with fish processing facilities, including False Pass, King Cove, Sand Point, Chignik, Larsen Bay, and Kodiak. Commercial and recreational vessels frequent Kodiak Island's Pier 1 as an access route to commercial facilities including harbors, fuel docks, and processing plants. Kodiak’s position as an important fishing hub translates to a high volume of vessel presence consisting of hundreds of fishing vessels that harbor at Kodiak year-round (ADF&G 2018a).

Vessel traffic includes tourism to a minor extent (Nuka Research and Planning Group 2014), and passenger vessels (e.g., cruise ships) generally limit travel to Kodiak and Dutch Harbor. The Alaska Marine Highway System operates from Kodiak to Unalaska Island, however the Aleutian Islands are not accessible during the wintertime due to hazardous weather conditions (Alaska Marine Highway System 2016). Vessel traffic also includes U.S. Coast Guard (USCG) operated vessels (see Section 4.1.6), which patrol and perform various operations, ranging from marine inspections to life saving missions, within the Western Alaska USCG area of responsibility.

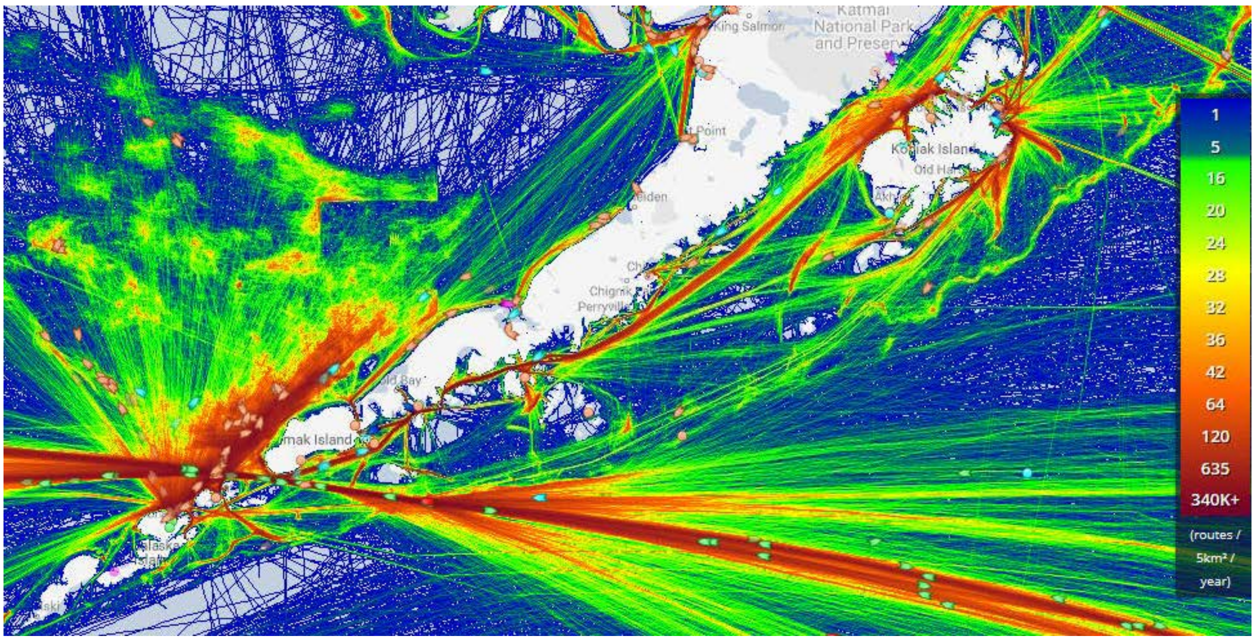

Figure 26. 2017 Vessel Traffic Density for Southwest Alaska (Source: TerraSond Limited 2018, via MarineTraffic)

4.1.6 Unexploded Ordnance and Military Activity

The Western Alaska Captain of the Port waterway zone extends clockwise from western Gulf of Alaska, through the Aleutian Islands, and north-northeast over the Arctic coast terminating at the Canadian border. This area of responsibility is the largest in the nation, and is overseen by multiple sectors of the USCG. Alaska is the USCG’s 17th district, and the U.S. military occupies a predominant industrial sector within the Kodiak Island Borough. Kodiak Island has an extensive military history and is home to the nation’s largest USCG base as well as the first privately owned rocket launch facility (Kodiak Island Borough 2018). The USCG base harbors three homeported cutters; the USCGC *Munro,* USCGC *Alex Haley,* and USCGC *Spar.* The USCG Sector Anchorage Waterways Management (WWM) Division monitors primary shipping waterways and security zones, and operates in conjunction with the USCG Aids to Navigation Team (ANT) in Kodiak to manage western Alaska navigational aid units (USCG 2018). Additionally, the U.S. Navy’s 55-acre Special Operations Forces Cold Weather Maritime Training Facility, Naval Special Warfare Cold Weather Detachment Kodiak is located near the city of Kodiak, on Spruce Cape and Long Island. At this facility, U.S. Navy SEALs complete extensive annual training courses focused on navigation, cold weather survival, and advanced tactical training.

Akutan and Kodiak Islands are the only two locations in the Project area in which unexploded ordnances (UXO) may be present. A northeastern area of Kodiak Island spanning Marmot, Chiniak, and Ugak Bays may contain UXOs, however none have been located along the proposed project route (TerraSond Limited 2018). Additionally, a confirmed UXO is located to the southeast of Akutan Island (TerraSond Limited 2018).

4.1.7 Oil and Gas

As of November 4, 2018, there are currently no active oil and gas leases in the Alaska Peninsula Lease Sale Area (ADNR 2018). Exploratory mining activity is ongoing near Sand Point and Perryville, however impacts to Project activities are unlikely. Overall, according to TerraSond Limited's 2018 project-specific desktop study, there are currently no occurrences of natural resource developments or extraction along the Project route that would interfere with the proposed cable survey or installation.

4.2 PROPOSED PROJECTS

4.2.1 Kodiak Existing and Proposed Infrastructure

Existing infrastructure around Kodiak and Mill Bay include the GCI-owned Kodiak Kenai Fiber Link, which lands in Mill Bay, and a chartered cable area from Miller Point in Monashka Bay to South Point on Spruce Island. Upcoming projects in the city of Kodiak include the Downtown Water Sewer and Storm Drain Master Plan, and Aleutian Homes Water and Sewer Phase VI, both designed by DOWL with schedules TBD (City of Kodiak Alaska 2018). Stantec Architecture Inc. also designed a New Fire Station project, with schedule TBD (City of Kodiak Alaska 2018).

4.2.2 Chignik Bay Public Dock Projects

In 2005, construction and dredging were conducted to support harbor and breakwater construction on the east side of the Chignik Bay (TerraSond Limited 2018). Additionally, Trident Seafoods and NorQuest Seafoods each own a public dock in the area. A public commercial and industrial dock on Chignik Bay waterfront land was proposed in 2013 and recently completed in 2017.

4.2.3 Chignik Lagoon Road and Airport Projects

The Chigniks' (Chignik Bay, Chignik Lake and Chignik Lagoon) Intertie Road and Metrofania Valley Airport were listed by the Chignik Lagoon Village Council as the highest priority projects in 2016. According to a draft Council community strategic direction plan for 2017-2022, the proposed intertie road would provide year-round access between the three Chigniks and connect to the proposed Metrofania airport which would be constructed centrally between the three.

4.2.4 Perryville Harbor Project

Three Star Point, near Perryville, has been selected as the development site for a small boat harbor. The harbor is intended to service the local fishing community; however, the project status has not been updated since 2016.

4.2.5 Sand Point Dock Replacement

Plans for replacement of the Sand Point Dock are underway, according to a public notice issued in December 2017 (USACE 2017). Work could entail the removal and salvage of seaward armor rock, followed by breakwater expansion and the construction of a new dock, which would be supported by piles (USACE 2017). An operations schedule for this project is currently unavailable.

4.2.6 Cold Bay Dock Upgrades

A list of Aleutians East Borough projects published in December 2017 indicated that the Cold Bay Dock will need major upgrades and repairs within the next decade. The Borough is currently working with the DOT&PF to gather information and initiate planning (Aleutians East Borough 2017).

4.2.7 False Pass Hydrokinetic Power Project

The City of False Pass is operating an ongoing Hydrokinetic Power Project, which is not expected to interfere with the proposed route (TerraSond Limited 2018). However, this project and its power cable route were considerations for an alternative landing site at the southernmost end of the runway where conflict is possible. GCI will coordinate with the City.

5.0 EFFECT OF THE ACTION

5.1 DIRECT EFFECTS

In Section 2.4, the Action Area for sea otters was defined as the estimated distance to the USFWS acoustic harassment disturbance threshold for continuous noise sources of 160 dB re 1 µPa rms. The distance to the 160 dB re 1 µPa rms threshold was conservatively estimated to be 100 m based on measurements of similar sound sources. Therefore, the Action Area for sea otters is equal to the route length within the species range plus a buffer of 100 m on each side of the route (200 m total width). The total Action Area encompasses approximately 333.7 km^2 (129.2 mi^2). The Action Area for eiders and albatross was defined as the potential area for disturbance from presence of the vessel, estimated to be 500 on each side of the route (total 1 km in width) within each of the species ranges. The total Action Area for eiders encompasses approximately 1,570.1 km^2 (606.2 mi^2), and the total Action Area for albatross encompasses approximately 1,626.4 km^2 (628.0 mi^2).

The amount of habitat range and critical habitat (when applicable) occurring within the Action Area for each species is summarized in Table 6. It is important to note that the vessel is not remaining in one place along the route for longer than is needed to complete the cable-laying operation.

Table 6. Calculation of Action Area by species range and critical habitat

Species	Action Area in Species Range (km^2)	Action Area in Critical Habitat (km^2)
Sea Otter	333.7	17.8
Steller's Eider	1,570.1	0
Short-tailed Albatross	1,626.4	N/A

5.1.1 Noise

5.1.1.1 Sounds Produced by the Proposed Action

As described in Section 2, vessels will use main drive propellers and/or DP thrusters to maintain position or move slowly during cable-laying operations. During these activities, non-impulse sounds are generated by the collapse of air bubbles (cavitation) created when propeller blades move rapidly through the water. Several acoustic measurements of vessels conducting similar operations using these types of propulsion have been made in Alaskan waters in previous years.

In 2011, Statoil conducted geotechnical coring operations in the Chukchi Sea using the vessel *Fugro Synergy*. Measurements were taken using bottom founded recorders at 50 m, 100 m, and 1 km away from the borehole while the vessel used dynamic positioning thrusters (Warner and McCrodan 2011). Sound levels measured at the recorder 1 km away ranged from 119 dB re 1 µPa rms to 129 dB re 1 µPa rms with most acoustic energy in the 110 to 140 Hz range. A sound propagation curve equation fit to the data and encompassing 90 percent of all measured values during the period of strongest sound emissions provided an estimate that sound levels would drop below 160 dB re 1 µPa rms at 6 m.

Project activities may also include the production of pulsed sounds from single-beam navigational echo sounders and positioning beacons (transceivers and transponders) used to determine the location of trenching or ROV equipment operating on or near the seafloor. These acoustic sources typically produce pulsed sounds at much higher frequencies than those produced by vessel thrusters, in narrow frequency bands, and in some cases (e.g., navigational echosounders), with narrow downward directed beamforms. For example, positioning beacons measured in the Chukchi Sea operated with center frequencies of 27 kHz (most energy between 26 and 28 kHz), 32 kHz (most energy between 25 and 35 kHz), and 22/23 kHz or 21/21.5 kHz (most energy between 20 and 25 kHz). For directional sources, the difference between in-beam and out-of-beam sound pressure levels at the same distance ranged from 5 to 15 dB re 1 μPa rms. Because high-frequency sounds attenuate more quickly in water, distances to threshold levels that may elicit behavioral responses in marine mammals were in the teens to several tens of meters, even within the narrow in-beam sound fields (Warner and McCrodan 2011). For this reason, and because the species considered in this assessment have less sensitive hearing at these higher frequencies, potential impacts from non-impulsive vessels sounds are likely to subsume potential impacts from these sonar sources and they are not addressed further below.

5.1.1.2 Sea Otters

5.1.1.2.1 Effects of Noise on Marine Mammals

The effects of sound on marine mammals are highly variable, and can be generally categorized as follows (adapted from Richardson et al. 1995):

1. The sound may be too weak to be heard at the location of the animal, i.e., lower than the prevailing ambient sound level, the hearing threshold of the animal at relevant frequencies, or both;
2. The sound may be audible but not strong enough to elicit any overt behavioral response, i.e., the mammal may tolerate it, either without or with some deleterious effects (e.g., masking, stress);
3. The sound may elicit behavioral reactions of variable conspicuousness and variable relevance to the well-being of the animal; these can range from subtle effects on respiration or other behaviors (detectable only by statistical analysis) to active avoidance reactions;
4. Upon repeated exposure, animals may exhibit diminishing responsiveness (habituation/sensitization), or disturbance effects may persist; the latter is most likely with sounds that are highly variable in characteristics, unpredictable in occurrence, and associated with situations that the animal may perceive as a threat;
5. Any man-made sound that is strong enough to be heard has the potential to reduce (mask) the ability of marine mammals to hear natural sounds at similar frequencies, including calls from conspecifics, echolocation sounds of odontocetes, and environmental sounds due to wave action or (at high latitudes) ice movement. Mammal calls and other sounds are often audible during the intervals between pulses, but mild to moderate masking may occur during that time because of reverberation.
6. Very strong sounds have the potential to cause temporary or permanent reduction in hearing sensitivity, or other physical or physiological effects. Received sound levels must far exceed the animal's hearing threshold for any temporary threshold shift to occur. Received levels must be even higher for a risk of permanent hearing impairment.

5.1.1.2.2 Hearing Abilities of Sea Otters

The hearing abilities of marine mammals are functions of the following (Richardson et al. 1995; Au et al. 2000):

1. Absolute hearing threshold at the frequency in question (the level of sound barely audible in the absence of ambient noise). The “best frequency” is the frequency with the lowest absolute threshold.
2. Critical ratio (the signal-to-noise ratio required to detect a sound at a specific frequency in the presence of background noise around that frequency).
3. The ability to determine sound direction at the frequencies under consideration.
4. The ability to discriminate among sounds of different frequencies and intensities.

Marine mammals rely heavily on the use of underwater sounds to communicate and to gain information about their surroundings. Experiments and monitoring studies also show that they hear and may react to many types of man-made sounds (e.g., Richardson et al. 1995; Gordon et al. 2004; Nowacek et al. 2007; Southall et al. 2007; Tyack 2008).

In-air vocalizations of sea otters have most of their energy concentrated at 3–5 kHz (McShane et al. 1995; Thomson and Richardson 1995). Sea otter vocalizations are considered to be most suitable for short-range communication among individuals (McShane et al. 1995). However, Ghoul and Reichmuth (2012) noted that the in-air “screams” of sea otters are loud signals (source level up to 113 dB re 20 µPa) that may be used over larger distances; screams have dominant frequencies of 4–8 kHz. Ghoul and Reichmuth (2012, 2014) examined the hearing abilities of sea otters using a behavioral approach; they found that the in-air hearing range was 0.125 to 32 kHz. Underwater, sea otter hearing is most sensitive at 8–16 kHz; however, their hearing is not specialized to detect sounds in background noise (Ghoul and Reichmuth 2016).

5.1.1.2.3 Potential Effects of Noise from Action on Sea Otters

Vessel sounds could affect sea otters along the proposed cable-laying route. Houghton et al. (2015) proposed that vessel speed is the most important predictor of received noise levels, with low vessel speeds (such as those expected during the proposed activity) resulting in lower sound levels. Sounds produced by large vessels generally dominate ambient noise at frequencies from 20 to 300 Hz (Richardson et al. 1995). However, some energy is also produced at higher frequencies (Hermannsen et al. 2014). The following materials in this section summarize results from studies addressing the potential effects, or lack thereof, of vessel sounds on marine mammals.

Tolerance

Numerous studies have shown that underwater sounds from industrial activities are often readily detectable in the water at distances of many kilometers. However, several studies have also shown that marine mammals at distances more than a few km away often show no apparent response to industry activities of various types (e.g., Moulton et al. 2005; Harris et al. 2001; LGL et al. 2014). This is often true even in cases when the sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to underwater sounds such as airgun pulses under some conditions, at other times mammals of all three types have shown no overt reactions (e.g., Stone and Tasker 2006; Hartin et al. 2013). In general, pinnipeds and small odontocetes seem to be more tolerant of exposure to some types of underwater sound than are baleen whales. Given the relatively low-levels of sound expected to be produced by project vessels and the common occurrence of numerous vessels in the project area, it is reasonable to expect that sea otters would show no or minimal response to the planned activities.

Masking

Masking is the obscuring of sounds of interest by interfering sounds, which can affect a marine mammal's ability to communicate, detect prey, or avoid predation or other hazards. Ship noise, through masking, can reduce the effective communication distance of a marine mammal if the frequency of the sound source is close to that used by the animal, and if the sound is present for a significant fraction of time (e.g., Richardson et al. 1995; Clark et al. 2009; Jensen et al. 2009; Hatch et al. 2012; Rice et al. 2014; Dunlop 2015; Erbe et al. 2016; Jones et al. 2017). In addition to the frequency and duration of the masking sound, the strength, temporal pattern, and location of the introduced sound also play a role in the extent of the masking (e.g., Branstetter et al. 2013, 2016; Finneran and Branstetter 2013). In order to compensate for increased ambient noise, some marine mammals increase the source levels of their calls in the presence of elevated noise levels from shipping, shift their peak frequencies, or otherwise change their vocal behavior (e.g., Parks et al. 2011, 2012, 2016; Castellote et al. 2012; Melcón et al. 2012; Azzara et al. 2013; Tyack and Janik 2013; Luís et al. 2014; Papale et al. 2015; Dahlheim and Castellote 2016; Gospić and Picciulin 2016; Gridley et al. 2016; Heiler et al. 2016; Tenessen and Parks 2016; Matthews 2017).

Shipping noise may have a limited potential to mask sea otter communication. Some vocalizations produced by sea otters may have overlapping frequencies with those produced by shipping; however, little is known about in-water sounds produced by sea otters and their best hearing range is 8–16 kHz, well above most sounds produced by ships. In addition, the exposure duration from a moving vessel is relatively short. Since sea otters spend ~80% of their time at the sea surface, they are more susceptible to airborne sounds rather than underwater noise. Thus, potential masking effects are expected to be very limited.

Disturbance Reactions

Many marine mammals show considerable tolerance of vessel traffic, although they sometimes react at long distances if confined by ice or shallow water, or if previously harassed by vessels (Richardson et al. 1995). Marine mammal responses to ships are presumably responses to noise, but visual or other cues may also be involved. Underwater sounds may be detectable by sea otters and could cause changes in behavior or distribution; however, we are not aware of any studies that have examined the responses of sea otters to underwater sounds. Behavioral effects could include temporary displacement from habitat (avoidance), altered direction of movement, and changes in resting or feeding cycles, alertness, vocal behavior, or swimming behavior. The most common response by sea otters to noise would likely be avoidance. Southall et al. (2007) reviewed a number of papers describing the responses of marine mammals to non-pulsed sound. In general, little or no response was observed in animals exposed at received levels from 90–120 dB re 1 µPa rms; probability of avoidance and other behavioral effects increased when received levels were 120–160 dB re 1 µPa rms.

Marine mammal response to the presence of vessels is variable. There is little information on the responses of sea otters to disturbances, let alone responses to noise, but disturbance responses appear to be highly variable (USFWS 2013). The reactions of individual sea otters to disturbance may vary depending on season, sex, and population (USFWS 2013). Although sea otters often allow close approaches by vessels, they sometimes avoid disturbed areas. This variability in responses makes it difficult to predict the reaction distance from a noise source for individual sea otters or the noise level that will consistently result in a response.

Vessel noise could disturb sea otters in their habitat, while they are foraging, reproducing, or resting. It is uncertain how brief changes in behavior could affect the well-being of sea otters. Some marine mammals that show no obvious avoidance or behavioral changes may still be adversely affected by sound (Richardson et al. 1995; Romano et al. 2004; Weilgart 2007; Wright et al. 2009, 2011; Rolland et al. 2012). For example, some research suggests that animals in poor condition or in an already stressed state may not react as strongly to human disturbance as would more robust animals (e.g., Beale and Monaghan 2004). Based on evidence from terrestrial mammals and humans, sound is a potential source of stress (Wright and Kuczaj 2007; Wright et al. 2007a, b, 2009, 2011; Atkinson et al. 2015; Houser et al. 2016; Lyamin et al. 2016). However, almost no information is available on sound-induced stress in marine mammals, or on its potential (alone or in combination with other stressors) to affect the long-term well-being or reproductive success of marine mammals (Fair and Becker 2000; Hildebrand 2005; Wright et al. 2007a, b). Such long-term effects, if they occur, would be mainly associated with chronic noise exposure, which would not result from this project. In addition, Lusseau and Bejder (2007) and Weilgart (2007) noted that if a sound source displaces a marine mammal from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant. However, the exposure duration of the proposed project is short. There have been no studies on the effects of disturbance on various aspects of sea otter biology, including foraging, reproductive success, energy expenditure, or stress (USFWS 2013).

Although it is possible that some sea otters may exhibit minor, short-term disturbance responses to underwater sounds from the cable laying activities, based on expected sound levels produced by the activity, any potential impacts on otter behavior would likely be localized to within a hundred meters of the active vessel(s) and would not result in population-level effects.

Temporary Threshold Shift

Temporary threshold shift (TTS) is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter 1985). While experiencing TTS, the hearing threshold rises and a sound must be stronger in order to be heard. It is a temporary phenomenon, and (especially when mild) is not considered to represent physical damage or “injury” (Southall et al. 2007; Le Prell 2012). Rather, the onset of TTS has been considered an indicator that, if the animal is exposed to higher levels of that sound, physical damage is ultimately a possibility. However, research has shown that sound exposure can cause cochlear neural degeneration, even when threshold shifts and hair cell damage are reversible (Kujawa and Liberman 2009; Liberman 2016). These findings have raised some doubts as to whether TTS should continue to be considered a non-injurious effect (Weilgart 2014; Tougaard et al. 2015, 2016).

The magnitude of TTS depends on the level and duration of sound exposure, and to some degree on frequency, among other considerations (Kryter 1985; Richardson et al. 1995; Southall et al. 2007). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity recovers rapidly after exposure to the sound ends. Extensive studies on terrestrial mammal hearing in air show that TTS can last from minutes or hours to (in cases of strong TTS) days. More limited data from odontocetes and pinnipeds show similar patterns (e.g., Mooney et al. 2009a, b; Finneran et al. 2010).

Based on what is known about vessel noise, there appears to be very little risk for TTS to sea otters from vessel noise, given that strong sound levels are only expected to occur very close to the vessel. Avoidance reactions of sea otters would also reduce the probability of exposure to shipping sounds that may be strong enough to induce hearing impairment.

Permanent Threshold Shift

When permanent threshold shift (PTS) occurs, there is physical damage to the sound receptors in the ear. In some cases, there can be total or partial deafness, whereas in other cases, the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter 1985). Physical damage to a mammal's hearing apparatus can occur if it is exposed to sound impulses that have very high peak pressures, especially if they have very short rise times. (Rise time is the interval required for sound pressure to increase from the baseline pressure to peak pressure.) However, sounds during the proposed activities are non-impulsive and are not expected to have high peak pressures.

As sea otter hearing is best between 8 and 16 kHz, the cavitation noise from vessels does not fall within the effective hearing range of otters. In addition, as the cable-lay ship is moving, long-term exposure of a given animal to continuous sounds from the vessel is not expected. It is extremely unlikely that a sea otter would remain close enough to a vessel for a sufficiently long period of time to incur PTS. In addition, Lloyd's mirror and surface release effects will ameliorate the effects for animals at or near the surface.

5.1.1.3 Seabirds

5.1.1.3.1 Hearing Abilities of Seabirds

There is very little information on the underwater hearing of seabirds; to date only studies on great cormorants have been published. Great cormorants were found to respond to underwater sounds and may have special adaptations for hearing underwater (Hansen et al. 2016; Johansen et al. 2016). The in-air hearing of a number of seabirds (including loons, scaups, gannets, and ducks) has recently been investigated by Crowell (2016), and the peak hearing sensitivity was found to be between 1.5 and 3 kHz. The best hearing frequency for the common eider was 2.4 kHz (Crowell 2016).

5.1.1.3.2 Effects of Noise on Seabirds

The effects of underwater sound on birds in general have not been well studied, but could include masking, disturbance, and hearing impairment. One study of the effects of underwater seismic survey sound on molting long-tailed ducks in the Beaufort Sea showed little effect on their behavior (Lacroix et al. 2003). However, the study did not consider potential physical effects on the ducks. The authors suggested caution in interpreting the data because of their limited utility to detect subtle disturbance effects, and recommended studies on other species to better understand the effects of seismic airgun sound on seabirds. Stemp (1985) conducted opportunistic observations on the effects of seismic exploration on seabirds; he did not observe any effects of seismic testing, but warned that his observations should not be extrapolated to areas with large concentrations of feeding or molting birds.

Seabirds are not known to communicate underwater or use underwater hearing during feeding activities. Thus, masking from underwater noise is unlikely to be a concern, but research on this issue is lacking. There are no data on the physiological effects of underwater noise on birds (e.g., temporary threshold shifts [TTS] or permanent threshold shifts [PTS]). However, comparative studies of in-air hearing of many bird species has shown that TTS may occur when exposed to continuous noise (12-24 hours) between 93 and 110 dB re 20 µPa rms (Dooling and Popper 2016); this would roughly translate to 119-136 dB re 1 µPa rms as measured underwater. In air, PTS occurred when birds were exposed to continuous noise above 110 dB re 20 μPa rms or to single impulse sounds above 140 dB re 20 μPa rms (Dooling and Popper 2016); underwater, those limits would be approximately 136 dB re 1 μPa rms for continuous noise and 176 dB re 1 μPa rms for single impulse sounds. However, it is not clear if values determined from in-air studies can be applied to seabirds in the water, especially given that they spend only a small portion of their time underwater.

5.1.1.3.3 Potential Effects of Noise from Action on Steller's Eider

Although the effect of underwater sound on eiders have not been studied, noise produced by the proposed project activities could affect the behavior of Steller's eiders along the cable-laying route. The north side of the Alaska Peninsula is the primary wintering area for Steller's eider, and three marine units of critical habitat have been designated along it (Seal Islands, Nelson Lagoon, and Izembek Lagoon; USFWS 2001a). The cable-laying route lies on the south side of the Alaska Peninsula, well away from these critical habitat areas, but Steller's eiders are also known to use deeper bays and offshore areas on the southern side of the Alaska Peninsula (Fredrickson 2001). Masking and hearing impairment are unlikely during the proposed activities because the continuous sound sources (e.g., DP thrusters) have lower frequencies than the range of peak hearing sensitivity for seabirds, and the impulse sounds (e.g., echosounders) have most of their energy at frequencies well above the range of peak hearing sensitivity for seabirds. Additionally, the duration of potential exposure to these low-level sounds would be insufficient to cause impacts to hearing abilities.

5.1.1.3.4 Potential Effects of Noise from Action on Short-tailed Albatross

Noise produced by the proposed project activities could affect the behavior of short-tailed albatross along the cable-laying route. Increasing evidence indicates that the waters surrounding the Aleutian Islands are important for feeding, particularly while the species is undergoing extensive molting (USFWS 2014a). Masking and hearing impairment are unlikely during the proposed activities because the continuous sound sources (e.g., DP thrusters) have lower frequencies than the range of peak hearing sensitivity for seabirds, and the impulse sounds (e.g., echosounders) have most of their energy at frequencies well above the range of peak hearing sensitivity for seabirds. Additionally, the duration of potential exposure to these low-level sounds would be insufficient to cause impacts to hearing abilities.

5.1.2 Strandings and Mortality

Due to the low-intensity and non-impulsive nature of sounds produced by the cable-laying activities, strandings or mortality resulting from acoustic exposure is highly unlikely. Rather, any potential effects of this nature are more likely to come from ship strikes (e.g., Redfern et al. 2013). Areas where high densities of marine mammals overlap with frequent transits by large and fast-moving ships present high-risk areas. Wiley et al. (2016) concluded that reducing ship speed is one of the most reliable ways to avoid ship strikes. The risk of collision of a cable-laying vessel with marine mammals exists but is extremely unlikely, because of the relatively slow operating speed (typically 1–4 km/h or 0.5–2 kts) of the vessel and the generally straight-line movement (Laist et al. 2001; Vanderlaan and Taggart 2007). For these reasons, collisions between sea otters and vessels proposed for using during project activities are unlikely. Additionally, sea otters generally respond to an approaching vessel by swimming away from the area, thereby further reducing the risk of collision. According to the USFWS (2013), injury by vessel strikes is likely to be rare in areas with limited boat traffic.

5.1.3 Habitat Disturbance

5.1.3.1 Potential Effects of Habitat Disturbance on Sea Otters

There is little information on the responses of sea otters to disturbances, but responses appear to be highly variable (USFWS 2013). Sea otter responses to ships are presumably responses to noise but visual or other cues may also be involved. Although sea otters often allow close approaches by vessels, they sometimes avoid disturbed areas. Sea otters could be disturbed during activities in the water or onshore, where the cable makes landfall. Otters may retreat to very shallow (<2 m) water or haul out on land in response to disturbance (USGS unpubl. data *in* USFWS 2013).

Garshelis and Garshelis (1984) noted that sea otters avoided waters with frequent boat traffic in southern Alaska, but that these areas were reoccupied during seasons when boat traffic was reduced. Also, Udevitz et al. (1995) suggested that ~15 percent of sea otters along boat survey transects were not detected because they moved away from the approaching boat. Curland (1997) suggested that sea otters occurring in areas with disturbance by boats, divers, and kayaks spend a greater amount of time traveling than they do in areas where there is less disturbance. The disturbance responses typically include diving or moving away from the disturbance; when in rafts, the animals may disperse and the raft may break up and not reform for hours (J. Watson pers. comm. in USFWS 2013). USFWS observations of sea otters along Akutan Harbor's north shore indicate that feeding sea otters are easily disturbed by human presence along the shoreline (USACE 2004). However, disturbance from vessels would be temporary.

According to the sea otter recovery plan, the effect from disturbance is expected to be small if boat traffic is limited in southwest Alaska (USFWS 2013). However, sea otters could incur some stress and exert energy to move away from the disturbance. If a sea otter reacts briefly to a disturbance by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population.

