APPENDIX F

Agency Correspondence, Consultations and Biological Assessments

From: Korsmo (Aughe), Stacey
To: Leanne Roulson - NOAA Affiliate
Cc: Emily Creely; Larson, Meghan; Pereira, Amanda; Andrew.Bielakowski; Cameron Miller; Nathan Mennen
Subject: RE: [EXT]:AKRO-2023-03226 AU-Aleutian II Fiber project (Grant # NT22TBC0290091)
Date: Wednesday, January 31, 2024 8:00:43 PM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
20240131 NMFS BA_Rev.1_clean.pdf

Good evening, Leanne,

As promised, please find attached the revised BA. In addition to your requested change to the Action Area, we also made a minor revision to the project timeline in Section 3.6. I included the following table clarifying anticipated "start" and "complete" dates for each project component.

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	Subsea FOC for Chignik Lake	6/1	6/30

Please let me know if you have any additional questions.

Kind regards,
Stacey

****Working part-time: Monday - Wednesday***

Stacey Korsmo
Senior Project Scientist
(907) 301-5815 Stacey.Aughe@WestonSolutions.com
Environmental and Infrastructure Solutions

From: Leanne Roulson - NOAA Affiliate <leanne.roulson@noaa.gov>
Sent: Tuesday, January 30, 2024 6:34 AM
To: Korsmo (Aughe), Stacey <Stacey.Aughe@WestonSolutions.com>
Cc: Emily Creely <ecreely@dowl.com>; Larson, Meghan <Meghan.Larson@WestonSolutions.com>;

apereira@ntia.gov; andrew.bielakowski@firstnet.gov; CMiller3@gci.com; Nathan Mennen <NMennen@gci.com>
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***** External Message *** -- PROBE message before clicking links or opening attachments.**

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Leanne
Leanne H. Roulson
Consultation Biologist

Salus Resources, Inc.
Certified Fisheries Professional

(813) 291-0181 (Google voice)
406-690-4223 (mobile)
leanne.roulson@noaa.gov

On Mon, Jan 29, 2024 at 2:20 PM Korsmo (Aughe), Stacey <Stacey.Aughe@westonsolutions.com> wrote:

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> (813) 291-0181 (Google voice)
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> leanne.roulson@noaa.gov
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From: Leanne Roulson - NOAA Affiliate <leanne.roulson@noaa.gov>
Sent: Thursday, January 11, 2024 10:26 AM
To: Larson, Meghan <Meghan.Larson@WestonSolutions.com>; Korsmo (Aughe), Stacey <Stacey.Aughe@WestonSolutions.com>
Cc: Sierra Franks - NOAA Federal <sierra.franks@noaa.gov>
Subject: [EXT]:AKRO-2023-03226 AU-Aleutian II Fiber project (Grant # NT22TBC0290091)

Hi Meghan and Stacey-

I have reviewed the materials provided for the Aleutian II Fiber project. The project has been assigned a tracking number in our NMFS Environmental Consultation Organizer (ECO), AKRO-2023-03226. Please refer to this number in any future inquiries regarding this project.

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It would be helpful if you could submit a cover letter that clearly describes the type of consultation being requested, and delineates aspects of the project which are being changed, or that you believe require additional consultation under Section 7(a)(2) of the ESA.

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Let me know if you have questions or want to discuss anything related to the project.

Thank you,

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To:	Korsmo (Aughe), Stacey
Cc:	Emily Creely; Larson, Meghan; Pereira, Amanda; Andrew.Bielakowski; Cameron Miller; Nathan Mennen
Subject:	Re: [EXT]:AKRO-2023-03226 AU-Aleutian II Fiber project (Grant # NT22TBC0290091)
Date:	Monday, February 5, 2024 9:13:18 AM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png

Hi Stacey-
I will take a look and let you know if I have any questions.
Thanks so much,
Leanne

Leanne H. Roulson
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Subject:	RE: [EXT]:AKRO-2023-03226 AU-Aleutian II Fiber project (Grant # NT22TBC0290091)
Date:	Friday, January 19, 2024 2:26:47 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png 20231218 Unicom AU-A II NMFS BA.pdf 20240119 AU-A II Request for Consultation_Cvr Ltr.pdf

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406-690-4223 (mobile)
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January 19, 2024

Leanne Roulson
National Marine Fisheries Service
Alaska Region, Protected Resources Division
709 W. 9th St.
Juneau, AK 99802-1668

RE: AU-Aleutian II Fiber Project - Request for Reinitiation of Endangered Species Act Section 7 Consultation AKRO-2019-00892

Dear Ms. Roulson,

National Telecommunications and Information Administration (NTIA) requests reinitiation of Consultation AKRO-2019-00892 for the AU-Aleutian (Phase I) Project to include new and revised branch segments and recent resource developments which occurred since the initial consultation was completed in 2019.

Initial Endangered Species Act (ESA) Section 7consultation for the 2021 AU-Aleutian Project included installation of nearly 1,287.5-kilometer (km; 800-mile [mi.]) subsea fiber optic cable (FOC) to extend broadband service to the remote communities of Larsen Bay, Chignik Bay, Sand Point, King Cove, Akutan, Unalaska, Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass. Of those communities proposed, five have not yet been constructed. Those five communities (Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass) as well as to two additional proposed branch segments are included in this request.

This request for re-initiation of the ESA consultation for Phase II of the AU-Aleutian Project (AU-A II) includes the following changes:

1. Change in lead federal agency from U.S. Department of Agriculture Rural Utility Service to NTIA
2. Two new branch segments to the communities of Ouzinkie and Port Lions
3. Modified branch segments to Chignik Lagoon and Chignik Lake
4. Newly designated humpback whale critical habitat
5. Addition of sunflower sea stars, which were recently proposed for listing under the ESA

Table 1 includes a summary of the scope of this request for reinitiation in relation to the scope included in the 2019 consultation for AU-A I (AKRO-2019-00892).

Table 1. Scope Summary of Request for Reinitiation of ESA Section 7 Consultation in Relation to that Included in the 2019 Consultation

Branch Segment Landfall	Included in Initial Consultation (AKRO-2019-00892)?	Landfall Coordinates		Request review of potential impacts on newly-designated humpback whale critical habitat	Request conference on proposed listing of sunflower sea stars
		Latitude	Longitude		
Ouzinkie		N 57.920577°	W 152.501018°	✓	✓
Port Lions		N 57.863725°	W 152.860244°	✓	✓
Chignik Lagoon	✓ (since modified)	N 56.31084328º	W 158.54006013º	✓	✓
Chignik Lake	✓ (since modified)	N 56.26037124º	W 158.70402045º	✓	✓
Perryville	✓	N 55.91007222º	W 159.14428056º	✓	✓
Cold Bay	✓	N 55.19574691º	W 162.69750980º	✓	✓
False Pass	✓	N 54.85574800º	W 163.40956004º	✓	✓

If you have any questions, please reach out to me (907-301-5815; Stacey.aughe@westonsolutions.com) or Meghan Larson (907-982-5529; Meghan.larson@westonsolutions.com) as NTIA's Non-Federal Designees for ESA Section 7 consultation.

Sincerely,

Stacey Korsmo

Stacey Korsmo
Sr. Project Scientist
Weston Solution, Inc.

From:	Bonnie Easley-Appleyard - NOAA Federal
To:	Larson, Meghan
Cc:	andrew.bielakowski@firstnet.gov; apereira@ntia.gov; cmiller3@gci.com; Emily Creely; Greg Balogh - NOAA Federal; Leah Davis - NOAA Federal; Sharee Tserlentakis (Marin)
Subject:	Re: [EXT]:Previous AU GCI Monitoring Report
Date:	Monday, October 30, 2023 10:38:01 AM
Attachments:	image001.png image002.png

You don't often get email from bonnie.easley-appleyard@noaa.gov. Learn why this is important

Hi Everyone,

We had a chance to review the materials you sent over and have an internal discussion (ESA & MMPA offices) regarding the remainder of the AU Aleutian Fiber Optic Cable Installation project. We no longer believe this is a formal consultation or in need of an IHA. The ESA office would still like to meet with you on Monday to fully understand the difference between what was previously consulted on and what is remaining to determine the path forward for the informal ESA Section 7 consultation but we wanted to give you a heads up.

Bonnie Easley-Appleyard
Marine Mammal Specialist
NOAA Fisheries, Alaska Region
Office: (907) 271-5172
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On Tue, Oct 24, 2023 at 9:26 AM Bonnie Easley-Appleyard - NOAA Federal <bonnie.easley-appleyard@noaa.gov> wrote:

> Thanks Meghan for the additional information. After our meeting we looked at our schedules and it was impossible for us to meet internally prior to Monday. Would it be possible for you to meet instead on Thursday Nov 2nd at 9 am AKT or Monday Nov 6th at 9 am AKT? It looks like all three of us are available both of those times.
>
> **Bonnie Easley-Appleyard**
> *Marine Mammal Specialist*
> NOAA Fisheries, Alaska Region
> Office: (907) 271-5172
> www.fisheries.noaa.gov
>
> On Mon, Oct 23, 2023 at 2:57 PM Larson, Meghan <Meghan.Larson@westonsolutions.com> wrote:

Thank you, Bonnie! And thank you to everyone for the discussion this morning, we appreciate your time and guidance.

Please find the following attached for reference as well:

1. Vicinity map
2. AUA BA submitted to NMFS
3. AUA LOC from NMFS

Additionally, the following is a summary of sightings during the AUA project based on the monitoring report Bonnie provided this morning and a summary of sound source proxies.

AUA Sighting Summary

Reactions were documented in 8 sightings of 12 individuals total; however, Smultea did not attribute reactions to vessel operations specifically. The data sheets do not say what the activity was at the time of sighting, so it is not clear if the sightings occurred while the vessel was in DP.

- Steller Sea Lion – 3 sightings, 4 individuals total; 'Look' was recorded as the reaction during all sightings
- Sea Otter – 5 sightings, 8 individuals total;
  - 1 sighting/1 animal 'Dive' was the reaction
  - 2 sightings/5 animals 'Look' was the reaction
  - 1 sighting/1 animal 'Speed up' was the reaction
  - 1 sighting/1 individual 'Change direction' was the reaction

"Behavioral changes were noted for eight of the marine mammal detections, however none indicated that the animals were reacting specifically to vessel operations. It should be noted that assessing behavioral changes can be difficult from vessels that are underway. The reactions observed could have been for any number of stimuli and not just the operations or vessel noise. Since the noise produced by the operations is similar in caliber to that of engine noise, it would be difficult to parse what an animal is reacting to when underway."

The following is a summary of marine mammals sighted within 2.3 km of the vessel (assumed to be the Level B acoustic harassment threshold during cable laying operations based on *Fugro Synergy* measurements). There were nearly an equal number of hours the PSOs were on watch while cable laying was not occurring (308 h; i.e., sightings included in the table below that would not be considered an exposure because a sound source was not active) as there were when PSOs were not on watch and cable laying was occurring

(324 h; i.e., when exposures may have occurred but not been document because PSOs were not on watch). It seems reasonable in this brief analysis these two differentiators would counterbalance each other, and the total number of sightings listed below would be an appropriate assumption for total potential project exposures within the Level B acoustic harassment threshold.

Species	# of Sightings	Total # of Individuals	Average Detection Distance (m)[1]	Average CPA (m)[1]
Dall's Porpoise	6	28	234	219
Fin Whale[2]	25	36	1286	1131
Harbor Seal	1	1	75	50
Humpback Whale[2]	85	140	1268	1057
Pacific White-sided Dolphin	1	2	5	5
Sea Otter[2, 3]	12	41	466	385
Steller Sea Lion[2]	11	18	489	445
Unidentified Whale	23	55	1160	1156

[1]Unweighted sighting average, does not account for multiple individuals in a given sighting.

[2]Listed as 'Endangered' under the Endangered Species Act

[3]Managed by USFWS

Sound Source Proxies

In AUA three sound sources were used:

1. Cable laying barge in shallow waters (non-impulsive sound): 149 dB re 1 µPa rms at 100 m based on Blackwell and Greene (2003) which measured the tug *Leo* pushing a full barge *Katie II* near the Port of Anchorage while using its thrusters to maneuver the barge during docking. 2.8 km Level B acoustic harassment threshold. Our understanding is a tug/barge combo will not be used for AU2, rather a 40- or 80-ft landing craft will be used. We haven't identified a sound source proxy for this yet because it is still unclear if the 40- or 80-ft boat will be used. The engines are 600 HP each and it is assumed they will have a much smaller acoustic footprint than the barge did.
2. Cable laying ship in all but shallow waters (non-impulsive sound): 119 to 127 dB re 1 µPa rms at 1 km from Warner and McCrodan (2011) which measured the *Fugro Synergy* while using dynamic positioning thrusters during geotechnical coring

operations in the Chukchi Sea. 2.3 km Level B acoustic harassment threshold. Important to note is this project proposes to use the *IT Integrity* (spec sheet available here) vs. the *IT Intrepid* which was used for AUA and is significantly bigger.

For AU2, a water jet is also being proposed:

3. Water jet: 176 dB re 1 µPa rms from Austin (2017) which measured sound from a Caviblaster in Cook Inlet. 860 m Level B acoustic harassment threshold.

Thank you, again,
Meghan

Meghan Larson
(907) 982-5529 Meghan.Larson@WestonSolutions.com

From: Bonnie Easley-Appleyard - NOAA Federal <bonnie.easley-appleyard@noaa.gov>
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Subject: [EXT]:Previous AU GCI Monitoring Report

Bonnie Easley-Appleyard
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United States Department of the Interior

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

In Reply Refer to:
FWS/R7/SAFWFO

Stacey Korsmo
Senior Project Scientist
Weston Solutions, Inc.
101 West Benson Boulevard, Suite 312
Anchorage, Alaska 99503

Subject: AU-Aleutian II Fiber Project, Bering Sea, Alaska (Consultation Number 2024-0046567)

Dear Stacey Korsmo:

Thank you for your December 21, 2023, letter 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). The National Telecommunications and Information Administration (NTIA) Tribal Broadband Connectivity Program is supporting a proposal from Unicom, Inc. (Unicom) and the Native Village of Port Lions to extend broadband service to six remote communities. The NTIA has designated Weston Solutions, Inc. as their non-Federal representative. Unicom, Inc. proposes to build on the AU-Aleutian I Fiber Project and connect additional communities to the existing subsea fiber backbone. Weston Solutions, Inc. determined the proposed project may affect but is not likely to adversely affect the federally threatened Steller's eider (*Polysticta stelleri*), the federally endangered short-tailed albatross (*Phoebastria albatrus*), and the federally threatened Southwestern Distinct Population Segment (SW-DPS) northern sea otter (*Enhydra lutris kenyoni*) and its designated critical habitat.

Project Description

The purpose of the project is to provide fast and reliable internet to seven rural Alaska Native communities for the first time (Ouzinkie, Port Lions, Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass). The proposed project includes installing fiber optic cable (FOC) by laying it on the seafloor, except areas within 298.8 meters (m; 980 feet [ft]) of shoreline. In nearshore areas of mean low water, FOC burial would occur within intertidal areas at seven landings. In areas where burial is necessary, the burial depth would be no deeper than 0.9 m (3 ft) and there would be no resulting side cast. The FOC would have a diameter up to 2.6 centimeters (1.02 inches). Unicom, Inc. anticipates terrestrial activities occurring between May 1 and October 31, 2024, and marine activities occurring between June 30 and October 15, 2024. Terrestrial activities in 2025 would occur between May 1 and October 31 and marine activities would occur between June 1 and June 30, with project completion in Fall 2025. Cable laying activities would occur 24 hours a day in the summer.

Listed Species

Short-Tailed Albatross

The short-tailed albatross was federally listed as endangered throughout its range on July 31, 2000 (65 FR 147:46643-46654). The short-tailed albatross is a large pelagic bird that ranges across most of the North Pacific Ocean, including the Aleutian Islands and into the Gulf of Alaska during the non-breeding season (USFWS 2008). The species spends the majority of their lives in marine environments and is known to forage primarily on continental shelf breaks in Alaskan waters but may also be found near shore when upwelling creates prey-rich concentrations. The project overlaps with the range of short-tailed albatross, but activities will take place closer to shore where the species is less likely to occur.

Steller's Eider

The threatened Steller's eider is a small, compact sea duck that nests on the Alaska Coastal Plain, near Utqiaġvik. Steller's eiders spend the majority of their lives in the marine environment, occupying terrestrial habitats only during the nesting season (USFWS 2019). The species undergoes an annual migration from tundra nesting grounds to pacific wintering habitat, during which they undergo a flightless molt (Petersen 1980). After molt, Pacific-wintering Steller's eiders disperse throughout the Aleutian Islands, Alaska Peninsula, and western Gulf of Alaska. The range of Steller's eiders overlaps with the proposed project area, and eiders may be in the project area between November and April. They are known to occur in nearshore waters along the Alaska Peninsula and Kodiak Island during winter, with known concentration areas near Kodiak and Cold Bay. Steller's eiders usually begin their spring migration to northern nesting sites in April with fall migration typically occurring August to November.

Northern Sea Otter

The SW-DPS of northern sea otters was federally listed as threatened on September 8, 2005 (70 FR 152:46366-46386). The SW-DPS northern sea otters are small marine mammals that occur from western Cook Inlet to Attu Island in the Aleutian Chain (USFWS 2020). The species typically occurs in water 40 m (131 ft) deep or less and within 0.9 to 3 kilometers (0.6 to 1.9 miles) of shore, and areas of kelp forest, seagrass bed, and barrens are used (USFWS 2020). The proposed project area overlaps with the range of northern sea otters, and sea otters may be present in the area at any time of year.

Sea Otter Critical Habitat

The Service finalized designation of sea otter critical habitat on October 8, 2009 (74 FR 51988). In all, 15,161 square kilometers (5,854 square miles) of critical habitat was designated for the threatened northern sea otter in southwest Alaska. The physical and biological features essential to conservation of the species, and which may require special management considerations, were identified as Primary Constituent Elements (PCEs) in the northern sea otter critical habitat rule (74 FR 51988). The PCEs identified for sea otter critical habitat are:

1. Shallow, rocky areas where marine predators are less likely to forage, which are generally waters less than 2 m (6.6 ft) in depth.

2. Nearshore waters that may provide protection or escape from marine predators, which are those within 100 m (328.1 ft) of the mean high tide line.
3. Kelp forests that provide protection from marine predators; kelp forests occur in waters less than 20 m (65.6 ft) in depth.
4. Prey resources within the areas identified by PCEs 1, 2, and 3, that are present in sufficient quantity and quality to support the energetic requirements of northern sea otters.

Critical habitat for northern sea otters is divided into five Management Units corresponding to the recovery units listed in the Recovery Plan (USFWS 2013). The proposed project is located in Unit 2: Eastern Aleutian, Unit 3: South Alaska Peninsula, and Unit 5: Kodiak, Kamishak, Alaska Peninsula with designated sea otter critical habitat extending from the "mean high tide line to the 20-m (65.6-ft) depth contour as well as waters occurring within 100 m (328.1 ft) of the mean high tide line" (74 FR 51988).