Sea bottom disturbance as a result of cable installation activities, route clearance, and ploughing have the potential to interact with sea otters. A brief and limited increase in turbidity as a result of suspension of sediments is expected to have minimal effect on sea otters. Cable-laying may also disturb the benthic community, which could in turn affect food supply over a small area. Sea otters feed on a wide variety of benthic invertebrates (Rotterman and Simon-Jackson 1988), including sea urchins, abalone, clams, mussels, and crabs (Riedman and Estes 1990). The Action Area overlaps PCEs within designated critical habitat along the route; however, the extent of overlap is only 17.8 km^2. This area constitutes 0.1% of the 15,164 km^2 of critical habitat designated for the Southwest Alaska DPS (USFWS 2009). The disturbance effects on the benthos would be localized, short-term, and likely indistinguishable from naturally occurring disturbances. Given the brief duration of this activity and the relatively small area impacted, it will likely have little impact on sea otter feeding efficiency.

5.1.3.2 Potential Effects of Habitat Disturbance on Seabirds

5.1.3.3 Vessel Traffic

Investigations into the effects of disturbance by vessel traffic on birds are limited. Schwemmer et al. (2011) examined the effects of disturbance by ships on seabirds in Germany. In areas with vessel traffic channels, sea ducks appeared to habituate to vessels. Four species of sea ducks examined had variable flushing distances, which was related to flock size; common eiders (*Somateria mollissima*) had the shortest flush distance. Flushing distances varied for common scoter (*Melanitta nigra*) with larger flocks flushing at distances of 1 to 2 km, and smaller flocks flushing at <1000 m. Loons were found to avoid areas with high vessel traffic (Schwemmer et al. 2011). During boat surveys, Steller's eiders flushed when approached by a small skiff at distance of 100–200 m in January and 300 m in March (LGL 2000; HDR 2004).

Speckman et al. (2004) reported that marbled murrelets appeared to habituate to small boat traffic during surveys; only a few birds flew away when approached by a skiff; most birds merely paddled away whereas others dove and resurfaced before moving away. However, fish-holding murrelets were found to swallow the fish when approached by a boat, a behavior that could have consequences for the chicks the prey was intended for (Speckman et al. 2004). Lacroix et al. (2003) noted that molting, flightless ducks frequently dove and swam away short distances when approached by a small research vessel, but would resurface quickly after the vessel passed. Even when long-tailed ducks were experimentally disturbed by a small research vessel doing transits every other day, they showed relatively high site fidelity; however, all ducks showed a disturbance response at distances >100 m (Flint et al. 2004).

Lacroix et al. (2003) did not detect any effects of nearshore seismic exploration on molting long-tailed ducks in the inshore lagoon systems of Alaska's North Slope. Both aerial surveys and radio-tracking indicated that the proportion of ducks that stayed near their marking location from before to after seismic exploration was unaffected by proximity to seismic survey activities. There was no large-scale movement from the seismic area even though the vessel transited the same area numerous times throughout the survey over the course of ~3 weeks. Nonetheless, several studies have shown that some bird species avoid areas with high disturbance. Kaiser et al. (2006) reported that common scoters (*Melanitta nigra*) avoided areas with high shipping traffic. Similarly, Johnson (1982 in Lacroix et al. 2003) reported that long-tailed ducks (*Clangula hyemalis*) moved from one habitat to another in response to vessel disturbance. Similarly, Thornburg (1973), Havera et al. (1992), and Kenow et al. (2003) reported that staging waterfowl were displaced from foraging areas by boating, but some of these areas had high levels of boating activity. Merkel et al. (2009) showed that feeding by common eiders (*Somateria mollissima*) was reduced when disturbed by fast moving, open boats, and that movement increased. The degree of the disturbance was related to the number of boats in the area. However, the eiders did attempt to compensate for lost feeding opportunities by feeding at different, perhaps less favorable, times of the day (Merkel et al. 2009).

Similar results were obtained by Velando and Munilla (2011) who found that foraging by European shags (*Phalacrocorax aristotelis*) was reduced by boat disturbance. Agness et al. (2008) suggested that changes in behavior of Kittlitz's murrelets in the presence of large, fast-moving vessels, and suggested the possibility of biological effects because of increased energy expenditure by the birds. In contrast, Flint et al. (2003) reported that boat disturbance did not have any effect on body condition of molting long-tailed ducks.

5.1.3.4 Artificial Lighting

Artificial lighting on the cable-lay vessel and barges will be present throughout the project for routine vessel safety and navigation purposes, but effects will generally be reduced compared to lower latitude locations due to the long daylight hours present during the time the project will take place. Several bird species are attracted to bright lights on ships at night and may injure or kill themselves by colliding with the ship (e.g., Ryan 1991; Black 2005; Merkel and Johansen 2011). Birds that spend most of their lives at sea are often highly influenced by artificial light (Montevecchi et al. 1999; Gauthreaux and Belser 2006; Montevecchi 2006; Ronconi et al. 2015). In Alaska, the crested auklet (*Aethia cristatella*) mass-stranded on a crab fishing boat (Dick and Donaldson 1978). An estimated 1.5 tons of the crested auklet either collided with or landed on the brightly lit fishing boat at night.

It has also been noted that seabird strandings seem to peak around the time of the new moon when moonlight levels are lowest (Telfer et al. 1987; Rodríguez and Rodríguez 2009; Miles et al. 2010). Birds are more strongly attracted to lights at sea during fog and drizzle conditions (Telfer et al. 1987; Black 2005). Moisture droplets in the air refract light increasing illumination creating a glow around vessels at seas. Birds may be confused or blinded by the contrast between a vessel's lights and the surrounding darkness. During the confusion, a seabird may collide with the vessel's superstructure. This may cause mortality directly or indirectly. They may also fly at the lights for long periods of time and tire or exhaust themselves decreasing their ability to feed and survive.

Many seabirds have great difficulty becoming airborne from flat surfaces. Once on a hard surface, stranded seabirds tend to crawl into corners or under objects such as machinery to hide. Here they may die from exposure, dehydration or starvation over hours or days. Once stranded on a deck, a seabird's plumage is prone to oiling from residual oil often present in varying degrees on the decks of a ship. Even a dime size spot of oil on a bird's plumage is sufficient to breach the thermal insulation essential for maintaining vital body heat. Therefore, even if rescued and released over the side of the vessel, a bird may later die from hypothermia.

5.1.3.5 Disturbance to Benthos

This project will cause some disturbance to the benthic community by seafloor clearing, plowing, and trenching to bury the cable. Trawling and dredging are known to reduce habitat complexity and reduce productivity. The benthic community can recover from these disturbances but recovery times could range from a few months to several decades depending on the location, substrate, the original ecosystem, and the scale of the disturbance (National Academy of Sciences 2002). In one Alaskan example, it took the benthic community four years to recover after underwater mining in Norton Sound (Jewett et al. 2000).

5.1.3.6 Potential Effects of Habitat Disturbance on Steller's Eider

Steller's eider winter in the study area in large numbers. Wintering habitat includes shallow lagoons with extensive mudflats but also deep bays with waters up to 30 m deep which are used exclusively at night (Frederickson 2001; Martin et al. 2015). The cable-laying route runs through some of these use areas but this would most likely not be an issue if the project is only conducted during the summer months.

If individual eiders were to remain in the activity area during the summer months, disturbance due to vessel traffic is likely to occur, although at relatively short distances from the vessel. Steller's eiders were found to flush at 100-200 m from a small skiff (LGL 2000; HDR 2004). While the vessel is in the vicinity of wintering Steller's eiders, they may be disturbed from feeding, causing them to move to less ideal habitats or feed at less ideal times. This disturbance would only be temporary, given the continual movement of the project activities along the cable route.

Steller's eiders are not expected to be impacted by artificial lighting on vessels. Eiders are primarily diurnal (McNeil et al. 1992) although they may feed at night when disturbed during the day or in winter when daylight is limited (Merkel et al. 2009; Merkel and Mosbech 2008). In a study of the effects of artificial lighting from gas-flaring at Northstar Island in the Alaskan Beaufort Sea, only one flock of eiders was observed, and these animals showed no reaction to the flaring (Day et al. 2015).

Steller's eider are primarily benthic feeders, with most of their diet made up of small bivalves, gastropods, and crustaceans (Bustnes and Systad 2001; Fredrickson 2001). There will be some disturbance to the benthos from cable-laying activities along the area that is dragged or trenched; this may in turn affect food supply over a small area. However, given that this will be a one-time action along a relatively narrow strip and well away from critical habitat areas, it will likely have little impact on eider feeding efficiency.

5.1.3.7 Potential Effects of Habitat Disturbance on Short-tailed Albatross

Short-tailed albatross feed primarily on squid, shrimp, and crustaceans. The birds are very strong, wide-ranging fliers that are not restricted to a limited foraging area (USFWS 2008). The species is considered a continental shelf-edge specialist, although birds are relatively common in nearshore areas of high productivity (Piatt et al. 2006). Therefore, given the mobility and preferred foraging habitat of the species, vessel traffic and cable-laying activities within the project area are unlikely to impact albatross feeding. Cable-laying activities will disturb the benthos along the seafloor that is dragged or trenched, which has the potential to affect the food supply within that area. However, this is a one-time action along a relatively narrow strip of water outside of prime foraging habitat.

Albatross are generally more active during the day, and birds in the project area are not expected to be impacted by artificial lighting on the vessels (USFWS 2008).

5.1.4 Measures to Reduce Direct Effects on Affected Species

5.1.4.1 Measures to Reduce Direct Effects on Sea Otters

The main measure to reduce potential effects of the proposed activities on sea otters would be to route cable-laying activities to avoid sea otter critical habitat and concentration areas; the currently proposed route would overlap with 17.8 km^2 sea otter critical habitat, which is approximately 0.1% of the Southwest Alaska DPS critical habitat (15,164 km^2). Other inherent mitigation measures include the slow speed of the vessel and the short period of time the vessel will be in any one area while laying cable. Look-outs by dedicated observers and ship crew during operations would decrease the risk of collisions with sea otters. Course alterations or speed reductions could be implemented to avoid a collision. Also, burial of the cable decreases the potential for interaction (entanglement) between sea otters and the cable.

5.1.4.2 Measures to Reduce Direct Effects on Seabirds

Spatial planning of the cable laying route to avoid concentration areas where eiders and albatross occur will reduce potential behavioral or disturbance effects. Bird attraction to artificial lighting at sea may be mitigated in a variety of ways. Recovering grounded seabirds and returning them to sea after their plumage has sufficiently dried greatly reduces mortality (Telfer et al. 1987; Le Corre et al. 2002; Rodríguez and Rodríguez 2009). Reducing, shielding or eliminating skyward radiation from artificial lighting also appears to reduce the number of stranded birds (Reed et al. 1985; Rodríguez and Rodríguez 2009; Miles et al. 2010). A preliminary study of the effect of replacing white and red lights with green lights on an offshore natural gas production platform suggested that there was a reduction in the number of nocturnally-migrating birds attracted to the artificial lighting (Poot et al. 2008).

5.2 INDIRECT EFFECTS

The proposed activities will result in primarily temporary indirect impacts to the listed species through the food sources they use. Although activities may have impacts on individual prey species, it is not expected that prey availability for the northern sea otter, Steller's eider, and short-tailed albatross would be significantly affected.

Potential effects of the noise and bottom disturbance produced by project activities on fish and invertebrates are summarized below. Any effects on these potential prey items could indirectly affect listed species in the area.

5.2.1 Potential Impacts of Noise on Habitat

Exposure to anthropogenic underwater sounds has the potential to cause physical (i.e., pathological and physiological) and behavioral effects on marine invertebrates and fishes. Studies that conclude that there are physical and physiological effects typically involve captive subjects that are unable to move away from the sound source and are therefore exposed to higher sound levels than they would be under natural conditions. Comprehensive literature reviews related to auditory capabilities of fishes and marine invertebrates and the potential effects of noise include Hastings and Popper (2005), Popper (2009), Popper and Hastings (2009a, b), and Hawkins et al. (2015).

Underwater sound has both a pressure component and a particle displacement component. While all marine invertebrates and fishes appear to have the capability of detecting the particle displacement component of underwater sound, only certain fish species appear to be sensitive to the pressure component (Breithaupt 2002; Casper and Mann 2006; Popper and Fay 2010).

5.2.1.1 Effects on Invertebrates

The sound detection abilities of marine invertebrates are the subject of ongoing scientific inquiry. Aquatic invertebrates, with the exception of aquatic insects, do not possess the equivalent physical structures present in fish and marine mammals that can be stimulated by the pressure component of sound. It appears that marine invertebrates respond to vibrations (i.e., particle displacement) rather than pressure (Breithaupt 2002).

Among the marine invertebrates, decapod crustaceans and cephalopods have been the most intensively studied in terms of sound detection and the effects of exposure to sound. Crustaceans appear to be most sensitive to low frequency sounds (i.e., <1,000 Hz) (Budelmann 1992; Popper et al. 2001). Both cephalopods (Packard et al. 1990) and crustaceans (Heuch and Karlsen 1997) have been shown to possess acute infrasound (i.e., <20 Hz) sensitivity. Some studies suggest that there are invertebrate species, such as the American lobster (*Homarus americanus*), that may also be sensitive to frequencies >1,000 Hz (Pye and Watson III 2004). A recent study concluded that planktonic coral larvae can detect and respond to sound, the first description of an auditory response in the invertebrate phylum Cnidaria (Vermeij et al. 2010). There are no studies that suggest invertebrates are likely to be harmed by, or show long-term responses to, brief exposures to vessel sounds like those that would occur during this project.

5.2.1.2 Effects on Fish

Marine fishes are known to vary widely in their abilities to detect sound. Although hearing capability data only exist for fewer than 100 of the 27,000 fish species (Hastings and Popper 2005), current data suggest that most species of fish detect sounds with frequencies <1,500 Hz (Popper and Fay 2010). Some marine fishes, such as shads and menhaden, can detect sound at frequencies >180 kHz (Mann et al. 1997, 1998, 2001).

Numerous papers about the behavioral responses of fishes to marine vessel sound have been published in the primary literature. They consider the responses of small pelagic fishes (e.g., Misund et al. 1996; Vabo et al. 2002; Jørgensen et al. 2004; Skaret et al. 2005; Ona et al. 2007; Sand et al. 2008), large pelagic fishes

(Sarà et al. 2007), and groundfishes (Engås et al. 1998; Handegard et al. 2003; De Robertis et al. 2008). Generally, most of the papers indicate that fishes typically exhibit some level of reaction to the sound of approaching marine vessels, the degree of reaction being dependent on a variety of factors including the activity of the fish at the time of exposure (e.g., reproduction, feeding, and migration), characteristics of the vessel sound, and water depth. Simpson et al. (2016) found that vessel noise and direct disturbance by vessels raised stress levels and reduced anti-predator responses in some reef fish and therefore more than doubled mortality by predation. This response has negative consequences for fish, but could be beneficial to the marine mammals that prey on fish.

Given the routine presence of other vessels in the region and the lack of significant effects on fish species from their presence, indirect effects to listed species from exposure of fish to project vessel sounds is expected to be very unlikely.

5.2.2 Measures to Reduce the Impacts of Noise on Habitat

Measures aimed at reducing the direct effects to the listed species, as described in Section 5.1.4, would also apply to reducing the indirect effects by reducing the effects on the species' prey. To reduce the potential for acoustic disturbance and to the extent it is practicable and safe, vessel operators will be instructed to operate their vessel thrusters (both main drive and dynamic positioning) at the minimum power necessary to accomplish the work.

5.3 CUMULATIVE EFFECTS

Cumulative effects under the ESA are future State, city/county, or private activities that are reasonably certain to occur within the action area and do not include future federal actions that are located within the action area of the proposed project (50 CFR 402.02).

Although a number of known and potential threats to the listed animals have been identified, the level of impact from many of these threats on an individual and on a collective basis is poorly understood. Cumulative effects include synergistic effects in which two stressors interact and cause greater harm than the effects of the overall impacts of an individual stressor. The following discussion describes the cumulative effects to the greatest extent practicable.

5.3.1 Coastal Development

Coastal zone development may result in the loss of habitat, increased vessel traffic, increased pollutants, increased noise associated with construction, and noise associated with the activities of the projects after construction. As the population in urban areas continue to grow, an increase in amount of pollutants that enter the region's waterways may occur. Sources of pollutants in urban areas include runoff from streets and discharge from wastewater treatment facilities. Gas, oil, and coastal zone development projects also contribute to pollutants that may enter the western Gulf of Alaska through discharge. Significant development is not expected to take place in the project area; therefore, it would be expected that pollutants will likely not increase in its waterways. Further, the EPA and the ADEC will continue to regulate the amount of pollutants that enter the Gulf of Alaska from point and non-point sources through NPDES permits. As a result, permittees will be required to renew their permits, verify they meet permit standards and potentially upgrade facilities. Additionally, the extreme weather patterns, tides, and strong currents around Kodiak Island, the Alaska Peninsula, and the Aleutian Islands may contribute in reducing the amount of pollutants found in the region.

Coastal zone development may result in the loss of habitat, increased vessel traffic, increased pollutants and increased noise associated with construction and noise associated with the activities of the projects after construction. The proposed project will result in a small and temporary increase in vessel traffic and associated noise during the cable-laying operations and temporary disturbance of marine mammal habitat. The broadband service will improve communications for communities throughout the region, and it is not expected to result in substantial coastal development.

5.3.2 Fisheries Interaction

Fishing is one of the primary industries throughout the project region. As long as fish stocks are sustainable, subsistence, personal use, recreational and commercial fishing will continue to take place. As a result, there will be continued prey competition, risk of ship strikes, potential harassment, potential for entanglement in fishing gear, and potential displacement from important foraging habitat for the marine mammals. NMFS and the ADF&G will continue to manage fish stocks and monitor and regulate fishing to maintain sustainable stocks.

The proposed project will result in a small and temporary increase in vessel traffic and associated noise during the cable-laying operations and temporary disturbance of marine animal habitat. The project is not expected to result in any conflicts with commercial or subsistence fisheries.

5.3.3 Vessel Traffic

With decreasing sea ice across the Northwest Passage, the number of vessels traversing through the region is expected to continue to increase (Arctic Council 2009).

The proposed project will result in temporary increased vessel traffic of only a few vessels during the cable-laying operations.

5.3.4 Oil and Gas

It is unknown if the Alaska Peninsula lease sale area will be opened to oil and gas exploration in the future. Potential impacts from gas and oil development on marine wildlife include increased noise from seismic activity, vessel and air traffic, construction of platforms and well drilling, discharge of wastewater; habitat loss from the construction of oil and gas facilities, and contaminated food sources and/or injury from a natural gas blowout or oil spill. The risk of these impacts may increase as oil and gas development increases; however, new development will undergo consultation prior to exploration and development.

Support vessels are required for gas and oil development to transport supplies and products to and from the facilities. Not only will the support vessels from increased gas and oil development likely increase noise in the action areas, there is a potential for increased ship strikes with marine animals.

6.0 DETERMINATION OF EFFECTS

The following section describes the effects of the proposed AU-Aleutian project on the USFWS listed species that occur in the region and their critical habitat. A summary of determination by species is provided in Table 1 in the Executive Summary.

6.1 EFFECT ON THE NORTHERN SEA OTTER (SOUTHWEST ALASKA STOCK) AND CRITICAL HABITAT

We conclude that the AU-Aleutian project **may affect and is not likely to adversely affect** the northern sea otter. USFWS determined that noise levels associated with the subsea cable installation activity will not reach levels exposing marine mammals to a Level B take harassment under the Marine Mammal Protection Act (MMPA). Although it is possible that some sea otters may exhibit minor, short-term disturbance responses to underwater sounds from the cable-laying activities, based on expected sound levels produced by the activity, any potential impacts on otter behavior would likely be localized to within a hundred meters of the active vessel(s) and would not result in population-level effects.

The proposed AU-Aleutian project would have **no adverse modification on critical habitat** on the Southwestern DPS sea otter Critical Habitat. The Action Area defined by potential acoustic disturbance overlaps 17.8 km^2 of designated critical habitat along the route. This area constitutes only 0.1 percent of the 15,164 km^2 (5,855 mi^2) of designated critical habitat for the Southwest Alaska DPS. Potential effects of the project could involve temporary displacement of sea otters from the immediate vicinity due to the presence of, or sounds produced by, the vessel and cable-laying activities. However, impacts from vessel presence or introduced sounds would only occur while the activities were actually taking place and have no lasting effects on PCEs.

6.2 EFFECT ON THE STELLER'S EIDER AND CRITICAL HABITAT

We conclude that the AU-Aleutian project **may affect and is not likely to adversely affect** the Steller eider. The effects of underwater noise on seabirds is not well understood, but the low levels and low frequency of the sound is not likely to result in disturbance or injury. The eiders may be disturbed by the vessel and lighting on the vessel, but only at close distances to the vessel. The short-term disturbance of the benthic habitat in which eiders may feed will have very little impact on eider feeding efficiency.

The Action Area for this proposed project does not occur in designated critical habitat of Steller's eider and therefore will not impact any of the defined PCEs; therefore, there would be **no effect on critical habitat.**

6.3 EFFECT ON THE SHORT-TAILED ALBATROSS

We conclude that the AU-Aleutian project **may affect and is not likely to adversely affect** the short-tailed albatross. The effects of underwater noise on seabirds is not well understood, but the low levels and low frequency of the sound is not likely to result in disturbance or injury. The albatross may be disturbed by the vessel and lighting on the vessel, but only at close distances to the vessel. The short-term disturbance of potential foraging habitat will have very little impact on albatross feeding success.

No critical habitat has been designated for this species.

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APPENDIX A

EQUIPMENT SPECIFICATIONS

NATIONAL MARINE FISHERIES SERVICE
BIOLOGICAL ASSESSMENT
FOR
GCI AU-ALEUTIAN FIBER OPTIC CABLE INSTALLATION PROJECT
BERING SEA, ALASKA

Prepared for

GCI Communication Corp.

2550 Denali Street, Suite 1000

Anchorage, AK 99503

Prepared by

DOWL

4041 B Street

Anchorage, AK 99503

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ACRONYMS AND ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
ANT	Aids to Navigation Team
Area M	Alaska Peninsula and Aleutian Islands Management Area
BA	Biological Assessment
BMH	beach man hole
CFR	Code of Federal Regulations
CMA	Chignik Management Area
CWA	Clean Water Act
dB re 1 μPa	decibels referenced to one microPascal
DOT&PF	Department of Transportation and Public Facilities
DPS	distinct population segment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ft	feet
GCI	GCI Communication Corp.
hp	horsepower
Hz	Hertz
kHz	kiloHertz
KKFL	Kodiak Kenai Fiber Link
km	kilometer
KMA	Kodiak Management Area
kW	kiloWatt
m	meter
mi	miles
MHW	Mean High Water
MLW	Mean Low Water
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PCE	Principal Constituent Element
PLGR	pre-lay grapnel run
PSO	Protected Species Observer
PTS	permanent threshold shift
rms	root mean square
ROV	remotely operated vehicle
SPLASH	Structure of Populations, Levels of Abundance and Status of Humpback Whales
TTS	temporary threshold shift
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UXO	unexploded ordnances
WWM	Waterways Management Division

1.0 EXECUTIVE SUMMARY

GCI Communication Corp. (GCI) is proposing to provide high speed internet (broadband) service to twelve communities in Alaska by extending broadband service from Kodiak to Unalaska. The AU-Aleutian Project (Project) will consist of approximately 1,734 kilometers (km; 1,078 miles [mi]) of submerged fiber optic cable, some of which will be buried where physical conditions warrant or where human activities affect the seafloor (e.g., oil exploration, trawling, anchoring). The primary baseline route initiates from Kodiak, spans southwest down the Shelikof Strait, then parallels the Alaska Peninsula to the south until termination at Unalaska. Additionally, broadband service will be routed to transmission sites which include Larsen Bay, Chignik, Chignik Lake, Chignik Lagoon, Perryville, Sand Point, King Cove, Cold Bay, False Pass, and Akutan. GCI anticipates initiating terrestrial activities on May 1, 2020, initiating marine activities by April 1, 2021, and completing the project by December 31, 2021.

The project requires a permit from the United States Army Corps of Engineers (USACE), Alaska District under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act (CWA) with the USACE acting as lead federal agency for purposes of compliance with the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA). Under Section 7 of the ESA, the USACE and GCI are required to consult with the United States Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) to ensure that any federal action will not jeopardize the existence of any species listed under the ESA or result in the destruction or adverse modification of its critical habitat.

This Biological Assessment (BA) was prepared by GCI on behalf of the USACE to assess the potential impacts on listed species and critical habitat from the project. Table 1 summarizes the listed species and critical habitat under the NMFS jurisdiction and determination of effects under the ESA. The detailed discussion of the effects determination is provided in Section 6.

Table 1. Determination of effects from the proposed subsea cable installation AU-Aleutian project.

Species	Status	Critical Habitat	Determination of Effects
Blue whale (*Balaenoptera musculus*)	Endangered	No	May Affect and is Not Likely to Adversely Affect Species No Critical Habitat
Fin whale (*Balaenoptera physalus*)	Endangered	No	May Affect and is Not Likely to Adversely Affect Species No Critical Habitat
North Pacific right whale (*Eubalaena japonica*)	Endangered	Yes	May Affect and is Not Likely to Adversely Affect Species No Effect on Critical Habitat
Western North Pacific gray whale (*Eschrichtius robustus*)	Endangered	No	May Affect and is Not Likely to Adversely Affect Species No Critical Habitat
Humpback whale (*Megaptera novaeangliae*) Western North Pacific stock	Endangered	No	May Affect and is Not Likely to Adversely Affect Species No Critical Habitat
Humpback whale (*Megaptera novaeangliae*) Mexico stock	Threatened	No	May Affect and is Not Likely to Adversely Affect Species No Critical Habitat
Sperm whale (*Physeter macrocephalus*)	Endangered	No	May Affect and is Not Likely to Adversely Affect Species No Critical Habitat
Steller sea lion (*Eumetopias jubatus*) Western stock	Endangered	Yes	May Affect and is Not Likely to Adversely Affect Species No Adverse Modification on Critical Habitat

2.0 PROJECT DESCRIPTION

2.1 INTRODUCTION

GCI is proposing to provide high speed internet (broadband) service to twelve communities in Alaska by extending broadband service from Kodiak to Unalaska by placing 1,734 km (1,078 mi) of fiber optic cable on the ocean floor (Figure 1). The AU-Aleutian Project (Project) is comprised of a fiber optic cable from Kodiak laid down the Shelikof Strait and then parallel to the Alaska Peninsula to the south until terminating at Unalaska. The cable will branch off to transmission sites located at Larsen Bay, Chignik, Chignik Lake, Chignik Lagoon, Perryville, Sand Point, King Cove, Cold Bay, False Pass, and Akutan. The fiber optic cable will have a diameter between 1.9 to 3.8 centimeters (cm; 0.75 and 1.5 inches), similar to what GCI has deployed in Southeast Alaska, Prince William Sound, Lake Iliamna, and Cook Inlet. In areas where physical conditions warrant or where human activities affect the seafloor, the fiber optic cable will be buried. GCI anticipates initiating terrestrial activities on May 1, 2020, initiating marine activities by April 1, 2021, and completing the project by December 31, 2021.

The project requires a permit from the USACE, Alaska District under Section 10 of the Rivers and Harbors Act and Section 404 of the CWA with the USACE acting as lead federal agency for purposes of compliance with NEPA and ESA. Under Section 7 of the ESA, the USACE and GCI are required to consult with the USFWS and NMFS to ensure that any federal action will not jeopardize the existence of any species listed under the ESA or result in the destruction or adverse modification of its critical habitat. A BA is required if the listed species or its critical habitat is present in the Action Area. This BA was prepared by GCI on behalf of the USACE.

2.2 PROJECT PURPOSE

The Project will provide broadband services to Kodiak, Larsen Bay, Chignik, Chignik Lake, Chignik Lagoon, Perryville, Sand Point, King Cove, Cold Bay, False Pass, Akutan, and Unalaska by extending the main base line from the Kodiak Kenai Fiber Link (KKFL) Network at Mill Bay, Kodiak, which is the primary source for external data communication beyond this network. Unalaska, the largest community in the Aleutian Islands and a “Port of Refuge,” is currently served by an oversubscribed satellite system. The lack of access to broadband service limits economic development, as well as the efficiency of services by health care providers, schools, tribal entities, businesses, and residents.

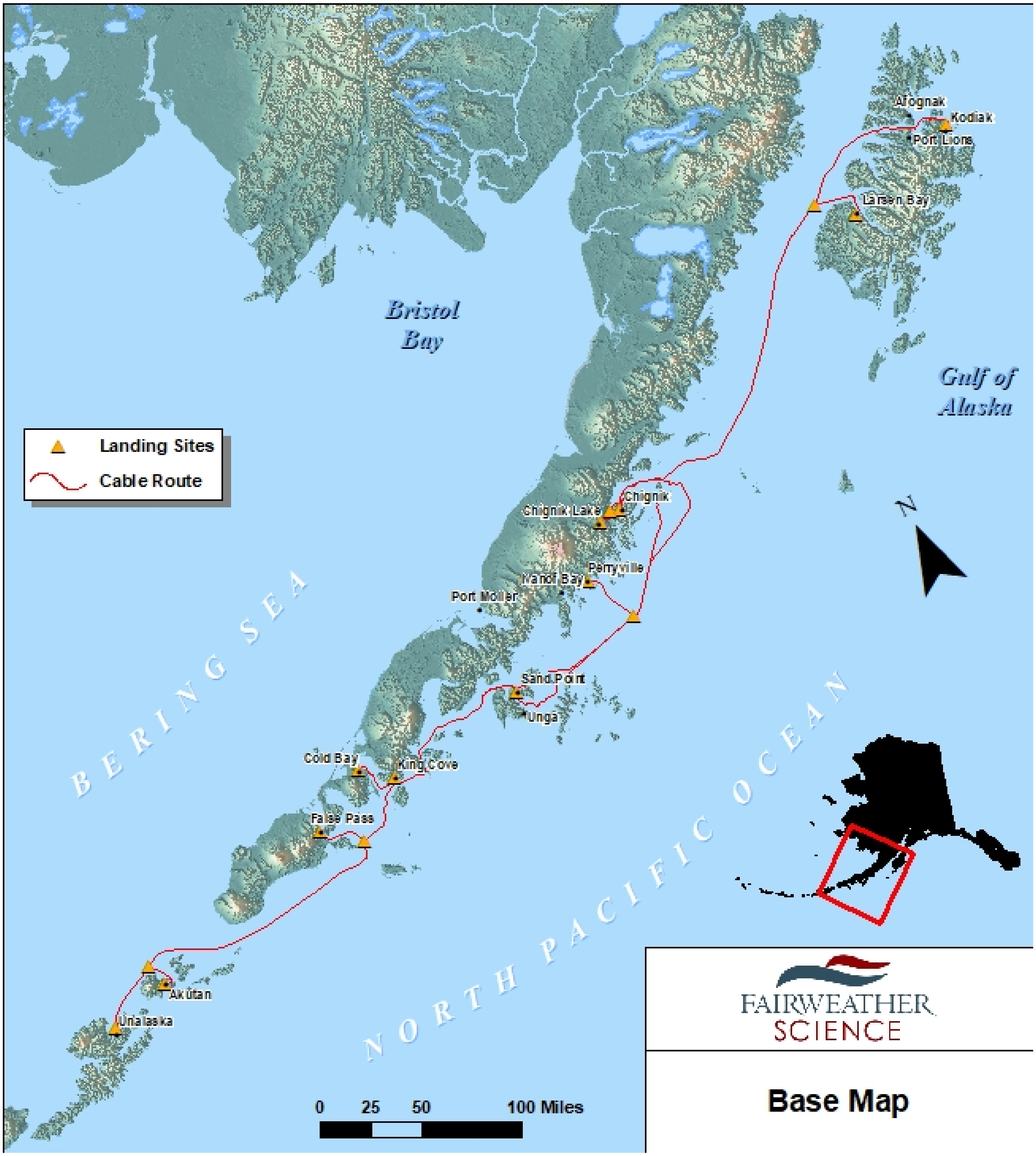

Figure 1. Project vicinity map.