Avoidance and Minimization Measures
The NTIA and Unicom will implement the mitigation measures provided in their Biological Assessment to reduce the risk of harm to listed northern sea otters, short-tailed albatross, and Steller's eiders (6.1.4 Measures to Reduce Direct Effects on Affected Species in AU Aleutian-II Fiber Project – USFWS Biological Assessment). These measures include:

- Employing a protected-species observer (PSO) that will clear a monitoring zone prior to the start of cable-laying operations, or when activities have been stopped for more than 30 minutes.
- Vessels will not allow tow lines to remain in the water, and no trash or other debris will be thrown overboard, thereby reducing the potential for entanglement of ESA-listed species.
- Vessels may not be operated in such a way as to separate members of a group of marine mammals from other members of the group.
- 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, to reduce potential acoustic disturbance.
- Spatial planning to avoid concentration areas of Steller's eiders and short-tailed albatross.
- Artificial lighting will be reduced or shielded so it is not projected skyward to reduce attracting birds.

Effects of the Action
Project activities could disturb short-tailed albatross, Steller's eiders, and sea otters if any are present during activities. Short-tailed albatross are not likely to occur near shore or in protected inlets (e.g., bays) where much of the project will take place, but they may be more likely to occur in areas of transit between branch segments. Short-tailed albatross can be attracted to vessel trash and debris and therefore can be vulnerable to entrapment, entanglement, or bycatch. Ensuring no trash or other debris is thrown overboard will prevent attracting short-tailed

albatross and reduce the potential for entanglement or entrapment. Other avoidance and minimization measures, such as minimizing lights and avoiding concentration areas, should reduce other potential negative effects to short-tailed albatross if they are in the project area. Therefore, such effects are expected to be insignificant.

Steller's eiders will likely only be present in the project area during wintering months (November to April) although they may occur before November, especially in Cold Bay, Alaska. Project activities will not occur in known molting areas. Marine FOC activities are scheduled between June 30 and October 15 in 2024 and June 1 to June 30 in 2025, limiting the time of overlap with Steller's eiders in the project area. If Steller's eiders are present during project activities, they could be affected by vessel traffic. Implementation of PSO and vessel operation protocols should minimize the potential for bird strike by vessels. The slow operating speed of the cable laying vessel (approximately 2 to 3 knots) and the use of spatial planning to avoid known concentration areas should also reduce the risk of strike. Light pollution is a particular concern for migrating birds. Birds may be attracted to or disoriented by artificial lighting, leading to collision-caused injuries and fatalities, grounding, or circling behavior that leads to exhaustion, decreased body condition, and reduced survival. Down shielding lights and keeping vessel deck lights to a minimum should minimize effects of light pollution on migrating Steller's eiders. Thus, project effects are expected to be insignificant on Steller's eiders.

Northern sea otters could also be affected by vessel traffic. The PSO protocols, vessel operation measures, and slow vessel operating speeds should minimize disturbance by vessels on sea otters and therefore should avoid potential take. Sea otters could also be disturbed by project noise. Using the sound source level for the cable laying ship provided in the Biological Assessment (185.2 dB re 1 μPa rms at 1 meter), the distance to the 160 dB re 1 μPa rms acoustic threshold for sea otters is 48 m (157 ft), assuming practical spreading loss. The risk of negative effects from noise should be minimal because the anticipated disturbance zone is relatively small, the 1,500-m (4,924-ft) monitoring zone includes this anticipated disturbance zone, and PSOs will report sightings of sea otters within the monitoring zone to the Service. Additionally, to reduce noise levels, vessel operators will be instructed to operate their vessel thrusters at the minimum power necessary. We expect project effects on northern sea otters to be insignificant.

Effects of proposed project activities are expected to be temporary and minimal to PCEs for sea otters. The proposed project would not result in the reduction of designated critical habitat for the northern sea otter, although there will likely be some temporary disturbance of the benthic community, kelp beds, and the seafloor. Disturbances to the benthic community could affect prey resources, but such affects are expected to be localized and temporary. It is unlikely that temporary habitat disturbance in these areas would affect essential features to any measurable degree therefore, we expect any such effects to be insignificant.

Conclusion

After reviewing the proposed project and evaluating its anticipated effects, the Service concurs with your determination that the proposed project is not likely to adversely affect Steller's eiders, short-tailed albatross, northern sea otters, and northern sea otter critical habitat. Based on your request and our response, requirements of section 7 of the ESA have been satisfied. However, if new information reveals that project impacts 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 should 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 questions or need more information, please contact Fish and Wildlife Biologist, Kaitlyn Howell, at kaitlyn_howell@fws.gov or 817-240-2179 and refer to Consultation Number 2024-0046567.

Sincerely,

DOUGLASS COOPER

Digitally signed by DOUGLASS COOPER
Date: 2024.02.15 09:04:14 -09'00'

Douglass M. Cooper
Ecological Services Branch Chief

References

Petersen, M.R. 1980. Observations of wing-feather molt and summer feeding ecology of Steller's eiders at Nelson Lagoon, Alaska. Wildfowl 31:99-106.

[USFWS] U.S. Fish and Wildlife Service. 2008. Short-tailed Albatross Recovery Plan. Anchorage, Alaska. 105 pp.

[USFWS]. 2013. Southwest Alaska Distinct Population Segment of the Northern Sea Otter (*Enhydra lutris kenyoni*) Recovery Plan. Marine Mammals Management Office. Anchorage, Alaska.

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

[USFWS]. 2020. Species status assessment report for the Southwest Distinct Population Segment of the Northern Sea Otter (*Enhydra lutris kenyoni*), Version 2.0. December 2020. U.S. Fish and Wildlife Service. Anchorage, Alaska.

From: Ott, Kaithryn
To: Korsmo (Aughe), Stacey; AK Marine Mammals, FW7
Cc: Emily Creely; Larson, Meghan; NMennen@gci.com; Cameron Miller; Pereira, Amanda; Andrew.Bielakowski; Cooper, Douglass
Subject: [EXT] Re: [EXTERNAL] AU-Aleutian II Fiber Project Biological Assessment Submittal
Date: Friday, December 22, 2023 8:52:24 AM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
AU-A II Non-Federal Designation_USFWS_signed.pdf
20231221 USFWS BA.pdf

Hi Stacey,

Someone in one of our other offices may have already reached out to you, so apologies if this message is a duplicate. Thank you for contacting us regarding the proposed fiber project. The action area is within our Anchorage office's jurisdiction and I've cc'd their Branch Manager, Doug Cooper, who can assist you further with this request. Please let me know if there's anything else I can do to help from this end.

Thanks again,

Kaiti

--
Kaithryn Ott (she/her)
Fish and Wildlife Biologist
U.S. Fish & Wildlife Service
Northern Alaska Field Office
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Fairbanks, AK 99701

Best number: 907-987-2213
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Subject: [EXTERNAL] AU-Aleutian II Fiber Project Biological Assessment Submittal

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Good afternoon,

On behalf of Unicom, Inc. please find attached a Biological Assessment prepared for the AU-Aleutian II Fiber Project. Unicom proposes to build on the AU-Aleutian I Fiber Project which is in the process of connecting the communities of Larsen Bay, Chignik Bay, Sand Point, King Cove, Akutan, and Unalaska (USFWS Consultations 07CAAN00-2018-I-0066 and 07CAAN00-2021-I-0196). The AU-A II Project proposes to connect the additional communities of Chignik Lagoon, Chignik Lake, Cold Bay, False Pass, Perryville, Ouzinkie, and Port Lions to the existing subsea fiber backbone. Installation of the FOC has potential to affect three species managed by USFWS and listed as threatened or endangered under the ESA: northern sea otters, Steller's eiders, and short-tailed albatrosses. Weston Solutions was designated as the non-Federal representative of the National Telecommunications and Information Administration (NTIA) for the purposes of conducting ESA Section 7 consultation in a letter from Amanda Pereira, dated 12 October 2023 (attached). Please let me know if you have any questions upon review of this Biological Assessment.

Kind Regards,
Stacey Korsmo

Working part-time: Monday - Wednesday

WESTON SOLUTIONS
Stacey Korsmo
Senior Project Scientist
(907) 301-5815 Stacey.Aughe@WestonSolutions.com
Environmental and Infrastructure Solutions

UNITED STATES FISH AND WILDLIFE SERVICE

BIOLOGICAL ASSESSMENT

FOR

AU-ALEUTIAN II FIBER PROJECT

BERING SEA, ALASKA

Prepared for
Unicom
2550 Denali Street, Suite 1000
Anchorage, AK 99503

Prepared by
Weston Solutions, Inc.
101 W. Benson Blvd., Suite 312
Anchorage, AK 99503

December 2023

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Appendix A Equipment Specifications

ACRONYMS AND ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
ADLWD	Alaska Department of Labor and Workforce Development
Area M	Alaska Peninsula and Aleutian Islands Management Area
AU-A	AU Aleutians
BA	Biological Assessment
BHP	brake horsepower
BMH	beach man hole
CFR	Code of Federal Regulations
cm	centimeter(s)
CMA	Chignik Management Area
dB re 1 μPa	decibels referenced to one microPascal
DOT&PF	Department of Transportation and Public Facilities
DPS	distinct population segment
ESA	Endangered Species Act
FOC	fiber optic cable
FR	Federal Register
ft.	feet
GCI	GCI Communication Corp.
Hz	Hertz
In.	inche(s)
kHz	kiloHertz
km	kilometer(s)
km^2	square kilometers
KMA	Kodiak Management Area
kts	knot(s)
kW	kiloWatt
m	meter(s)
mi.	mile(s)
mi^2	square mile(s)
MHW	Mean High Water
MLW	Mean Low Water
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NTIA	National Telecommunications and Information Administration
PCE	Primary Constituent Element
Project	AU-A II Fiber Project
PSO	Protected Species Observer
PTS	permanent threshold shift
rms	root mean square
TTS	temporary threshold shift
Unicom, Inc.	Unicom
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
UXO	unexploded ordnances
Y-K	Yukon-Kuskokwim

1.0 EXECUTIVE SUMMARY

This Biological Assessment (BA) was prepared by Weston Solutions on behalf of the National Telecommunications and Information Administration (NTIA) to assess the potential impacts on Endangered Species Act (ESA)-listed species and critical habitat from the project. Table 1 summarizes the ESA-listed species and critical habitat within or near the Action Area managed by the United States Fish and Wildlife Service (USFWS) and determination of effects under the ESA. A detailed discussion of the effects determination is provided in Section 6, *Effects of the Action*.

Table 1. Determination of effects from the proposed FOC installation AU-Aleutian II 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 No Adverse Modification of Critical Habitat
Steller's Eider (*Polysticta stelleri*)	Threatened	Yes	May Affect and is Not Likely to Adversely Affect Species No Adverse Modification of Critical Habitat
Short-tailed Albatross (*Phoebastria albatrus*)	Endangered	No	May Affect and is Not Likely to Adversely Affect Species

2.0 INTRODUCTION

In 2021, with support from the U.S. Department of Agriculture Rural Development, Unicom, Inc. (Unicom), a wholly owned subsidiary of GCI Communications Corp. (GCI), installed a nearly 1,287.5-kilometer (km; 800-mile [mi.]) subsea fiber optic cable (FOC) to extend broadband service to six remote communities for the AU-Aleutian (AU-A I) fiber project.

Unicom, on behalf of the Native Village of Port Lions and with support from the NTIA Tribal Broadband Connectivity Program, proposes to extend the AU-A project through Phase II and bring high-speed internet service to approximately 800 people in six remote Alaska Native villages for the first time.

The AU-Aleutian II Fiber Project (Project) builds on the AU-A I project by connecting communities to its existing subsea fiber backbone. The Project is currently in the process of connecting Larsen Bay, Chignik Bay, Sand Point, King Cove, Akutan, and Unalaska. The Project proposes to connect the communities of Chignik Lagoon, Chignik Lake, Cold Bay, False Pass, Perryville, Ouzinkie, and Port Lions (Figure 1).

The Project would consist of approximately 176 km (109 mi.) of submerged (laid on the seafloor) FOC. Portions of the cable within 298.8 meters (m; 980 feet [ft.]) may be buried. Unicom anticipates initiating terrestrial activities in May 2024, initiating and completing marine activities in June 2024, and completing the project in Fall 2025.

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. NTIA would act as the lead federal agency for purposes of compliance with the National Environmental Policy Act and the ESA. Under Section 7 of the ESA, the NTIA is required to consult with the 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. The NTIA has designated Ms. Meghan Larson and Ms. Stacey Korsmo of Weston Solutions, Inc. as the Non-Federal Representative to conduct the Section 7 consultation.

A BA is prepared to assist the consulting agencies with the Section 7 consultation process if ESA-listed species or designated critical habitat is present within or in the vicinity of the Action Area. A BA was submitted to USFWS during ESA Section 7 consultation for the original AU-A I Project for marine portions of the project (Consultation 07CAAN00-2018-I-0066). In 2021, ESA Section 7 consultation was completed for the terrestrial portions of the AU-A I Project (Consultation 07CAAN00-2021-I-0196). USFWS concluded the consultations with concurrence that both marine and terrestrial portions of the AU-A I project may affect but are not likely to adversely affect ESA-listed species or their critical habitat. This BA was originally prepared by Unicom on behalf of the USACE. It is hereby updated on behalf of NTIA to include a description of the proposed Project and relevant new scientific information on potentially affected ESA-listed species and designated critical habitat occurring in the Action Area.

The proposed Project would service the communities of Ouzinkie and Port Lions in addition to communities of Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass which were proposed under the original AU-A I Project but not constructed (Figure 1). The previously-proposed branch segments were included in the ESA Section 7 consultation (07CAAN00-2018-I-0066) for the original AU-A I Project.

3.0 PROJECT DESCRIPTION

This Project includes FOC installation by laying the cable on the seafloor, with the exception of areas within 298.8 m (980 ft.) of shoreline. In nearshore areas within 298.8 m (980 ft.) of mean low water (MLW), burial of the FOC is proposed to occur within the intertidal area at each of the seven landings. In areas where burial is necessary, the burial depth would be no deeper than 0.9 m (3 ft.) and there would be no resulting side cast. The FOC would have a diameter up to 2.6 centimeters (cm; 1.02 inches [in.]). Unicom anticipates initiating terrestrial activities in May 2024, initiating marine activities by June 2024, and completing the Project in Fall 2025.

3.1 PROJECT PURPOSE

The Project would provide fast 2,500 megabits per second (approximately 2.5 gigabits per second) internet speeds and affordable, unlimited data plans to seven rural Alaska Native communities for the first time, supporting economic development and expansion of social services. The Project's seven isolated communities are neither connected by road nor an intertied electrical grid. Currently, the lack of broadband access limits economic development and efficiency of services delivered by health care providers, schools, and tribal entities.

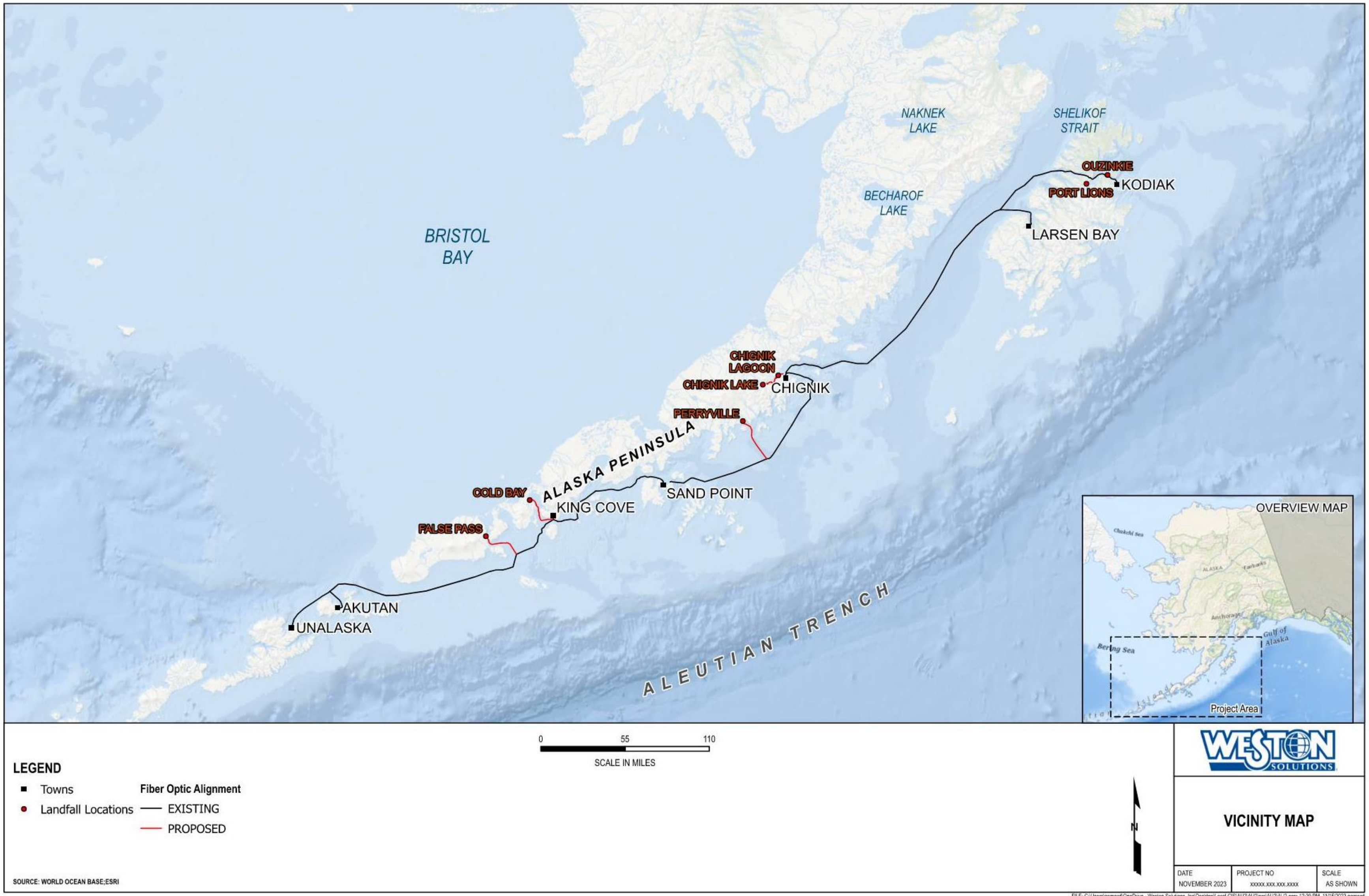

Figure 1. Project Vicinity Map

3.2 LOCATION

The Project is located in the Gulf of Alaska, south of the Aleutians Islands (Figure 1). The FOC would extend from the existing FOC backbone to cable landings at 7 sites. The Project lies within the boundaries of the Kodiak Island Borough, Lake and Peninsula Borough, and Aleutians East Borough.

3.3 DEFINITION OF ACTION AREA

The Action Area, as 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 and according to NMFS guidance, marine portions of 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). It should be noted that the 120-dB acoustic threshold for continuous noise sources (e.g. vessels) is commonly used by NMFS to define the action area for whales; however, specific acoustic criteria have not been determined for sea otters. Instead, USFWS considers the acoustic threshold for determining the Action Area for sea otters to be 160 dB re 1 µPa rms. To be conservative, and for ease of observers and project personnel to determine the extent of the action area in the field, the same Action Area extent used for NMFS species (i.e. whales and pinnipeds) will be used for USFWS species included in this BA.

For the cable laying ship (*IT Integrity*) installing cable in all waters except within 298.8 m (980 ft.) of MLW, the distance to the 120 dB re 1 µPa rms threshold was estimated using measurements taken from a larger vessel conducting similar work near Nome, Alaska in 2016.

Quintillion conducted a FOC laying project in Alaska in 2016 (Illingworth & Rodkin 2016). A sound source verification study was conducted near Nome, Alaska to characterize the underwater sounds produced during cable laying activities. They measured underwater sound from propeller noise generated by the cable-laying ship *Ile de Brehat* while towing a plow. Results indicated plowing operations produced a generally continuous sound; the noise from the main propeller's cavitation were the dominant sound over the plow or support vessel sounds. The ship was pulling the plow at 80 percent power. Sound measurement results ranged from 145 dB re 1 µPa rms at 200 m (656 ft.) to 121 dB re 1 µPa rms at 4,900 m (3 mi.). One-third octave band spectra show dominant sounds between 100 and 2,500 hertz (Hz). The source level was computed to 185.2 dB re 1 µPa rms at 1 m (3.2 ft.) using the measured transmission loss of 17.36 log. Assuming spherical spreading transmission loss (20 log), the distance to the 120 dB re 1 µPa rms acoustic threshold was calculated to be 1.8 km (1.1 mi.) for the cable laying ship *Ile de Brehat*.

The *IT Integrity* is a smaller vessel (72 m [236 ft.] total length) than the *Ile de Brehat* (140 m [459 ft.] total length). Additionally, measurements taken during the sound source verification of the *Ile de Brehat* were during cable laying operations using a plow to bury the FOC. This project will not include use of a plow to bury FOC. The FOC will be laid on the seafloor or buried by a diver using a water jet in nearshore areas. Therefore, sound pressure levels produced by the *IT Integrity* are expected to be lower than those produced by the *Ile de Brehat.* Source levels determined by Illingworth & Rodkin will be used as a conservative proxy for the *IT Integrity* for the purposes of the Project.

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, also affects 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 assumed to be 1.8 km (1.1 mi.) from the cable laying ship, *IT Integrity*.

The marine portions of Action Area is defined as the route length plus a buffer of 1.8 km (1.1 mi.) on each side of the route (3.6 km [2.2 mi.] total width) for areas in which the cable laying ship would be used. The total Action Area encompasses approximately 669.28 square kilometers (km^2) (258.41 square miles [$mi.^2$]) as summarized in Table 2. It should be noted that the maximum area ensonified to the 120-dB acoustic threshold at any given time would be 10.18 km^2 (3.93 $mi.^2$). The Action Area encompasses the area within the largest extent to the area of potential effect for all ESA-listed species occurring in the area. Extent to the areas of potential effect for each of the USFWS managed ESA-listed species is smaller than the Action Area (Table 3.)

Table 2. Calculated Marine Portions of the Action Area

Description	Width of Route including Action Area Buffer (km/mi.)	Area (in km2)	Area (in mi2)
Cable laying ship- IT Integrity	3.6/2.2	669[1]	258[1]

[1]The Area presented is the total sum of ensonified areas along all branch segment routes. The maximum area ensonified to the 120-dB acoustic threshold at any given time would be 10.18 km^2 (3.93 $mi.^2$).

The area of potential effect for sea otters is assumed to be 100 m (328 ft.) from the *IT Integrity*, as was conservatively assumed for the AU-A I Project; although the distance to the 160-dB acoustic threshold typically used by USFWS to determine the area of effect is anticipated to be much less than 100 m (328 ft.). The area of potential effect for Steller's eiders and short tailed albatrosses is limited to the area of disturbance from the presence of the vessel, which is estimated to be 500 m (1,640.4 ft.) from the vessel. This assumption was also used for the AU-A I Project. Table 3 includes these distances and the calculated areas of potential effect by species.

Table 3. Calculated Areas of Potential Effect by Species

Species	Distance from Vessel (m/ft.)	Area of Overlap with Species Range	
		km^2	$mi.^2$
Sea otters	100/328	35.31	13.63
Steller's eiders	500/1,640	176.1	68
Short-tailed albatross	500/1,640	176.1	68
Total		**387.5**	**149.63**

Sea otters, Steller's eiders, and short tailed albatrosses are highly dependent on the marine environment. Terrestrial activities associated with the project are expected to have no effect on these species and will not be discussed further in this BA.

The Action Area also includes terrestrial portions of the project as described in Section 3.4.1, *Description of Landfall Locations*; however, since the species considered in this BA typically do not use terrestrial habitat within the Action Area, the terrestrial portion of the Action Area is not included in detail in the following assessment.

3.4 PROPOSED ACTION

The Project would extend broadband service to seven communities located from Kodiak to False Pass by placing 176 km (109 mi.) of FOC on the ocean floor (Figure 1). The Project connects FOC from the existing subsea FOC backbone to each of the seven communities. The main cable would branch off to transmission sites located at Ouzinkie, Port Lions, Chignik Lake, Chignik Lagoon, Perryville, Cold Bay, and False Pass. The FOC would have a diameter up to 2.6 cm (1.02 in). In nearshore areas (within 298.8 m [980 ft.] of MLW), the FOC may be buried. Figure 1 shows project location and Table 4 presents landing site coordinates.

Table 4. Landing Site Coordinates

Location	Latitude	Longitude
Ouzinkie	57.920577°	-152.501018°
Port Lions	57.863725°	-152.860244°
Chignik Lagoon	56.31084328º	-158.54006013º
Chignik Lake	56.26037124º	-158.70402045º
Perryville	55.91007222º	-159.14428056º
Cold Bay	55.19574691º	-162.69750980º
False Pass	54.85574800º	-163.40956004º

° = degrees

3.4.1 Description of Landfall Locations

The following describes proposed terrestrial operations that would occur between MLW and existing GCI facilities, including intertidal areas. All landfall locations have existing GCI facilities. The onshore portions of the FOC would be trenched with a maximum width of 0.9 m (3 ft.) and depth of 1.2 m (4 ft) throughout the intertidal zone (within no more than 298.8 m [980 ft.] of MLW) to Mean High Water (MHW). In terrestrial areas above MHW, trenching would have a maximum width of 0.9 m (3 ft.) and depth of 0.9 m (3 ft.) with a side cast width not to exceed 2.4 m (8 ft.). The landfall maps and landing site specification maps for each location are provided in Figure 2 through Figure 15.

For all landfall locations, the following construction methods apply:

- The FOC would be linked to a new beach manhole (BMH), setback from MHW of the adjacent waterbody with a stub of conduit. The BMH would measure 1.2 m to 1.5 m (4 ft. by 5 ft.) or 1.86 m^2 (20 $ft.^2$) and 1.2 m (4 ft.) deep. The BMH excavation would not exceed 1.5 m (5 ft.) by 1.8 m (6 ft.) [(2.8 m^2) 30 ft^2)] with a depth of 1.5 m (5 ft.). The stub of conduit would be placed above MLW.
- From the beach to the BMH, up to three 5.1-cm (2-in.) conduits would be buried at a depth no deeper than 91 cm (36 in.).
- Excavation to accommodate the BMH measurements would not exceed 1.5 by 1.5 m (5 by 5 ft.) and 1.8 m (6 ft.) deep. Measurements would vary based on shoreline/bank contours and substrate.
- In all communities except Chignik Lake, the FOC would be routed from the BMH to new Cable Landing Stations (CLS), wherein new prefabricated communications shelters [approximately 8.3 m (25 ft.) long, 3.3 m (10 ft.) wide, and 3.3 m (10 ft. high)] would be placed onto new gravel pads or pile foundation co-located with existing facilities. Gravel pads would measure approximately 232.3 m^2 (2,500 $ft.^2$) and have a depth of 0.6 m (2 ft.).

- From the CLS, FOC would be used to create a main line, from which end users would be connected. FOC between the BMH and CLS would be terrestrial cable placed into an approximate 0.9 m (3 ft.) wide by 0.9 m (3 ft.) deep trench. Trench width may be less if a cable plow or chain trencher is available. If existing suitable utility poles are available, the FOC local distribution may use overhead construction as well.
- Vaults would be installed at intervals of approximately every 244 m (800 ft.) of FOC. The terrestrial vaults would be placed at a depth of 0.9 m (3 ft.) and would be used to provide slack loops and splicing points along the main line route and at the CLS. The 0.9 m (3 ft.) by 1.2 m (4 ft.) vaults would require no more than a 1.5 m (5 ft.) by 1.5 m (5 ft.) excavation.
- All terrestrial FOC would be trenched adjacent to existing roads and would remain within existing utility rights-of-way and easements to the extent possible; which may include trenching in areas near the toe of the slope. FOC trenching would generally follow the utility distribution system in each community.
- Installation crews would use backhoes and standard trenching techniques to set BMSs and vaults flush with the original ground grade.
- All areas would be returned to pre-construction elevations and all trenched areas would be re-graded to original conditions.
- Excavated material that is side cast next to trenches during excavation would be used as backfill to bury the cable and BMH.

For all intertidal areas, the following construction methods would apply:

- All trenching would have a maximum 0.9 m (3 ft.) width and 0.9 m (3 ft.) depth.
- Any work below MHW would occur during low tide.
- Heavy equipment needing to operate in intertidal areas and wetlands would be placed on mats, with the exception of beaches with firm sediments, such as large cobble or boulders (e.g. Ouzinkie, False Pass).
- No excess material requiring disposal is anticipated to be produced.
- Alterations to shorelines would be temporary and trenches would be constructed and backfilled to prevent them from acting as a drain.

In general, equipment used at each landfall location, with the exception of work in the Chignik River, may include:

- Rubber wheel backhoe,
- Tracked excavator or backhoe,
- Utility truck and trailer to deliver materials,
- Chain trencher or cable plow (optional),
- Hand tools (e.g. shovels, rakes, pry bars, and wrenches),
- Survey equipment,
- Winch or turning sheave, and
- Splicing equipment, small genset and splicing tent.

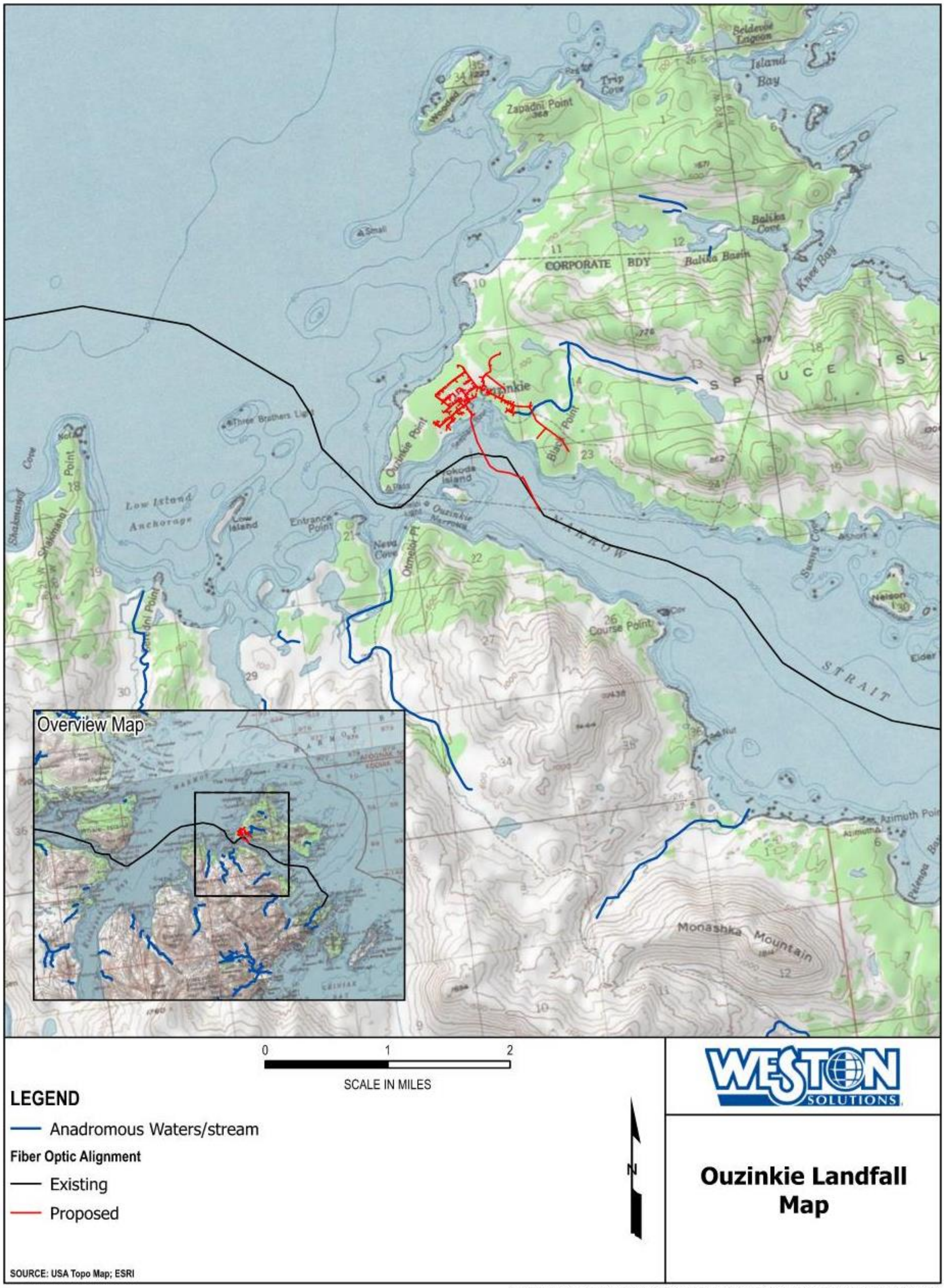

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Figure 2. Ouzinkie Landfall Map

Figure 3. Ouzinkie Landing Site

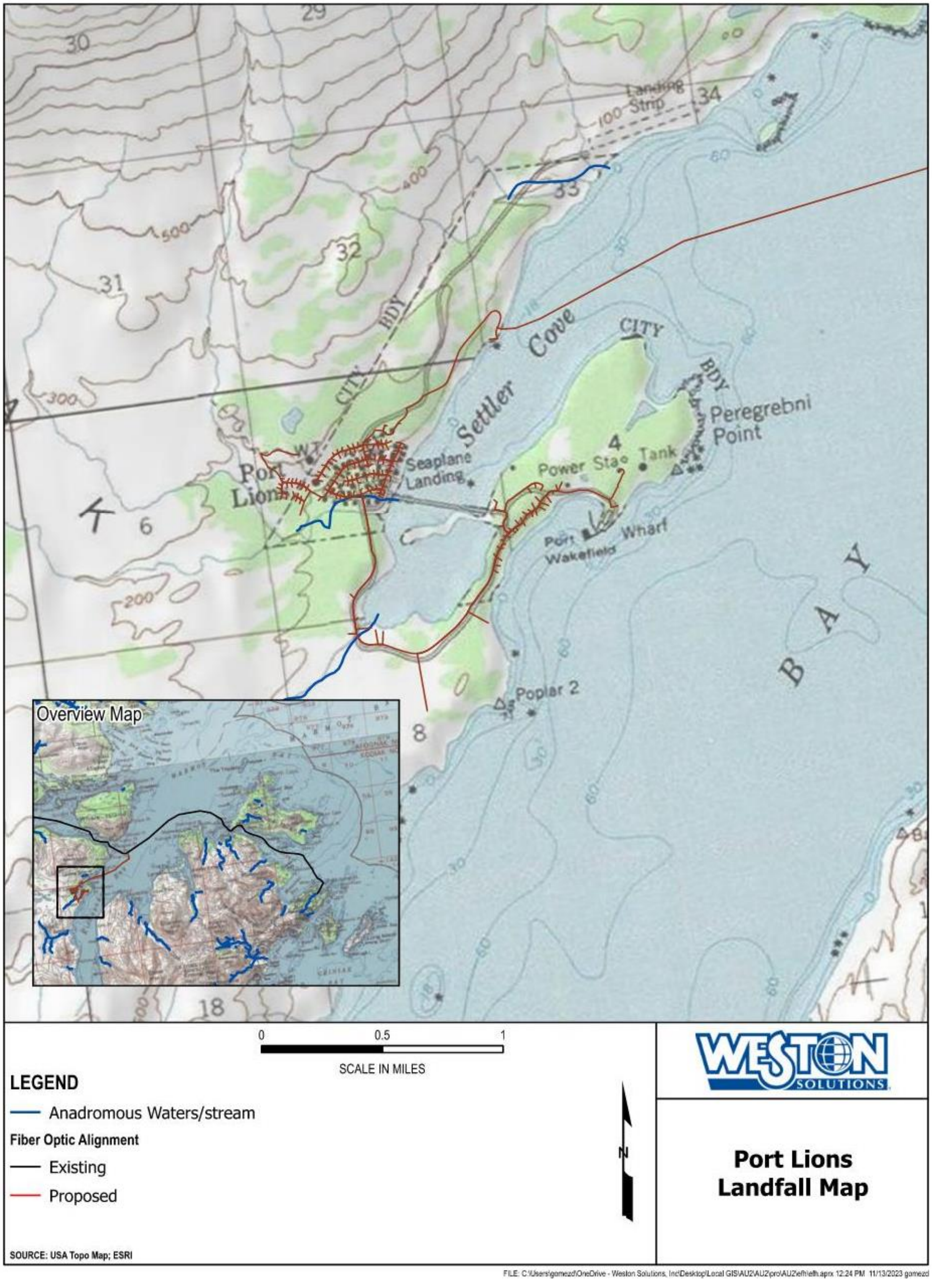

Figure 4. Port Lions Landfall Map

Figure 5. Port Lions Landing Site

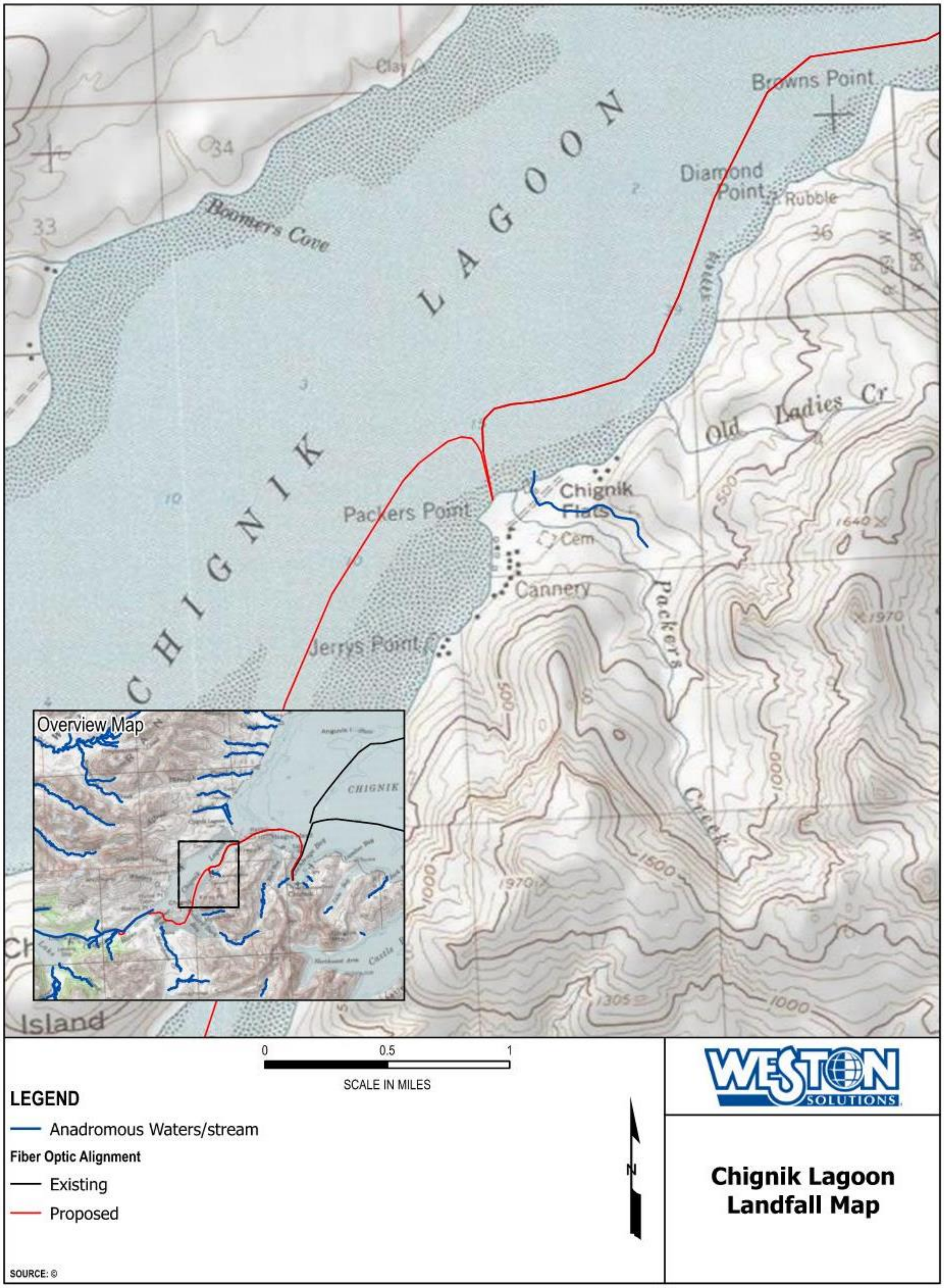

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Figure 6. Chignik Lagoon Landfall Map