2.3 LOCATION

The project is located in the Gulf of Alaska, south of the Aleutians Islands (Figure 1). The fiber optic cable will extend from Kodiak to Unalaska with cable landfalls at 12 sites. The Project lies within the boundaries of the Kodiak Island Borough, Lake and Peninsula Borough, and Aleutians East Borough.

2.4 DEFINITION OF ACTION AREA

The Action Area defined by the ESA includes all areas affected directly or indirectly by the proposed project, not just the immediate area involved in the action (50 Code of Federal Regulations [CFR] 402.02). The Action Area generally extends outside the project footprint to the point where there are no measurable effects from project activities. For the purposes of this BA, the Action Area has been defined as the estimated distance to the NMFS acoustic harassment disturbance threshold for continuous noise sources of 120 decibels referenced to one microPascal root mean square (dB re 1 μPa rms).

For the cable laying barge installing cable in shallow waters at Chignik Lagoon, Chignik Lake, and Cold Bay, the distance to the 120 dB re 1 μPa rms threshold was estimated using measurements taken from a vessel of similar size and class in Cook Inlet. Blackwell and Greene (2003) measured the tug *Leo* pushing a full barge *Katie II* near the Port of Anchorage and recorded 149 dB re 1 μPa rms at 100 m when the tug was using its thrusters to maneuver the barge during docking.

For the cable laying ship installing cable for all waters except those listed above, the distance to the 120 dB re 1 μPa rms threshold was estimated using measurements taken from vessel of similar size and class in the Chukchi Sea. In 2011, Statoil conducted geotechnical coring operations in the Chukchi Sea using the vessel *Fugro Synergy*. Measurements were taken using bottom founded recorders at 50 m, 100 m, and 1 km away from the borehole while the vessel used dynamic positioning thrusters (Warner and McCrodan 2011). Sound levels measured at the recorder 1 km away ranged from 119 dB re 1 μPa rms to 127 dB re 1 μPa rms with most acoustic energy in the 110 to 140 Hertz (Hz) range. A sound propagation curve equation fit to the data and encompassing 90 percent of all measured values during the period of strongest sound emissions provided an estimate that sound levels would drop below 120 dB re 1 μPa rms at 2.3 km.

Underwater sound propagation depends on many factors including sound speed gradients in water, depth, temperature, salinity, and bottom composition. In addition, the characteristics of the sound source, like frequency, source level, type of sound, and depth of the source, will also affect propagation. For ease in estimating distances to thresholds, simple transmission loss can be calculated using the logarithmic spreading loss with the formula:

TL = B * log10(R), where TL is transmission loss, B is logarithmic loss, and R is radius.

The three common spreading models are cylindrical spreading for shallow water, or 10 log R; spherical spreading for deeper water, or 20 log R; and, practical spreading, or 15 log R. Assuming spherical spreading transmission loss (20 log), the distance to the 120 dB re 1 μPa rms threshold is calculated to be 2.8 km for the cable laying barge and 2.3 km for the cable laying ship.

The Action Area is defined as the route length plus a buffer of 2.3 km on each side of the route (4.6 km total width) for areas in which the cable laying ship will be used and the route length plus a buffer of 2.8 km on each side of the route (5.6 km total) for areas in which the cable laying barge will be used. The total Action Area encompasses approximately 7,167.0 km^2 (2,767.2 mi^2) as summarized in Table 2.

Table 2. Calculated action area.

Description	Buffer (km)	Area (in km2)	Area (in mi2)
Cable laying barge	5.6 km	258.1	99.6
Cable laying ship	4.6 km	6,908.9	2,667.5
Total		7,167.0	2,767.2

2.5 PROPOSED ACTION

The Project will extend broadband service from Kodiak to Unalaska by placing 1,734 km (1,078 mi) of fiber optic cable on the ocean floor (Figure 1). The Project is comprised of a fiber optic cable from Kodiak laid down the Shelikof Strait and then parallel to the Alaska Peninsula to the south until Unalaska. The cable will branch off to transmission sites located at Larsen Bay, Chignik, Chignik Lake, Chignik Lagoon, Perryville, Sand Point, King Cove, Cold Bay, False Pass, and Akutan. The fiber optic cable will have a diameter between 1.9 to 3.8 cm (0.75 and 1.5 inches). In areas where physical conditions warrant or where human activities affect the seafloor, the fiber optic cable will be buried. GCI anticipates initiating terrestrial activities on May 1, 2020, initiating marine activities by April 1, 2021, and completing the project by December 31, 2021. Figure 1 shows the project location and Table 3 shows the coordinates of each of the landing sites.

Table 3. Coordinates of landing sites.

Location	Latitude	Longitude
Mill Bay	N 57.82031º	W 152.354361°
Larsen Bay	N 57.53827017º	W 153.98366315º
Chignik Bay	N 56.29778153º	W 158.40865666º
Chignik Lagoon	N 56.31084328º	W 158.54006013º
Chignik Lake	N 56.26037124º	W 158.70402045º
Perryville	N 55.91007222º	W 159.14428056º
Sand Point	N 55.3409987º	W 160.49990739º
King Cove	N 55.05906483º	W 162.31368478º
Cold Bay	N 55.19574691º	W 162.69750980º
False Pass	N 54.85574800º	W 163.40956004º
Akutan	N 54.13311401º	W 165.77585178º
Dutch Harbor	N 53.91552847º	W 166.50294680º

2.5.1 Description of Landfall Locations

The following describe operations that occur between Mean Low Water (MLW) and existing GCI facilities, including intertidal areas. All landfall locations have existing GCI facilities. The fiber optic cable will be trenched with a maximum width of 3 ft and depth of 18 inches between Mean High Water (MHW). In areas above MHW, trenching will have a maximum width of 3 ft and depth of 36 inches. The landfall locations are provided in Figure 2 through Figure 13, after the descriptions.

For all landfall locations, the following construction methods apply:

- The fiber optic cable will be linked to a new beach manhole (BMH), setback from MHW of the adjacent waterbody with a stub of conduit. The BMH measures 0.9 to 1.2 meters (m; 3 x 4 feet [ft]) or 3.6 m^2 (12 ft^2) and 1.2 m (4 ft) high. The stub of conduit will be placed above MLW.

- From the beach to the BMH, two 10.1-cm (4-inch) conduits will be buried at a depth no deeper than 91 cm (36 inches).
- Excavation to accommodate the BMH measures will not exceed 1.5 by 1.5 m (5 x 5 ft) and 1.5 m (5 ft) deep that will vary by shoreline/bank contours and substrate.
- From the BMH, cable will be taken to existing GCI facilities where the fiber optic cable will terminate at a shelter. Between the BMH and existing facilities, the terrestrial cable will be placed in a trench, approximately 0.5 m wide by 0.9 m deep (1.5 ft wide by 3 ft deep). The trench width will be less if cable can be plowed or a chain trencher is available for placement. Additional vaults may be used to provide slack loops along the route and at the termination point (communications shelter).
- The cable between BMH and existing GCI facilities will be trenched adjacent to existing roads. This may include trenching in areas near the toe of slope.
- Shelters will be constructed adjacent to existing GCI facilities; they require shelter pads that measure approximately 9.1-m wide by 9.1-m long by 0.6-m deep (25-ft by 25-ft by 2-ft). Terrestrial installation crews will use backhoes and standard trenching techniques to set the BMH flush with the original ground.
- Any work below the ordinary high-water mark will occur during low tide.
- Heavy equipment in intertidal areas and wetlands will be placed on mats, with the exception of beaches with firm sediments (Unalaska, Akutan), such as large boulders.
- All areas will be returned to pre-construction elevations; all trenched areas will be re-graded to original conditions.
- GCI does not intend to re-enter the BMH for 25 years, unless required to address a service or maintenance issue.
- Excavated material will be side-cast next to trenches and be used to bury the cable and BMH.
- No excess material is anticipated to be produced requiring disposal.
- Alterations to shorelines will be temporary and trenches will be constructed and backfilled to prevent acting as a drain (e.g., not backfilled).

Any trenching work in vegetated areas are temporary impacts of jurisdictional resources and all fill (BMH, shelter pads) are permanent impacts of jurisdictional resources.

In general, equipment used at each landfall location includes:

- Rubber wheel backhoe
- Tracked excavator or backhoe (medium to large excavator required at Unalaska)
- Small tracked excavator
- Utility truck and trailer to deliver materials
- Chain trencher (optional)
- Hand tools, shovels, rakes, pry bars wrenches
- Survey equipment
- Winch or turning sheave
- Utility truck and trailer to deliver materials
- Small utility boat to run pull line to beach
- Dive boat with hand jetting tools

- Splicing equipment, small genset and tent

Permanent fill associated with the project includes:

- Construction of a gravel pad (7.6 m x 7.6 m x 0.6 m [25 ft x 25 ft x 2 ft]) for shelters
- BMH installation (0.9 m x 1.2 m [3 ft x 4 ft]) in (locations) (excavation limits 7.6 m x 7.6 m x 7.6 m [5 ft x 5 ft x 5 ft]).

Temporary fill associated with the project includes:

- Trenching of cable (maximum width of 0.9 m [3 ft] and depth of 91 cm [36 inches]) between mean and low high water and in waters less than 15 m (49.2 ft) deep
- Trenching of cable (maximum width of 0.9 m [3 ft] and depth of 45.7 cm [18 inches]) in coastal wetlands
- The fiber optic cable will either be surface laid on the seafloor or buried via plow (maximum width of 30.5 cm [12 inches] and depth of 1.5 m [5 ft]) in waters more than 15 m (49.2 ft) deep

2.5.1.1 Site Specific Operations and Conditions

Kodiak

- Landfall is located on a beach at Mill Bay (Figure 2). The landing is existing and designated a required landing along the trunk route. The beach consists mostly of poorly sorted compacted aggregate ranging in size from silt to boulder. Visible bedrock outcrops are present in the near vicinity to the landing and massive blocks are erratically distributed around the bay shoreline.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 7 m (23 ft).
- The landfall of the cable will use an open trench in the intertidal area to expose the previous buried conduit stub and provide a safe path for the submarine cable. Once the new cable is tied into the existing stub, no further work will be done at this site.
- The nearest receiving body is Mill Bay.

Larsen Bay

- Landfall is located within Larsen Bay (Figure 3). Bedrock outcrops precede the shore, which is comprised of poorly sorted aggregate ranging in size from silt to cobble.
- Distance from MHW to BMH is approximately 18 m (60 ft), and distance to existing GCI facilities from the BMH is approximately 214 m (701 ft).
- The BMH will be installed in vegetation and assumed coastal wetlands.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 9.1 m (30 ft).
- The project area above MHW consists of vegetated coastal wetlands. The BMH will be installed within this area, along with approximately 185 m (610 ft) of trenching. The shelter will be located within a disturbed area cleared of vegetation.
- The nearest receiving body is Larsen Bay.

Chignik

- Landfall is located within Anchorage Bay (Figure 4). The landing will cross perpendicularly through a waste water pipeline operated by the fish processing plant before terminating at the BMH. Additionally, the approach consists mostly of banded well sorted unconsolidated aggregate ranging in size from sand to cobble. The beach is comprised of well worked cobble with a steep termination incline.

- Distance from MHW to BMH is approximately 27 m (90 ft), and the distance to existing GCI facilities from the BMH is approximately 0.72 km (0.45 mi).
- The BMH will be installed within coastal wetland.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 17.7 m (58 ft).
- Approximately 701 m (2,300 ft) of cable will be trenched along an existing road.
- The nearest receiving body is Anchorage Bay.

Chignik Lagoon

- Landfall is located at the end of a designated Utility Easement (Figure 5). The approach to the landing is comprised of poorly sorted aggregate ranging in size from glacial flour to boulder.
- Distance from MHW to BMH is approximately 7.6 m (25 ft), and the distance to existing GCI facilities from the BMH is approximately 152 m (500 ft).
- The BMH will be installed in within a disturbed landing.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 7 m (23 ft).
- The project area above MHW consists of vegetated coastal wetlands. The first BMH will be installed within this area, along with approximately 152 m (500 ft) of trenching. The shelter will be located within a disturbed area cleared of vegetation.
- The nearest receiving body is Chignik Lagoon.

Chignik Lake

- Landfall is located on a small, informal boat launch at the end of the main access road (Figure 6). The beach consists mostly of well sorted compacted aggregate ranging in size from silt to gravel.
- Distance from MHW to BMH is approximately 34 m (113 ft), and the distance to existing GCI facilities from the BMH is approximately 5.3 km (3.3 mi).
- The BMH will be installed within a disturbed landing.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 1.5 m (5 ft).
- The nearest receiving body is Chignik Lake.

Perryville

- The landfall in Perryville is on the west side of the sand road above the MHW demarcation (Figure 7). The approach is expected to be trenchable as the sediment consists mostly of fine black sand.
- Distance from MHW to BMH is approximately 128 m (420 ft), and the distance to existing GCI facilities from the BMH is approximately 120 m (394 ft).
- The BMH will be installed alongside a road. Trenching may disturb vegetation.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 8.5 m (28 ft).
- The nearest receiving body is Anchor Bay.

Sand Point

- Landfall is located within vegetation on City property (Figure 8). The approach consists mostly of poorly sorted compacted aggregate ranging in size from sand to boulders.
- Distance from MHW to BMH is approximately 19 m (63 ft), and the distance to existing GCI facilities from the BMH is approximately 1.3 km (0.8 mi).

- The BMH will be installed within a developed roadway though the cable will initially travel through 11.9 m (39 ft) of coastal wetland.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 10 m (33 ft).
- The project area above MHW consists of vegetated coastal wetlands. The first BMH will be installed within this area, along with approximately 1.3 km (0.8 mi) of trenching. The cable route will then join with pre-existing hardware.
- The nearest receiving body is Unga Strait.

King Cove

- The landfall in King Cove is adjacent to the King Cove Corporation (Figure 9). There is existing conduit infrastructure which is expected to reduce the impact upon asphalt disturbance.
- Distance from MHW to BMH is approximately 16.8 m (55 ft), and the distance to existing GCI facilities from the BMH is approximately 320 m (1050 ft).
- The BMH will be installed in a disturbed area though the cable will initially travel through 10.4 m (34 ft) of coastal wetland.
- Intertidal trenching (linear distance between MHW and MLW) is approximately 2.4 m (8 ft).
- The nearest receiving body is Cold Bay.

Cold Bay

- The landfall in Cold Bay is adjacent to the Landing Craft Pad (Figure 10). The approach is unconsolidated sandy muds with the beach being well sorted and comprised of fine to medium sized sand with gravel.
- Distance from MHW to BMH is approximately 29.6 m (97 ft), and the distance to existing GCI facilities from the BMH is approximately 1.6 km (1 mi).
- The BMH will be installed on disturbed land though the cable will be initially routed through 17.4 m (57 ft) of coastal wetland.
- Intertidal trenching (linear distance between mean high and MLW) is approximately 12.5 m (41 ft).
- The project area above MHW consists of vegetated coastal wetlands; however, the BMH will be installed in a disturbed area. The first BMH will be installed within this area, along with approximately 1.9 km (1.2 mi) of trenching. The shelter will be located within a disturbed area cleared of vegetation.
- The nearest receiving body is Cold Bay.

False Pass

- Landfall in False Pass is approximately 5.6 km (3.5 mi) from Ikatan Bay in Bechevin Bay/Isanotski Straight (Figure 11). The landing is located in the middle of the village just north of the abandoned cannery and south of a small, unnamed stream and estuary.
- Landing will be completed by the shallow water marine installation vessel as a pre-laid shore end out to a point near the False Pass branching unit.
- Distance from MHW to BMH is approximately 33.5 m (110 ft), and the distance to existing GCI facilities from the BMH is approximately 0.8 km (0.5 mi).
- Intertidal trenching (linear distance between mean high and MLW) is approximately 5.2 m (17 ft).

- The BMH will be installed above MHW within an area previously disturbed that was historically a small roadway, outside of jurisdictional areas.
- The shelter will be located within a wetland.
- The nearest receiving body is the unnamed stream that discharges into Bechevin Bay/Isanotski Straight.

Akutan

- Landfall is approximately 19 km (12 mi) from the Bering Sea in Akutan Bay (Figure 12). The landing is located in the middle of the village just west of the village outfall pipe. The water off the Akutan landing is deep enough to allow a direct shore end landing from the main submarine lay burial vessel.
- Distance from MHW to BMH is approximately 22.2 m (73 ft), and the distance to existing GCI facilities from the BMH is approximately 86.6 m (284 ft).
- The connection between BMH and existing facilities is through approximately 50 m (164 ft) of coastal wetlands and approximately 36 m (118 ft) of cable along the road.
- Intertidal trenching (linear distance between mean high and MLW) is approximately 6.4 m (21 ft).
- The project area above MHW consists of vegetated coastal wetlands. The BMH will be installed within this area, along with approximately 42.7 m (140 ft) of trenching. The shelter will be located within a coastal wetland.
- The nearest receiving body is Akutan Bay.

Dutch Harbor

- Landfall is approximately 16 km (10 mi) from the Bering Sea within Unalaska Bay (Figure 13). The water off the Unalaska landing is deep enough to allow a direct shore end landing from the main submarine lay burial vessel.
- The cable landing is located outside the port area at a fishing gear storage yard. The beach consists of large boulders which will require a larger excavator to move material when placing cable and conduit.
- Distance from MHW to BMH is approximately 15.5 m (51 ft), and the distance to existing GCI facilities from the BMH is approximately 3.2 km (2 mi).
- Intertidal trenching (linear distance between mean high and MLW) is approximately 8.8 m (29 ft).
- Distance to existing GCI facilities is approximately 0.8 km (0.5 mi) along existing road. The connection between the BMH and existing facilities will be via trenched cables along the road and/or existing disturbance.
- The BMH will be installed above MHW within an area consisting of a cleared area adjacent to the existing road. However, the cable will travel through 7.3 m (24 ft) of coastal wetland between the MHW and BMH. The shelter will be located within a disturbed area cleared of vegetation.
- The nearest receiving body is Unalaska Bay.

Figure 2. Kodiak landing site.

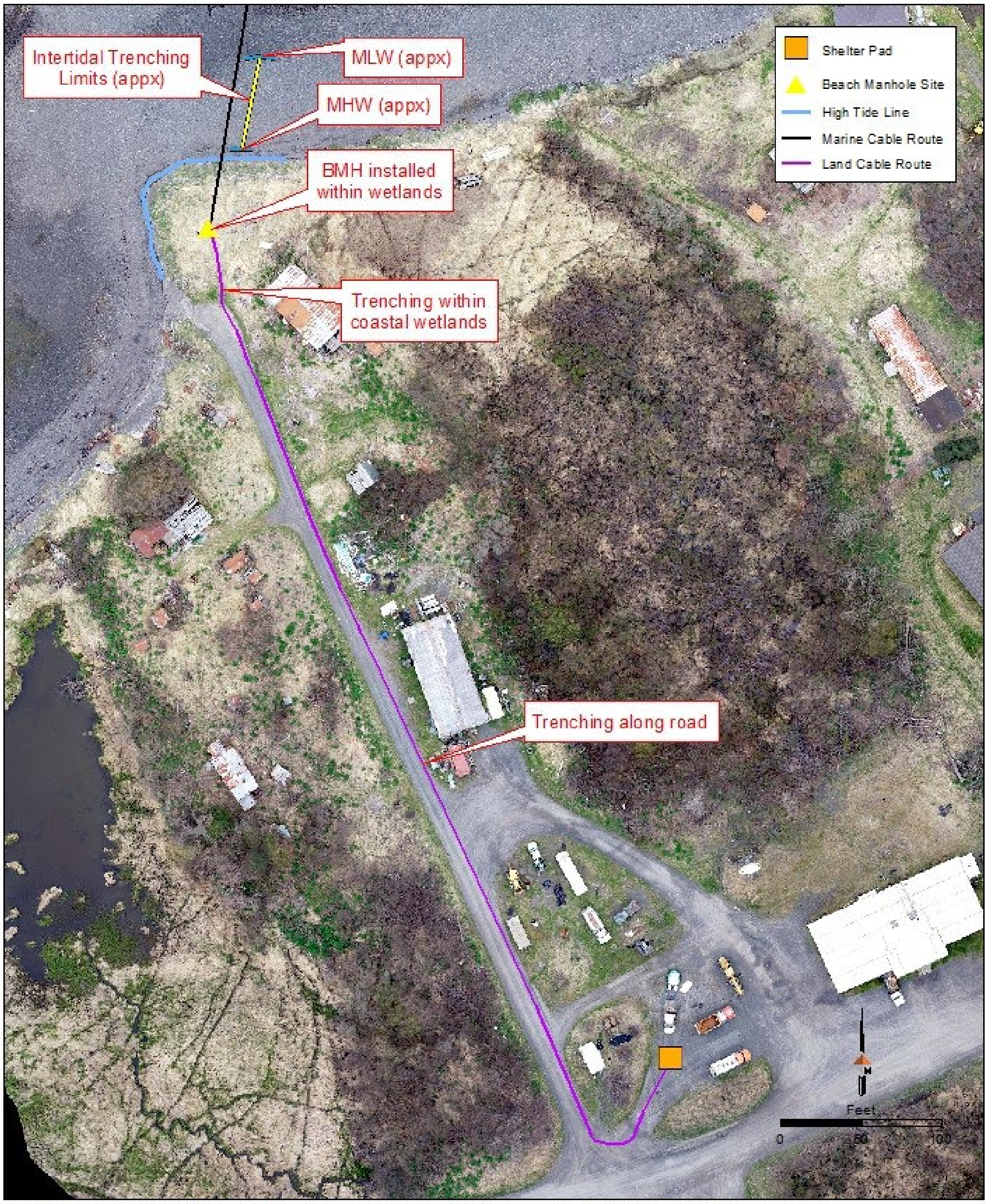

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Figure 3. Larsen Bay landing site.

Figure 4. Chignik landing site.

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Figure 5. Chignik Lagoon landing site.

Figure 6. Chignik Lake landing site.

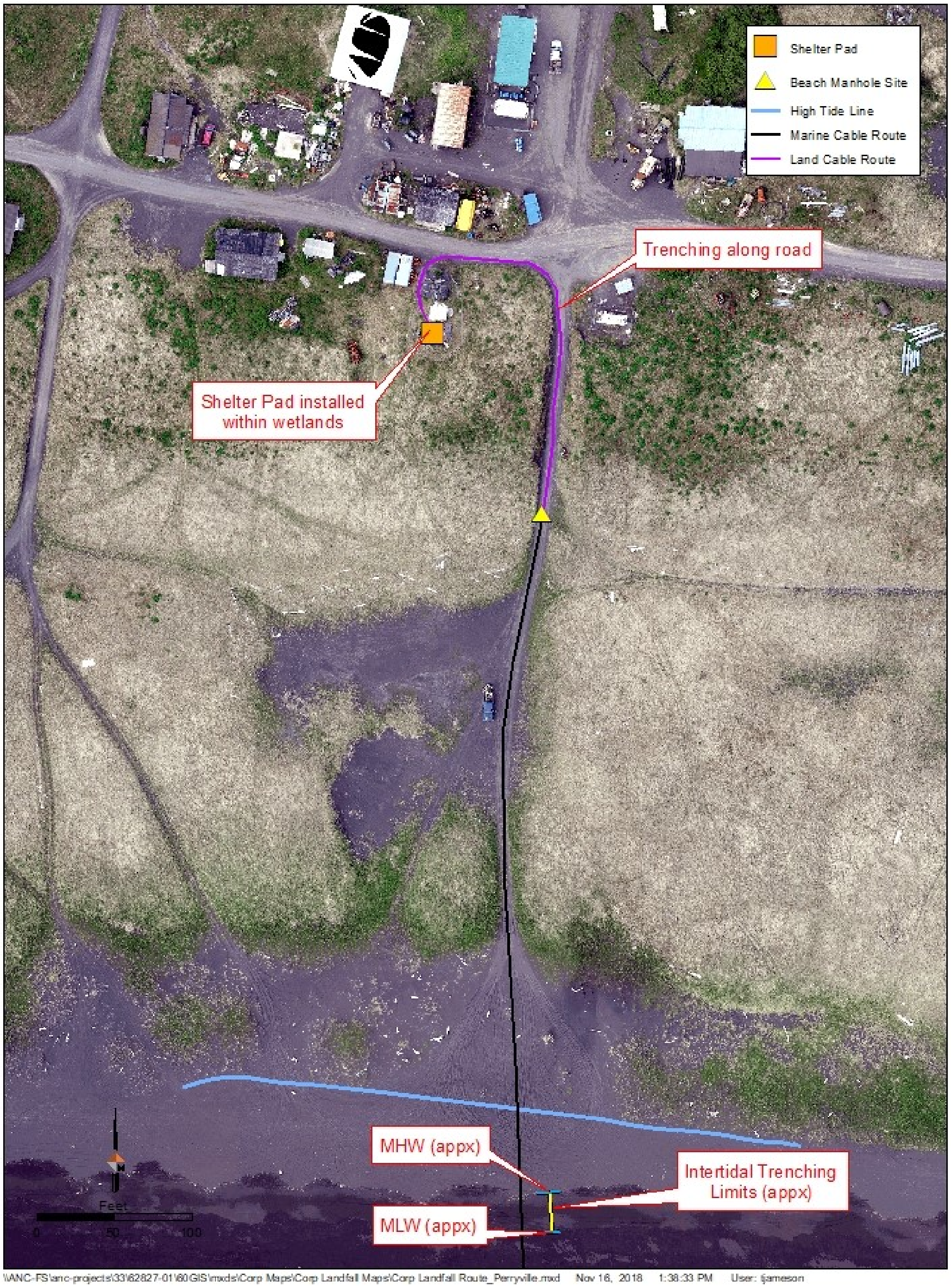

Figure 7. Perryville landing site.

Figure 8. Sand Point landing site.

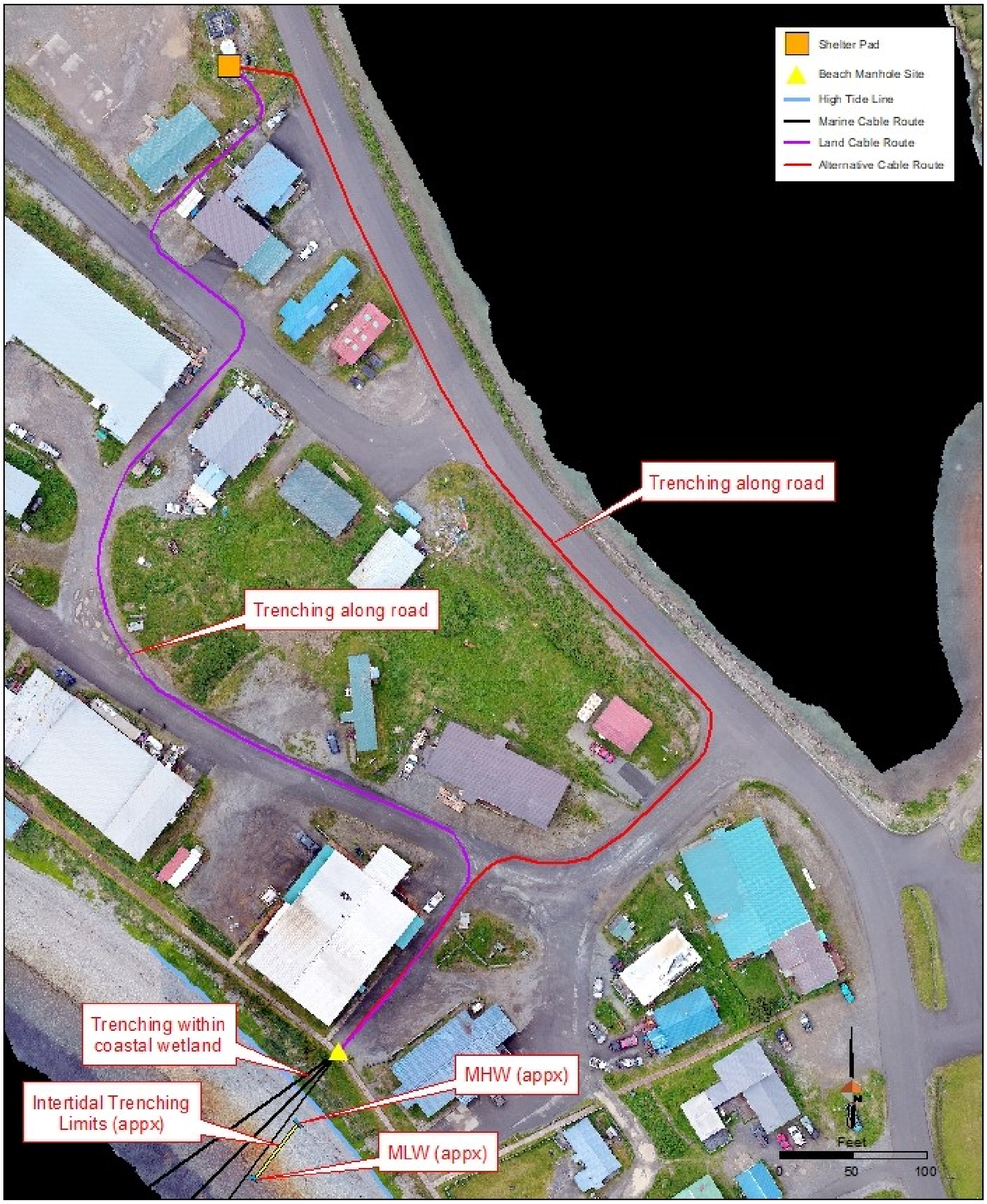

Figure 9. King Cove landing site.