Figure 7. Chignik Lagoon Landing Site

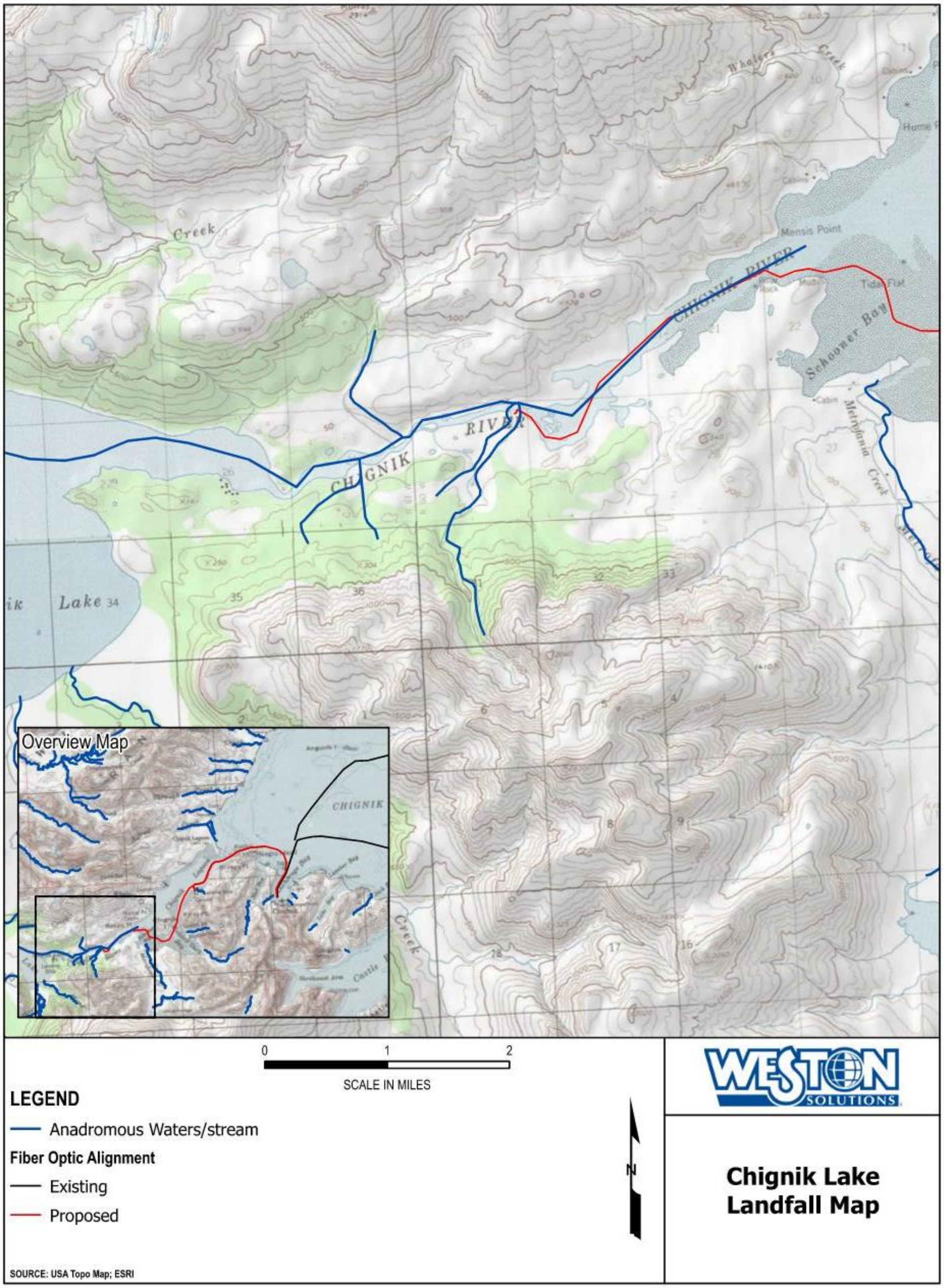

Figure 8. Chignik Lake Landfall Map

Figure 9. Chignik Lake Landing Site

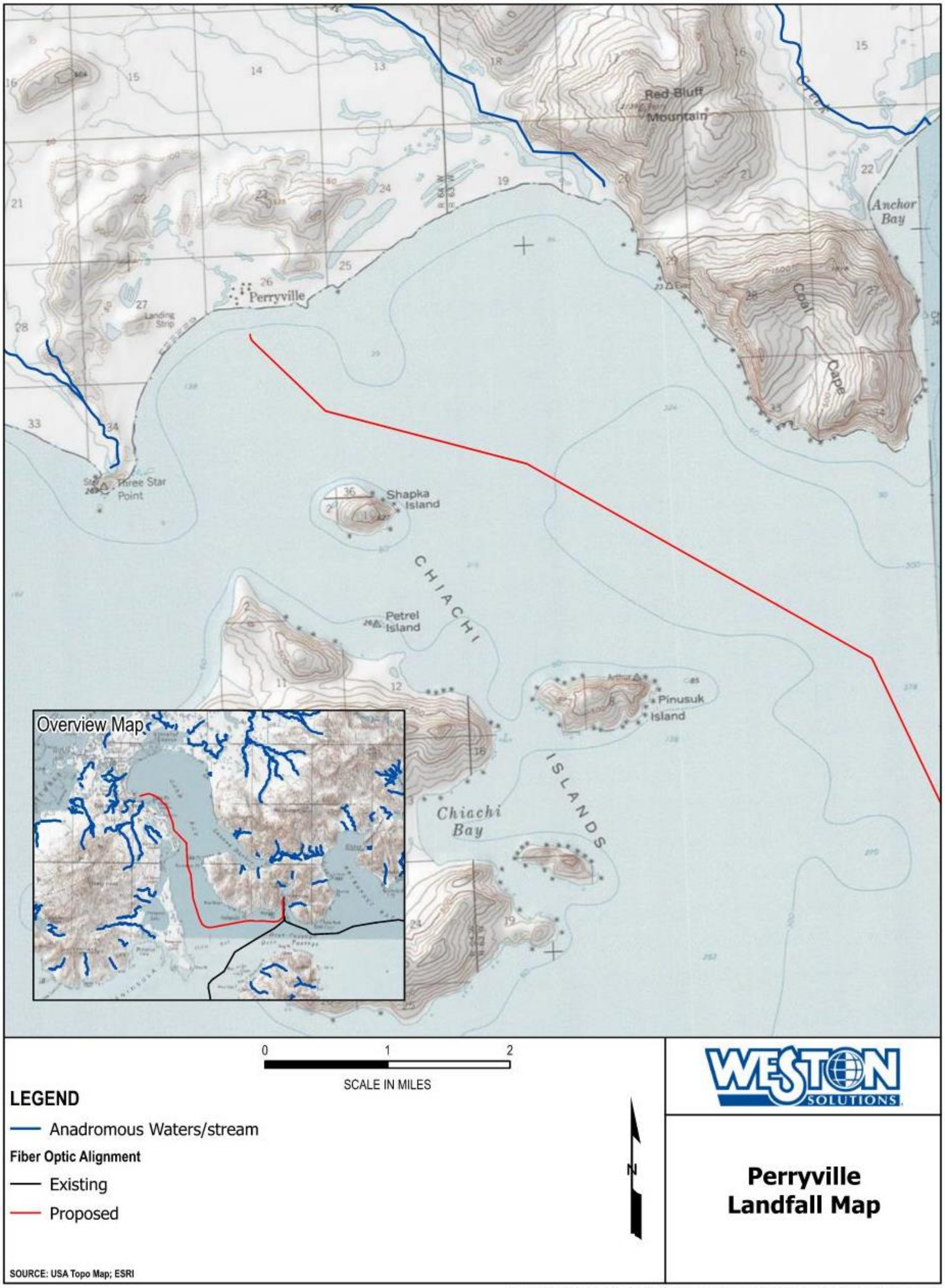

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Figure 10. Perryville Landfall Map

Figure 11. Perryville Landing Site

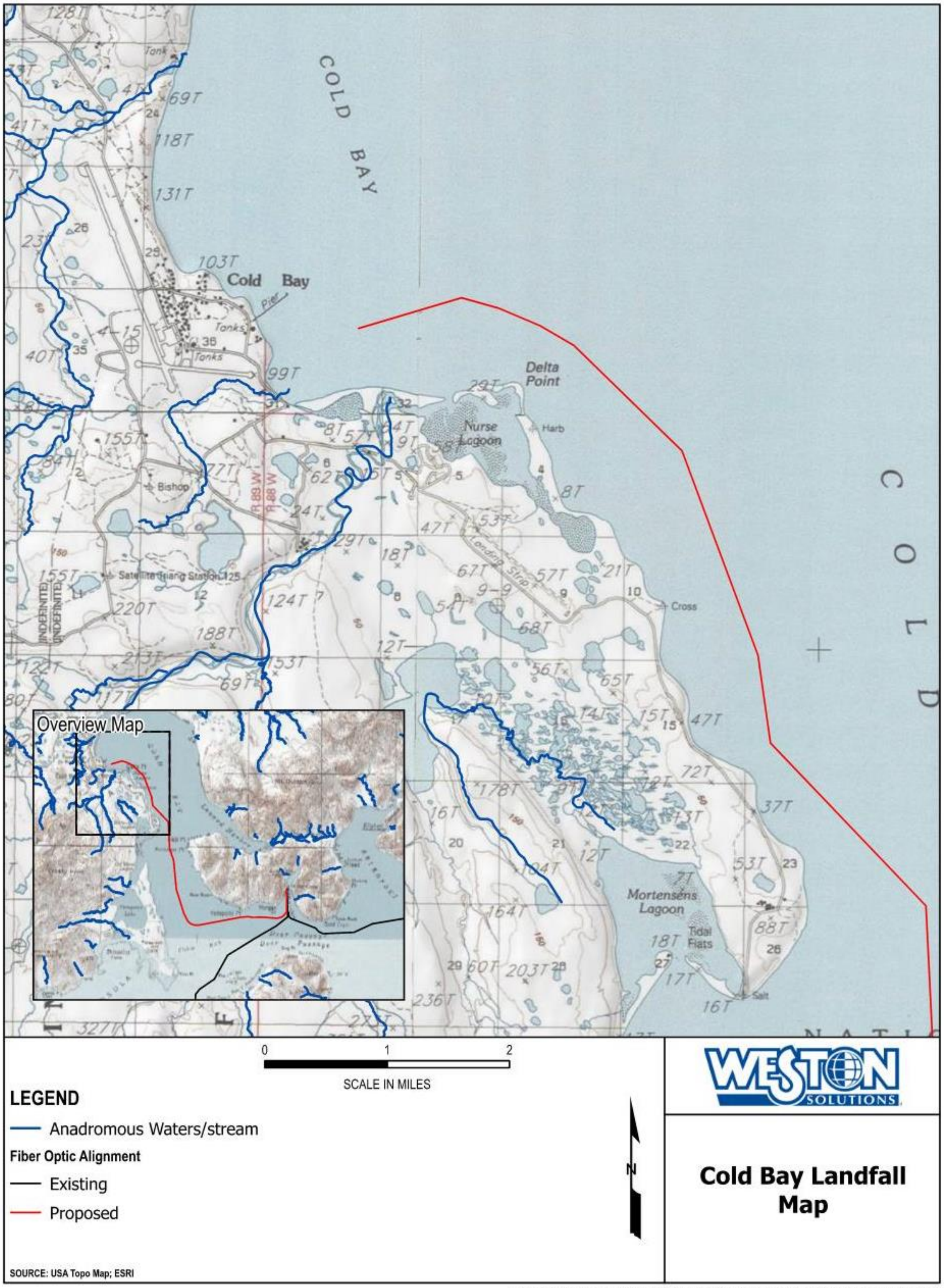

Figure 12. Cold Bay Landfall Map

Figure 13. Cold Bay Landing Site

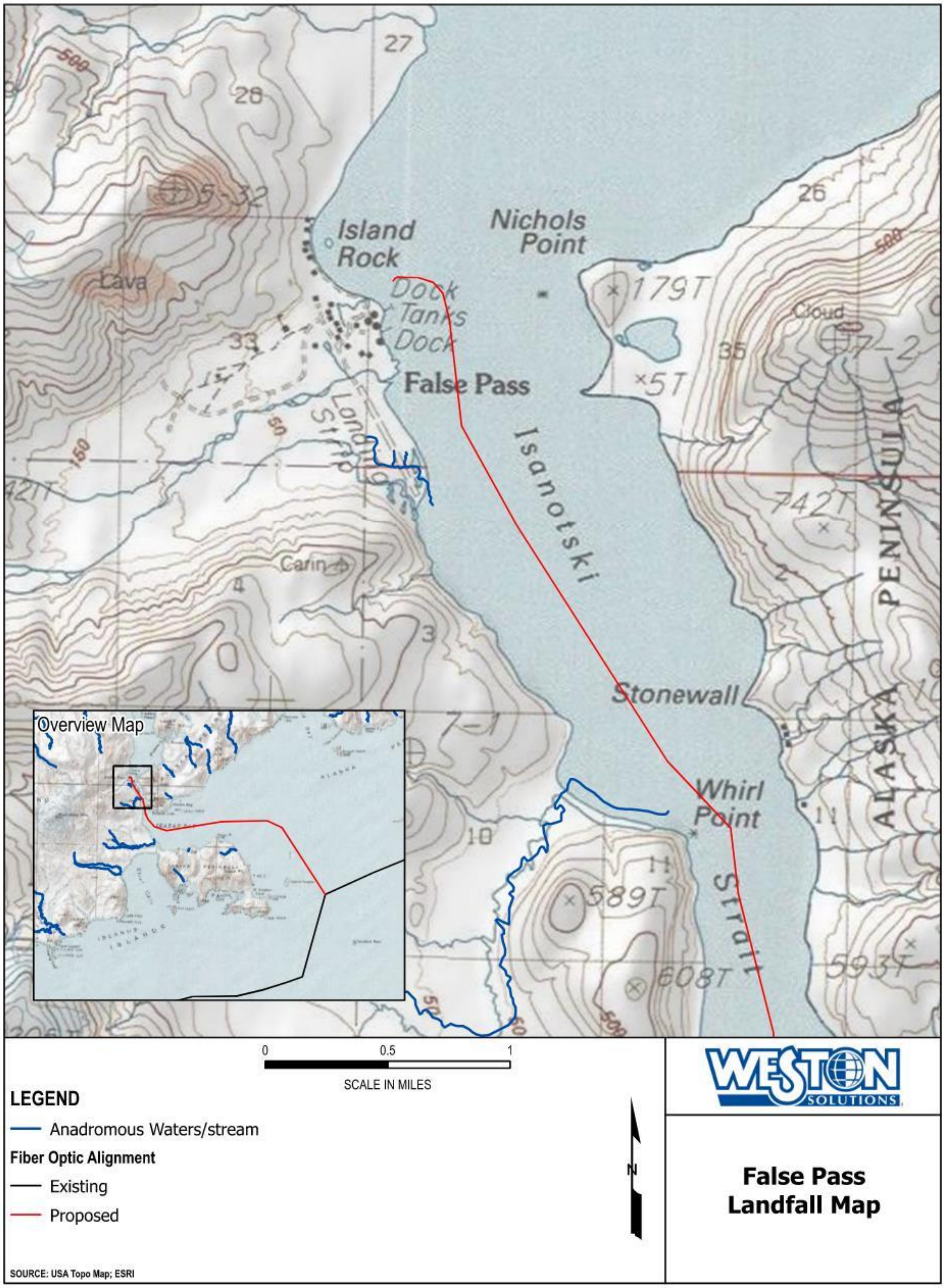

Figure 14. False Pass Landfall Map

Figure 15. False Pass Landing Site

3.4.2 Description of Marine and Riverine Operations

The following text describes operations that would occur in the marine environment, outside of intertidal areas. Over 99 percent of the FOC would be surface laid directly on the sea floor. In waters within approximately 91 m (300 ft.) from MLW, the FOC would be buried by a diver using a hand-held water jet (maximum burial depth of 0.9 m [3 ft.]).

Offshore (waters deeper than 15 m [49 ft.] deep) cable-lay operations would be conducted from the main lay cable ship, *IT Integrity* (Figure 16). Details of the ship specifications are provided in Appendix A. The ship is 72 m (236 ft.) in length and 16 m (52.5 ft.) in breadth, with berths for a crew of 38. The ship is propelled by two 2,032 kilowatt (kW) (2,725 brake horsepower [BHP]) main engines. Dynamic positioning is maintained by two 745 kW (1,000 BHP) azimuth thrusters. Dynamic positioning is used only as needed for safety – the frequency depends on weather and currents in the region. Average speed for surface laid cable is approximately 1.9 to 5.5 km per hour (1 to 3 knots [kts]).

Source: https://www.fleetmon.com/vessels/it-integrity_9239343_11680/

Figure 16. Photo of Cable-Laying Ship, *IT Integrity*

For work in the Chignik River, installation of the FOC would not occur when water is not present in the channel, and to the extent possible, would occur during periods of high water. No post-lay inspection and burial would be conducted. In general, equipment in the nearshore marine and riverine environment may include:

- Two small utility boats (24.4 m (80 ft.) and 12.2 m (40 ft.) landing crafts) to run pull line to the beach. Each boat is equipped with engines that are less than 3,000 horsepower;
- A dive boat; and
- Hand jet for work estimated to take 1 day (12 hours).

3.5 SUMMARY OF PROJECT ELEMENTS FOR EACH LANDING

Length of marine portions of each branch segment is provided below in Table 5.

Table 5. Marine Project Elements by Community

Branch Segment	Total Route Length in Water (km[mi.])
Ouzinkie	1.15 km (1.85 mi.)
Port Lions	4.81 km (7.74 mi.)
Chignik Lagoon	10.55 km (16.98 mi.)
Chignik Lake	9.62 km (15.48 mi.)
Cold Bay	26.18 km (42.13 mi.)
False Pass	26.87 km (43.24 mi.)
Perryville	30.19 km (48.59 mi.)

3.6 DATES AND DURATION

The following anticipated construction schedule would be contingent upon receipt of permits and environmental authorizations:

- May 2024: Begin terrestrial FOC installation of BMHs in all communities.
- June 2024: Start and complete subsea FOC for Ouzinkie, Port Lions, Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass.
- Late Summer 2024: Begin terrestrial FOC installation for Ouzinkie and Port Lions.
- Summer 2025: Begin terrestrial FOC installation for Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass.
- Fall 2025: Complete terrestrial FOC installation in remaining communities.

Anticipated service dates for each community:

- Ouzinkie- Quarter 1, 2025
- Port Lions- Quarter 1, 2025
- Chignik Lagoon- Quarter 3, 2025
- Chignik Lake- Quarter 3, 2025
- Perryville-Quarter 3, 2025
- Cold Bay- Quarter 3, 2025
- False Pass- Quarter 3, 2025

4.0 DESCRIPTION OF THE SPECIES AND THEIR HABITAT

The species identified and discussed in this BA are listed in Table 6 and discussed in the following text.

Table 6. USFWS ESA-Listed Species in the Action Area

Species	Conservation Status	Stock	Population Estimate
Northern Sea Otter (Enhydra lutris)	ESA - Threatened	Southwest AK stock	51,935 (entire stock)[1] 8,593 (Eastern Aleutian Management Unit)[2] 546 (South Alaska Peninsula Management Unit)[3] 9,733 (Bristol Bay Management Unit)[3] 30,658 (Kodiak, Kamishak, and Alaska Peninsula Management Unit)[4]
Steller's Eider (Polysticta stelleri)	ESA - Threatened	Alaska Breeding Population	500[5] (Breeding population)
Short-tailed Albatross *(Phoebastria albatrus)*	ESA - Endangered	N/A	2,887[6] (Breeding population)

[1]USFWS 2023
[2]Wilson et al. 2021
[3]Beatty et al. 2021
[4]Cobb 2018; Esslinger 2020; Garlich-Miller et al. 2018
[5]USFWS 2011; Stehn et al. 2013
[6]USFWS 2018

4.1 NORTHERN SEA OTTER (SOUTHWEST ALASKA STOCK)

4.1.1 Population

Northern sea otters are listed as threatened under the ESA and classified as a strategic stock under the Marine Mammal Protection Act (MMPA). They are the largest member of the weasel family and are the only marine mammals relying on dense fur rather than blubber for insulation (USFWS 2023). Three distinct population segments (DPSs) occur within AK: the Southeast AK stock, the Southcentral AK stock, and the Southwest AK stock. Sea otters in or near the Project belong to the Southwest AK stock. This stock ranges from the western shore of lower Cook Inlet to the Alaska Peninsula and Bristol Bay coasts, as well as the Aleutian, Barren, Kodiak, and Pribilof islands (USFWS 2023).

Sea otters mainly subsist on clams, mussels, fish, and sea urchins (Doroff and DeGange 1994). They must eat an estimated 23 to 33 percent of their body weight on a daily basis (Riedman and Estes 1990). Nearly all of a sea otter's life is spent at sea, though they do occasionally haul out on land. Otters eat, sleep, mate, and give birth in the water and spend most of their time floating on their backs in single sex groups either resting, eating, or grooming themselves at the water's surface. Sea otter movement can be affected by inclement weather as well as tidal and wind patterns, with otters often seeking refuge from storms in protected waters such as bays and inlets. Sea otters are gregarious animals and may be seen "rafting" together in groups (Schneider 1976).

Aerial surveys in many parts of AK indicated sea otter populations declined by approximately 70 percent between 1992 to 2000 (Doroff et al 2003); however, sea otter counts in the Kodiak Archipelago, as well as the Alaska Peninsula coast and Kamishak Bay appear to be stable and possibly increasing during this same time frame (Coletti et al 2009, USFWS 2013). The northern sea otter population in the Southwest AK stock is estimated at 51,935 animals, based on aerial and skiff surveys from 2014 through 2018 (USFWS 2023).

Natural predators of northern sea otters primarily include killer whales and bald eagles. Other threats to northern sea otters include oil spills and infectious disease. Sea otters near Kodiak are also used for subsistence purposes by AK Native hunters. The Kodiak salmon gillnet is the only fishery identified by NOAA as interacting with the Southwest AK stock of northern sea otters. No interactions were identified for this stock; however, in other areas with salmon drift gillnet fisheries, such as Prince William Sound (Southcentral AK stock), interactions with sea otters have been observed (78 Federal Register [FR] 53336).

4.1.2 Distribution

The Southwest Alaska Stock includes the Alaska Peninsula and Bristol Bay coasts, and the Aleutian, Barren, Kodiak, and Pribilof Islands (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 further than 100 km (Garshelis and Garshelis 1984), although movements are likely limited by geographic barriers, high energy requirements of animals, and social behavior.

4.1.3 Foraging Habitat

Sea otters are known to occupy waters in or adjacent to the Action Area (Figure 17) and typically occur in coastal waters within a 40-m (131-ft.) depth contour (Riedman and Estes 1990). They forage along a variety of bottom substrates including sand, rocky reef, kelp forest, and mixed substrates (USFWS 2013). 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).

4.1.4 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.

4.1.5 Critical Habitat

Critical habitat for the Southwest AK stock of the northern sea otter was designated by USFWS in 2009 and spans 15,164 km^2 (5,855 mi^2) in southwestern AK (74 FR 51988) (Figure 17). Boundaries of the critical habitat are defined as all the nearshore marine environment ranging from the mean high tide line to the 20 m (65.6 ft.) depth contour as well as waters occurring within 100 m (328.1 ft.) of the mean high tide line (74 FR 51988).

For management purposes, critical habitat was broken into five separate units - the Western Aleutian Unit, the Eastern Aleutian Unit, the South AK Peninsula Unit, the Bristol Bay Unit, and the Kodiak, Kamishak, AK Peninsula Unit. 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.

USFWS defined the following Primary Constituent Elements (PCEs) for the Southwest AK stock of northern sea otter critical habitat:

1. Shallow, rocky areas where marine predators are less likely to forage, which are waters less than 2 m (6.6 ft.) in depth;

2. Nearshore waters that may provide protection or escape from marine predators, which are those within 100 m (328.1 ft.) from the mean high tide line;

3. Kelp forests that provide protection from marine predators, which occur in waters less than 20 m (65.6 ft.) in depth; and

4. Prey resources within the areas identified by PCEs 1, 2, and 3 that are present in sufficient quantity and quality to support the energetic requirements of the species.

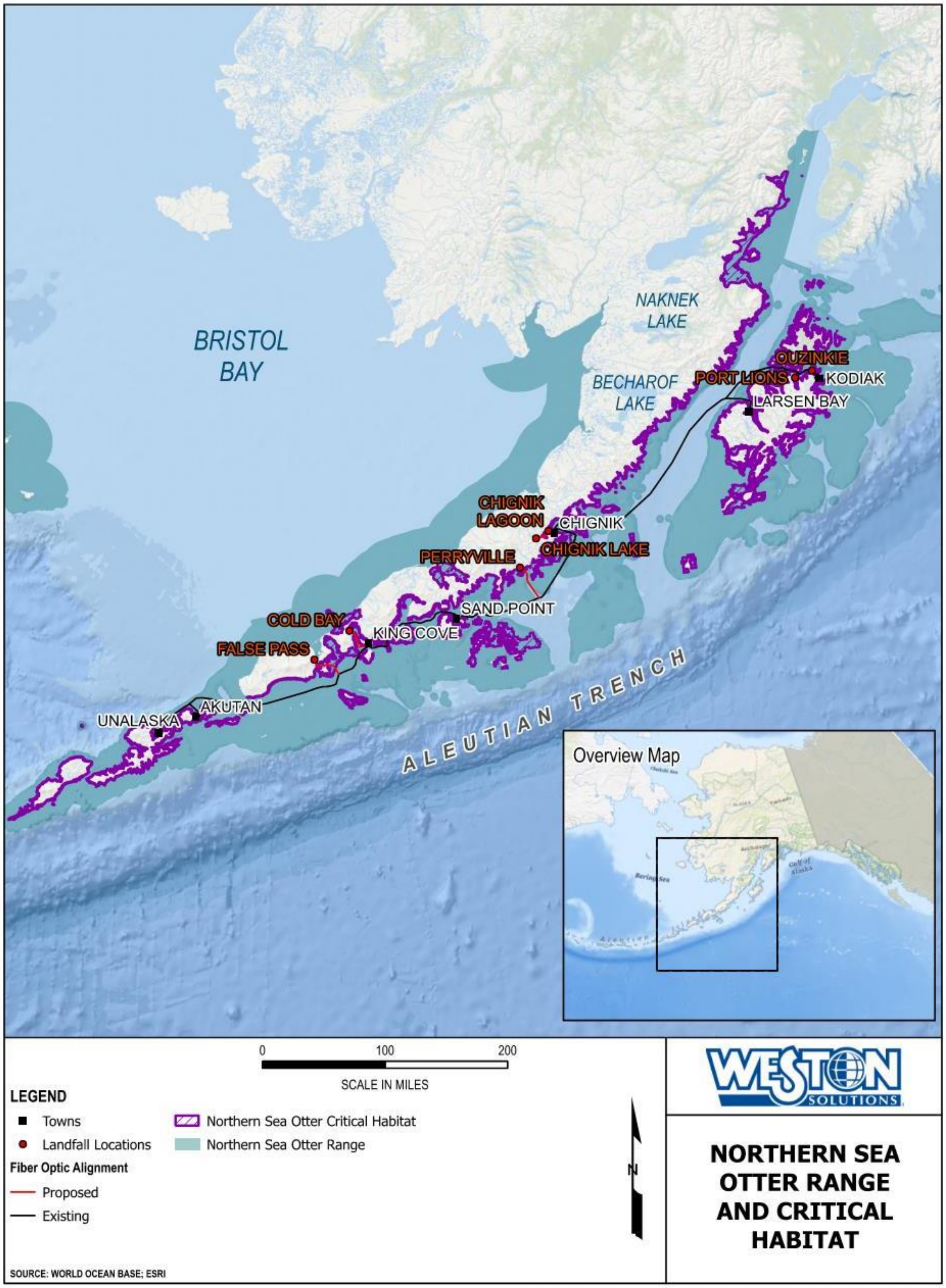

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Figure 17. Northern Sea Otter Southwest Alaska Stock Distribution in the Action Area

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 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 marine portion of 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 278.6 km^2 (106 $mi.^2$) of sea otter critical habitat, which is approximately 1.8 percent of the Southwest Alaska DPS critical habitat (15,164 km^2 [5,854 $mi.^2$]).

4.2 STELLER'S EIDER

4.2.1 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 eiders were 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).

4.2.2 Distribution

Large concentrations of Steller's eiders overwinter and stage in areas of shallow water along the shorelines of the Aleutian Islands and Alaska Peninsula. Pacific-wintering Steller's eiders may be in the Action Area from fall to spring, as they disperse throughout the Aleutian Islands, Alaska Peninsula, and western Gulf of Alaska. Dates vary depending on gender, nesting success, open water, and timing of ice melt. The most vulnerable time for eiders within the Action Area would be during molting in fall. 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).

Steller's eiders molt in several lagoons and bays, mainly along the northwest side of the Alaska Peninsula, including 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).

Some Steller's eiders may remain in these areas during the wintering period (December to late April) 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). Wintering habitat includes shallow lagoons with extensive mudflats but deep bays and water up to 30 m are used exclusively at night (Frederickson 2001; Martin et al. 2015).

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).

Eiders spend the majority of their lives in the marine environment, occupying terrestrial habitat only during the nesting season (USFWS 2019). The presence of Steller's eiders in the Action Area would be incidental to flyover and is therefore discountable.

4.2.3 Critical Habitat

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 [989 $mi.^2$]), the Kuskokwim Shoals (3,813 km^2 [1,472 $mi.^2$]), and at the Seal Island (63 km^2 [24 $mi.^2$]), Nelson Lagoon (533 km^2 [206 $mi.^2$]), and Izembek Lagoon (140 $mi.^2$ [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 Action 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 (3.4 mi.) north of Harbor Point, on Moller Spit at longitude of 160º 32' W and runs northwest to Wolf Point in the Kudobin Islands and east along the line of mean high tide to 161º 24' W, encompassing the Nelson Lagoon, portions of Hague Channel and Herendeen Bay south to 55º 51' N. The Izembek Lagoon unit begins at 162º 30' approximately 9 km (5.6 mi.) 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).

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 does not occur in designated critical habitat of Steller's eider and therefore will not impact any of the defined PCEs (Figure 18).

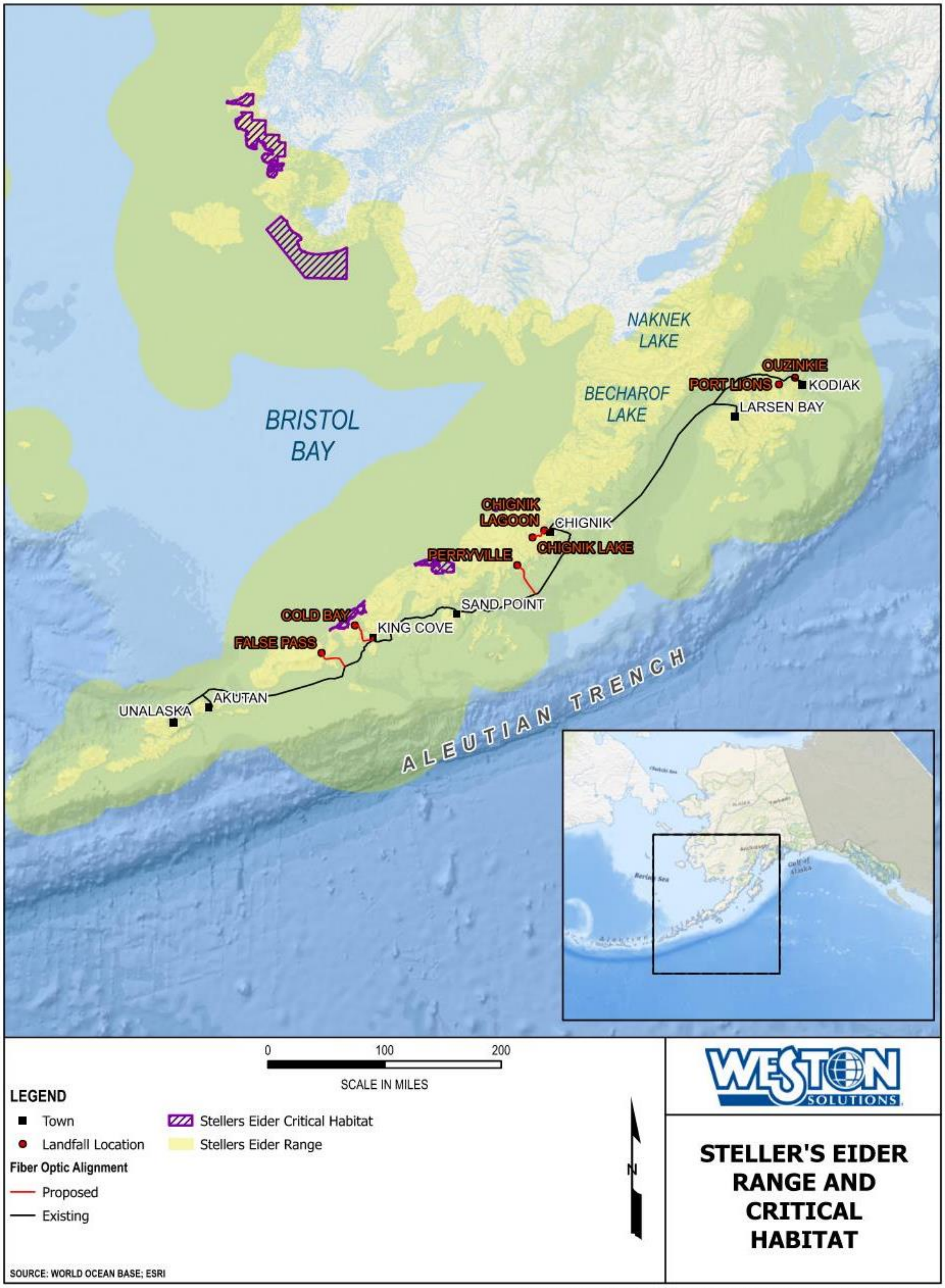

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Figure 18. Steller's eider distribution in the Action Area.

4.3 SHORT-TAILED ALBATROSS

4.3.1 Population

From the late 1800s through as late as the 1930s, millions of short-tailed albatrosses 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 a 3-year running average growth rate of 8.9 percent; and the percent current total population estimate is 7,365 individuals (Sievert 2020 personal communication as cited in USFWS 2020). The species is making progress toward meeting some of the recovery criteria for delisting.

4.3.2 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 percent 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 2020). 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. 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 2020). 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 2020). Distribution patterns and habitat use of sub-adult birds become similar to adult birds by age three.

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).

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 deeper than 1,000 m (3,280 ft.) more than 70 percent of the time, and juveniles spent approximately 80 percent of their time in these shallower waters. Adults spent less than 20 percent 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 2020). Figure 19 shows where the Action Area overlaps with the range of the short-tailed albatross.

Short-tailed albatrosses are primarily observed near and over deep-water canyons in the Gulf of Alaska, Aleutian Islands, and Bering Sea (USFWS 2020). The presence of short-tailed albatrosses in the Action Area would be incidental to flyover and is therefore discountable.

4.3.3 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).