Figure 10. Cold Bay landing site.

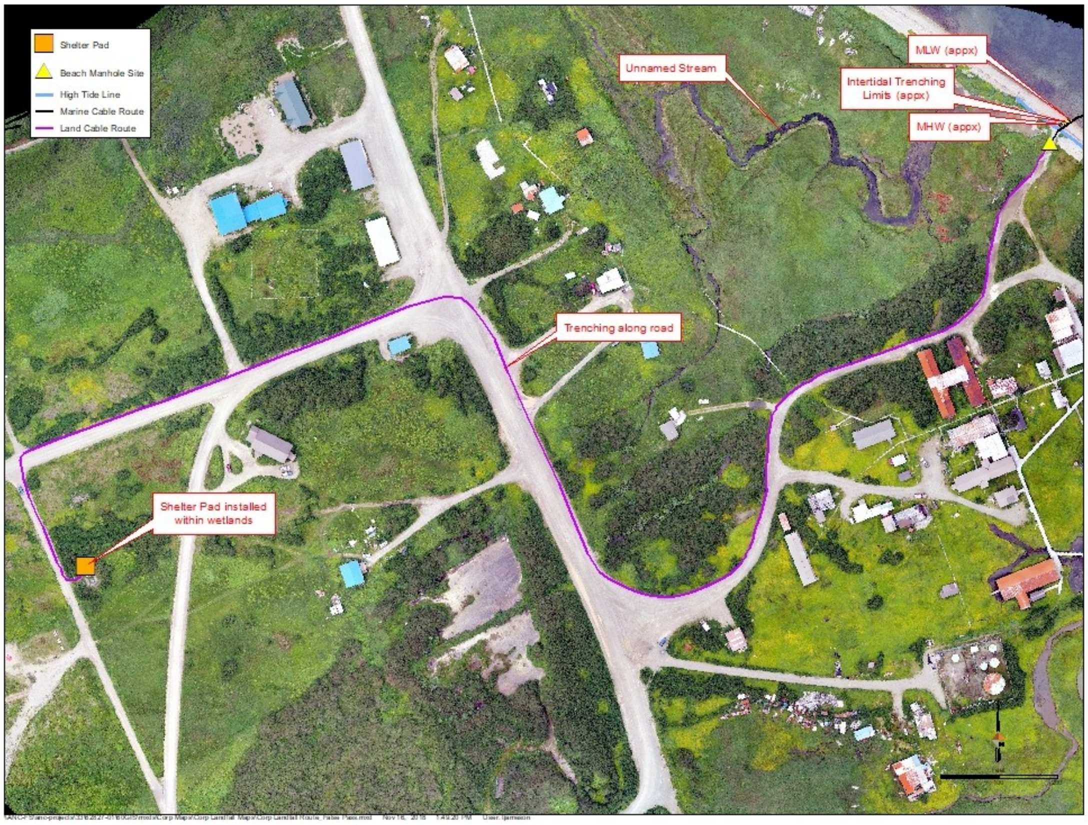

Figure 11. False Pass landing site.

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Figure 12. Akutan landing site.

Figure 13. Unalaska landing site.

2.5.2 Description of Marine Operations

The following describe operations that will occur in the marine environment, outside of intertidal areas. The fiber optic cable will either be surface laid on the sea floor or buried via plow (maximum width of 30.5 cm [12 inches] and depth of 1.5 m [5 ft]), in waters deeper than 15 m (49.2 ft). While it is expected that the temporary cable trench created by the plow collapses immediately, natural current and wave surge processes will further fill any depression caused by the plow. Post-lay inspection and burial will be conducted using a remotely operated vehicle (ROV). In waters less than 15 m (49.2 ft) deep, the cable may be buried using a towed sled, tracked ROV, diver hand jet, and/or water lifts.

The offshore (waters >15 m [49 ft] deep) cable-lay operations will be conducted from a main lay/burial cable ship, similar to CS *Intrepid* (Figure 14). Details of the ship are provided in Appendix A. The ship is 115 m (377 ft) in length and 18 m (59 ft) in breadth, with berths for a crew of 76. The ship is propelled by two 2,200 kiloWatt (kW) main engines. Dynamic positioning (DP) is maintained by two 750 kW gill thrusters, one aft and one forward. DP is used only as needed for safety – the frequency depends on weather and currents in the region. Support vessels may include a tug in the vicinity of the main lay/burial vessel.

Figure 14. Photo of cable-laying ship, CS *Intrepid.*

A cable-lay barge will be used during cable laying activities occurring in the shallow water landing sites (Chignik Lagoon, Chignik Lake, Cold Bay). The cable-lay barge will be outfitted with spuds and an anchorage system to allow very shallow water positioning control. Two tugs (<4,000 horsepower [hp]) will be used to propel the barge during lay operations. The utility tugs and barge to be used have not yet been identified. The proposed barge is flat deck and provides few accommodations for additional crew or supernumeraries. An additional vessel certified to accommodate up to 30 personnel will work in tandem with the cable-lay barge for crew berths, meals, and sanitation.

Average speed for surface laid cable is approximately 2 to 3 km/hour (1-2 knots), and the average speed (depending on sub-bottom conditions) for buried cable during plow operations will be about 0.5 km/hour (1 knot).

Depending on bottom substrate, water depth, and distance from shore, the cable will either lay on the ocean floor or will be buried using a plow or an ROV equipped for burial by water jetting. Trenching equipment (plow) is 4.5 m (15-ft) wide and can bury the cable up to 1.5 m (5 ft) in depth.

Before cable is laid, a pre-lay grapnel run (PLGR) will be carried out along the proposed cable route where burial is required. The objective of the PLGR operation is to identify and clear any seabed debris (e.g., wires, hawsers, fishing gear) that may have been deposited along the route. Any debris recovered during the PLGR operations will be discharged ashore on completion of the operations and disposed of in accordance with local regulations. If any debris cannot be recovered, then a local re-route will be planned to avoid the debris. The PLGR operation will be conducted to industry standards employing towed grapnels (the type of grapnel being determined by the nature of the seabed). The PLGR operation will be conducted by the cable vessel or a local tug boat ahead of the cable-lay activities.

Where deemed necessary in shallow waters, to protect the cable from light ice scour, human activities, or surf action, the cable will be buried by jet burial using a towed sled, tracked ROV, or by diver jet burial. Methods will be subject to seabed conditions in the area. The planned ROV will be similar to ROVJET 207 series, which is 2.8 m (9.0 ft) long and 3.4 m (11.2 ft) wide, and has a jet tool capable of trenching to 1.5 m (4.9 ft) depth (Figure 15). In water depths greater than 15 m (49.2 ft), the plow has a submerged weight of 17 tonnes (18.6 tons). The plow is pulled by the tow wire and the cable is fed through a cable depressor that pushes it into the trench (Figure 16). Burial depth is controlled by adjusting the front skids. The normal tow speed is approximately 600 meters per hour (m/hr) (less than 1 knot). Specifications of the ROV and plough are found in Appendix A.

Figure 15. Photo of the ROVJET 207 remotely operated vehicle.

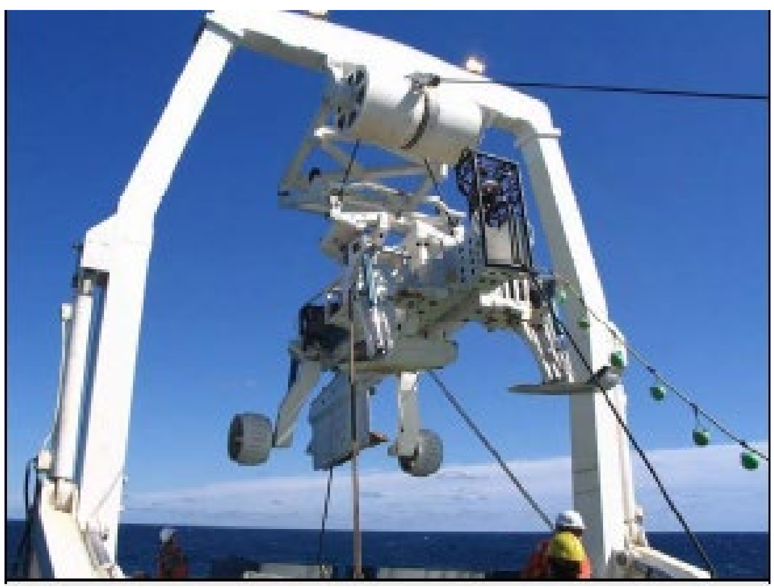

Figure 16. Photo of the IT Plough.

2.6 DATES AND DURATION

GCI anticipates initiating terrestrial activities May 1, 2020, initiating marine activities by April 1, 2021; and completing the project by December 31, 2021.

3.0 DESCRIPTION OF THE SPECIES AND THEIR HABITAT

The species identified and discussed in this BA are listed in Table 4 and discussed in the following text.

Table 4. Marine mammal species in the project area.

Species	Status	Population Estimate
Blue whale (*Balaenoptera musculus*)	Endangered	133[2]
Fin whale (*Balaenoptera physalus*)	Endangered	3,168[3]
North Pacific right whale (*Eubalaena japonica*)	Endangered	31[3]
Western North Pacific gray whale (*Eschrichtius robustus*)	Endangered	140[1]
Humpback whale (*Megaptera novaeangliae*) Western North Pacific stock	Endangered	1,107[3]
Humpback whale (*Megaptera novaeangliae*) Mexico stock	Threatened	1,918[2]
Sperm whale (*Physeter macrocephalus*)	Endangered	102,112[3]
Steller sea lion (*Eumetopias jubatus*) Western stock	Endangered	50,983[3]

[1]Carretta et al. 2017
[2]Carretta et al. 2018
[3]Muto et al. 2018

3.1 BLUE WHALE

3.1.1 Population

North Pacific blue whales likely exist in two sub-populations, the Eastern North Pacific stock and the Central North Pacific stock. The Central North Pacific stock inhabits waters near the Action Area, feeding southwest of Kamchatka, south of the Aleutians, and in the Gulf of Alaska in the summer (Stafford 2003; Watkins et al. 2000) and migrating to lower latitudes in the western and central Pacific, including Hawaii, in the winter (Stafford et al. 2001).. The best current available abundance estimate for this stock is 133 whales; however, this estimate is based on survey effort of the Hawaiian Islands during the summer and fall when the whales would be expected to be at higher latitude feeding grounds. The minimum population size is estimated to be 63 blue whales within the Hawaiian Islands EEZ. There is currently insufficient data to assess population trends for this species.

3.1.2 Distribution

Blue whales are found in all oceans and are separated into populations by ocean basin in the North Atlantic, North Pacific, and Southern Hemisphere (Figure 17). The Central North Pacific stock of blue whales is found predominantly in waters southwest of Kamchatka, south of the Aleutians, and in the Gulf of Alaska in the summer months (Stafford 2003). During the winter, they migrate to lower latitudes in the western and central Pacific (Stafford et al. 2001). Little is known about the detailed movements of blue whales on their summer feeding grounds or about their migratory speeds, routes, and winter destinations (Mate et al. 1999).

3.1.3 Foraging Habitat

Foraging habitat for these blue whales includes areas southwest of Kamchatka, south of the Aleutians, and in the Gulf of Alaska during the summer months (Stafford 2003). Blue whales primarily eat krill, and will be found in areas with high concentrations of krill. This may be tied to coastal upwelling areas where phytoplankton concentrations are high (Bailey et al. 2009).

3.1.4 Breeding and Calving Habitat

Reproductive activities, including birthing and mating, take place during the winter months. Breeding is thought to occur in unproductive, low-latitude areas (Bailey et al. 2009).

3.1.5 Hearing

No studies have directly measured the sound sensitivity of large cetacean species. Summaries of the best available information on marine mammal hearing are provided in Richardson et al. (1995), Erbe (2002), Southall et al. (2007), and NMFS (2016). However, it is generally assumed that most animals hear well in the frequency ranges similar to those used for their vocalizations, which are mainly below 1 kilohertz (kHz) in baleen whales (Richardson et al. 1995). NMFS has separated marine mammals into functional hearing groups, with the generalized hearing range of low frequency cetaceans between 7 Hz and 35 kHz. Blue whales make calls at a fundamental frequency of between 10 and 40 Hz lasting between ten and thirty seconds.

An increase in anthropogenic noise is a potential habitat concern for blue whales. Blue whales exposed to simulated mid-frequency sonar and pseudo-random noise demonstrated a variety of responses including termination of deep dives, directed travel away from sound sources, and cessation of feeding (Goldbogen et al. 2013). These behavioral responses were dependent upon the type of sound source and the activities of the whale at the time of exposure. Whales that were deep-feeding, as well as whales that were not feeding, reacted more strongly than surface-feeding whales, which typically showed no change in behavior. Repeated exposures to anthropogenic noise could negatively impact individual feeding performance, and potentially population health (Goldbogen et al. 2013).

3.1.6 Critical Habitat

There is no critical habitat designated for blue whales.

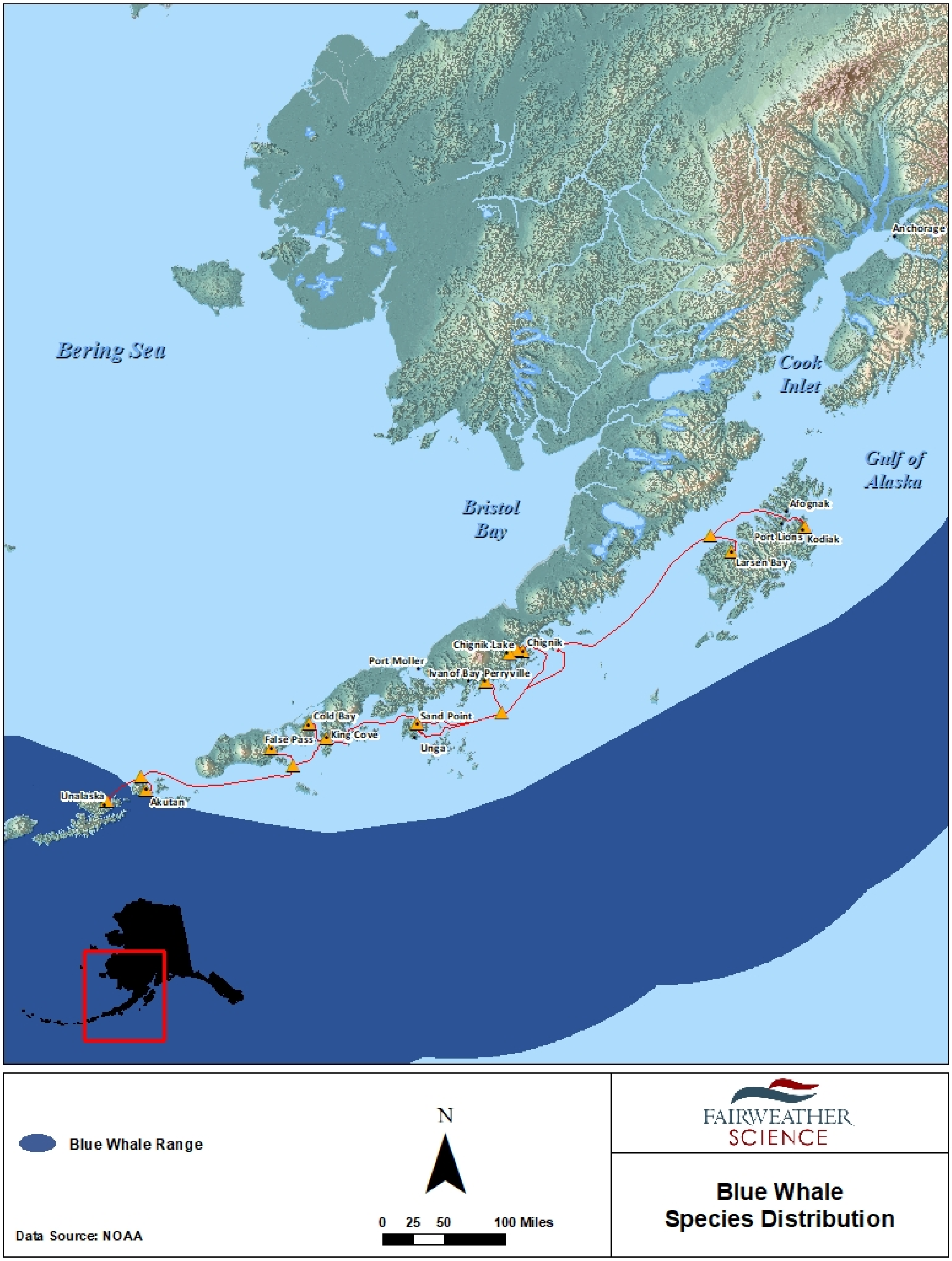

Figure 17. Blue whale distribution in the project area.

3.2 FIN WHALE

3.2.1 Population

Fin whales in the United States have been divided into four stocks, including Hawaii, California/Oregon/Washington, Alaska (Northeast Pacific) and Western North Atlantic. Reliable population estimates for the Northeast Pacific stock are not currently available. Dedicated line-transect surveys were conducted in the offshore waters of the Gulf of Alaska in 2013 and 2015, and abundance estimates of 3,168 and 916 fin whales, respectively, were reported. The higher estimate of 3,168 fin whales calculated for the 2013 survey effort better represents a minimum abundance for this stock because it is more precise and encompasses a larger survey area. The minimum population estimate is currently 2,554 whales, however, this is based on surveys that covered a small portion of the known range and this number is considered an underestimate for the entire stock (Muto et al. 2018).

3.2.2 Distribution

Fin whales are widely distributed throughout the world's oceans (Figure 18), with the exception of the Arctic Ocean where they have only recently begun to appear (USDOI 2015). There are discrete meta populations in the North Atlantic, the North Pacific, and the Southern Hemisphere (Mizroch et al. 2009). Fin whales can be found in the Chukchi Sea, the Sea of Okhotsk, around the Aleutian Islands, and the Gulf of Alaska (USDOI 2015). Surveys conducted along the Bering Sea shelf indicated that fin whales were the most common large whale sighted, with the whales distributed in an area of high productivity along the edge of the eastern Bering Sea continental shelf and in the middle shelf area (Friday et al. 2012, 2013; Springer et al. 1996).

Mizroch et al. (2009) describe the patterns of distribution and movements of fin whales in the North Pacific using whaling harvest records, scientific surveys, opportunistic sightings, acoustic data from offshore hydrophone arrays, and from recoveries of marked whales. Based on this information, fin whales range from the Chukchi Sea south to 35° N on the Sanriku coast of Honshu, to the Subarctic Boundary (ca. 42° N) in the western and central Pacific, and to 32° N off the coast of California. Fin whales have also been observed around Wrangel Island (USDOI 2015).

3.2.3 Foraging Habitat

Fin whales feed on krill, small schooling fish (e.g., herring, capelin, and sand lance), and squid in the summer. They feed by lunging into schools of prey with their mouth open, using throat pleats to gulp large amounts of food and water. Fin whales fast in the winter while they migrate to warmer waters.

3.2.4 Breeding and Calving Habitat

Little is known about fin whale social and mating systems, and breeding and calving habitat has not been studied. Females give birth to single calves in tropical and subtropical areas during midwinter months.

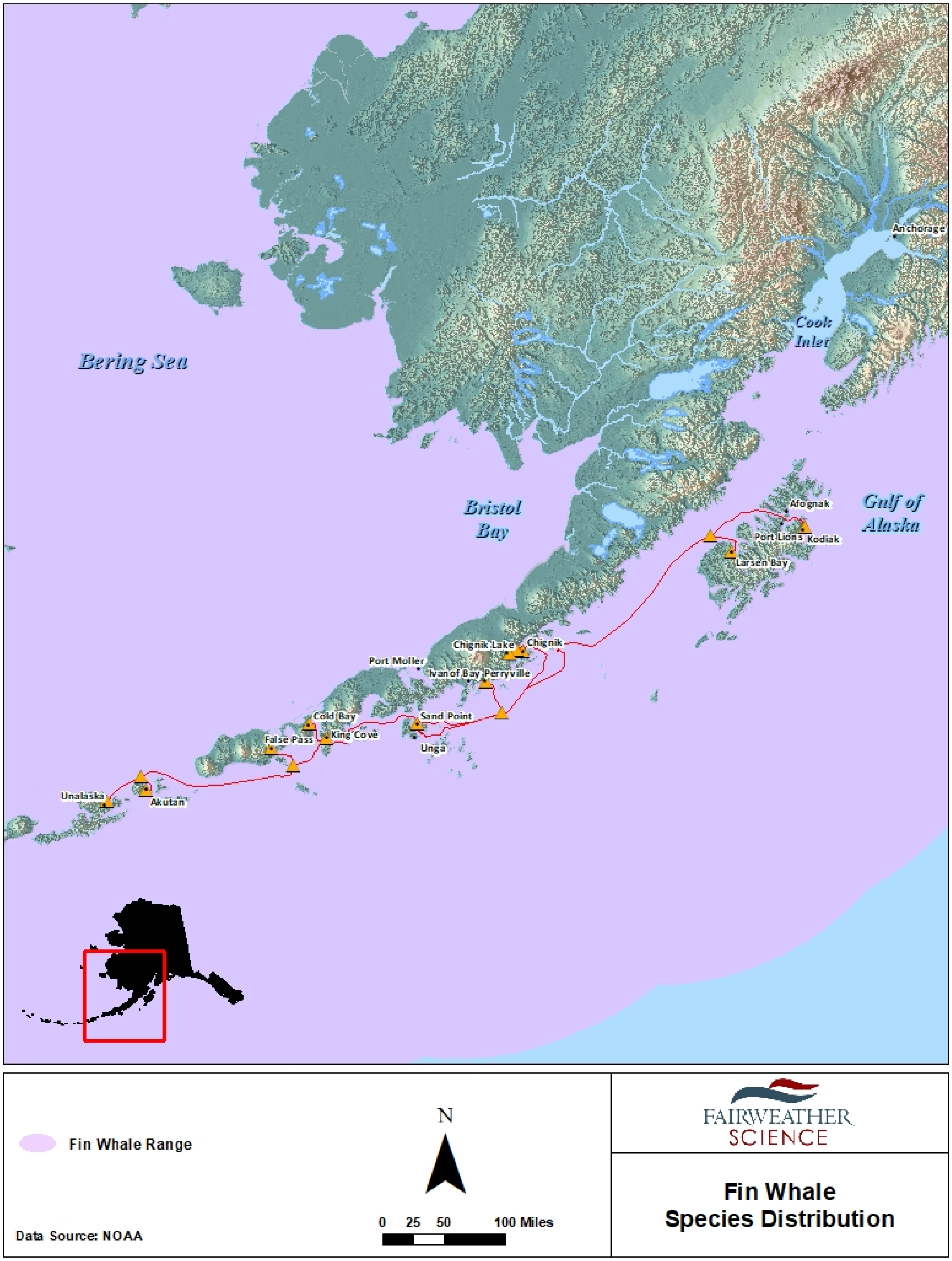

Figure 18. Fin whale distribution in the project area.

3.2.5 Hearing

No studies have directly measured the sound sensitivity of large cetacean species. Summaries of the best available information on marine mammal hearing are provided in Richardson et al. (1995), Erbe (2002), Southall et al. (2007), and NMFS (2016). However, it is generally assumed that most animals hear well in the frequency ranges similar to those used for their vocalizations, which are mainly below 1 kHz in baleen whales (Richardson et al. 1995). NMFS has separated marine mammals into functional hearing groups with the generalized hearing range of low frequency cetaceans between 7 Hz and 35 kHz.

Fin whale vocalizations have been studied extensively. Fin whales produce a variety of low-frequency sounds in the 10-200 Hz band, with the most typical signals occurring in the 18-35 Hz range (USDOI 2015).

3.2.6 Critical Habitat

There is no critical habitat designated for fin whales.

3.3 NORTH PACIFIC RIGHT WHALE

3.3.1 Population

The population of North Pacific right whales was severely impacted by commercial whaling, primarily by illegal whaling conducted by the Soviet Union in the 1960s. Sightings of North Pacific right whales in the mid-1990s caused a renewed interest in conducting surveys for this species. A 2002 survey in the southeast Bering Sea documented seven right whale sightings (LeDuc 2004). In 2004, multiple right whales were located acoustically. Photographs confirmed at least 17 individuals, including 10 males and 7 females. NMFS conducted a dedicated right whale survey along tracklines on the shelf and in deeper waters to the south and east of Kodiak in 2015 aboard the NOAA ship *Reuben Lasker* using visual and acoustic survey methods (B. Rone, NMFS-AFSC-MML, unpublished data as cited in Muto et al. 2017). Right whales were acoustically detected twice on the shelf, but none were visually observed. Wade et al. (2011) calculated an abundance estimate of 31 individuals in the Bering Sea and Aleutian Islands based mark-recapture data collected from 1998-2008. The current minimum estimate of abundance for North Pacific right whales is 26, based on photo-identification estimates (Muto et al. 2017).

3.3.2 Distribution

Historically, and prior to commercial whaling activities, North Pacific right whales were found in the Gulf of Alaska, eastern Aleutian Islands, south-central Bering Sea, Sea of Okhotsk, and Sea of Japan (Figure 19). The majority of North Pacific right whale sightings have occurred from about 40° N to 60° N latitude. Most sightings of right whales in the past 20 years have been in the southeastern Bering Sea, with a few in the Gulf of Alaska (Muto et al. 2018).

Migratory patterns of North Pacific right whales are largely unknown, although researchers suggest they migrate from high-latitude feeding grounds in summer to more temperate waters during the winter. North Pacific right whales may occur in the north Bering Sea during winter months. Vessel and aerial surveys, and bottom-mounted acoustic recorders have documented right whales in the southeastern portion of the Bering Sea during most summers (Rone et al. 2012). The whales remain in the southeastern Bering Sea from May through December, with a peak in September (Wright 2015; Munger and Hildebrand 2004). A few sightings have also been documented in the Gulf of Alaska.

3.3.3 Foraging Habitat

North Pacific right whales prey upon a variety of zooplankton species, and the availability of these species greatly influences their distribution on the feeding grounds in the southeastern Bering Sea. Right whales feed regularly during the spring and summer, and congregations of right whales can be found in areas with dense concentrations of copepods and other large zooplankton species.

3.3.4 Breeding and Calving Habitat

Breeding and calving habitat for North Pacific right whales is unknown and researchers speculate that the whales calve primarily offshore, rather than coastal waters. (Clapham et al. 2004).

3.3.5 Hearing

No studies have directly measured the sound sensitivity of large cetacean species. Summaries of the best available information on marine mammal hearing are provided in Richardson et al. (1995), Erbe (2002), Southall et al. (2007), and NMFS (2016). However, it is generally assumed that most animals hear well in the frequency ranges similar to those used for their vocalizations, which are mainly below 1 kHz in baleen whales (Richardson et al. 1995). NMFS has separated marine mammals into functional hearing groups with the generalized hearing range of low frequency cetaceans between 7 Hz and 35 kHz.

Estimation of hearing ability based on inner ear morphology was completed for two mysticete species: humpback whales (700 Hz to 10 kHz; Houser et al. 2001) and North Atlantic right whales (10 Hz to 22 kHz; Parks et al. 2007a). North Pacific right whale vocalizations generally range from 80–200 Hz (McDonald and Moore 2002).

3.3.6 Critical Habitat

3.3.6.1 Description

The final designation of critical habitat for North Pacific right whales was issued in 2006 (73 FR 38277). Critical habitat can be found in the Gulf of Alaska and the Bering Sea (Figure 19). The Bering Sea critical habitat is delineated by the following coordinates: 58° 00′ N/168° 00′ W, 58° 00′ N/163° 00′ W, 56° 30′ N/161° 45′ W, 55° 00′ N/166° 00′ W, 56° 00′ N/168° 00′ W and returning to 58° 00′ N/168° 00′ W. The Gulf of Alaska critical habitat is delineated by a series of straight lines connecting the following coordinates in the order listed: 57° 03′ N/153° 00′ W, 57° 18′ N/151° 30′ W, 57° 00′ N/151° 30′ W, 56° 45′ N/153° 00′ W, and returning to 57° 03′ N/153 00′ W.

Principal habitat requirements for right whales are dense concentrations of prey such as large species of zooplankton (Clapham et al. 2006). Potential threats to right whale habitat are linked to commercial shipping and fishing vessel activity. Fishing activity increases the risk of entanglement, while shipping activities increase the risk of vessel strikes and oil spills in right whale habitat.

3.3.6.2 Primary Constituent Elements

NMFS considers Primary Constituent Elements (PCE) when designating critical habitat. PCEs are characterized by "physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection" and may include 1) space for individual and population growth (normal behavior), 2) nutritional and physiological requirements (food, water, air, light, minerals, etc.), 3) cover or shelter, and 4) breeding sites (e.g., reproduction, rearing of offspring) habitat protected from disturbance or of historic geographical and ecological distributions of species (50 CFR 424.12; 76 FR 20180). PCEs designated for the North Pacific right whale are shown in Table 5.