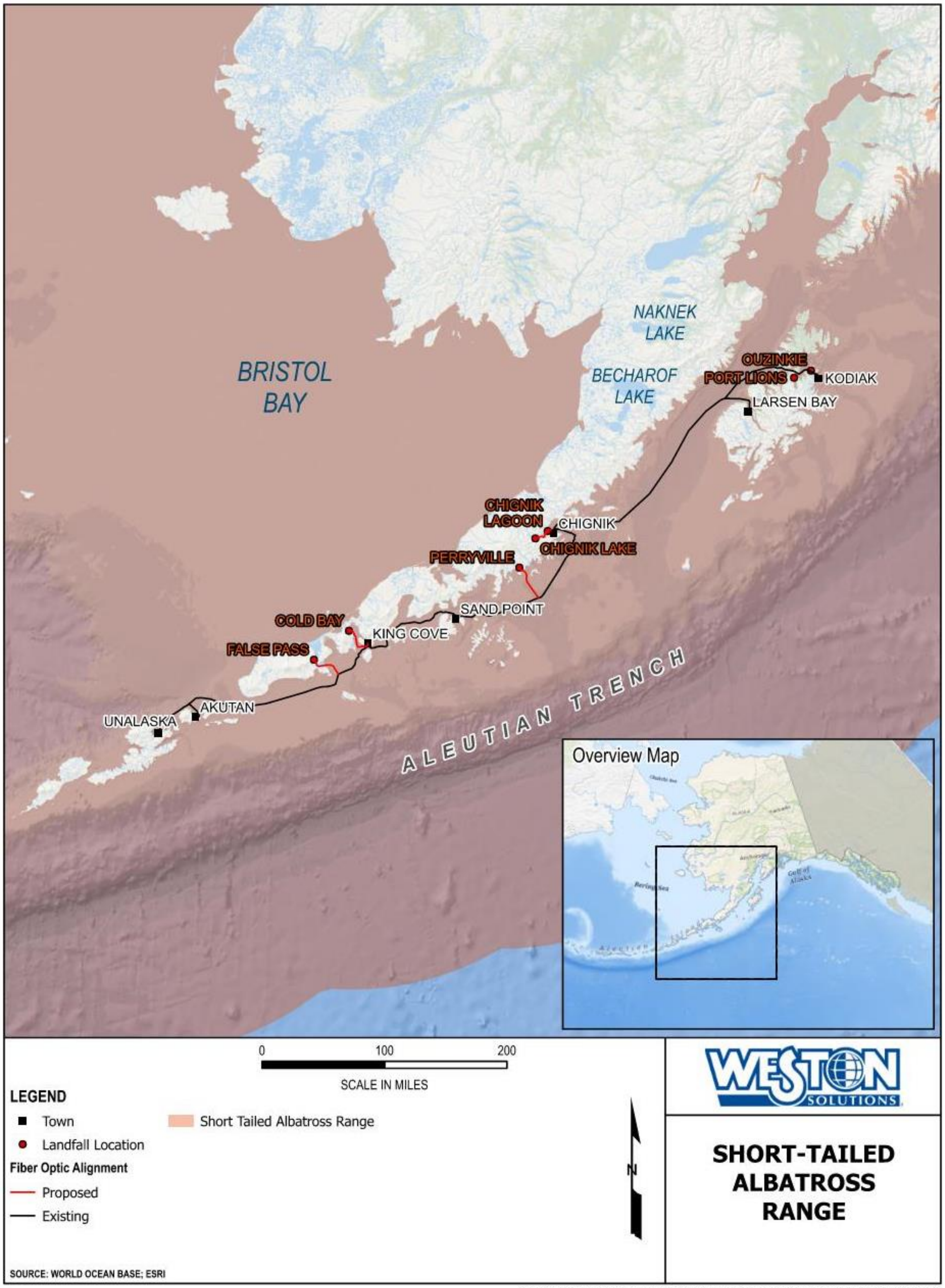

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Figure 19. Short-tailed albatross distribution in the Action Area.

5.0 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 ESA 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.

5.1 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 over 6 m (19.7 ft.) occur less than 15 percent of the time. Weather events also influence coastal flooding and erosion, which are known to affect the project region (TerraSond Limited 2018).

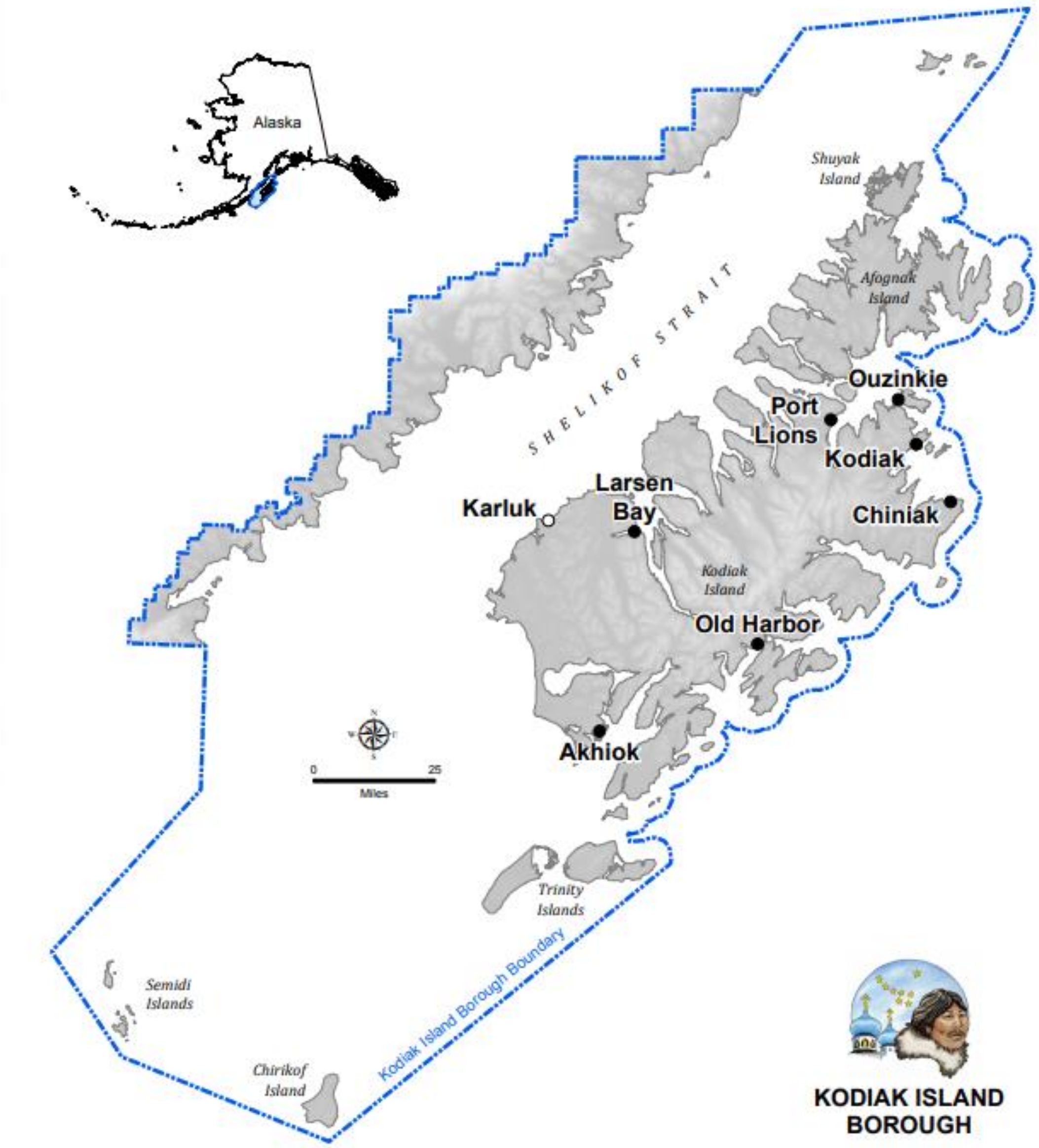
Ocean basin topography, currents, water temperature, and other environmental characteristics influence the high productivity of the region’s saltwater environments, which support many species of fish, marine mammals, crustaceans, and birds. A pre-history of glaciation throughout the region has also significantly 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.

5.1.1 Coastal Development

The Project’s FOC routes would connect two communities on Kodiak Island and five communities along the Alaska Peninsula. The routes would pass through three Alaskan boroughs including the Kodiak Island Borough, Lake and Peninsula Borough, and the Aleutians East Borough.

5.1.1.1 Kodiak Island Borough

The Kodiak Island Borough encompasses the Kodiak Island Archipelago, Shelikov Strait waterbody, and 284.9 km (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 13,101 residents (Alaska Department of Labor and Workforce Development [ADLWD] 2020), most of which live in or near the city of Kodiak (Kodiak Island Borough 2023). Additionally, seven villages are located within the borough; Old Harbor (218 residents), Port Lions (194 residents), Ouzinkie (161 residents), Akhiok (71 residents), Larsen Bay (87 residents), Chiniak (47 residents) and Karluk (37 residents; ADLWD 2023).

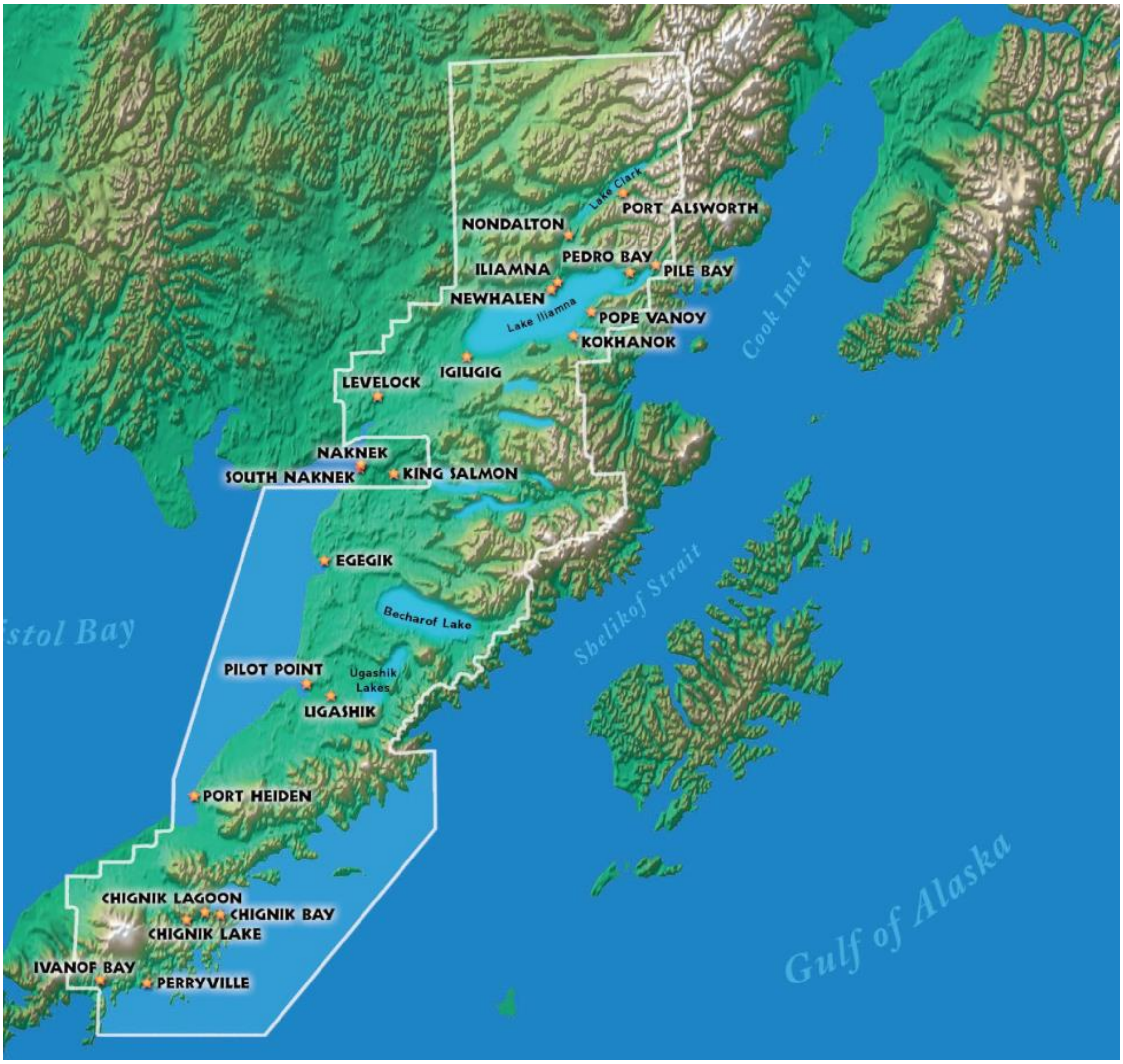


Source: Kodiak Island Borough 2018

Figure 20. Kodiak Island Borough Boundary and Villages

5.1.1.2 Lake and Peninsula Borough

The Lake and Peninsula Borough has a total population of 1,476 residents (ADLWD 2023) comprising 18 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 (133 residents), Port Alsworth (186 residents), Kokhanok (152 residents), Newhalen (168 residents), Levelock (69 residents), Iliamna (108 residents), Igiugig (68 residents), and Pedro Bay (43 residents; ADLWD 2023). The villages in the Upper Peninsula Area include; Egegik (39 residents), Port Heiden (100 residents), Pilot Point (70 residents), and Ugashik (4 residents; ADLWD 2023). The southernmost area, Chignik Area, contains 5 villages; Perryville (88 residents), Chignik Lagoon (72 residents), Chignik Lake (61 residents), Chignik (97 residents), and Ivanof Bay (1 resident; ADLWD 2023).



Source: Lake and Peninsula Borough 2018

Figure 21. Lake and Peninsula Borough Boundary and Villages

5.1.1.3 Aleutians East Borough

The Aleutians East Borough includes the westernmost landmass of the Alaska Peninsula, and spans southwest from Mud and Herendeen Bays to Akutan Island (Source: Aleutians East Borough 2018). The borough is home to a total of approximately 3,420 residents (ADLWD 2023) who reside within 6 coastal communities; Sand Point (578 residents), King Cove (757 residents), Akutan (1,589 residents), False Pass (397 residents), Cold Bay (50 residents), and Nelson Lagoon (41 residents; ADLWD 2023).

Source: Aleutians East Borough 2018

Figure 22. Aleutians East Borough Boundary and Villages

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 5.1.4 - *Tourism*), however many villages in the proposed project region are remote and have few economic opportunities.

5.1.2 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).

5.1.3 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 23).

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

Source: Fey and Ames 2013

Figure 23. Alaska Federally Managed Commercial Fisheries Fleet Crossover

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.

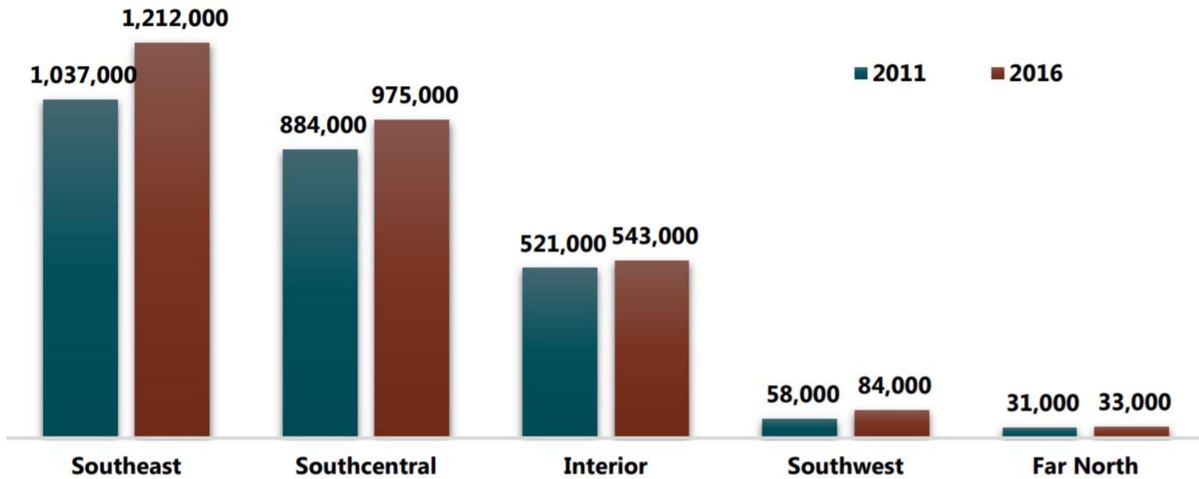
Fishing and commercial seafood processing has occurred on Kodiak Island since the late 1800s (ADFG 2018a), and today Kodiak is home to Alaska's largest fishing port. The KMA includes the marine waters surrounding the Kodiak Archipelago, as well as drainage from the southeastern portion of the Alaska 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 CMA 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.

Area M 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.

5.1.4 Tourism

The Alaska Peninsula, Kodiak Archipelago, and Aleutian Islands are components of the Southwest Alaska tourism region, which as a whole receives approximately 4 percent 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. 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 24).



Source: ADCCED 2017

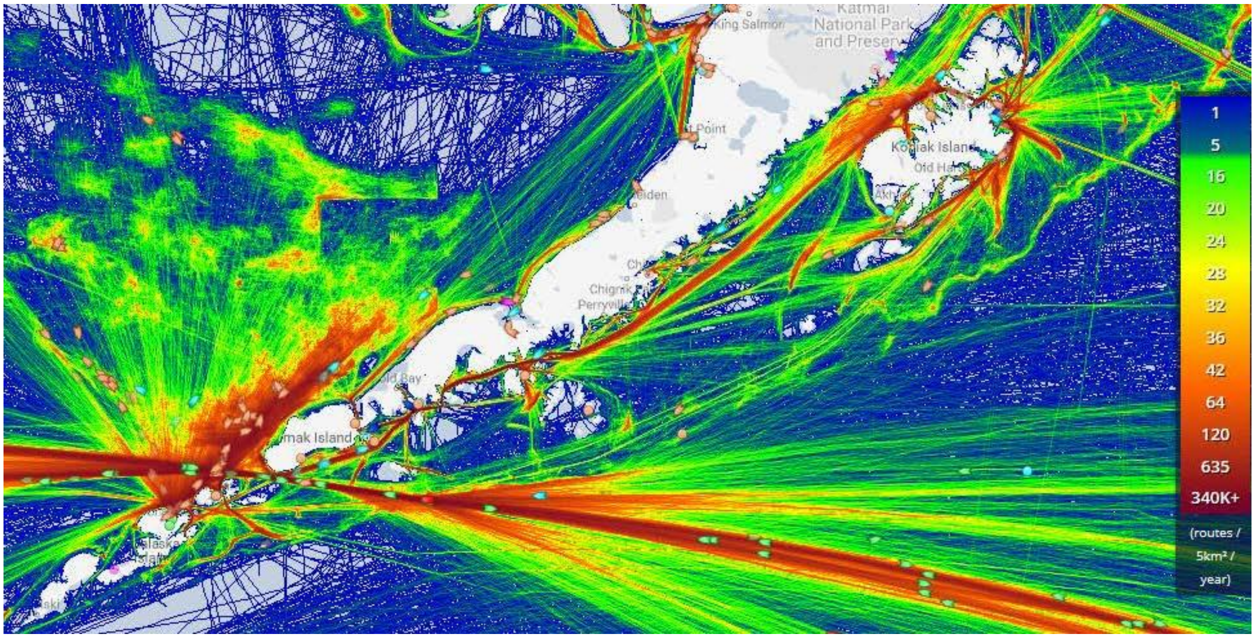
Figure 24. Estimated Visitor Volume to Alaska Regions, Summer 2011 and 2016

5.1.5 Vessel Traffic

Waters adjacent to the Alaskan Peninsula, Kodiak Island, and the Eastern Aleutian Islands experience high levels of annual vessel traffic (Figure 255) 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, which patrol and perform various operations, ranging from marine inspections to life saving missions, within the Western Alaska USCG area of responsibility.



Source: TerraSond Limited 2018, Via Marine Traffic

Figure 25. 2017 Vessel Traffic Density for Southwest Alaska

5.1.6 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 Division monitors primary shipping waterways and security zones and operates in conjunction with the USCG Aids to Navigation Team 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.

Kodiak Island is the only location in the Action 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).

5.1.7 Oil and Gas

The State of Alaska Department of Natural Resources – Division of Oil and Gas (ADNR-DOG) is conducting a lease sale in the Alaska Peninsula Region (Alaska Peninsula Areawide) In November and December 2023 (ADNR-DOG 2023). Exploratory mining activity is ongoing near Perryville; however, impacts on Project activities are unlikely. Overall, according to TerraSond Limited's 2018 project-specific desktop study, there are currently no known occurrences of natural resource developments or extraction near the Action Area that would interfere with the proposed FOC installation.

5.2 PROPOSED PROJECTS

5.2.1 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.

5.2.2 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.

5.2.3 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.

5.2.4 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.

5.2.5 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).

5.2.6 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 Project (TerraSond Limited 2018). Unicom will coordinate with the City.

6.0 EFFECT OF THE ACTION

6.1 DIRECT EFFECTS

In Section 3.3, *Definition of the Action Area*, the Action Area was defined as the estimated distance to the 120 dB re 1 µPa rms acoustic threshold. The distance to the 120 dB re 1 µPa rms threshold was conservatively estimated to be 1.8 km (1.1 mi.) based on measurements of similar sound sources. Therefore, the Action Area is equal to the route length within the species range plus a buffer of 1.8 km (1.1 mi.) on each side of the route (3.6 km [2.2 mi.]) total width). The total Action Area encompasses approximately 669.28 km^2 (258.41 mi^2).

The amount of critical habitat occurring within the Action Area for each species is summarized in Table 7. 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 7. Calculated Area of Critical Habitat within the Action Area

Designated Critical Habitat	Action Area in Critical Habitat (km^2 [$mi.^2$])
Northern sea otter	278.6 km^2 (105.8 $mi.^2$)
Steller's eider	0 km^2 (0 $mi.^2$)
Short-tailed albatross	N/A

6.1.1 Noise

All vessels generate noise as a result of their operations. The vessels in this project would use main drive propellers and/or DP thrusters to maintain position or move slowly during cable lay operations. 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.

While the main noise source would be the *IT Infinity* during FOC-laying operations, noise would be generated during trenching and other terrestrial-based construction activities as well; however, since USFWS-managed ESA-listed species typically use marine habitat, not terrestrial habitat within the Action Area, noise produced by terrestrial activities is not likely to affect these species and will not be discussed further in this BA.

6.1.1.1 Sounds Produced by the Proposed Action

As described in Section 3.3, *Definition of the Action Area*, results of a sound source verification study to characterize underwater sounds produced by the cable-laying ship *Ile de Brehat* conducting activities similar to the proposed Project indicated the noise from the main propeller's cavitation were the dominant sound over plow activities for burying a subsea cable or support vessel sounds. Sound measurement results ranged from 145 dB re 1 µPa rms at 200 m (656 ft.) to 121 dB re 1 µPa rms at 4,900 m (3 mi.)(Illingworth and Rodkin 2016). One-third octave band spectra show dominant sounds between 100 and 2,500 Hz. The source level was computed to 185.2 dB re 1 µPa rms at 1 m (3.2 ft.) using the measured transmission loss of 17.36 log (Illingworth and Rodkin 2016). Assuming spherical spreading transmission loss (20 log), the distance to the 120 dB re 1 µPa rms acoustic threshold was calculated to be 1.8 km (1.1 mi.) for the cable laying ship *Ile de Brehat*.

6.1.1.2 Sea Otters

6.1.1.2.1 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 (TTS) to occur. Received levels must be even higher for a risk of permanent hearing impairment.

6.1.1.2.2 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).

Controlled sound exposure trials on southern sea otters (*Enhydra lutris nereis*) indicate otters hearing ability ranges between 125 Hz and 38 kilohertz (kHz) with the best sensitivity between 1.2 and 27 kHz (Ghoul and Reichmuth 2014). Aerial and underwater sound exposures with a captive adult male southern sea otter indicated otters have a lower sensitivity to both high-frequency (greater than 22 kHz) and low-frequency (less than 2 kHz) sounds than land-based carnivorous mammals but have similar sensitivities to those of eared seals (in-air hearing range is 0.250 to 30 kHz). Sea otter vocalizations are typically between 3 and 8 kHz, with some occasionally recorded above 60 kHz (McShane et al. 1995; Ghoul and Reichmuth 2012a). Ghoul and Reichmuth (2014) suggest that although sea otters are adapted to an aquatic lifestyle, they retain in-air hearing sensitivity similar to terrestrial carnivores and are vulnerable to coastal anthropogenic disturbance. Overall, the in-water hearing sensitivity of sea otters is reduced in comparison to other marine mammals, such as pinnipeds, since sea otters lack the ability to detect sounds embedded in background noise. Specific Level A acoustic criteria have not been determined for sea otters. Instead, USFWS relies on thresholds determined for otariids as a proxy for sea otters, given the biological similarities (Ghoul and Reichmuth 2014).

Southall et al. (2007, 2019) determined sound exposures to pinnipeds between approximately 90 to 140 dB generally did not appear to induce strong behavioral responses in water, but behavioral effects such as avoidance became more likely in exposures to sound between 120 to 160 dB.

Thresholds based on TTS have been used as a proxy for Level B acoustic harassment (70 FR 1871, 71 FR 3260, 73 FR 41318). Southall et al. (2007) derived TTS thresholds for pinnipeds based on 212 dB peak and 171-dB cumulative sound exposure level (SEL_{cum}). Kastak et al. (2005) found exposures resulting in TTS in pinnipeds ranging from 152 to 174 dB (183-206 dB SEL). Kastak et al. (2008) demonstrated a persistent TTS, if not a permanent threshold shift (PTS), after 60 seconds of 184 dB SEL. Kastelein et al. (2012) found small but statistically significant TTSs at approximately 170 dB SEL (136 dB, 60 minutes) and 178 dB SEL (148 dB, 15 minutes). Finneran (2015) summarized these and other studies, and NMFS (2018) has used the data to develop a TTS threshold for otariid pinnipeds of 188 dB SEL_{cum} for impulsive sounds and 199 dB SEL_{cum} for non-impulsive sounds.

Based on the lack of a disturbance response or any other reaction by sea otters to playback studies and the absence of a clear pattern of disturbance or avoidance behaviors attributable to underwater sound levels up to about 160 dB resulting from vibratory pile driving and other sources of similar low-frequency broadband noise, USFWS assumed 120 dB is not an appropriate behavioral response threshold for sea otters exposed to continuous underwater noise (86 FR 30613). USFWS assumed based on the work of NMFS (2018), Southall et al. (2007, 2019), and others described here, that either a 160-dB threshold or a 199-dB SEL_{cum} threshold is likely to be the best predictor of Level B take of sea otters for continuous noise exposure, using southern sea otters and pinnipeds and otariids as a proxy, and based on the best available data. When behavioral observations during vibratory pile driving (ESNERR 2011) and results of behavioral response modelling (Wood et al. 2012) are considered, the application of a 160-dB rms threshold is most appropriate.

Exposure to sound levels greater than 160 dB can elicit behavioral changes in marine mammals that might be detrimental to health and long-term survival where it disrupts normal behavioral routines (86 FR 30613).

6.1.1.2.3 Potential Effects of Noise from Action on Sea Otters

Vessel sounds could affect sea otters within the Action Area. 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 Action 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 approximately 80 percent 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

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 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.

6.1.1.3 Seabirds

6.1.1.3.1 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).

6.1.1.3.2 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., TTS or 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.

6.1.1.3.3 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 in the Action Area. 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 Action Area 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. Additionally, the duration of potential exposure to these low-level sounds would be insufficient to cause impacts to hearing abilities.

6.1.1.3.4 Potential Effects of Noise from Action on Short-tailed Albatrosses

Noise produced by the proposed project activities could affect the behavior of short-tailed albatrosses within the Action Area. 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. Additionally, the duration of potential exposure to these low-level sounds would be insufficient to cause impacts to hearing abilities.

6.1.2 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 (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 to 4 km per hour [0.5 to 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.

6.1.3 Habitat Disturbance

6.1.3.1 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 (less than 2-m [6.6-ft.] depth) water or haul out on land in response to disturbance (USGS unpublished 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 approximately 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 laying the FOC on the seafloor has 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 sea otter critical habitat along the route; however, the extent of overlap is only 278.6 km^2 (106 $mi.^2$). This area constitutes 1.8 percent of the 15,164 km^2 (5,854.9 $mi.^2$) 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.

6.1.3.2 Potential Effects of Habitat Disturbance on Seabirds

6.1.3.3 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 (0.62 to 1.24 mi.), and smaller flocks flushing at less than 1000 m (3,281 ft.). 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 to 200 m (328.1 to 656.2 ft.) in January and 300 m (984.3 ft.) 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 less than 100 m (328.1 ft.) (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 approximately 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.

6.1.3.4 Artificial Lighting

Artificial lighting on project vessels 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 be injured or killed from collision by flying into 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.

6.1.3.5 Disturbance to Benthos

This project will cause some disturbance to the benthic community from laying of the FOC on the seafloor. The benthic community would recover from these disturbances, but recovery times may vary depending on the location, substrate, the original ecosystem, and the scale of the disturbance (National Academy of Sciences 2002). The Project is not expected to affect populations of benthic organisms but rather a relatively small number of individuals within the population.

6.1.3.6 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 (98 ft.) deep which are used exclusively at night (Frederickson 2001; Martin et al. 2015). The Action Area overlaps with some of these use areas; however, 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 to 200 m (328.1 to 656.2 ft.) 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; 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.

6.1.3.7 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 Action Area are unlikely to impact albatross feeding. Cable-laying activities will disturb the benthos, which has the potential to affect the food supply within that area. However, effects would be along a relatively narrow strip of seafloor in comparison to available prime foraging habitat in the area.

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

6.1.4 Measures to Reduce Direct Effects on Affected Species

6.1.4.1 Measures to Reduce Direct Effects on Sea Otters

As described above, direct effects on ESA-listed species may result from in-water sounds produced by project vessel activities, potential ship strike by project vessels, or disturbance of 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 ESA-listed species, while project vessels are actively laying cable or transiting in the Action Area, Unicom plans for Protected Species Observers (PSOs) to watch for ESA-listed species and assist vessel operators with following guidelines for reducing impacts.

Project vessels will implement the following procedures:

- During cable-laying operations, it is unsafe to stop activities; therefore, there are no shut down procedures for this project. PSOs will observe a 1,500-m (4,921-ft.) monitoring zone and report sightings to USFWS.
- Prior to the start of cable-laying operations, or when activities have been stopped for longer than a 30-minute period, PSOs will clear the 1,500-m (4,921-ft.) monitoring zone for a period of 30 minutes when activities have been stopped for longer than a 30-minute period. Clearing the zone means no ESA-listed birds or 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
  - it has not been seen within the zone for 15 minutes in the case of sea otters, Steller's eiders, or short-tailed albatrosses.
- Vessels will not allow tow lines to remain in the water, and no trash or other debris will be thrown overboard, thereby reducing the potential for entanglement of ESA-listed species.
- Vessels may not be operated in such a way as to separate members of a group of marine mammals from other members of the group.
- Vessels will report any stranded, dead, or injured ESA-listed species to the Alaska Marine Mammal Stranding Hotline at 877-925-7773 and USFWS.
- Although take is not authorized, if an ESA-listed marine mammal is taken (e.g., struck by a vessel), it must be reported to USFWS within 24 hours. The following will be included when reporting take of an ESA-listed species:
  - Number of ESA-listed animals taken.
  - The date, time, and location of the take.
  - The cause of the take (e.g., vessel strike).
  - The time the animal(s) was first observed and last seen.
  - Mitigation measures implemented prior to and after the animal was taken.
  - Contact information for PSOs, if any, at the time of the collision, ship's Pilot at the time of the collision, or ship's Captain.

Unicom will have contracted two PSOs (one on watch at a time) on the cable laying ship. A PSO will be on watch during all daylight hours. Cable-laying activities will take place 24 hours-per-day in the summer. PSOs will:

- be trained in ESA-listed species identification and behaviors.
- have no other primary duty than to watch for and report on events related to ESA-listed species.
- 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 ESA-listed species, to act if ESA-listed species enter the 1,500-m (4,921-ft.) monitoring zone, and to record these events:
    - Binoculars, range finder, GPS, compass
    - Two-way radio communication with construction foreman/superintendent
    - A logbook of all activities which will be made available to NMFS upon request.
- PSOs will record all ESA-listed species observed using agency-approved observation forms. 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.

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

6.1.4.2 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

6.2 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.

6.2.1 Potential Impacts of Noise on Habitat

6.2.1.1 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., less than 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., less than 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 greater than 1,000 Hz (Pye and Watson III 2004). A recent study concluded that planktonic coral larvae 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.

6.2.1.2 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 less than 1,500 Hz (Popper and Fay 2010). Some marine fishes, such as shads and menhaden, can detect sound at frequencies greater than 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.

6.2.2 Measures to Reduce the Impacts of Noise on Habitat

Measures aimed at reducing the direct effects to the listed species, as described in Section 6.1.4, *Measures to Reduce Direct Effects on Affected Species,* 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.

6.3 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.

6.3.1 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 Action Area; therefore, it would be expected that pollutants will likely not increase in its waterways. Further, the Environmental Protection Agency and the Alaska Department of Environmental Conservation will continue to regulate the amount of pollutants that enter the Gulf of Alaska from point and non-point sources through National Pollutant Discharge Elimination System 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.

6.3.2 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.

6.3.3 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 and incrementally increased vessel traffic of only a few vessels during the cable-laying operations.

6.3.4 Oil and Gas

ADNR-DO&G published notice of a competitive oil and gas lease sale in the Alaska Peninsula Areawide area during the fourth quarter of 2023. The lease sale area is approximately 5.0 million acres of state-owned land, encompassing onshore and offshore acreage. The lease sale tracts are located on land and water north of the Action Area and associated activities are unlikely to overlap in time and space with this Project. Potential impacts from gas and oil development on ESA-listed species 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 would undergo consultation prior to exploration and development, and activities beyond the exploration phase are unlikely to occur during the Project.

The activity most likely to overlap with this Project would be vessel transportation for moving supplies and equipment to and from exploration activities. Support vessels from increased gas and oil development would likely increase noise in the action areas, and there would be potential for increased ship strikes with marine animals.

7.0 DETERMINATION OF EFFECTS

The following section describes the effects of the proposed Project on the USFWS ESA-listed species occurring in the Action Area and their critical habitat. A summary of determination by species is provided in Table 1 in the Executive Summary.

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

We conclude that the 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 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. Since sea otters primarily use marine habitat within the Action Area, noise related to proposed terrestrial activities is not expected to affect the animals.

The Project would have **no adverse modification on critical habitat** of the Southwestern DPS of Northern sea otters. The Action Area defined by potential acoustic disturbance overlaps 278.6 km^2 (106 $mi.^2$) of designated sea otter critical habitat. This area constitutes only 1.8 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.

7.2 EFFECT ON THE STELLER'S EIDER AND CRITICAL HABITAT

We conclude the Project **may affect and is not likely to adversely affect** Steller's eiders. 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. Since Steller's eiders primarily use marine habitat within the Action Area, noise related to proposed terrestrial activities is not expected to affect these birds.

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

7.3 EFFECT ON THE SHORT-TAILED ALBATROSS

We conclude that the 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. Since short-tailed albatrosses primarily use marine habitat within the Action Area, noise related to proposed terrestrial activities is not expected to affect these birds.

No critical habitat has been designated for the short-tailed albatross.

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APPENDIX A

EQUPIMENT SPECIFICATIONS

C.S. IT INTEGRITY

The IT Integrity is a UT755L - 5,450 BHP Platform supply / ROV support vessel recently acquired and fully retrofitted as a versatile and capable vessel for submarine cable repair, installation, marine route survey, ROV support and more.

SPECIFICATIONS

REGISTRATION

Year Built	2001
Builder	Soviknes Verft, Norway
Flag	Barbados
Classification	DNV 1A1, SF, EO, DK, DYNPOS - AUTR

DIMENSIONS

Length Overall	72 m
Breadth Moulded	16 m
NRT	936 T
Deadweight	3,200 T

SPEED – CONSUMPTION

Cruising Speed	12 kts – 14T/day
Economic Speed	10 kts – 10T/day
DP	Approx 4 to 5T/day

MACHINERY

Main Engines	2 x 2,725 BHP
Thrusters Bow	1 x 800 BHP
Thruster Azimuth	1 x 1,000 BHP
Thruster Azimuth	1 x 1,000 BHP
Rudders	2 x Rolls Royce High Lift
Propellers	2 x CPP
Capstans	2 x 8 T
Deck Crane	1 x 5T @ 10 m
Tugger Winch	2 x 10 T
Deck Load	1,500 T
Fuel Oil	916.8 m3
Potable Water	796.3 m3

ACCOMODATION

14 x 1 man + 12 x 2 man = 38 beds total

CRANES / LIFTING CAPACITIES

Stern A-frame	25 T
Fwd Deck Crane	5T@10m
	3T@16m

OTHERS

Moon pool	4.35 x 3.8 m
Survey tube	0.5 m clear hole

PROJECT PERMANENT EQUIPMENT

Survey Cursor in moonpool

From:	Korsmo (Aughe), Stacey
To:	akr.prd.section7@noaa.gov
Cc:	Emily Creely; Larson, Meghan; NMennen@gci.com; Cameron Miller; Pereira, Amanda; Andrew.Bielakowski
Subject:	[EXT] AU-Aleutian II Fiber Project Biological Assessment Submittal
Date:	Thursday, December 21, 2023 1:50:23 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png AU-A II Non-Federal Designation_NMFS_signed.pdf 20231218 Unicom AU-A II NMFS BA.pdf

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Good afternoon,

On behalf of Unicom, Inc. please find attached a Biological Assessment prepared for the AU-Aleutian II Fiber Project. Unicom proposes to build on the AU-Aleutian I Fiber Project which is in the process of connecting the communities of Larsen Bay, Chignik Bay, Sand Point, King Cove, Akutan, and Unalaska (NMFS Consultation AKRO-2019-00892). The AU-A II Project proposes to connect the additional communities of Chignik Lagoon, Chignik Lake, Cold Bay, False Pass, Perryville, Ouzinkie, and Port Lions to the existing subsea fiber backbone. Installation of the FOC has potential to affect six baleen whales, one toothed whale, and one pinniped species managed by NMFS currently listed as threatened or endangered under the ESA: blue whales, humpback whales, fin whales, gray whales, North Pacific right whales, sperm whales, and Steller sea lions. Additionally, the Project has the potential to affect the sunflower sea star, which is a candidate for listing under the ESA. Weston Solutions was designated as the non-Federal representative of the National Telecommunications and Information Administration (NTIA) for the purposes of conducting ESA Section 7 consultation in a letter from Amanda Pereira, dated 12 October 2023 (attached). Please let me know if you have any questions upon review of this Biological Assessment.