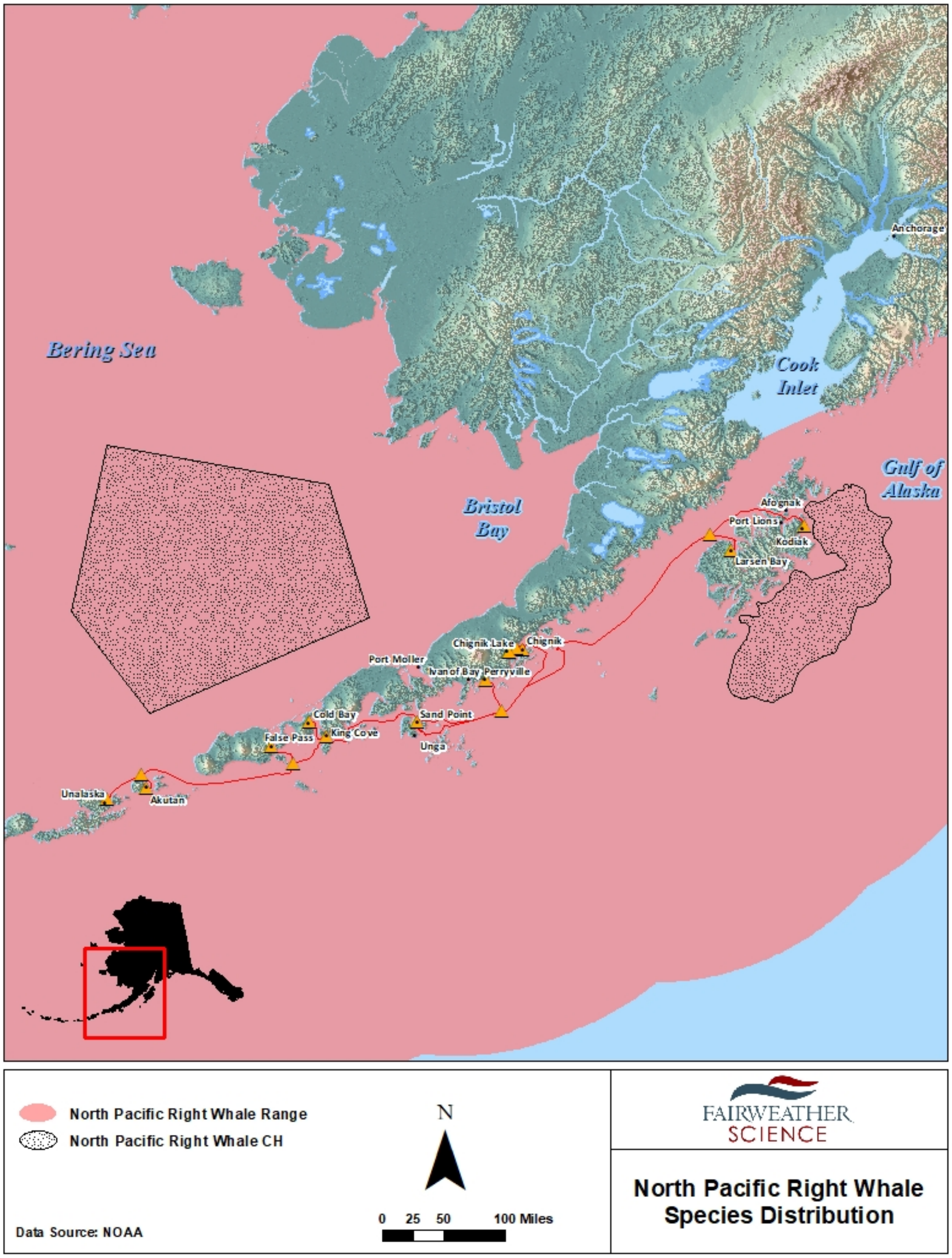

Figure 19. North Pacific right whale distribution in the project area.

Table 5. Primary Constituent Elements (PCE) for North Pacific Right Whale and the Status of Each PCE in the Action Area.

PCE	PCE is present and "healthy" in the Action Area	PCE is present but at risk within the Action Area	PCE requirement cannot be met in the Action Area
The copepods *Calanus marshallae, Neocalanus cristatus,* and *N. plumchris,* and the euphausiid *Thysanoessa raschii*	Yes	No	No

North Pacific right whale critical habitat and its associated PCEs lie outside of the Action Area and should not be impacted by this project. It is unlikely that right whales would be present in the Action Area during cable laying activities and are not likely to be subject to vessel strikes.

3.4 WESTERN NORTH PACIFIC GRAY WHALE

3.4.1 Population

There are two geographically isolated populations of gray whales in the North Pacific: the eastern North Pacific stock, found along the west coast of North America, and the western North Pacific or "Korean" stock, found along the coast of eastern Asia. In 2012, NMFS convened a scientific task force to assess the currently recognized and emerging stock structure of gray whales in the North Pacific (Allen and Angliss 2015). They reported significant differences in both mitochondrial and nuclear DNA between whales sampled off Sakhalin Island and whales sampled in the eastern North Pacific, which provided sufficient evidence that a separate stock was warranted.

Photo-identification data collected on the summer feeding grounds off of Sakhalin Island between 1994 and 2011 were used to calculate an abundance estimate of 140 non-calf whales in 2012 (Cooke et al. 2013). The western North Pacific stock remains highly depleted and its continued survival is questionable with a minimum population estimate of 135 gray whales (Carretta et al. 2017).

3.4.2 Distribution

Western North Pacific gray whales feed during summer and fall in the Okhotsk Sea off northeast Sakhalin Island, Russia, and off southeastern Kamchatka in the Bering Sea (Figure 20; Allen and Angliss 2015). Some gray whales observed feeding off Sakhalin and Kamchatka migrate during the winter to the west coast of North America in the eastern North Pacific while others migrate to areas off Asia in the western North Pacific (Allen and Angliss 2015).

3.4.3 Foraging Habitat

Gray whales are benthic feeders, sucking sediment and amphipods from the sea floor. They feed during summer and fall in the Okhotsk Sea off northeast Sakhalin Island, Russia, and off southeastern Kamchatka in the Bering Sea (Allen and Angliss 2015).

3.4.4 Breeding and Calving Habitat

Gray whales breed and calve in warmer, shallow waters in the areas off Asia in the western North Pacific.

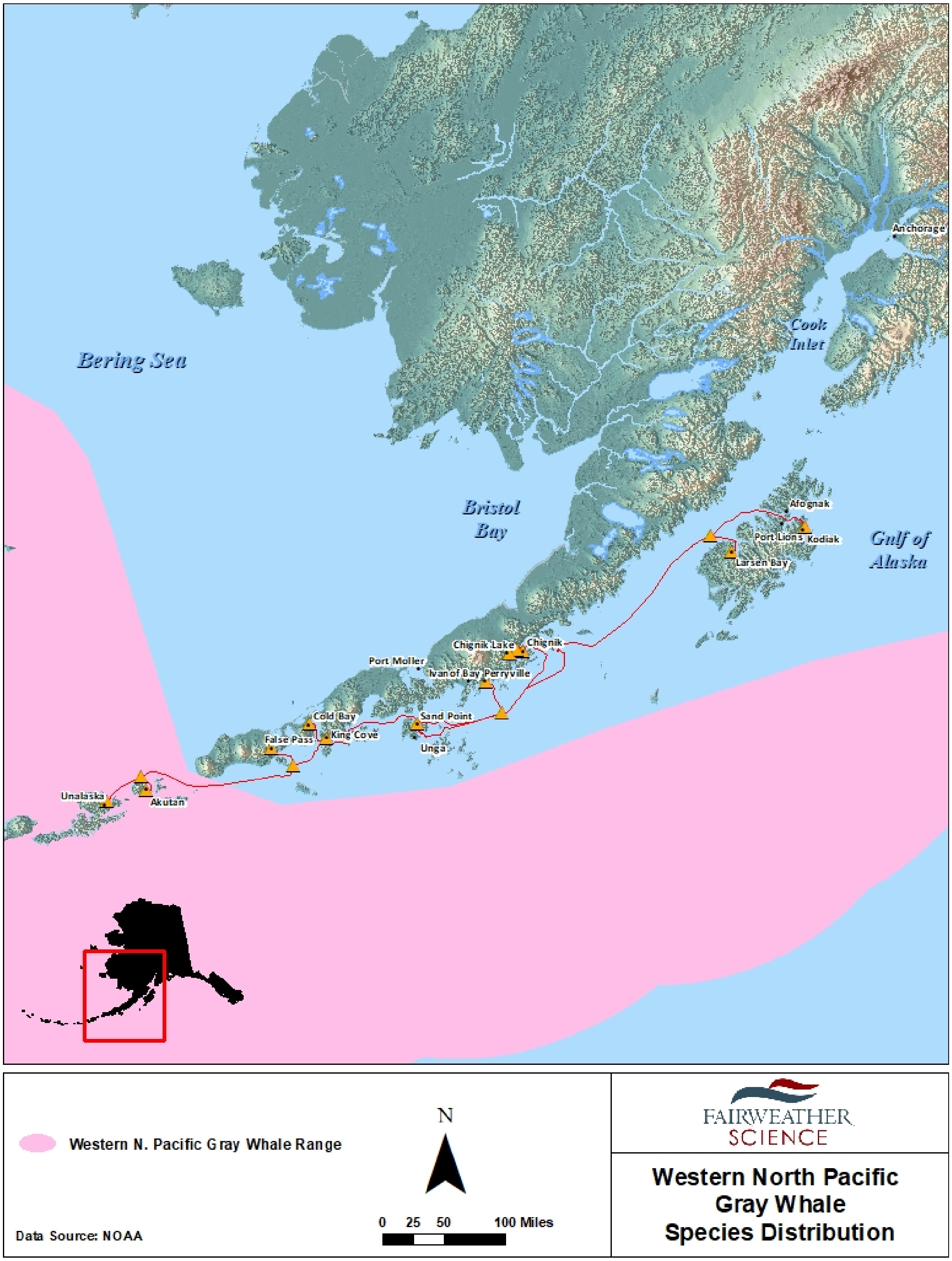

Figure 20. Western North Pacific gray whale distribution in the project area.

3.4.5 Hearing

No studies have directly measured the sound sensitivity of large cetacean species. Summaries of the best available information on marine mammal hearing are provided in Richardson et al. (1995), Erbe (2002), Southall et al. (2007), and NMFS (2016). However, it is generally assumed that most animals hear well in the frequency ranges similar to those used for their vocalizations, which are mainly below 1 kHz in baleen whales (Richardson et al. 1995). NMFS has separated marine mammals into functional hearing groups with the generalized hearing range of low frequency cetaceans between 7 Hz and 35 kHz. Gray whales produce knocks and pulses with most of the energy from <100 Hz to 2 kHz.

3.4.6 Critical Habitat

There is no critical habitat designated for gray whales.

3.5 HUMPBACK WHALE

3.5.1 Population

NMFS Stock Assessment Reports recognize three distinct stocks of humpback whales in the North Pacific Ocean (Muto et al. 2018). These are based on genetic and photo-identification studies and include the California/Oregon/Washington stock, the Central North Pacific stock, and the Western North Pacific stock.

The definition of these stocks has not yet been updated to match the DPS definitions created in the recent ESA final rulemaking for humpback whales (NOAA 2016). Of relevance here, the Central North Pacific stock includes the Hawaii DPS and the California/Oregon/Washington stock includes the Mexico DPS. The Hawaii DPS was removed from listing under the ESA, while the Mexico DPS was listed as Threatened and the Western North Pacific DPS was listed as Endangered.

Individuals from the Western North Pacific DPS, Mexico DPS, and the Hawaii DPS could occur in the project area, however only the ESA listed Western North Pacific DPS and Mexico DPS are considered here. Photo-identification data collected during the Structure of Populations, Levels of Abundance and Status of Humpback Whales (SPLASH) project resulted in an abundance estimate of 1,107 whales in the Western North Pacific stock. The current minimum population estimate for the stock is 865 individuals, and abundance estimates suggest that the population is increasing at a rate of approximately 6.7 percent annually over the 1991-1993 estimates; however, this may be biased high due to survey coverage between datasets (Muto et al. 2018).

The best estimate of abundance for the California/Oregon/Washington stock, which includes the Mexico DPS, is 1,918 whales. The minimum population estimate is 1,876 animals, and the growth rate is estimated to be 6-7 percent. These estimates are derived from combining both the California/Oregon and Washington/southern British Columbia feeding group estimates (Muto et al. 2018). The Mexico DPS, therefore, contains fewer whales as the California/Oregon/Washington stock includes multiple DPS. In particular, virtually the entire Central American DPS (411 whales) migrates to California and Oregon to feed (Wade et al. 2016).

3.5.2 Distribution

The migratory destinations of the Western North Pacific DPS are not completely known. Research indicates movement between winter/spring locations off Asia, including several island chains in the western North Pacific, to primarily Russia as well as the Bering Sea/Aleutians Islands during the summer months (Figure 21; Muto et al. 2018). The Mexico DPS of humpback whales winter in Mexico, and migrate to diverse feeding areas. Summer feeding areas for this DPS include: the Aleutian Islands, Bering, Chukchi, and Beaufort seas; Gulf of Alaska; Southeast Alaska/Northern British Columbia, Southern British Columbia/Washington; and Oregon/California. Humpback whales from the Western North Pacific DPS, Mexico DPS, and Hawaii DPS overlap on summer feeding grounds.

3.5.3 Foraging Habitat

Humpback whales typically feed in shallow, cold, productive coastal waters during the summer months. Studies conducted at the Ogasawara Islands, Japan documented movements of humpbacks between there and British Columbia (Darling et al. 1996), the Kodiak Archipelago in the central Gulf of Alaska (Calambokidis et al. 2001), and the Shumagin Islands in the western Gulf of Alaska (Witteveen et al. 2004). The SPLASH project indicated that Russia is likely the primary summer destination for Asian whales; however, some go to the Aleutian Islands, Bering Sea, and Gulf of Alaska (Calambokidis et al. 2008). The majority of whales from the Mexico DPS forage in waters spanning from southern British Columbia to California (Wade et al. 2016). Some migrate farther north to feed off of Alaska, and the probability of encountering a whale from the Mexico DPS in Alaskan waters ranges from approximately 6-11 percent (Wade et al. 2016).

3.5.4 Breeding and Calving Habitat

Humpback whales give birth and likely mate from January to March in their wintering grounds. The winter migratory destination of the Western North Pacific DPS is not completely known, but includes several island chains in the western North Pacific near Asia. Data also suggest that some whales from this DPS winter somewhere between Hawaii and Asia, possibly around the Mariana Islands, the Marshall Islands, and the Northwestern Hawaiian Islands (Muto et al. 2018). The Mexico DPS aggregates in three main locations in the Mexican Pacific during the winter: the southern end of the Baja California Peninsula; the Bahia Banderas area including the Islas Tres Marias and Isla Isabel along the mainland Mexico; and the offshore Revillagigedo Archipelago (wade et al. 2016).

3.5.5 Hearing

No studies have directly measured the sound sensitivity of large cetacean species. Summaries of the best available information on marine mammal hearing are provided in Richardson et al. (1995), Erbe (2002), Southall et al. (2007), and NMFS (2016). However, it is generally assumed that most animals hear well in the frequency ranges similar to those used for their vocalizations, which are mainly below 1 kHz in baleen whales (Richardson et al. 1995). NMFS has separated marine mammals into functional hearing groups with the generalized hearing range of low frequency cetaceans between 7 Hz and 35 kHz.

Estimation of hearing ability based on inner ear morphology was completed for two mysticete species: humpback whales (700 Hz to 10 kHz; Houser et al. 2001) and North Atlantic right whales (10 Hz to 22 kHz; Parks et al. 2007a). Humpback whale vocalizations generally range from 30 Hz to 8 kHz.

3.5.6 Critical Habitat

There is no critical habitat designated for humpback whales.

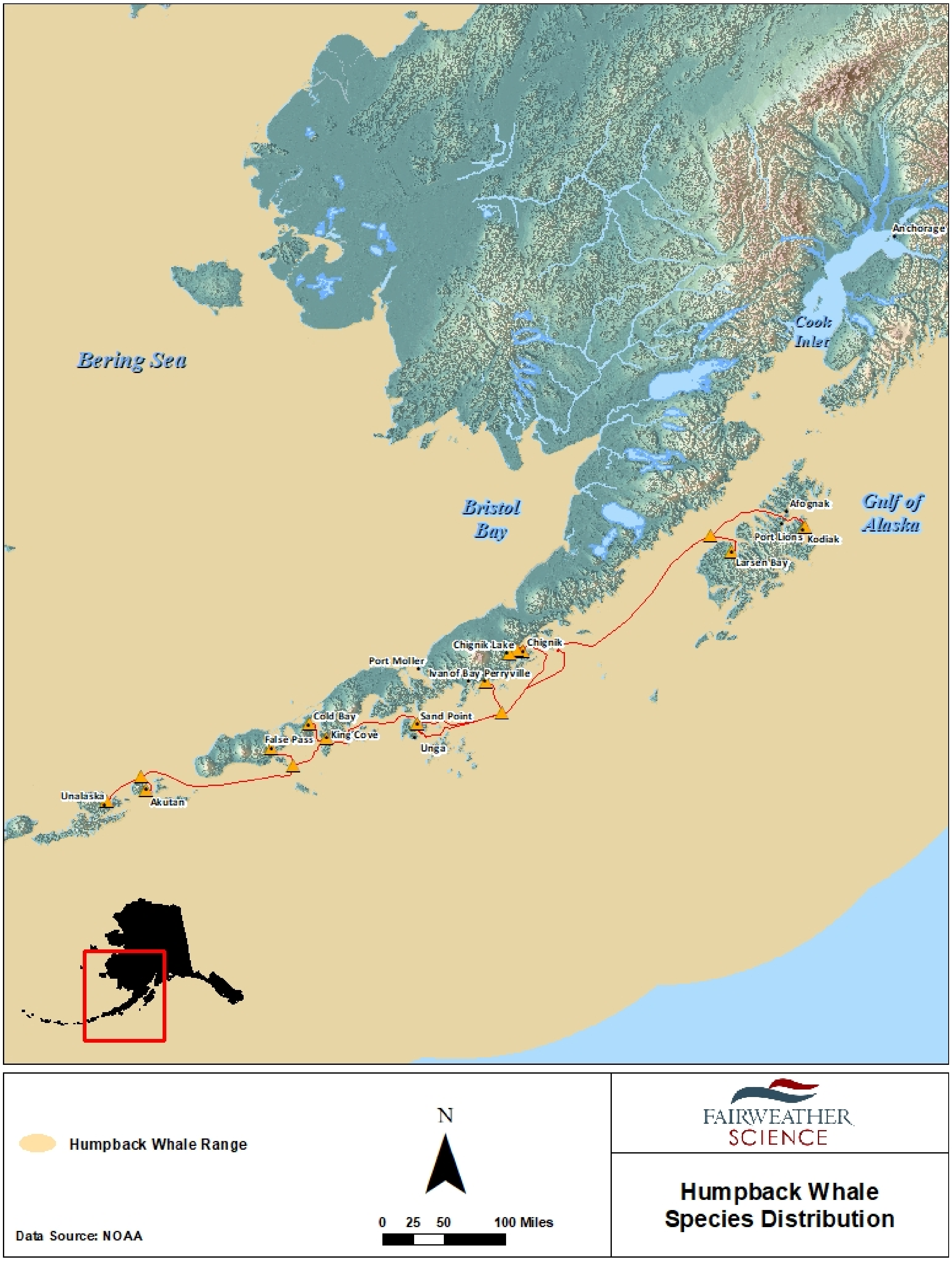

Figure 21. Humpback whale distribution in the project area.

3.6 SPERM WHALE

3.6.1 Population

There is currently no reliable estimate for the total number of sperm whales worldwide, including the North Pacific. The abundance of sperm whales in the North Pacific was reported to be 1,260,000 prior to exploitation, but confidence intervals for these estimates are unknown (Muto et al. 2018). The number of sperm whales in Alaska waters is unknown and a reliable estimate of abundance for the North Pacific stock is not available. Additionally, there is no reliable minimum population estimate for this species. Although Kato and Miyashita (1998) believe their estimate to be positively biased, their analysis suggested 102,112 sperm whales in the western North Pacific.

3.6.2 Distribution

Sperm whales (*Physeter microcephalus*) are one of the most widely distributed marine mammal species; however, their population was depleted by commercial whaling over a period of more than 100 years. Sperm whales are widely distributed in the North Pacific, with the northernmost boundary extending from Cape Navarin to the Pribilof Islands (Figure 22). Extensive numbers of female sperm whales have been documented in the western Bering Sea and Aleutian Islands (Mizroch and Rice 2006; Ivashchenko et al. 2014). Males have been found in the Gulf of Alaska, Bering Sea, and waters around the Aleutian Islands in the summer (Mizroch and Rice 2013; Ivashchenko et al. 2014).

3.6.3 Foraging Habitat

Sperm whales are primarily found in deep waters (greater than 1,000 m). They live and forage in areas with water depths of 600 m or more and are generally not found in waters less than 300 m deep. Sperm whales feed primarily on giant squid, octopus, other cephalopods, fish, and shrimp.

3.6.4 Breeding and Calving Habitat

Sperm whale breeding occurs during the summer months in deep offshore waters and 12-13 ft calves are born after a 14-16 month gestation period.

3.6.5 Hearing

No studies have directly measured the sound sensitivity of large cetacean species. Summaries of the best available information on marine mammal hearing are provided in Richardson et al. (1995), Erbe (2002), Southall et al. (2007), and NMFS (2016). However, it is generally assumed that most animals hear well in the frequency ranges similar to those used for their vocalizations. NMFS has separated marine mammals into functional hearing groups with the generalized hearing range of mid-frequency cetaceans, where sperm whales are classified, between 150 Hz and 160 kHz.

Sperm whales produce several types of click sounds: patterned clicks (codas associated with social behavior), usual clicks, creaks, and slow clicks (Weilgart and Whitehead 1988). Most of the acoustic energy from sperm whales is below 4 kHz, although above 20 kHz has been reported (Thode et al. 2002). Other studies indicate that the wide-band clicks of sperm whales contain energy between 0.1 and 20 kHz (Weilgart and Whitehead 1993, 1997; Goold and Jones 1995).

3.6.6 Critical Habitat

There is no critical habitat designated for sperm whales.

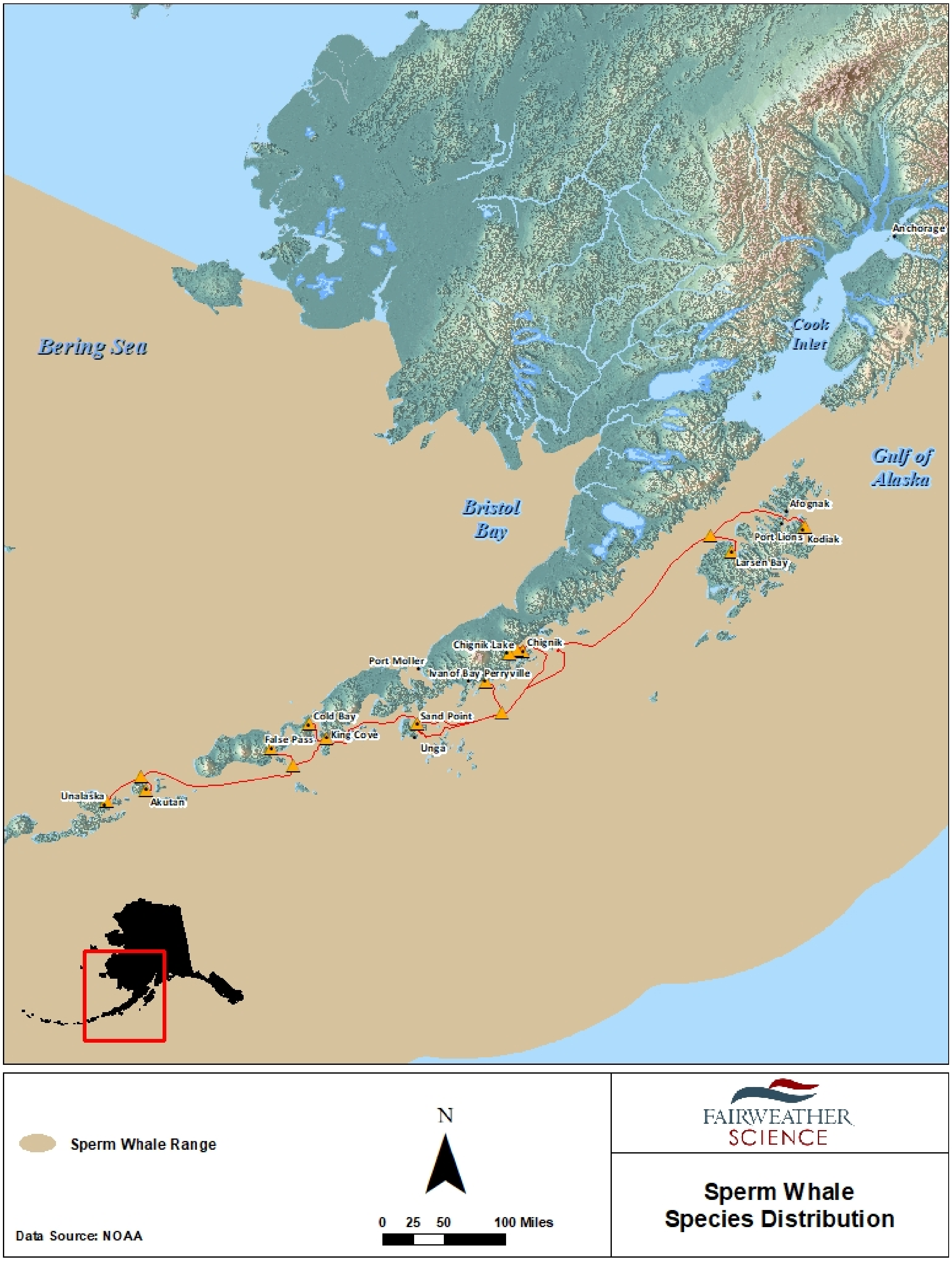

Figure 22. Sperm whale distribution in the project area.

3.7 STELLER SEA LION

3.7.1 Population

Steller sea lions occurring in the project vicinity belong to the western or eastern U.S. stock. This assessment evaluates the endangered western DPS as the eastern stock has been delisted from the ESA. Based on counts made in 2016, the current minimum population estimate for the western stock of Steller sea lions is 53,303 (Sweeney et al. 2016). To calculate this estimate, pups were counted during the breeding season, and the number of births was estimated from the pup count. This population number is considered a minimum estimate as it has not been corrected to account for individuals that were at sea during the surveys. Data collected through 2016 indicate that pup and non-pup counts of the western stock of Steller sea lions in Alaska were at their lowest in 2002 and 2003, respectively, and have increased at a rate of 2.19% and 2.24% per year, respectively, between 2003 and 2016 (Sweeney et al. 2016). While, overall, the western stock population is increasing, there are strong regional differences in trends across the range in Alaska. Positive population trends have been observed east of Samalga Pass (~170° W), including the eastern Bering Sea and Gulf of Alaska, with negative trends to the west in the central and western Aleutian Islands.

3.7.2 Distribution

Steller sea lion habitat extends around 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 south to California (Figure 23; NMFS 2008). NMFS reclassified Steller sea lions as two DPS under the ESA based on genetic studies and phylogeographical analyses from across their range (62 FR 24345). The eastern DPS includes sea lions born east of Cape Suckling, Alaska (144°W) and the western DPS includes animals born west of Cape Suckling (Loughlin 1997).

The western DPS breeds on rookeries in Alaska from Prince William Sound west through the Aleutian Islands. There are more than 100 haulout and rookery sites within the Steller sea lion range in western Alaska, with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands (Muto et al. 2018). Outside of the breeding season, during late May-early July, large numbers of individuals, both male and female, disperse widely. Steller sea lions are commonly found from nearshore habitats to the continental shelf and slope (Jefferson et al. 2008).

3.7.3 Foraging Habitat

Steller sea lions are capable of traveling long distances within a season and forage in both nearshore and pelagic waters. They are opportunistic predators, foraging and feeding primarily at night on a wide variety of fishes (e.g., capelin, cod, herring, mackerel, pollock, rockfish, salmon, sand lance, etc.), bivalves, cephalopods (e.g., squid and octopus), and gastropods. Their diet may vary seasonally, depending on the abundance and distribution of prey. They may disperse and range far distances to find prey, but are not known to migrate.

3.7.4 Breeding and Pupping Habitat

Steller sea lions generally breed and give birth from mid-May to mid-July with the mean pup birth dates in Alaska ranging from 4–14 June (Pitcher et al. 2001; Kuhn et al. 2017). Females remain onshore with their pups for a few days after birth before beginning a routine of alternating between foraging at sea and nursing on land. Pups remain at rookeries until about early to mid-September (Calkins et al. 1999) and are likely weaned before reaching one year of age.

3.7.5 Hearing

Steller sea lion reproduction, foraging, predator avoidance, and navigation are dependent upon in-air and underwater hearing and communication. Steller sea lions have similar hearing thresholds in-air and underwater to other otariids. In-air hearing ranges from 0.250–30 kHz, with best hearing sensitivity ranging from 5–14.1 kHz (Muslow and Reichmuth 2010). The underwater audiogram shows the typical mammalian U-shape and the range of best hearing was from 1 to 16 kHz. Higher hearing thresholds, indicating decreased sensitivity, were observed for signals below 16 kHz and above 25 kHz (Kastelein et al. 2005).

3.7.6 Critical Habitat

3.7.6.1 Description

Steller sea lion critical habitat for the western DPS was designated by NMFS on August 27, 1993. Critical habitat designations are based on primary constituent elements that make the habitat essential for conservation of the species. In the case of Steller sea lions, primary constituent elements were not specifically identified, but the designation was based on the terrestrial and aquatic needs of the species. This included the physical and biological essential features that support reproduction, foraging, rest, and refuge.

Rookeries and haulout sites are widespread throughout their range, and these locations change little from year to year. Typically, rookeries are located on relatively remote islands, rocks, reefs, and beaches, where access by terrestrial predators is limited. During the non-breeding season, rookeries may also be used as haulout sites, which frequently consist of rocks, reefs, and beaches. Substrate, exposure to wind and waves, the extent and type of human activities and disturbance in the region, and proximity to prey resources are all factors that determine the suitability of an area as a rookery or haulout location (58 FR 45269).

Essential features for Steller sea lion aquatic habitat primarily revolve around feeding. Diet will vary geographically, seasonally, and over years in response to the availability and abundance of food resources. Foraging strategies and ranges will also change seasonally and in step with the age and reproductive status of the individual. Tagging studies indicate that the waters in proximity of rookeries and haulout sites are critical foraging habitats. The aquatic areas surrounding rookeries are essential to postpartum females and young animals. The waters around haulout sites provide foraging and refuge habitat for non-breeding animals year-round and for reproductively mature animals during the non-breeding season (58 FR 45269).

Designated critical habitat includes all major Steller sea lion rookeries and major haulouts identified in the listing notice (58 FR 45269) and associated terrestrial, air, and aquatic zones. Critical habitat includes a terrestrial zone that extends 0.9 km (3,000 ft) landward from each major rookery and major haulout, and an air zone that extends 0.9 km (3,000 ft) above the terrestrial zone of each major rookery and major haulout. For each major rookery and major haulout located west of 144° W. longitude, critical habitat includes an aquatic zone (or buffer) that extends 37 km (20 nautical mi) seaward in all directions. Critical habitat also includes three large offshore foraging areas: the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area (58 FR 45269). NMFS has also prohibited vessel entry within 5.6 km (3 nautical mi) of all Steller sea lion rookeries west of 150° W. longitude.

The cable laying route as well as several landfall locations are within designated critical habitat. The fiber optic cable will be laid within the 37 km (20 nautical mi) aquatic zones of several major haulouts and rookeries, and will also extend through portions of the Shelikof Strait and Bogoslof foraging areas. The nearshore waters of the Larsen Bay, Akutan, and Dutch Harbor landfall locations are also included in the

Shelikof Strait and Bogoslof foraging areas. The remaining landfall locations, with the exception of Chignik Bay, Chignik Lagoon, and Chignik Lake, have nearshore waters that are covered by the designated aquatic zones of several major haulouts and rookeries. Project vessels, however, will not enter the 5.6 km (3 nautical mi) area surrounding major rookeries. It is anticipated that the presence of Steller sea lions will be high in the Action Area and animals may be attracted to the ship and barge during construction. However, there are no major rookeries or haulouts in close proximity to the planned landfall locations or cable laying route.

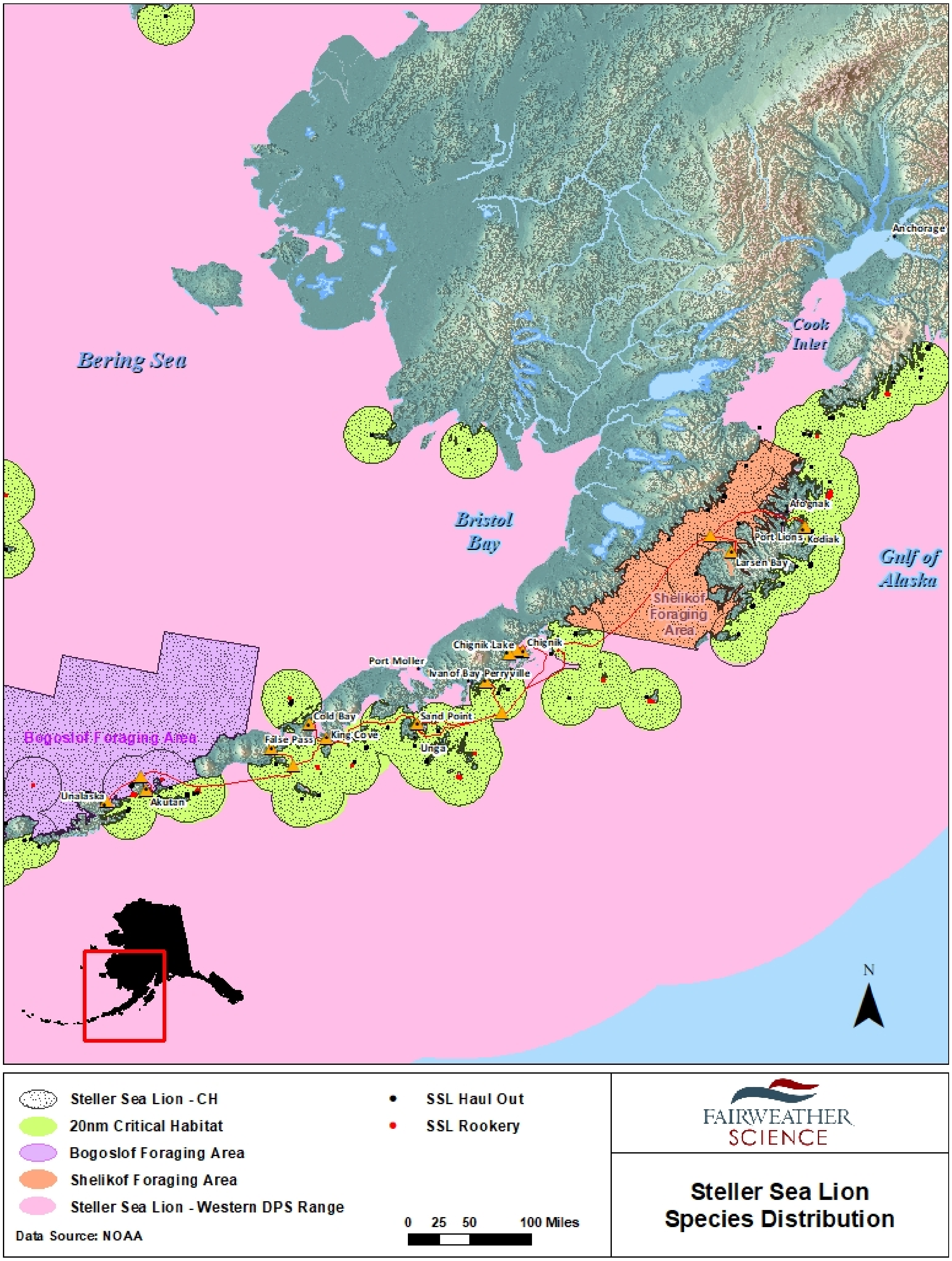

Figure 23. Steller sea lion (western DPS) distribution in the project area.

4.0 ENVIRONMENTAL BASELINE

Environmental baseline, as defined under the ESA, consists of past and present impacts of all Federal, State, or private actions and other human activities in action areas, the anticipated impacts of all the proposed Federal projects in an action area that have already undergone formal or early Section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation process (50 CFR §402.02). The following section describes the environmental baseline accounting for past and ongoing natural and anthropogenic factors that exist in action areas associated with the cable laying route.

4.1 EXISTING CONDITIONS

The Project region is composed of a variety of landforms, channels, and coastlines extending from the mainland of southwest Alaska to the Aleutian Islands. The Kodiak Island Archipelago is comprised of 16 separate islands, of which Kodiak Island is the largest by area, and the Aleutian Islands consist of 55 islands spanning approximately 1,770 km (1,100 mi) from the termination of the Alaska Peninsula to the southwest. Coastal and offshore waterways throughout the entire area typically remain ice-free throughout the year, and any coastal sea-ice which occurs is generally constricted to False Pass, east of Unimak Island.

Due to its position above the Alaska-Aleutian subduction zone and proximity to a highly active section of the Pacific Ring of Fire, much of the region is home to many active volcanoes and experiences frequent earthquakes. Extreme weather systems occur in the Gulf of Alaska, including high and shifting winds, wave action, snow, and rain. These events occur throughout the year, however inclement weather is usually magnified during winter months (December-February). During the summer (May-August), gale force wind and sea states >6 m occur less than 15% of the time. Weather events also influence coastal flooding and erosion, which are known to affect the project region (TerraSond Limited 2018).

Ocean basin topography, currents, water temperature, and other environmental characteristics influence the high productivity of the region's salt water environments, which support many species of fish, marine mammals, crustaceans, and birds. A pre-history of glaciation throughout the region has also significantly influenced its current seafloor morphology and sediment composition. The dominant current in the area is the Alaska Coastal Current, which passes through the Shelikof Strait and southward along the Alaska Peninsula and Aleutian Islands. Each project segment area is additionally influenced by local tidal currents.

4.1.1 Coastal Development

The Project route commences at the port city of Kodiak on Kodiak Island, passes west through Larsen Bay, then spans southwest along the Alaska Peninsula to the Aleutian Islands, terminating at Dutch Harbor, Unalaska Island. The route passes through three Alaskan boroughs including the Kodiak Island Borough, Lake and Peninsula Borough, and Aleutians East Borough, as well as the Aleutians West Census Area.

The Kodiak Island Borough encompasses the Kodiak Island Archipelago, Shelikov Strait waterbody, and 177 mi of the Katmai Coast along the southeastern Alaska Peninsula (Figure 24; Kodiak Island Borough 2018). The borough has a total population of approximately 13,287 residents (Alaska Department of Labor 2017), of which nearly 11,000 live in or near the city of Kodiak (Kodiak Island Borough 2018). Additionally, seven villages are located within the borough; Old Harbor (302 residents), Port Lions (240 residents), Ouzinkie (189 residents), Akhiok (74 residents), Larsen Bay (47 residents), and Karluk (45 residents; DataUSA 2018). Chiniak (Figure 24) is not listed on the Kodiak Island Borough community page, but the village has a population of 47 per the most recent U.S. census in 2010 (United States Census Bureau 2010).

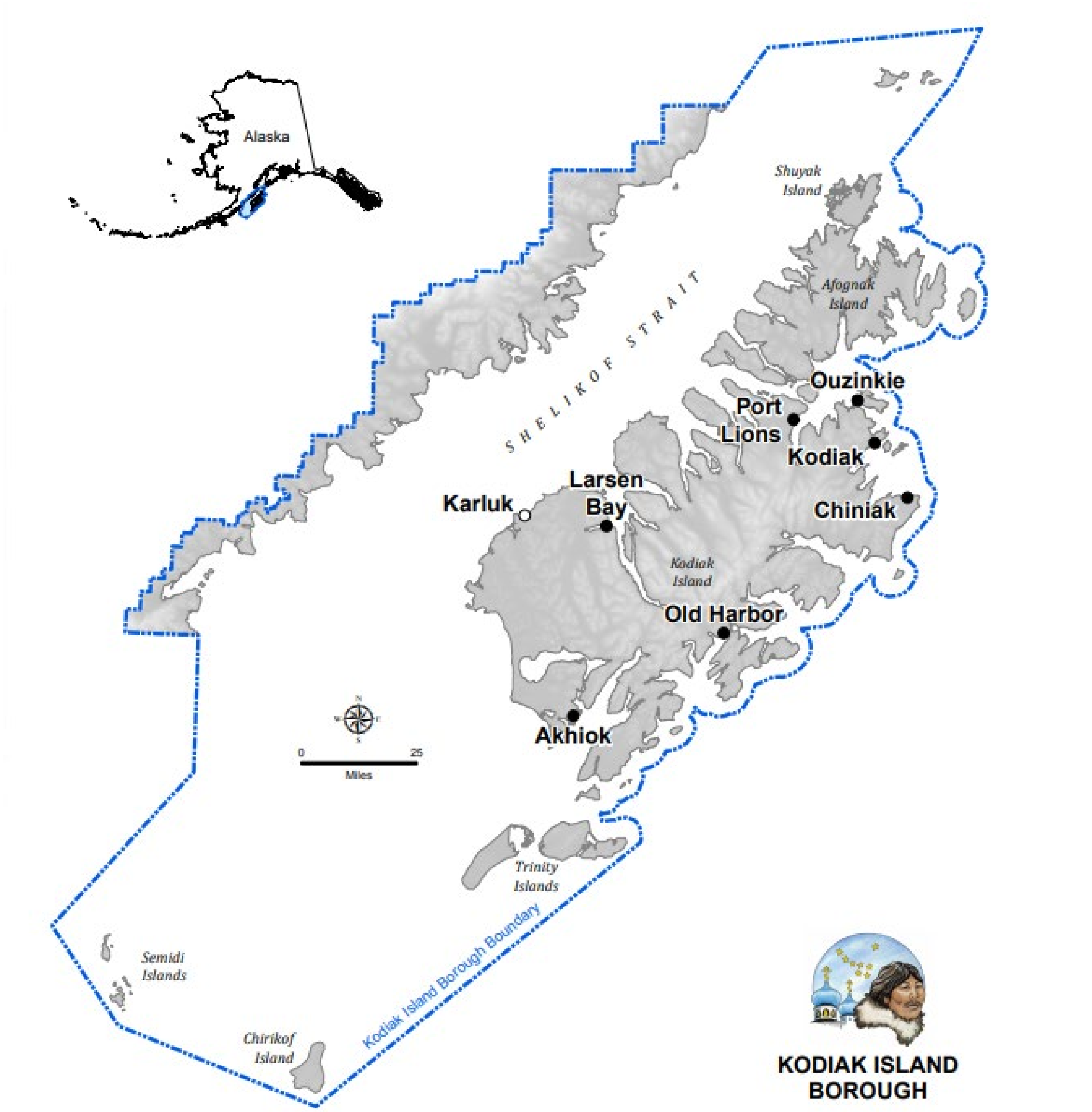

Figure 24. Kodiak Island Borough Boundary and Villages (Source: Kodiak Island Borough 2018)

The Lake and Peninsula Borough has a total population of 1,712 residents (Alaska Department of Labor 2017) comprising 17 communities across three distinct regional areas; Lakes Area, Upper Peninsula Area, and Chignik Area (Figure 25; Lake and Peninsula Borough 2018). The Lakes Area is the northernmost region, and includes 8 villages; Nondalton (186 residents), Port Alsworth (156 residents), Kokhanok (145 residents), Newhalen (143 residents), Levelock (97 residents), Iliamna (86 residents), Igiugig (47 residents), and Pedro Bay (13 residents; DataUSA 2018). The villages in the Upper Peninsula Area include; Egegik (80 residents), Port Heiden (73 residents), Pilot Point (49 residents), and Ugashik (14 residents; DataUSA 2018). The southernmost area, Chignik Area, contains 5 villages; Perryville (94 residents), Chignik Lagoon

(59 residents), Chignik Lake (71 residents), Chignik (40 residents), and Ivanof Bay (<5 residents; DataUSA 2018).

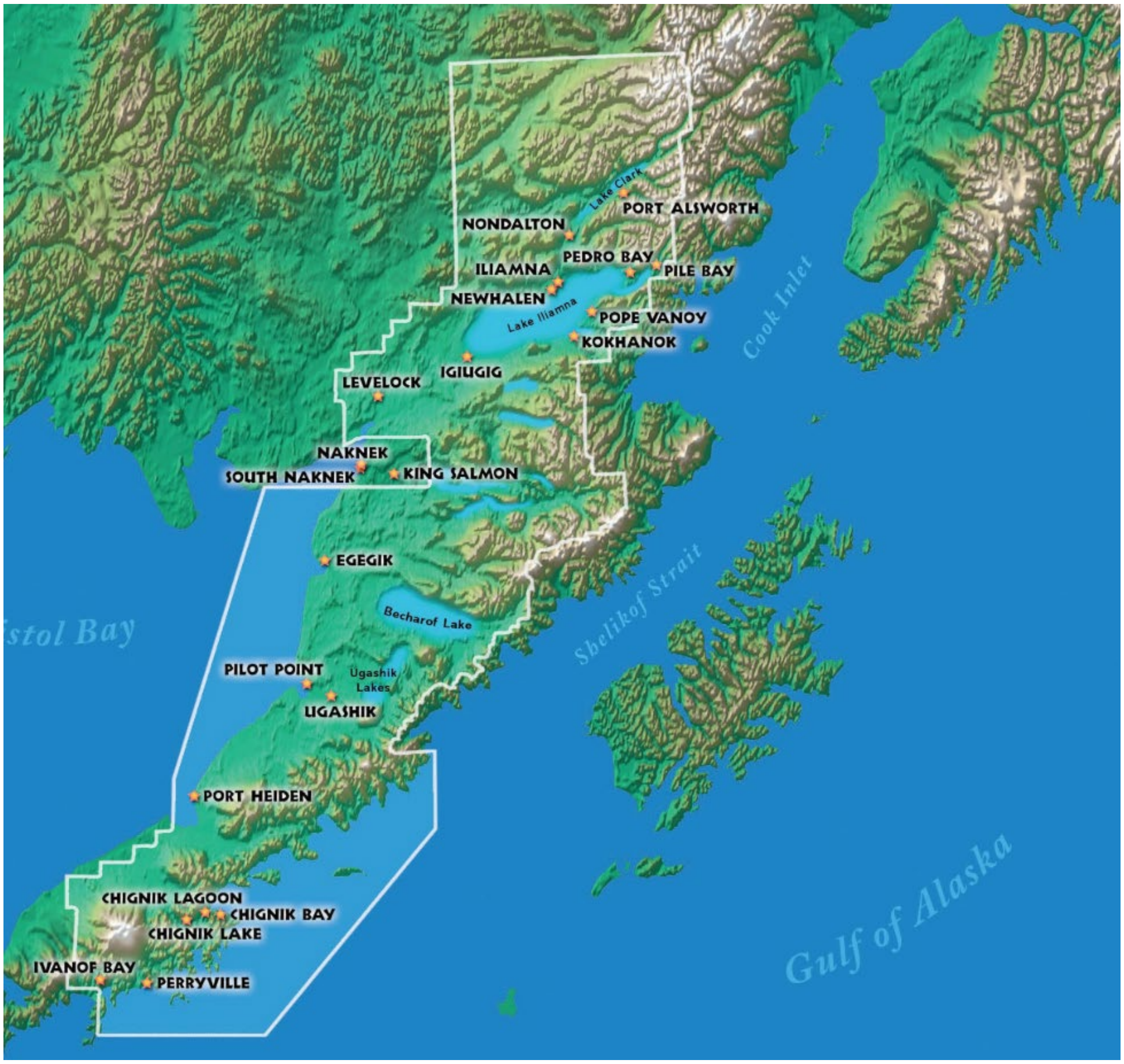

Figure 25. Lake and Peninsula Borough Boundary and Villages (Source: Lake and Peninsula Borough 2018)

The Aleutians East Borough includes the westernmost landmass of the Alaska Peninsula, and spans southwest from Mud and Herendeen Bays to Akutan Island (Figure 26). The borough is home to a total of approximately 2,977 residents (Alaska Department of Labor) who reside within 6 coastal communities; Sand Point (1,248 residents), King Cove (1,080 residents), Akutan (782 residents), False Pass (64 residents), Cold Bay (60 residents), and Nelson Lagoon (46 residents; DataUSA 2018).

Figure 26. Aleutians East Borough Boundary and Villages (Source: Aleutians East Borough 2018)

The Aleutians West Census Area includes the Aleutian Islands west of Akutan Island (Figure 27), and has a population of approximately 5,357 residents (Alaska Department of Labor 2017). Seven villages are established in the census area, including; Unalaska (4,710 residents), St. Paul (525 residents), Adak (122 residents), St. George (74 residents), and Atka (51 residents; DataUSA 2018)

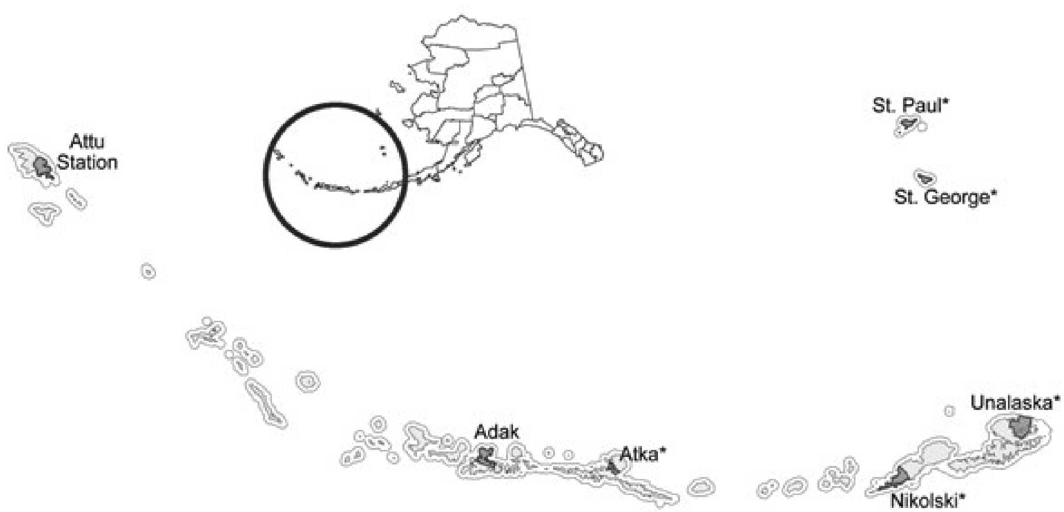

Figure 27. Aleutians West Census Area and Villages (Source: Southwest Alaska Municipal Conference 2018)

The primary economic activity in the Project region is commercial fishing for salmon, Pacific halibut, crab, and Pacific cod. Salmon and Pacific cod processing occurs at Peter Pan Seafoods (King Cove), Trident

Seafoods (Sand Point and Akutan), and Bering Pacific (False Pass). The Peter Pan cannery in King Cove is one of the largest operations under one roof in Alaska. Additional economic activities in the overall area include sightseeing and wildlife tours (See Section 4.1.4 Tourism), however many villages in the proposed project region are remote and have few economic opportunities.

4.1.2 Transportation

The Alaska Peninsula, Kodiak Island, and Aleutian Islands are not accessible to the rest of the state by road. The existing road network is discontinuous and limited to the areas surrounding a few communities, therefore water and air are the primary modes of inter-community transportation. Unalaska's deep-water port is one of the most productive cargo ports in the United States, for both regional fishing as well as domestic and international cargo. The Alaska Marine Highway system serves the Kodiak hub year-round, and the southern Aleutian Chain as far west as Unalaska during the summer service months (May-September); no scheduled marine services are available for communities west of Unalaska. Aviation is the principal means of transporting people to communities throughout the region. There are 30 airports controlled by the Alaska Department of Transportation and Public Facilities (DOT&PF) in the Alaska Peninsula, Kodiak Island, and Aleutian Islands combined, as well as numerous additional FAA-registered public and private runways (DOT&PF 2017).

4.1.3 Fisheries

Fishing is a major industry in Alaska. A wide range of vessels, from small skiffs to large catcher-processors, participate in federally managed commercial and charter fisheries in Alaskan waters. In 2010, there were 2,736 vessels participating in federal managed fisheries, and this does not include vessels that only participate in Alaska state managed fisheries (e.g., salmon, herring, and shellfish fisheries). Witherell et. al (2012), categorized these vessels into 16 commercial fleets and one charter fleet based on target species, gear type, licenses, or catch share program eligibility. Some of these vessels, however, engage in multiple fisheries and fall into more than one fleet (Figure 28).

Fleet Crossover

Fleet	A80	AFA Catcher Processors	AFA Motership	AFA Catcher Vessels	Other BSAI Trawl	Freezer Longline	Longline Catcher Vessels	Groundfish Pot	Jig	Central Gulf Trawl	Western Gulf Trawl	Halibut IFQ	Halibut CDQ	Sablefish	BSAI Crab	Scallop
A80	21	1	0	0	0	0	0	0	0	8	15	0	0	0	0	0
AFA Catcher Processors	1	17	0	0	0	0	0	0	0	0	1	0	0	0	0	0
AFA Motership	0	0	15	7	0	0	0	0	0	2	0	0	0	0	0	0
AFA Catcher Vessels	0	0	7	81	0	0	0	0	0	22	2	2	0	0	3	0
Other BSAI Trawl	0	0	0	0	17	0	0	1	0	8	5	1	0	1	1	1
Freezer Longline	0	0	0	0	0	35	0	2	0	0	0	2	0	13	2	0
Longline Catcher Vessels	0	0	0	0	0	0	80	2	6	0	0	65	3	47	0	0
Groundfish Pot	0	0	0	0	1	2	2	130	4	4	8	57	4	33	32	1
Jig	0	0	0	0	0	0	6	4	244	0	0	47	3	14	0	0
Central Gulf Trawl	8	0	2	22	8	0	0	4	0	70	30	12	0	5	0	0
Western Gulf Trawl	15	1	0	2	5	0	0	8	0	30	45	8	0	3	0	0
Halibut IFQ	0	0	0	2	1	2	65	57	47	12	8	991	36	339	8	0
Halibut CDQ	0	0	0	0	0	0	3	4	3	0	0	36	238	11	1	0
Sablefish	0	0	0	0	1	13	47	33	14	5	3	339	11	382	5	0
BSAI Crab	0	0	0	3	1	2	0	32	0	0	0	8	1	5	83	2
Scallop	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	4

Figure 28. Alaska federally managed commercial fisheries fleet crossover (Source: Fey and Ames 2013)

Several fisheries occur in the western Gulf of Alaska that have the potential to compete with marine mammals and seabirds for resources. Subsistence and personal use fishing are only permitted for Alaskan residents, and recreational fishing is open to residents and non-residents. The Project action areas are located within the Western Region fisheries unit, which is managed by the Alaska Department of Fish and Game (ADF&G) Division of Commercial Fisheries. Within the Western Region, the Project route spans three fishery management areas; Kodiak Management Area (KMA), Chignik Management Area (CMA), and Alaska Peninsula and Aleutian Islands Management Area (Area M). Numerous shore-based and floating processors operate within these areas and employ both residents and non-residents during peak fishing seasons.

Fishing and commercial seafood processing has occurred on Kodiak Island since the late 1800s (ADF&G 2018a), and today Kodiak is home to Alaska's largest fishing port. The Kodiak Management Area includes the marine waters surrounding the Kodiak Archipelago, as well as drainage from the southeastern portion of the Alaska Peninsula into the Shelikof Strait. Several commercial fisheries occur in these highly productive waters, including salmon, herring, Pacific halibut, Pacific cod, rockfish, scallops, and crab. Catch is processed in local facilities, with the bulk of KMA's processing capacity located in Kodiak and Larsen Bay.

The Chignik Management Area is located southwest of the KMA, and fishery effort focuses primarily on sockeye salmon, which is essential to the local economy (ADF&G 2018c). One land-based salmon processing plant operates seasonally in Chignik.

The Alaska Peninsula and Aleutian Islands Management Area is located west of the CMA and extends southwest to Atka Island. Fisheries in this area include salmon, Pacific cod, crab, herring, Pacific halibut, and other groundfish, and major fish processing operations are located at Sand Point, King Cove, Dutch Harbor, and Akutan (ADFG 2018b). The Port of Dutch Harbor is the largest fishing port in the United States in terms of volume, and second largest in terms of value.

4.1.4 Tourism

The Alaska Peninsula, Kodiak Archipelago, and Aleutian Islands are components of the Southwest Alaska tourism region, which as a whole receives approximately 4% of the state's annual visitors (ADCCED 2017). This low percentage is due to high travel costs and limited tourism infrastructure and development in the area. Aviation is the most common means by which people visit Southwest Alaska. Kodiak and Dutch Harbor are the project area's only towns with active tourism development, and receive occasional cruise ship and day tour visitation for purposes including fishing, wildlife viewing, and sightseeing (TerraSond Limited 2018). The majority of visitors to the project region include those who identified business as a primary objective for travel (ADCCED 2017), which could likely be attributed to employment of seasonal laborers throughout the region. Overall, visitation rate to the Southwest has remained relatively low over the past decade (Figure 29).

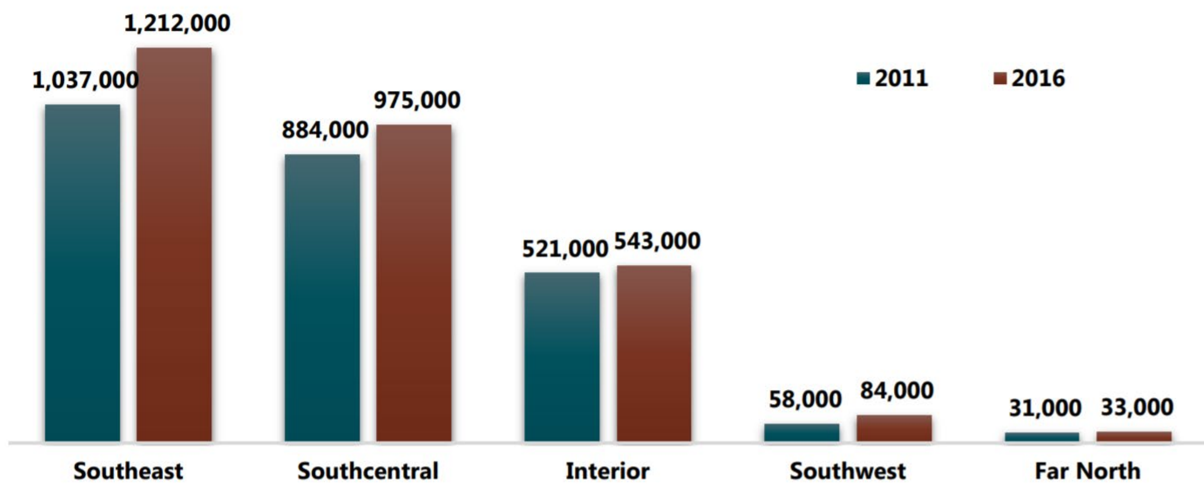

Figure 29. Estimated Visitor Volume to Alaska Regions, Summer 2011 and 2016 (Source: ADCCED 2017)

4.1.5 Vessel Traffic

Waters adjacent to the Alaskan Peninsula, Kodiak Island, and the Eastern Aleutian Islands experience high levels of annual vessel traffic (Figure 30) due to freight, fishing, and general transportation including interstate commerce and occasional tourism. In particular, Umiak Pass is a primary transit point for vessels headed west to Asia or the Arctic, and logs approximately 4,500 commercial vessel transits per year (Transportation Research Board 2008). Due to lack of interconnecting roads, the region's local communities rely on vessels for local commerce and shipment of items not feasible to transport by air.

The region supports highly productive fisheries, and vessel traffic during peak fishing months (April-November) is especially heavy at landing sites with fish processing facilities, including False Pass, King Cove, Sand Point, Chignik, Larsen Bay, and Kodiak. Commercial and recreational vessels frequent Kodiak Island's Pier 1 as an access route to commercial facilities including harbors, fuel docks, and processing plants. Kodiak's position as an important fishing hub translates to a high volume of vessel presence consisting of hundreds of fishing vessels that harbor at Kodiak year-round (ADF&G 2018a).

Vessel traffic includes tourism to a minor extent (Nuka Research and Planning Group 2014), and passenger vessels (e.g., cruise ships) generally limit travel to Kodiak and Dutch Harbor. The Alaska Marine Highway System operates from Kodiak to Unalaska Island, however the Aleutian Islands are not accessible during the wintertime due to hazardous weather conditions (Alaska Marine Highway System 2016). Vessel traffic also includes U.S. Coast Guard (USCG) operated vessels (see Section 4.1.6), which patrol and perform various operations, ranging from marine inspections to life saving missions, within the Western Alaska USCG area of responsibility.

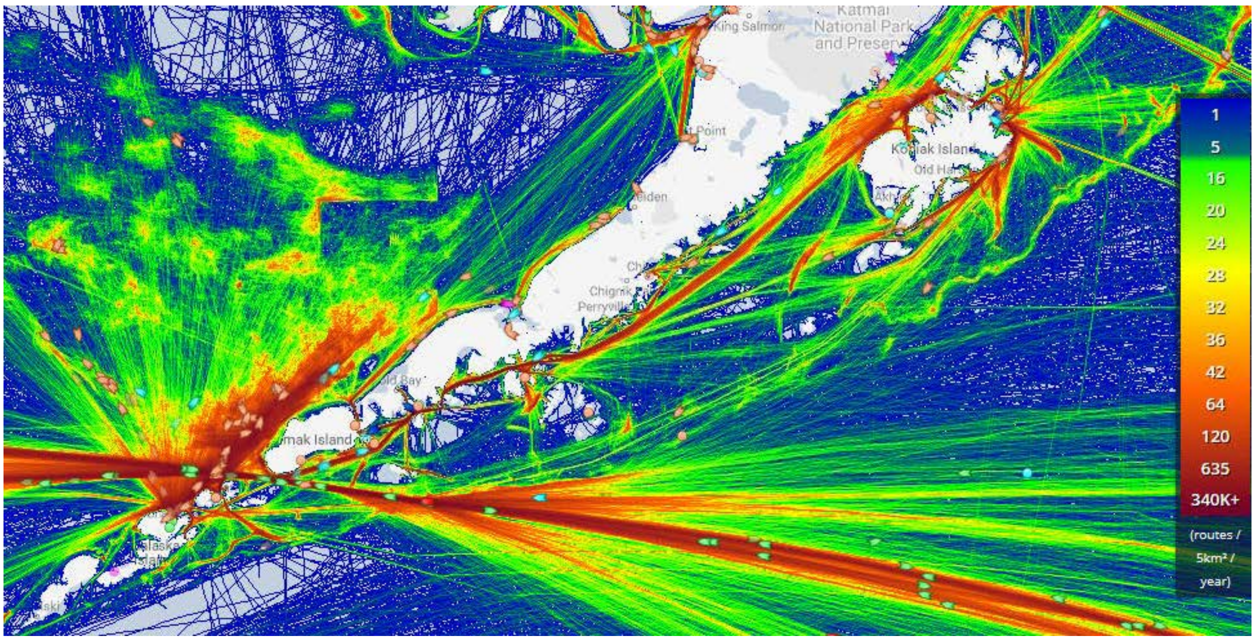

Figure 30. 2017 Vessel Traffic Density for Southwest Alaska (Source: TerraSond Limited 2018, via MarineTraffic)

4.1.6 Unexploded Ordnance and Military Activity

The Western Alaska Captain of the Port waterway zone extends clockwise from western Gulf of Alaska, through the Aleutian Islands, and north-northeast over the Arctic coast terminating at the Canadian border. This area of responsibility is the largest in the nation, and is overseen by multiple sectors of the USCG. Alaska is the USCG's 17th district, and the U.S. military occupies a predominant industrial sector within the Kodiak Island Borough. Kodiak Island has an extensive military history and is home to the nation's largest USCG base as well as the first privately owned rocket launch facility (Kodiak Island Borough 2018). The USCG base harbors three homeported cutters; the USCGC *Munro,* USCGC *Alex Haley,* and USCGC *Spar.* The USCG Sector Anchorage Waterways Management (WWM) Division monitors primary shipping waterways and security zones, and operates in conjunction with the USCG Aids to Navigation Team (ANT) in Kodiak to manage western Alaska navigational aid units (USCG 2018). Additionally, the U.S. Navy's 55-acre Special Operations Forces Cold Weather Maritime Training Facility, Naval Special Warfare Cold Weather Detachment Kodiak is located near the city of Kodiak, on Spruce Cape and Long Island. At this facility, U.S. Navy SEALs complete extensive annual training courses focused on navigation, cold weather survival, and advanced tactical training.

Akutan and Kodiak Islands are the only two locations in the Project area in which unexploded ordnances (UXO) may be present. A northeastern area of Kodiak Island spanning Marmot, Chiniak, and Ugak Bays may contain UXOs, however none have been located along the proposed project route (TerraSond Limited 2018). Additionally, a confirmed UXO is located to the southeast of Akutan Island (TerraSond Limited 2018).

4.1.7 Oil and Gas

As of November 4, 2018, there are currently no active oil and gas leases in the Alaska Peninsula Lease Sale Area (ADNR 2018). Exploratory mining activity is ongoing near Sand Point and Perryville, however impacts to Project activities are unlikely. Overall, according to TerraSond Limited's 2018 project-specific desktop study, there are currently no occurrences of natural resource developments or extraction along the Project route that would interfere with the proposed cable survey or installation.

4.2 PROPOSED PROJECTS

4.2.1 Kodiak Existing and Proposed Infrastructure

Existing infrastructure around Kodiak and Mill Bay include the GCI-owned Kodiak Kenai Fiber Link, which lands in Mill Bay, and a chartered cable area from Miller Point in Monashka Bay to South Point on Spruce Island. Upcoming projects in the city of Kodiak include the Downtown Water Sewer and Storm Drain Master Plan, and Aleutian Homes Water and Sewer Phase VI, both designed by DOWL with schedules TBD (City of Kodiak Alaska 2018). Stantec Architecture Inc. also designed a New Fire Station project, with schedule TBD (City of Kodiak Alaska 2018).

4.2.2 Chignik Bay Public Dock Projects

In 2005, construction and dredging were conducted to support harbor and breakwater construction on the east side of the Chignik Bay (TerraSond Limited 2018). Additionally, Trident Seafoods and NorQuest Seafoods each own a public dock in the area. A public commercial and industrial dock on Chignik Bay waterfront land was proposed in 2013 and recently completed in 2017.

4.2.3 Chignik Lagoon Road and Airport Projects

The Chigniks' (Chignik Bay, Chignik Lake and Chignik Lagoon) Intertie Road and Metrofania Valley Airport were listed by the Chignik Lagoon Village Council as the highest priority projects in 2016. According to a draft Council community strategic direction plan for 2017-2022, the proposed intertie road would provide year-round access between the three Chigniks and connect to the proposed Metrofania airport which would be constructed centrally between the three.

4.2.4 Perryville Harbor Project

Three Star Point, near Perryville, has been selected as the development site for a small boat harbor. The harbor is intended to service the local fishing community; however, the project status has not been updated since 2016.

4.2.5 Sand Point Dock Replacement

Plans for replacement of the Sand Point Dock are underway, according to a public notice issued in December 2017 (USACE 2017). Work could entail the removal and salvage of seaward armor rock, followed by breakwater expansion and the construction of a new dock, which would be supported by piles (USACE 2017). An operations schedule for this project is currently unavailable.

4.2.6 Cold Bay Dock Upgrades

A list of Aleutians East Borough projects published in December 2017 indicated that the Cold Bay Dock will need major upgrades and repairs within the next decade. The Borough is currently working with the DOT&PF to gather information and initiate planning (Aleutians East Borough 2017).

4.2.7 False Pass Hydrokinetic Power Project

The City of False Pass is operating an ongoing Hydrokinetic Power Project, which is not expected to interfere with the proposed route (TerraSond Limited 2018). However, this project and its power cable route were considerations for an alternative landing site at the southernmost end of the runway where conflict is possible. GCI will coordinate with the City.

5.0 EFFECT OF THE ACTION

5.1 DIRECT EFFECTS

In Section 2.4, the Action Area was defined as the estimated distance to the NMFS acoustic harassment disturbance threshold for continuous noise sources of 120 dB re 1 μPa rms. The distances to the 120 dB re 1 μPa rms threshold were conservatively estimated to be 2.8 km for the barge used in water depths <15 m and 2.3 km for the ship used in water depths >15 m. Therefore, the Action Area is equal to the route length plus a buffer of 2.3 km on each side of the route (4.6 km total width) for areas in which the depth is greater than 15 m and the cable laying ship would be used and the route length plus a buffer of 2.8 km on each side of the route (5.6 km total) for areas in which the depth is less than 15 m and the cable laying barge would be used. The total Action Area encompasses approximately 7,167 km^2 (2767 mi^2). The amount of each species range and critical habitat (when applicable) potentially impacted by the proposed project Action Area was calculated for each species (Table 6). It is important to note that the vessel is not remaining in one place along the route for longer than is needed to complete the cable-laying operation.

Table 6. Calculation of Action Area by Species Range and Critical Habitat.

Species	Action Area for Barge (< 15 m depth)	Action Area for Ship (>15 m depth)	Action Area in Species Range (km^2)	Action Area in Critical Habitat (km^2)
Blue whale	2.8 km	2.3 km	183.5	NA
Fin whale	2.8 km	2.3 km	7,167	NA
North Pacific right whale	2.8 km	2.3 km	7,167	0
Western North Pacific gray whale	2.8 km	2.3 km	923.4	NA
Humpback whale	2.8 km	2.3 km	7,167	NA
Sperm whale	2.8 km	2.3 km	7,167	NA
Steller sea lion	2.8 km	2.3 km	7,167	5,808.8

5.1.1 Noise

5.1.1.1 Sounds Produced by the Proposed Plan

All vessels generate noise as a result of their operations. The vessels in this project will use main drive propellers and/or DP thrusters to maintain position or move slowly during cable laying/trenching operations. During these activities, non-impulse sounds are generated by the collapse of air bubbles (cavitation) created when propeller blades move rapidly through the water. Several acoustic measurements of vessels conducting similar operations using these types of propulsion have been made in Alaskan waters in previous years.

As previously mentioned in the Project Description, Statoil conducted geotechnical coring operations in the Chukchi Sea in 2011 using the vessel Fugro Synergy. Measurements were taken using bottom founded recorders at 50 m, 100 m, and 1 km away from the borehole while the vessel used dynamic positioning thrusters (Warner and McCrodan 2011). Sound levels measured at the recorder 1 km away ranged from 119 dB re 1 μPa rms to 127 dB re 1 μPa rms with most acoustic energy in the 110 to 140 Hz range. A sound propagation curve equation fit to the data and encompassing 90 percent of all measured values during the period of strongest sound emissions provided an estimate that sound levels would drop below 120 dB re 1 μPa rms at 2.3 km.

Project activities may also include the production of pulsed sounds from single-beam navigational echo sounders and positioning beacons (transceivers and transponders) used to determine the location of trenching or ROV equipment operating on or near the seafloor. These acoustic sources typically produce pulsed sounds at much higher frequencies than those produced by vessel thrusters, in narrow frequency bands, and in some cases (e.g. navigational echosounders), with narrow downward directed beamforms. For example, positioning beacons measured in the Chukchi Sea operated with center frequencies of 27 kHz (most energy between 26 and 28 kHz), 32 kHz (most energy between 25 and 35 kHz), and 22/23 kHz or 21/21.5 kHz (most energy between 20 and 25 kHz). For directional sources, the difference between in-beam and out-of-beam sound pressure levels at the same distance ranged from 5 to 15 dB re 1 μPa rms. Because high-frequency sounds attenuate more quickly in water, distances to threshold levels that may elicit behavioral responses in marine mammals were in the tens to several tens of meters, even within the narrow in-beam sound fields (Warner and McCrodan 2011). For this reason, and because the species considered in this assessment have less sensitive hearing at these higher frequencies, potential impacts from non-impulsive vessels sounds are likely to subsume potential impacts from these sonar sources and they are not further addressed below.

5.1.1.2 Effects of Noise on Affected Marine Mammals

The effects of sound on marine mammals are highly variable, and can be generally categorized as follows (adapted from Richardson et al. 1995):

1. The sound may be too weak to be heard at the location of the animal, i.e., lower than the prevailing ambient sound level, the hearing threshold of the animal at relevant frequencies, or both;
2. The sound may be audible but not strong enough to elicit any overt behavioral response, i.e., the mammal may tolerate it, either without or with some deleterious effects (e.g., masking, stress);
3. The sound may elicit behavioral reactions of variable conspicuousness and variable relevance to the well-being of the animal; these can range from subtle effects on respiration or other behaviors (detectable only by statistical analysis) to active avoidance reactions;
4. Upon repeated exposure, animals may exhibit diminishing responsiveness (habituation/sensitization), or disturbance effects may persist; the latter is most likely with sounds that are highly variable in characteristics, unpredictable in occurrence, and associated with situations that the animal may perceive as a threat;
5. Any man-made sound that is strong enough to be heard has the potential to reduce (mask) the ability of marine mammals to hear natural sounds at similar frequencies, including calls from conspecifics, echolocation sounds of odontocetes, and environmental sounds due to wave action or (at high latitudes) ice movement. Marine mammal calls and other sounds are often audible during the intervals between pulses, but mild to moderate masking may occur during that time because of reverberation.
6. Very strong sounds have the potential to cause temporary or permanent reduction in hearing sensitivity, or other physical or physiological effects. Received sound levels must far exceed

the animal's hearing threshold for any temporary threshold shift to occur. Received levels must be even higher for a risk of permanent hearing impairment.

5.1.1.3 Hearing Abilities of Affected Marine Mammals

The hearing abilities of marine mammals are functions of the following (Richardson et al. 1995; Au et al. 2000):

1. Absolute hearing threshold at the frequency in question (the level of sound barely audible in the absence of ambient noise). The "best frequency" is the frequency with the lowest absolute threshold.
2. Critical ratio (the signal-to-noise ratio required to detect a sound at a specific frequency in the presence of background noise around that frequency).
3. The ability to determine sound direction at the frequencies under consideration.
4. The ability to discriminate among sounds of different frequencies and intensities.

Marine mammals rely heavily on the use of underwater sounds to communicate and to gain information about their surroundings. Experiments and monitoring studies also show that they hear and may react to many types of man-made sounds (Richardson et al. 1995; Gordon et al. 2004; Nowacek et al. 2007; Tyack 2008).

Baleen Whales (Mysticetes)

The hearing abilities of baleen whales (mysticetes) have not been studied directly given the difficulties in working with such large animals. Behavioral and anatomical evidence indicates that they hear well at frequencies below 1 kHz (Richardson et al. 1995; Ketten 2000). Frankel (2005) noted that gray whales reacted to a 21–25 kHz signal from whale-finding sonar. Some baleen whales react to pinger sounds up to 28 kHz, but not to pingers or sonars emitting sounds at 36 kHz or above (Watkins 1986). In addition, baleen whales produce sounds at frequencies up to 8 kHz and, for humpback whales, with components up to >24 kHz (Au et al. 2006). The anatomy of the baleen whale inner ear seems to be well adapted for detection of low-frequency sounds (Ketten 1991, 1992, 1994, 2000; Parks et al. 2007b). Although humpback and minke whales (Berta et al. 2009) may have some auditory sensitivity to frequencies above 22 kHz, for baleen whales as a group, the functional hearing range is thought to be about 7 Hz to 22 kHz or possibly 35 kHz; baleen whales are said to constitute the "low-frequency" (LF) hearing group (Southall et al. 2007; NMFS 2016). The absolute sound levels that they can detect below 1 kHz are probably limited by increasing levels of natural ambient noise at decreasing frequencies (Clark and Ellison 2004). Ambient noise levels are higher at low frequencies than at mid frequencies. At frequencies below 1 kHz, natural ambient levels tend to increase with decreasing frequency.

The hearing systems of baleen whales are undoubtedly more sensitive to low-frequency sounds than are the ears of the small toothed whales that have been studied directly (e.g., MacGillivray et al. 2014). Thus, baleen whales are likely to hear vessel sounds farther away than small toothed whales and, at closer distances, vessel sounds may seem more prominent to baleen than to toothed whales. However, baleen whales have commonly been seen well within the distances where sounds from vessels (or other sources such as seismic airguns) would be detectable and often show no overt reaction to those sounds. Behavioral responses by baleen whales to various anthropogenic sounds, including sounds produced by vessel thrusters, have been documented, but received levels of sounds necessary to elicit behavioral reactions are typically well above the minimum levels that the whales are assumed to detect (see below).

Seals and Sea Lions (Pinnipeds)

Underwater audiograms have been determined for several species of phocid seals (true seals), monachid seals (monk seals), otariids (eared seals), and the walrus (reviewed in Richardson et al. 1995; Kastak and Schusterman 1998, 1999; Kastelein et al. 2002, 2005, 2009; Reichmuth et al. 2013; Sills et al. 2014, 2017; Cunningham and Reichmuth 2016). The functional hearing range for phocid seals in water is generally considered to extend from 50 Hz to 86 kHz (Southall et al. 2007; NMFS 2016), although a harbor seal, spotted seal, and California sea lion were shown to detect frequencies up to 180 kHz (Cunningham and Reichmuth 2016). However, some species—especially the otariids—have a narrower auditory range (60 Hz to 39 kHz; NMFS 2016). In comparison with odontocetes, pinnipeds tend to have lower best frequencies, lower high-frequency cutoffs, better auditory sensitivity at low frequencies, and poorer sensitivity at frequencies of best hearing.

At least some of the phocid seals have better sensitivity at low frequencies (≤1 kHz) than do odontocetes. Below 30–50 kHz, the hearing thresholds of most species tested are essentially flat down to ~1 kHz, and range between 60 and 85 dB re 1 µPa. Measurements for harbor seals indicate that, below 1 kHz, their thresholds under quiet background conditions deteriorate gradually with decreasing frequency to ~75 dB re 1 µPa at 125 Hz (Kastelein et al. 2009). Recent measurements of underwater hearing for spotted seals (*Phoca largha*) showed a peak sensitivity of ~51–53 dB re 1 µPa at 25.6 kHz, with the best hearing range at ~0.6 to 11 kHz, and good auditory sensitivity extending seven octaves (Sills et al. 2014).

For the otariid seals, the high frequency cutoff is lower than for phocids and sensitivity at low frequencies (below 1 kHz) rolls off faster, resulting in an overall narrower bandwidth of best sensitivity (NMFS 2016).

5.1.1.4 Potential Effects of Noise from Action on Affected Marine Mammals

Vessel noise can contribute substantially to a low-frequency ambient noise environment already filled with natural sounds. Vessel noise from this project could affect marine animals along the proposed cable lay route. Houghton et al. (2015) proposed that vessel speed is the most important predictor of received noise levels, with low vessel speeds (such as those expected during the proposed activity) resulting in lower sound levels. Sounds produced by large vessels generally dominate ambient noise at frequencies from 20 to 300 Hz (Richardson et al. 1995). However, some energy is also produced at higher frequencies (Hermannsen et al. 2014). The following materials in this section summarize results from studies addressing the potential effects, or lack thereof, of vessel sounds on affected marine mammals.

Tolerance

Numerous studies have shown that underwater sounds from industry activities are often readily detectable in the water at distances of many kilometers. As described below, numerous studies have also shown that marine mammals at distances more than a few kilometers away often show no apparent response to industry activities of various types (Moulton et al. 2005, Harris et al. 2001, LGL et al. 2014). This is often true even in cases when the sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to underwater sound such as airgun pulses under some conditions, at other times mammals of all three types have shown no overt reactions (Stone and Tasker 2006, Hartin et al. 2013). In general, pinnipeds and small odontocetes seem to be more tolerant of exposure to some types of underwater sound than are baleen whales. Given the relatively low-levels of sound expected to be produced by project vessels and the common occurrence of numerous vessels in the project area, it is reasonable to expect that many marine mammals will show no response to the planned activities.

Masking

Masking is the obscuring of sounds of interest by interfering sounds, which can affect a marine mammal's ability to communicate, detect prey, or avoid predation or other hazards. Ship noise, through masking, can reduce the effective communication distance of a marine mammal if the frequency of the sound source is close to that used by the animal, and if the sound is present for a significant fraction of time (e.g., Richardson et al. 1995; Clark et al. 2009; Jensen et al. 2009; Gervaise et al. 2012; Hatch et al. 2012; Rice et al. 2014; Dunlop 2015; Erbe et al. 2016; Jones et al. 2017; Cholewiak et al. 2018). In addition to the frequency and duration of the masking sound, the strength, temporal pattern, and location of the introduced sound also play a role in the extent of the masking (Branstetter et al. 2013, 2016; Finneran and Branstetter 2013; Sills et al. 2017). Branstetter et al. (2013) reported that time-domain metrics are also important in describing and predicting masking. In order to compensate for increased ambient noise, some cetaceans are known to increase the source levels of their calls in the presence of elevated noise levels from shipping, shift their peak frequencies, or otherwise change their vocal behavior (e.g., Parks et al. 2011, 2012, 2016a,b; Castellote et al. 2012; Melcón et al. 2012; Azzara et al. 2013; Tyack and Janik 2013; Luís et al. 2014; Sairanen 2014; Papale et al. 2015; Bittencourt et al. 2016; Dahlheim and Castellote 2016; Gospić and Picciulin 2016; Gridley et al. 2016; Heiler et al. 2016; Martins et al. 2016; O'Brien et al. 2016; Tenessen and Parks 2016).

Using acoustic propagation and simulation modeling, Clark et al. (2009) estimated lost communication space from vessel traffic for fin, humpback, and North Atlantic right whales in the northwestern Atlantic Ocean. They found that because of higher call source levels and the frequency range of calls falling outside of the range of strongest ship sounds, fin and humpback whales are likely to experience much less of a reduction in communication space than North Atlantic right whales. Since right whale call frequencies are more centered on the strongest frequencies produced by large ships and their call source levels are typically lower, they may experience nearly complete loss of communication space when a large ship is within 4 km of that whale. However, the sound source levels of the ship used by Clark et al. (2009) were much higher than those expected to be produced by the smaller and slower moving vessels used during cable laying activities. Therefore, masking is not anticipated to present a significant concern for the large baleen whales expected to be encountered in the project area, including North Pacific right whales.

Auditory studies on pinnipeds indicate that they can hear underwater sound signals of interest in environments with relatively high background noise levels, a possible adaption to the noisy nearshore environment they inhabit (Southall et al. 2000). Southall et al. (2000) found northern elephant seals, harbor seals, and California sea lions lack specializations for detecting low-frequency tonal sounds in background noise, but rather were more specialized for hearing broadband noises associated with schooling prey. Given the ability for pinnipeds to hear well in noisy backgrounds (Southall et al. 2000), combined with the relatively short duration and low intensity of exposure from the cable laying activities, masking concerns are not particularly significant for Steller sea lions.

Disturbance Reactions

Baleen whales are thought to be more sensitive to sound at these low frequencies than are toothed whales (e.g., MacGillivray et al. 2014), possibly causing localized avoidance of the proposed survey area during seismic operations. Reactions of gray and humpback whales to vessels have been studied, and there is limited information available about the reactions of right whales and rorquals (fin, blue, and minke whales). Reactions of humpback whales to boats are variable, ranging from approach to avoidance (Payne 1978; Salden 1993). Baker et al. (1982, 1983) and Baker and Herman (1989) found humpbacks often move away when vessels are within several kilometers. Humpbacks seem less likely to react overtly when actively feeding than when resting or engaged in other activities (Krieger and Wing 1984, 1986). Increased levels of ship noise have been shown to affect foraging (Blair et al. 2016) and singing behavior by humpback whales (Tsujii et al. 2018). Fin whale sightings in the western Mediterranean were negatively correlated with the number of vessels in the area (Campana et al. 2015). Minke whales and gray seals have shown slight displacement in response to construction-related vessel traffic (Anderwald et al. 2013).

Southall et al. (2007 Appendix C) reviewed a number of papers describing the responses of marine mammals to non-pulsed sound. In general, little or no response was observed in animals exposed at received levels from 90-120 dB re 1 µPa rms. Probability of avoidance and other behavioral effects increased when received levels were 120-160 dB re 1 µPa rms. Some of the relevant studies are summarized below.

Baker et al. (1982) reported some avoidance by humpback whales to vessel noise when received levels were 110-120 dB re 1 µPa rms, and clear avoidance at 120-140 dB re 1 µPa rms (sound measurements were not provided by Baker but were based on measurements of identical vessels by Miles and Malme 1983).

Malme et al. (1986) observed the behavior of feeding gray whales during four experimental playbacks of drilling sounds (50 to 315 Hz; 21-minutes (min) overall duration and 10 percent duty cycle; source levels 156 to 162 dB re 1 µPa-m). In two cases for received levels of 100 to 110 dB re 1 µPa, no behavioral reaction was observed. Avoidance behavior was observed in two cases where received levels were 110 to 120 dB re 1 µPa rms.

Richardson et al. (1990) performed 12 playback experiments in which bowhead whales in the Alaskan Arctic were exposed to drilling sounds. Whales generally did not respond to exposures in the 100 to 130 dB re 1 µPa rms range, although there was some indication of behavioral changes in several instances.

McCauley et al. (1996) reported several cases of humpback whales responding to vessels in Hervey Bay, Australia. Results indicated clear avoidance at received levels between 118 to 124 dB re 1 µPa rms in three cases for which response and received levels were observed / measured.

Frankel and Clark (1998) conducted playback experiments with wintering humpback whales using a single speaker producing a low-frequency “M-sequence” (sine wave with multiple-phase reversals) signals in the 60 to 90 Hz band with output of 172 dB re 1 µPa rms. For 11 playbacks, exposures were between 120 and 130 dB re 1 µPa and included sufficient information regarding individual responses. During eight of the trials, there were no measurable differences in tracks or bearings relative to control conditions, whereas on three occasions, whales either moved slightly away from (n = 1) or towards (n = 2) the playback speaker during exposure. The presence of the source vessel itself had a greater effect than did the M-sequence playback.

Nowacek et al. (2004) used controlled exposures to demonstrate behavioral reactions of northern right whales to various nonpulse sounds. Playback stimuli included ship noise, social sounds of conspecifics, and a complex, 18-min “alert” sound consisting of repetitions of three different artificial signals. Ten whales were tagged with calibrated instruments that measured received sound characteristics and concurrent animal movements in three dimensions. Five out of six exposed whales reacted strongly to alert signals at measured received levels between 130 and 150 dB re 1 µPa rms (i.e., ceased foraging and swam rapidly to the surface). Two of these individuals were not exposed to ship noise and the other four were exposed to both stimuli. These whales reacted mildly to conspecific signals. Seven whales, including the four exposed to the alert stimulus, had no measurable response to either ship sounds or actual vessel noise.

A negative correlation between the presence of some cetacean species and the number of vessels in an area has been demonstrated by several studies (e.g., Campana et al. 2015; Culloch et al. 2016; Oakley et al. 2017). Based on modeling, Halliday et al. (2017) suggested that shipping noise can be audible more than 100 km away and could affect the behavior of a marine mammal at a distance of 52 km in the case of tankers.

Based upon the above information regarding baleen whale responses to non-impulse sounds, it is possible that some baleen whales may exhibit minor, short-term disturbance responses to underwater sounds from the cable laying/trenching activities. Based on expected sound levels produced by the activity, any potential impacts on baleen whale behavior would likely be localized to within a few kilometers of the active vessel(s) and would not result in population-level effects.

Temporary Threshold Shift (TTS)

TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter 1985). While experiencing TTS, the hearing threshold rises and a sound must be stronger in order to be heard. It is a temporary phenomenon, and (especially when mild) is not considered to represent physical damage or "injury" (Southall et al. 2007; Le Prell 2012). Rather, the onset of TTS has been considered an indicator that, if the animal is exposed to higher levels of that sound, physical damage is ultimately a possibility. However, research has shown that sound exposure can cause cochlear neural degeneration, even when threshold shifts and hair cell damage are reversible (Kujawa and Liberman 2009; Liberman 2016). These findings have raised some doubts as to whether TTS should continue to be considered a non-injurious effect (Weilgart 2014; Tougaard et al. 2015, 2016).

The magnitude of TTS depends on the level and duration of sound exposure, and to some degree on frequency, among other considerations (Kryter 1985; Richardson et al. 1995; Southall et al. 2007). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity recovers rapidly after exposure to the sound ends. Extensive studies on terrestrial mammal hearing in air show that TTS can last from minutes or hours to (in cases of strong TTS) days. More limited data from odontocetes and pinnipeds show similar patterns (e.g., Mooney et al. 2009a,b; Finneran et al. 2010).

There are no data, direct or indirect, on levels or properties of sound that are required to induce TTS in any baleen whale. The frequencies to which mysticetes are most sensitive are assumed to be lower than those to which odontocetes are most sensitive, and natural background noise levels at those low frequencies tend to be higher. As a result, auditory thresholds of baleen whales within their frequency band of best hearing are believed to be higher (less sensitive) than are those of odontocetes at their best frequencies (Clark and Ellison 2004). From this, Southall et al. (2007) suspected that received levels causing TTS onset may also be higher in mysticetes. However, Wood et al. (2012) suggested that received levels that cause hearing impairment in baleen whales may be lower.

In pinnipeds, initial evidence from exposures to non-pulses suggested that some pinnipeds (harbor seals in particular) incur TTS at somewhat lower received levels than do most small odontocetes exposed for similar durations (Kastak et al. 1999, 2005, 2008; Ketten et al. 2001). Kastak et al. (2005) reported that the amount of threshold shift increased with increasing SEL in a California sea lion and harbor seal. They noted that, for non-impulse sound, doubling the exposure duration from 25 to 50 min (i.e., a +3 dB change in SEL) had a greater effect on TTS than an increase of 15 dB (95 vs. 80 dB) in exposure level. Mean threshold shifts ranged from 2.9–12.2 dB, with full recovery within 24 hr (Kastak et al. 2005). Kastak et al. (2005) suggested that, for non-impulse sound, SELs resulting in TTS onset in three species of pinnipeds may range from 183 to 206 dB re 1 $\mu Pa^2 \cdot s$, depending on the absolute hearing sensitivity.

Permanent Threshold Shift (PTS)

When PTS occurs, there is physical damage to the sound receptors in the ear. In some cases, there can be total or partial deafness, whereas in other cases, the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter 1985). Physical damage to a mammal's hearing apparatus can occur if it is exposed to sound impulses that have very high peak pressures, especially if they have very short rise times. Rise time is the interval required for sound pressure to increase from the baseline pressure to peak pressure. However, sounds during the proposed activities are non-impulsive and are not expected to have high peak pressures. As sea lion hearing is best between 1 and 25 kHz, the majority of cavitation noise from ships falls outside of their most sensitive hearing range. The highest sensitivity of baleen whale hearing is within the range of frequencies produced by ships. However, it is unlikely that a whale or sea lion would remain close enough to a vessel for sufficiently long to incur PTS from the low-intensity ship sounds.

5.1.1.5 Potential Effects of Noise from Action on Blue Whales

An increase in anthropogenic noise has been suggested to be a concern for blue whales. Melcon et al. (2012) found that anthropogenic noise, even at frequencies well above the whales' sound production range, had a strong probability of eliciting changes in vocal behavior. Goldbogen et al. (2013) stated that repeated exposures to anthropogenic noise could negatively impact individual feeding performance, and potentially population health. McKenna (2011) found that blue whale song was disrupted in the presence of ships and that foraging animals showed a partial Lombard effect, that is, the amplitude of calls increased with increases in background noise.

The Action Area encompasses only 183.5 km^2 within the typical range of blue whales as they are more likely to be encountered further offshore in the deeper waters of the Gulf of Alaska. The slow but continual movement of project vessels along with the rare occurrence of this species in nearshore waters means that any potential encounters are likely be brief and inconsequential.

5.1.1.6 Potential Effects of Noise from Action on Fin Whales*)*

Avoidance responses of fin whales to noise from vessel traffic alone have not been widely reported, but information on responses to seismic survey vessels during periods of inactive versus active use of airguns suggest that these whales may show some avoidance of operating vessels out to a distance of 1 km when airguns are not active (Stone 2015). Nonetheless, fin whales have routinely been sighted from seismic survey vessels during active airgun use, suggesting a certain level of tolerance of anthropogenic sounds (Stone 2003, MacLean and Haley 2004; Stone and Tasker 2006; Stone 2015). Anderwald et al. (2013) identified a negative relationship between the presence of minke whales (closely related to fin whales) and the number of vessels present during construction of a gas pipeline across a bay on the northwest coast of Ireland, suggesting some avoidance response of construction vessel activity may be expected.

The effects of sounds from shipping vessels on fin whale calls were investigated by Castellote et al. (2012). They found that in locations with heavy shipping traffic, fin whale 20-Hz notes had a shortened duration, narrower bandwidth, decreased center frequency, and decreased peak frequency. These results indicate that fin whales likely modify their call characteristics to compensate for increased background noise conditions, which may help reduce potential impacts from anthropogenic sounds.

The Action Area for this project covers 7,167 km^2 of fin whale habitat. There is also a Biologically Important Area (BIA) for fin whale feeding throughout the Action Area (Ferguson et al. 2015). However, given the low vessel speeds and low sound levels produced by this project, the effects on fin whales are expected to be minimal and temporary.

5.1.1.7 Potential Effect of Noise from Action North Pacific Right Whales

The effects of noise on North Pacific right whales (NPRW) is poorly understood, but numerous studies have occurred on North Atlantic right whales. Similar to finding of Castellote et al. (2012) for fin whales, right whales have been found to alter they calls in response to changing ambient noise conditions (Parks et al. 2007b, 2009, 2011). Tennessen and Parks (2016) used acoustic propagation modeling to show that both the passing of a nearby ship and the overall elevated background noise levels from distant vessels can reduce the distance over which right whales can communicate; however, they also showed that changes in the amplitude and frequency content of calls can compensate and increase the likelihood of detecting communication signals in shipping noise. The potential loss of right whale communication space as a result of shipping noise has also been studied by Clark et al. (2009) and Hatch et al. (2012). In addition to effects on right whale vocalizations, noise from shipping may also be responsible for elevated stress hormone levels in right whales (Rolland et al. 2012).

Tagged right whales showed no response to the playback of ship sounds, or actual ships, but did respond to the playback of an "alert" signal by swimming strongly to the surface (Nowacek et al. 2004). The authors hypothesized that the lack of responses to ship sounds may have resulted from habituation to those sounds in the heavily trafficked northwestern Atlantic Ocean.

In all these cases, the vessel sounds considered were primarily from very large shipping vessels traveling at speeds routinely above 10 kts and as high as 20 kts. Sounds produced by the smaller and slower moving vessels involved in the proposed activity are expected to be substantially lower and will not create overall elevated levels of ambient noise associated with heavily used shipping lanes. Due to the lower speeds and sounds produced by this project, changes in NPRW call characteristics or stress levels are unlikely to result from the activity.

Wright et al. (2018) found that NPRWs use Unimak Pass both during and outside of the migration period. This area has frequent vessel traffic and associated noise and may be a location where NPRW are more vulnerable to interactions with vessels. However, the lower levels of vessel activity in this region relative to the northwest Atlantic mean NPRWs may be more likely to show avoidance responses to vessel sounds, which may be beneficial in reducing the likelihood of ship strike. Nonetheless, careful watch for NPRWs should be maintained near Unimak Pass in order to avoid potential interactions.

The Action Area of this project covers 7,167 km^2 of the NPRW range; however, none of the Action Area is located in NPRW critical habitat. There is a Biologically Important Area (BIA) for NPRW feeding near the Action Area off the South East side of Kodiak Island (Ferguson et al. 2015). Given the low vessel speeds and sound levels produced by this project and the low probability of encountering NPRW along the route, effects on the NPRW are not anticipated.

5.1.1.8 Potential Effects of Noise from Action on Western North Pacific Gray Whales

There have been many studies on the effects of anthropogenic sounds on gray whales. Most of these are seismic survey related and the whales showed mixed reactions to the sounds. Studies of seismic surveys near Sakhalin Island in 1997 and 2001 found that there was no indication that Western North Pacific gray whales exposed to seismic sounds were displaced from their overall feeding grounds (Würsig et al. 1999; Johnson et al. 2007; Meier et al. 2007; Yazvenko et al. 2007a), but the whales exhibited subtle behavior changes and localized redistribution so as to avoid close approaches by the seismic vessel (Weller et al. 2002, 2006; Yazvenko et al. 2007a). Although these responses were observed, the frequency of feeding did not seem to be altered (Yazvenko et al. 2007b). Similarly, no large changes in gray whale movement, respiration, or distribution patterns were observed during the seismic programs conducted in 2010 (Bröker et al. 2015; Gailey et al. 2016).

Gray whale responses to offshore drilling activities with sound characteristics similar to or including vessel propulsion have also been reported. Malme et al. (1983, 1984) used playback of sound from helicopter overflight and drilling rigs and platforms to study behavioral effects on migrating Eastern North Pacific gray whales. Received levels exceeding 120 dB re 1 μPa rms induced avoidance reactions. Malme et al. (1984) calculated 10, 50, and 90 percent probabilities of gray whale avoidance reactions at received levels of 110, 120, and 130 dB re 1 μPa rms, respectively.

Malme et al. (1986) observed the behavior of feeding Eastern North Pacific gray whales during four experimental playbacks of drilling sounds (50 to 315 Hz; 21-minutes (min) overall duration and 10 percent duty cycle; source levels 156 to 162 dB re 1 μPa-m). In two cases for received levels of 100 to 110 dB re 1 μPa, no behavioral reaction was observed. Avoidance behavior was observed in two cases where received levels were 110 to 120 dB re 1 μPa rms. The Action Area of this project covers 923.4 km^2 of the Western North Pacific gray whale range.

The Action Area overlaps a very small portion of a Biologically Important Area (BIA) for gray whale feeding, as well as a migratory BIA for gray whales (Ferguson et al. 2015). The low sound levels generated by this project and the low probability of encountering Western North Pacific gray whales in this region make it unlikely that effects to this species will occur.

5.1.1.9 Potential Effects of Noise from Action on Humpback Whales

Measurements of several different whale-watch boats on humpback whale wintering grounds in Hawaii showed that the vessels should be readily audible to the whales (despite high ambient noise levels resulting from chorusing humpback whales), but that vessel sounds received by the whales are likely at lower levels than the sounds received by whales when in close proximity to another singing whale. That is, the source levels of singing whales are, at times, higher than the source levels of whale watching boats (Au and Green 2000). For that reason, the authors concluded that there is little chance of auditory injury to whales resulting from whale-watch boat activities. Nonetheless, disturbance reactions by humpback whales from whale-watch vessels have been reported (Schaffar et al. 2013), as well as ship strikes from these vessels (Lammers et al. 2013). Humpback whales have also shown a general avoidance reaction at distances from 2 to 4 km (1.2 to 2.5 mi) of cruise ships and tankers (Baker et al. 1982, 1983), although they have displayed no reactions at distances to 0.8 km (0.5 mi) when feeding (Watkins et al. 1981, Krieger and Wing 1986), and temporarily disturbed whales often remain in the area despite the presence of vessels (Baker et al. 1988, 1992).

Dunlop (2016) considered the effect of vessel noise and natural sounds on migrating humpback whale communication behavior. Results showed that humpbacks did not change how often or for how long they produced common vocal sounds in response to increases in either wind or vessel noise. However, increases in vocal source levels and the use of non-vocal sounds (e.g. flipper and tail slaps on the water surface) were observed in response to wind noise, but not vessel noise. The author suggested this may mean humpbacks are susceptible to masking from vessel sounds, but differences in the spectral overlap of wind and vessel sounds with humpback whale communication signals may also be a contributing factor. Tsujii et al. (2018) determined that vessel noise caused humpback whales in the Ogasawara water to stop singing temporarily rather than modifying the sound characteristics of their song through frequency shifting or source level elevation. Fournet et al. (2018) noted that humpback foraging calls in Southeast Alaska were approximately 25 to 65 dB lower than those reported by Thompson et al. (1986) and that average source level estimates for humpback whale calls in the eastern Australian migratory corridor were 29 dB higher than those in Glacier Bay (Dunlop et al. 2013). This could be the result of overall lower ambient noise in Alaskan waters, but it does provide a more accurate source level estimate for humpback whales in Alaska and highlight that humpback whale calls on foraging grounds may be at risk for acoustic masking (Fournet et al. 2018; McKenna et al. 2012).

Behavioral response studies of humpback whales to sounds from a small seismic airgun (20 in^3 volume) involved both “control” and “active” approaches where a vessel approached or crossed the path of migrating whales with and without the airgun operating. Results showed minor decreases in group dive time and the speed of southward movement, but no difference in these metrics between the “control” and “active” trials suggesting that the whales were responding to the vessel sounds more than the airgun sounds. Similar results showing minor changes in speed and/or direction were observed during “control” and “active” trials involving the ramp-up of a 440 in^3 airgun array (Dunlop et al. 2016). These results provide further support for minor responses by humpback whales to nearby vessels, but not significant disturbance reactions.

The Action Area for this project covers 7,167 km^2 of the humpback whale range. BIAs for humpback whale feeding have been designated surrounding Kodiak Island and the Shumagin Islands (Ferguson et al. 2015). Given the low sound levels produced by project vessels and slow speeds during cable laying, potential effects on humpback whales are anticipated to be minimal and temporary in nature.

5.1.1.10 Potential Effects of Noise from Action on Sperm Whales

Studies of sperm whales and the effects of airgun sounds show that the sperm whales have considerable tolerance of airgun pulses and in most cases do not show strong avoidance (Stone and Tasker 2006; Moulton and Holst 2010). Sperm whales studied off the coast of Kaikoura, New Zealand did not appear to alter their respiratory behavior, blow rates, or surface interval in the presence of whale watching vessels (Isojunno et al. 2018).

The Action Area of this project covers 7,167 km^2 of the sperm whale range habitat. Sperm whales are typically found in waters greater than 300 m deep, so it is unlikely that sperm whales will be encountered. In the unlikely event that one is encountered, the low vessel speeds and associated sound levels should have minimal effects on sperm whales and be temporary.

5.1.1.11 Potential Effects of Noise from Action on Steller Sea Lions

Most information on the reaction of sea lions to boats is related to the disturbance of hauled out animals. None of the proposed cable-lay activities will come within disturbance distance to sea lion haulouts, so impacts of this type are not expected.

There is little information on the reaction of sea lions to ships while in the water other than some anecdotal information that sea lions are often attracted to vessels (Richardson et al. 1995). However, one study of sea lion hearing found that California sea lions are able to detect realistic, complex acoustic signals in the presence of masking vessel noise better than predicted by a basic hearing model (Cunningham et al. 2014). This suggests that noise from project vessels is unlikely to have any significant effects.

The Action Area of this project covers 7,167 km^2 of Steller sea lion species range and 5,808.8 km^2 of critical habitat. None of the landing sites are near haul outs and given the relatively low sounds levels produced by project vessels, it is unlikely that impacts to Steller sea lions will occur from in-water sounds produced by the cable laying activities.

5.1.2 Strandings and Mortality

Due to the low intensity and non-impulsive nature of sounds produced by the cable laying activities, strandings or mortality resulting from acoustic exposure is highly unlikely. Rather, any potential effects of this nature are more likely to come from ship strike. Globally, the amount of shipping traffic has increased steadily over the past several decades; and along with increasing baleen whale populations (in some locations), ship-strike has been identified as a major factor potentially effecting complete recovery of whale populations to pre-exploitation levels. Laist et al. (2001) reported that fin whales are struck most frequently, but that right, humpback, sperm, and gray whales also are regularly hit. There are less frequent records of collisions with blue, sei, and minke whales. Humpback whales on feeding (Hill et al. 2017) and breeding (Lammers et al. 2013) grounds are known to experience ship strikes, and right whales are vulnerable on their feeding grounds in the northwest Atlantic (Knowlton and Kraus 2001).

In Alaska, from 1978–2011, 86% (n = 93) of reported ship strikes were of humpback whales, and there were 15 cases where humpback whales struck anchored or drifting vessels (Neilson et al. 2012). An apparent lack of effective avoidance responses by large whales, including right whales and fin whales, contributes to the risk of ship strike (Nowacek et al. 2004; McKenna et al. 2015).

Several studies have considered the risk of ship strike to fin and humpback whales in areas with heavy shipping traffic along the west coast of North America (Williams and O'Hara 2010; Nichol et al. 2017; Rockwood et al. 2017). Places where high densities of whales overlapped with frequent transits by large and fast-moving ships were identified as high-risk areas. Similarly, assessments of vessel-strikes of North Atlantic right whales resulted in changes to shipping lanes and speed restrictions in waters off the east coast of the U.S. The most significant factor in ship strikes appears to be vessel speed. Most lethal and severe injuries to large whales resulting from documented ship strikes have occurred when vessels were travelling at 26 km/h (14 kts) or greater (Laist et al. 2001); speeds not uncommon among large ships. Vanderlaan and Taggart (2007), using a logistic regression modelling approach based upon vessel strike records, found that for vessel speeds greater than 28 km/h (15 kts), the probability of a lethal injury (mortality or severely injured) from a ship-strike approaches 1. Similarly, Currie et al. (2017) found a significant decrease in close encounters with humpback whales in the Hawaiian Islands, and therefore reduced likelihood of ship strike, when vessels speeds were below 12.5 kts. Reducing ship speeds to <10 kts has proven effective for reducing ship strikes of North Atlantic right whales (Laist et al. 2014; Van der Hoop et al. 2015; Wiley et al. 2016). Because of the slow operating speeds (typically 1–4 km/h or 0.5–2 kts) and generally straight-line movements of vessels during cable laying operations, the likelihood of a ship strike, especially a lethal one, is very low.

5.1.3 Habitat Disturbance

The proposed activities will result in primarily temporary impacts to habitats used by the listed marine mammals. The main habitat disturbance impact issue associated with the proposed activity will be temporarily elevated noise levels and the associated effects on marine mammals, as discussed in Section 5.1.1, above. Other potential habitat disturbance effects of the proposed activities on marine mammals include the risk of ship strikes (see Section 5.1.2), the risk of entanglements with cables and bottom disturbance.

5.1.3.1 Risk of Entanglements

The presence of the submarine fiber optic cable during the operations phase has potential to interact with the listed marine mammals. The presence of cables between the vessel and sea floor, as well as exposed cables on the seafloor presents a potential risk of whale entanglement. While reports regarding whale interaction with deep-sea cables are rare, they have been recorded. Heezen (1957) reported 14 instances of whales entangled in submarine cables, some of these at depth of over 1,000 m. All of the whales that could be positively identified to the species level were sperm whales. Entanglements often occurred near repairs where there was a chance for extra slack cable on the bottom (Heezen 1957). These reports of entanglement from cables were from over 60 years ago with very few, if any, reports from cable-laying activities within the last 20 years. Further, cable-laying operations have improved, so the risk of entanglement is extremely low.

5.1.3.2 Bottom Disturbance

Sea bottom disturbance as a result of fiber optic cable installation route clearance and plowing/cable burial has the potential to temporarily interact with marine mammals through reduced visibility caused by the suspension of seafloor sediments in the water column. Although increased turbidity has been shown to reduce the visual acuity of harbor seals (Weiffen et al. 2006), observations of blind harbor and grey seals indicated they were capable of foraging successfully enough to maintain body condition (Newby et al. 1970; McConnell et al. 1999). High levels of turbidity are present in locations where marine mammals that do not utilize biosonar routinely forage, and laboratory studies have shown that seals are able to use other sensory systems to detect and follow potential prey without using their vision (Dehnhardt et al. 2001). Thus, any increases in turbidity are likely to have limited or no direct effects.

5.1.3.3 Potential Effects of Habitat Disturbance on Marine Mammal Species

The direct loss of habitat available to listed marine mammals due to vessel noise is expected to be minimal. Vessel noises will occupy a small fraction of the area available to marine mammals and any disruptions are expected to be minimal and temporary, with no lasting effects, as addressed in Section 5.1.1 above.

The risk of entanglement with fiber optic cables is expected to be very minimal, both during the laying of the cable (cable between the vessel and the seafloor) and once laid on the seafloor, if not buried. The listed marine mammal species are not typical benthic feeders that routinely feed near or on the seafloor, thereby decreasing the potential for interactions with the laid cables.

The limited increase in turbidity as a result of suspension of sediments from bottom disturbance will have minimal direct effect on listed marine mammals. The potential indirect effects of bottom disturbance on marine mammals through reduced feeding opportunities is assessed below in Section in Section 5.2.

5.1.4 Measures to Reduce Direct Effects on Marine Mammals

As described above, direct effects to listed marine mammals may result from in-water sounds produced by project vessel activities, potential ship strike by project vessels, or disturbance to habitat. Given the continual movement of the cable laying vessel during project activities, it is not practicable to utilize a noise attenuating device, such as a bubble curtain, sometimes used during other in-water construction activities. To reduce the potential for acoustic disturbance and to the extent it is practicable and safe, vessel operators will be instructed to operate their vessel thrusters (both main drive and dynamic positioning) at the minimum power necessary to accomplish the work.

Given the slow movements of project vessels while laying cable, ship strikes are very unlikely. Nonetheless, and to further reduce potential direct effects on listed marine mammals, while project vessels are actively laying cable or transiting in the project area, GCI plans for protected species observers (PSOs) to watch for marine mammals and assist vessel operators with following NMFS guidelines for reducing impacts to marine mammals (NOAA 2017). These measures include not approaching marine mammals closer than 100 yards, not deliberately placing a vessel in the path of oncoming marine mammals, operating the vessel at a slow, safe speed and avoiding multiple changes in direction when marine mammals are present near a vessel, not separating individuals from a group/pod, and generally not disrupting normal behaviors.

Along the route, the fiber optic cable will be laid on the seafloor surface or trenched under the surface. Trenching will likely result in greater habitat disturbance, albeit temporary, through increased turbidity in the water column and indirect effects on prey resources. Pre-lay surveys of the cable route have been conducted and the results are currently being evaluated. The results of the surveys will be used to minimize the extent to which trenching is necessary, thereby reducing impact on marine mammal habitat.

5.2 INDIRECT EFFECTS

The proposed activities will result primarily in temporary indirect impacts to listed marine mammals through the food sources they use. Although activities may have impacts on individual prey species, it is not expected that prey availability for marine mammals would be significantly affected.

Potential effects of the noise and bottom disturbance produced by project activities on fish and invertebrates are summarized below. Any effects on these potential prey items could indirectly affect marine mammals in the area.

5.2.1 Potential Impacts of Noise on Habitat

Exposure to anthropogenic underwater sounds has the potential to cause physical (i.e., pathological and physiological) and behavioral effects on marine invertebrates and fishes. Studies that conclude that there are physical and physiological effects typically involve captive subjects that are unable to move away from the sound source and are therefore exposed to higher sound levels than they would be under natural conditions. Comprehensive literature reviews related to auditory capabilities of fishes and marine invertebrates and the potential effects of noise include Hastings and Popper (2005), Popper (2009), Popper and Hastings (2009a, b), and Hawkins et al. (2015).

Underwater sound has both a pressure component and a particle displacement component. While all marine invertebrates and fishes appear to have the capability of detecting the particle displacement component of underwater sound, only certain fish species appear to be sensitive to the pressure component (Breithaupt 2002; Casper and Mann 2006; Popper and Fay 2010).

5.2.1.1 Effects on Invertebrates

The sound detection abilities of marine invertebrates are the subject of ongoing debate. Aquatic invertebrates, with the exception of aquatic insects, do not possess the equivalent physical structures present in fish and marine mammals that can be stimulated by the pressure component of sound. It appears that marine invertebrates respond to vibrations (i.e., particle displacement) rather than pressure (Breithaupt 2002).

Among the marine invertebrates, decapod crustaceans and cephalopods have been the most intensively studied in terms of sound detection and the effects of exposure to sound. Crustaceans appear to be most sensitive to low frequency sounds (i.e., <1,000 Hz) (Budelmann 1992; Popper et al. 2001). Both cephalopods (Packard et al. 1990) and crustaceans (Heuch and Karlsen 1997) have been shown to possess acute infrasound (i.e., <20 Hz) sensitivity. Some studies suggest that there are invertebrate species, such as the American lobster (*Homarus americanus*), that may also be sensitive to frequencies >1,000 Hz (Pye and Watson III 2004). A recent study concluded that planktonic coral larvae can detect and respond to sound, the first description of an auditory response in the invertebrate phylum Cnidaria (Vermeij et al. 2010).

5.2.1.2 Effects on Fish

Marine fishes are known to vary widely in their abilities to detect sound. Although hearing capability data only exist for fewer than 100 of the 27,000 fish species (Hastings and Popper 2005), current data suggest that most species of fish detect sounds with frequencies <1,500 Hz (Popper and Fay 2010). Some marine fishes, such as shads and menhaden, can detect sound at frequencies >180 kHz (Mann et al. 1997, 1998, 2001).

Numerous papers about the behavioral responses of fishes to marine vessel sound have been published in the primary literature. They consider the responses of small pelagic fishes (e.g., Misund et al. 1996; Vabo et al. 2002; Jørgensen et al. 2004; Skaret et al. 2005; Ona et al. 2007; Sand et al. 2008), large pelagic fishes (Sarà et al. 2007), and groundfishes (Engås et al. 1998; Handegard et al. 2003; De Robertis et al. 2008). Generally, most of the papers indicate that fishes typically exhibit some level of reaction to the sound of approaching marine vessels, the degree of reaction being dependent on a variety of factors including the activity of the fish at the time of exposure (e.g., reproduction, feeding, and migration), characteristics of the vessel sound, and water depth. Simpson et al. (2016) found that vessel noise and direct disturbance by vessels raised stress levels and reduced anti-predator responses in some reef fish and therefore more than doubled mortality by predation. This response has negative consequences for fish but could be beneficial to marine mammals that prey on fish.

Given the routine presence of other vessels in the region and the lack of significant effects on fish species from their presence, indirect effects to listed species from exposure of fish to project vessel sounds is expected to be very unlikely.

5.2.1.3 Sea Bottom Disturbance

Limited negative effect of sea bottom disturbance will occur during various marine cable installation activities, including route clearance and ploughing. During each of these activities, equipment will make contact with the substrate. Section 2.5 describes each of these activities and indicates that contact between each activity's equipment and the substrate is very limited in surface area extent. Bottom disturbance during route clearance and pre-lay grapnel run is very surficial while disturbance caused by ploughing and post-lay inspection and burial is slightly deeper but will not exceed 1.5 m (~5 ft). Sediment and benthos would be most affected by the activities although there is some potential for limited temporary suspension of sediment in the water column. It is unlikely that there will be any significant indirect effect on listed marine mammals through the activities' disturbance of the sea bottom on invertebrate and fish eggs and larvae in the water column.

5.3 CUMULATIVE EFFECTS

Cumulative effects under the ESA are future State, city/county, or private activities that are reasonably certain to occur within the action area and do not include future federal actions that are located within the action area of the proposed project (50 CFR 402.02).

Although a number of known and potential threats to the listed marine mammals have been identified, the level of impact from many of these threats on an individual and on a collective basis is poorly understood. Cumulative effects include synergistic effects in which two stressors interact and cause greater harm than the effects of the overall impacts of an individual stressor. The following discussion describes the cumulative effects to the greatest extent practicable.

5.3.1 Coastal Development

Coastal zone development may result in the loss of habitat, increased vessel traffic, increased pollutants, increased noise associated with construction, and noise associated with the activities of the projects after construction. As the population in urban areas continue to grow, an increase in amount of pollutants that enter the region's waterways may occur. Sources of pollutants in urban areas include runoff from streets and discharge from wastewater treatment facilities. Gas, oil, and coastal zone development projects also contribute to pollutants that may enter the western Gulf of Alaska through discharge. Significant development is not expected to take place in the project area; therefore, it would be expected that pollutants will likely not increase in its waterways. Further, the EPA and the ADEC will continue to regulate the amount of pollutants that enter the Gulf of Alaska from point and non-point sources through NPDES permits. As a result, permittees will be required to renew their permits, verify they meet permit standards and potentially upgrade facilities. Additionally, the extreme weather patterns, tides, and strong currents around Kodiak Island, the Alaska Peninsula, and the Aleutian Islands may contribute in reducing the amount of pollutants found in the region.

Coastal zone development may result in the loss of habitat, increased vessel traffic, increased pollutants and increased noise associated with construction and noise associated with the activities of the projects after construction. The proposed project will result in a small and temporary increase in vessel traffic and associated noise during the cable-laying operations and temporary disturbance of marine mammal habitat. The broadband service will improve communications for communities throughout the region, and it is not expected to result in substantial coastal development.

5.3.2 Fisheries Interaction

Fishing is one of the primary industries throughout the project region. As long as fish stocks are sustainable, subsistence, personal use, recreational, and commercial fishing will continue to take place. As a result, there will be continued prey competition, risk of ship strikes, potential harassment, potential for entanglement in fishing gear, and potential displacement from important foraging habitat for the marine mammals. NMFS and the ADF&G will continue to manage fish stocks and monitor and regulate fishing to maintain sustainable stocks.

The proposed project will result in a small and temporary increase in vessel traffic and associated noise during the cable-laying operations and temporary disturbance of marine mammal habitat. The project is not expected to result in any conflicts with commercial or subsistence fisheries.

5.3.3 Vessel Traffic

With decreasing sea ice across the Northwest Passage, the number of vessels traversing through the region is expected to continue to increase (Arctic Council 2009).

The proposed project will result in temporary increased vessel traffic of only a few vessels during the cable-laying operations.

5.3.4 Oil and Gas

It is unknown if the Alaska Peninsula lease sale area will be opened to oil and gas exploration in the future. Potential impacts from gas and oil development on marine mammals include increased noise from seismic activity, vessel and air traffic, construction of platforms and well drilling, discharge of wastewater; habitat loss from the construction of oil and gas facilities, and contaminated food sources and/or injury from a natural gas blowout or oil spill. The risk of these impacts may increase as oil and gas development increases; however, new development will undergo consultation prior to exploration and development.

Support vessels are required for gas and oil development to transport supplies and products to and from the facilities. Not only will the support vessels from increased gas and oil development likely increase noise in the action areas, there is a potential for increased ship strikes with marine animals.

6.0 DETERMINATION OF EFFECTS

The following section describes the effects of the proposed AU-Aleutian project on the listed species that occur in the region and their critical habitat (if applicable). A summary of determination by species is provided in Table 1 in the Executive Summary.

6.1 EFFECT ON THE BLUE, FIN, GRAY, HUMPBACK, AND SPERM WHALE AND THEIR CRITICAL HABITAT

We conclude that the AU-Aleutian project **may affect and is not likely to adversely affect** the blue, fin, gray, humpback, and sperm whale due to the noise associated with the subsea cable installation activity. NMFS determined that noise associated with the installation will not reach levels exposing marine mammals to a Level B take (harassment) under the MMPA. Further, these species are associated with deeper waters in the Gulf of Alaska and are very unlikely to be observed during the installation. The mitigation measures described in Section 5.1.4 will be implemented throughout the duration of the project to reduce exposure to noise and risk from ship strikes associated with the activity. Mitigation measures include vessel-based monitoring and speed or course alteration.

No critical habitat has been designated for these species.

6.2 EFFECT ON THE NORTH PACIFIC RIGHT WHALE AND ITS CRITICAL HABITAT

We conclude that the AU-Aleutian project **may affect and is not likely to adversely affect** the North Pacific right whale due to the noise associated with the subsea cable installation activity. NMFS determined that noise associated with the installation will not reach levels exposing marine mammals to a Level B take (harassment) under the MMPA. The mitigation measures described in Section 5.1.4 will be implemented throughout the duration of the project to reduce exposure to noise and risk from ship strikes associated with the activity. Mitigation measures include vessel-based monitoring and speed or course alteration.

The proposed AU-Aleutian project would have **no effect on critical habitat** of the North Pacific right whale because the proposed project is located outside of designated critical habitat for this species. No permanent modifications from the program on North Pacific right whale critical habitat are anticipated because subsea installation activity will be short-term, localized, and outside of designated critical habitat. No studies have demonstrated that ship noise affects prey species of the right whale, except when exposed to sound levels within a few meters of a strong sound source.

6.3 EFFECT ON THE STELLER SEA LION AND ITS CRITICAL HABITAT

We conclude that the AU-Aleutian project **may affect and is not likely to adversely affect** the Steller sea lion due to the noise associated with the subsea cable installation activity. NMFS determined that noise associated with the installation will not reach levels exposing marine mammals to a Level B take (harassment) under the MMPA. The monitoring measures described in Section 5.1.4 will be implemented throughout the duration of the project to reduce exposure to noise and risk from ship strikes associated with the activity. Mitigation measures include vessel-based monitoring and speed or course alteration. There are several rookeries and haulouts near the Action Area and it is expected that Steller sea lions will be present. They may be attracted to the ship and barge during construction activities; therefore, the presence of Steller sea lions near project vessels is anticipated to be very likely.

The proposed AU-Aleutian project would result in disturbance due to noise of approximately 5,808.8 km^2 of Steller sea lion critical habitat. No permanent modifications from the program on Steller sea lion critical habitat are anticipated because subsea installation activity will be short-term and localized. Therefore, there would be **no adverse modification to critical habitat** of Steller sea lion.

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APPENDIX A

EQUIPMENT SPECIFICATIONS