Kind Regards,
Stacey Korsmo

****Working part-time: Monday - Wednesday***

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Environmental and Infrastructure Solutions

NATIONAL MARINE FISHERIES SERVICE

BIOLOGICAL ASSESSMENT

FOR

AU-ALEUTIAN II FIBER PROJECT

BERING SEA, ALASKA

Prepared for
Unicom
2550 Denali Street, Suite 1000
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WESTON SOLUTIONS®

December 2023

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ACRONYMS AND ABBREVIATIONS

°	degree(s)
ADF&G	Alaska Department of Fish and Game
ADNR-DOG	Alaska Department of Natural Resources, Division of Oil and Gas
Area M	Alaska Peninsula and Aleutian Islands Management Area
BA	Biological Assessment
BHP	brake horsepower
BIA	biologically important area
BMH	beach manhole
CFR	Code of Federal Regulations
CLS	cable landing station
cm	centimeters
CMA	Chignik Management Area
CWA	Clean Water Act
dB re 1 µPa	decibels referenced to one microPascal
DIP	demographically independent population
DOT&PF	Department of Transportation and Public Facilities
DP	dynamic positioning
DPS	distinct population segment
ESA	Endangered Species Act
FOC	fiber optic cable
FR	Federal Register
ft.	feet
GCI	GCI Communication Corp.
hp	horsepower
Hz	Hertz
in	inches
kHz	kiloHertz
km	kilometer
km^2	square kilometer(s)
KMA	Kodiak Management Area
kW	kilowatt
m	meter
mi.	miles
$mi.^2$	square mile(s)
MHW	Mean High Water
MLW	Mean Low Water
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
N	north
NEPA	National Environmental Policy Act
nm	nautical mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NTIA	National Telecommunications and Information Administration
PCE	Primary Constituent Element
Project	AU-Aleutian II Project
PSO	Protected Species Observer
PTS	permanent threshold shift
rms	root mean square

SEL	sound exposure level
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
USFWS	United States Fish and Wildlife Service
UXO	unexploded ordnances
W	west

1.0 EXECUTIVE SUMMARY

This Biological Assessment (BA) was prepared by Weston Solutions on behalf of the National Telecommunications and Information Administration (NTIA) to assess the potential impacts on Endangered Species Act (ESA_-listed species and critical habitat from the project. Table 1 summarizes the ESA-listed species and critical habitat within or near the Action Area managed by the NMFS jurisdiction and determination of effects under the ESA. A detailed discussion of the effects determination is provided in Section 6, *Effects of the Action*.

Table 1. Determination of effects from the proposed FOC installation AU-Aleutian II 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[1]	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 DPS	Endangered	Yes	May Affect and is Not Likely to Adversely Affect Species No Adverse Modification of Critical Habitat
Humpback whale (*Megaptera novaeangliae*) Mexico DPS	Threatened	Yes	May Affect and is Not Likely to Adversely Affect Species No Adverse Modification of 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 of Critical Habitat
Sunflower sea star (*Pycnopodia helianthoides*)	Proposed Threatened	No	May Affect and is Not Likely to Adversely Affect Species No Critical Habitat

[1]Designated critical habitat for North Pacific right whales is in the vicinity of the Action Area to the north of the Alaska Peninsula. The Action Area does not overlap the critical habitat area.

2.0 INTRODUCTION

In 2021, with support from the U.S. Department of Agriculture Rural Development, Unicom, Inc. (Unicom), a wholly owned subsidiary of GCI Communications Corp. (GCI), installed a nearly 1,287.5-kilometer (km; 800-mile [mi.]) subsea fiber optic cable (FOC) to extend broadband service to six remote communities for the AU-Aleutians (AU-A I) fiber project.

Unicom, on behalf of the Native Village of Port Lions (NVPL) and with support from the NTIA Tribal Broadband Connectivity Program, proposes to extend the AU-A project through Phase II and bring high-speed internet service to approximately 800 people in six remote Alaska Native villages for the first time.

The AU-A II Fiber Project (Project) builds on the AU-A I project by connecting communities to its existing subsea fiber backbone. The AU-A I project is currently in the process of connecting Larsen Bay, Chignik Bay, Sand Point, King Cove, Akutan, and Unalaska. This Project proposes to connect the communities of Chignik Lagoon, Chignik Lake, Cold Bay, False Pass, Perryville, Ouzinkie, and Port Lions.

The Project would consist of approximately 176 km (109 mi.) of submerged (laid on the seafloor) FOC. Portions of the cable within 298.8 meters (m; 980 feet [ft.]) may be buried. Unicom anticipates initiating terrestrial activities in May 2024, initiating and completing marine activities in June 2024, and completing the project in Fall 2025.

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 NTIA would act as the lead federal agency for purposes of compliance with the National Environmental Policy Act and the ESA. Under Section 7 of the ESA, the NTIA is 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. The NTIA has designated Ms. Meghan Larson and Ms. Stacey Korsmo of Weston Solutions, Inc. as the Non-Federal Representative to conduct the ESA Section 7 consultation.

A BA is prepared to assist the consulting agencies with the Section 7 consultation process if ESA-listed species or designated critical habitat is present within or in the vicinity of the Action Area. A BA was submitted to NMFS during ESA Section 7 consultation for the original AU-A I Project (AKRO-2019-00892). This BA was originally prepared by Unicom on behalf of the USACE. It is hereby updated on behalf of NTIA to include a description of the proposed Project and relevant new scientific information on potentially affected ESA-listed species and designated critical habitat occurring in the Action Area.

The proposed Project would service the communities of Ouzinkie and Port Lions in addition to communities of Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass which were proposed under the original AU-A I project but not constructed (Figure 1). The previously-proposed branch segments were included in the ESA Section 7 consultation (AKRO-2019-00892) for the original AU-A I project.

3.0 PROJECT DESCRIPTION

This Project includes FOC installation by laying the cable on the seafloor, with the exception of areas within 298.8 m (980 ft.) of shoreline. In nearshore areas within 298.8 m (980 ft.) of mean low water (MLW), burial of the FOC is proposed to occur within the intertidal area at each of the seven landings. In areas where burial is necessary, the burial depth would be no deeper than 0.9 m (3 ft.) and there would be no resulting side cast. The FOC would have a diameter up to 2.6 cm (1.02 in). Unicom anticipates initiating terrestrial activities in May 2024, initiating marine activities by June 2024, and completing the Project in Fall 2025.

3.1 PROJECT PURPOSE

The Project would provide fast 2,500 megabits per second (approximately 2.5 gigabits per second) internet speeds and affordable, unlimited data plans to seven rural Alaska Native communities for the first time, supporting economic development and expansion of social services. The Project's seven isolated communities are neither connected by road nor an intertied electrical grid. Currently, the lack of broadband access limits economic development and efficiency of services delivered by health care providers, schools, and tribal entities.

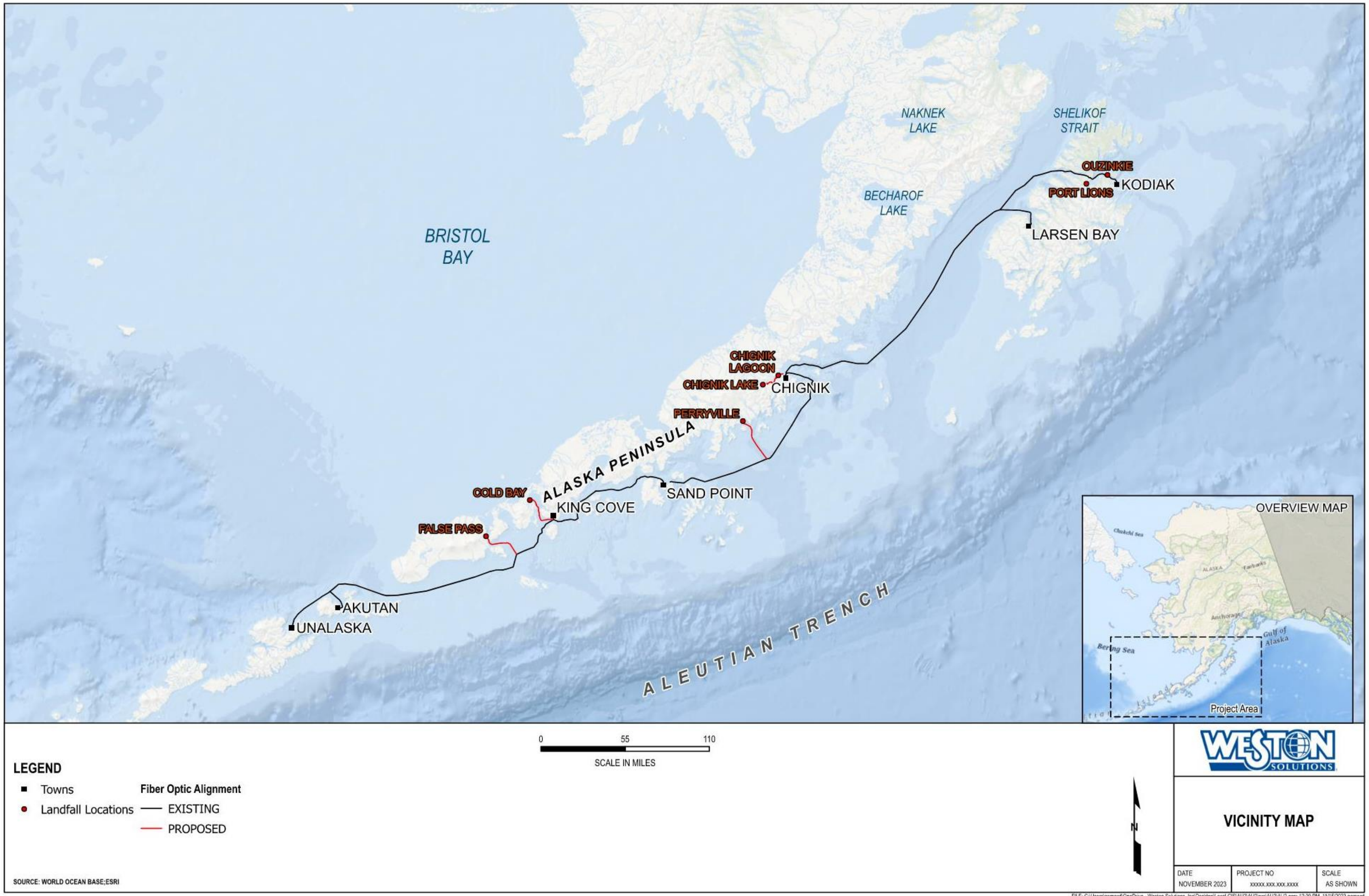

Figure 1. Project Vicinity Map

3.2 LOCATION

The Project is located in the Gulf of Alaska, south of the Aleutians Islands (Figure 1). The FOC would extend from the existing FOC backbone to cable landings at 7 sites. The Project lies within the boundaries of the Kodiak Island Borough, Lake and Peninsula Borough, and Aleutians East Borough.

3.3 DEFINITION OF ACTION AREA

The Action Area, as 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 and according to NMFS guidance, 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 ship (*IT Integrity*) installing cable in all waters except within 298.8 m (980 ft.) of MLW, the distance to the 120 dB re 1 μPa rms threshold was estimated using measurements taken from a larger vessel conducting similar work near Nome, Alaska in 2016.

Quintillion conducted a FOC laying project in Alaska in 2016 (Illingworth & Rodkin 2016). A sound source verification study was conducted near Nome, Alaska to characterize the underwater sounds produced during cable laying activities. They measured underwater sound from propeller noise generated by the cable-laying ship *Ile de Brehat* while towing a plow. Results indicated plowing operations produced a generally continuous sound; the noise from the main propeller's cavitation were the dominant sound over the plow or support vessel sounds. The ship was pulling the plow at 80 percent power. Sound measurement results ranged from 145 dB re 1 μPa rms at 200 m (656 ft.) to 121 dB re 1 μPa rms at 4,900 m (3 mi.). One-third octave band spectra show dominant sounds between 100 and 2,500 hertz (Hz). The source level was computed to 185.2 dB re 1 μPa rms at 1 m (3.2 ft.) using the measured transmission loss of 17.36 log. Assuming spherical spreading transmission loss (20 log), the distance to the 120 dB re 1 μPa rms acoustic threshold was calculated to be 1.8 km (1.1 mi.) for the cable laying ship *Ile de Brehat*.

The *IT Integrity* is a smaller vessel (72 m [236 ft.] total length) than the *Ile de Brehat* (140 m [459 ft.] total length). Additionally, measurements taken during the sound source verification of the *Ile de Brehat* were during cable laying operations using a plow to bury the FOC. This project will not include use of a plow to bury FOC. The FOC will be laid on the seafloor or buried by a diver using a water jet in nearshore areas. Therefore, sound pressure levels produced by the *IT Integrity* are expected to be lower than those produced by the *Ile de Brehat;* Source levels determined by Illingworth & Rodkin will be used as a conservative proxy for the *IT Integrity* for the purposes of the Project.

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, also affects 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 assumed to be 1.8 km (1.1 mi.) from the cable laying ship, *IT Integrity*.

The Action Area is defined as the route length plus a buffer of 1.8 km (1.1 mi.) on each side of the route (3.6 km [2.2 mi.] total width) for areas in which the cable laying ship would be used. The total Action Area encompasses approximately 669 square kilometers (km^2) (258 square miles [$mi.^2$]) as summarized in Table 2.

Table 2. Calculated Action Area

Description	Width of Route including Action Area Buffer (km/mi.)	Area (in km^2)	Area (in mi^2)
Cable laying ship- *IT Integrity*	3.6/2.2	669[1]	258[1]

[1]The Area presented is the total sum of ensonified areas along all branch segment routes. The maximum area ensonified to the 120-dB acoustic threshold at any given time would be 10.18 km^2 (3.93 $mi.^2$).

3.4 PROPOSED ACTION

The Project would extend broadband service to seven communities located from Kodiak to False Pass by placing 176 km (109 mi.) of FOC on the ocean floor (Figure 1). The Project connects FOC from the existing subsea FOC backbone to each of the seven communities. The main cable would branch off to transmission sites located at Ouzinkie, Port Lions, Chignik Lake, Chignik Lagoon, Perryville, Cold Bay, and False Pass. The FOC would have a diameter up to 2.6 cm (1.02 in). In nearshore areas (within 298.8 m [980 ft.] of MLW), the FOC may be buried. Figure 1 shows project location and Table 3 presents landing site coordinates.

Table 3. Landing Site Coordinates

Location	Latitude	Longitude
Ouzinkie	N 57.920577°	W 152.501018°
Port Lions	N 57.863725°	W 152.860244°
Chignik Lagoon	N 56.31084328º	W 158.54006013º
Chignik Lake	N 56.26037124º	W 158.70402045º
Perryville	N 55.91007222º	W 159.14428056º
Cold Bay	N 55.19574691º	W 162.69750980º
False Pass	N 54.85574800º	W 163.40956004º

N = north; W = west
° = degrees

3.4.1 Description of Landfall Locations

The following describes proposed terrestrial operations that would occur between MLW and existing GCI facilities, including intertidal areas. All landfall locations have existing GCI facilities. The onshore portions of the FOC would be trenched with a maximum width of 0.9 m (3 ft.) and depth of 1.2 m (4 ft) throughout the intertidal zone (within no more than 298.8 m [980 ft.] of MLW) to Mean High Water (MHW). In terrestrial areas above MHW, trenching would have a maximum width of 0.9 m (3 ft.) and depth of 0.9 m (3 ft.) with a side cast width not to exceed 2.4 m (8 ft.). The landfall maps and landing site specification maps for each location are provided in Figure 2 through Figure 15.

For all landfall locations, the following construction methods apply:

- The FOC would be linked to a new beach manhole (BMH), setback from MHW of the adjacent waterbody with a stub of conduit. The BMH would measure 1.2 m to 1.5 m (4 ft. by 5 ft.) or 1.86 m^2 (20 ft^2) and 1.2 m (4 ft.) deep. The BMH excavation would not exceed 1.5 m (5 ft.) by 1.8 m (6 ft.) [(2.8 m^2) 30 ft^2)] with a depth of 1.5 m (5 ft.). The stub of conduit would be placed above MLW.
- From the beach to the BMH, up to three 5.1 cm (2 inch) conduits would be buried at a depth no deeper than 91 cm (36 in).
- Excavation to accommodate the BMH measurements would not exceed 1.5 by 1.5 m (5 by 5 ft.) and 1.8 m (6 ft.) deep. Measurements would vary based on shoreline/bank contours and substrate.
- In all communities except Chignik Lake, the FOC would be routed from the BMH to new Cable Landing Stations (CLS), wherein new prefabricated communications shelters [approximately 8.3 m (25 ft.) long, 3.3 m (10 ft.) wide, and 3.3 m (10 ft. high)] would be placed onto new gravel pads or pile foundation co-located with existing facilities. Gravel pads would measure approximately 232.3 m^2 (2,500 ft^2) and have a depth of 0.6 m (2 ft.).
- From the CLS, FOC would be used to create a main line, from which end users would be connected. FOC between the BMH and CLS would be terrestrial cable placed into an approximate 0.9 m (3 ft.) wide by 0.9 m (3 ft.) deep trench. Trench width may be less if a cable plow or chain trencher is available. If existing suitable utility poles are available, the FOC local distribution may use overhead construction as well.
- Vaults would be installed at intervals of approximately every 800 ft of FOC. The terrestrial vaults would be placed at a depth of 0.9 m (3 ft.) and would be used to provide slack loops and splicing points along the main line route and at the CLS. The 0.9 m (3 ft.) by 1.2 m (4 ft.) vaults would require no more than a 1.5 m (5 ft.) by 1.5 m (5 ft.) excavation.
- All terrestrial FOC would be trenched adjacent to existing roads and would remain within existing utility rights-of-way and easements to the extent possible; which may include trenching in areas near the toe of the slope. FOC trenching would generally follow the utility distribution system in each community.
- Installation crews would use backhoes and standard trenching techniques to set BMSs and vaults flush with the original ground grade.
- All areas would be returned to pre-construction elevations and all trenched areas would be re-graded to original conditions.
- Excavated material that is side cast next to trenches during excavation would be used as backfill to bury the cable and BMH.

For all intertidal areas, the following construction methods would apply:

- All trenching would have a maximum 0.9 m (3 ft.) width and 0.9 m (3 ft.) depth.
- Any work below MHW would occur during low tide.
- Heavy equipment needing to operate in intertidal areas and wetlands would be placed on mats, with the exception of beaches with firm sediments, such as large cobble or boulders (e.g. Ouzinkie, False Pass).
- No excess material requiring disposal is anticipated to be produced.
- Alterations to shorelines would be temporary and trenches would be constructed and backfilled to prevent them from acting as a drain.

In general, equipment used at each landfall location, with the exception of work in the Chignik River, may include:

- Rubber wheel backhoe,

- Tracked excavator or backhoe,
- Utility truck and trailer to deliver materials,
- Chain trencher or cable plow (optional),
- Hand tools (e.g. shovels, rakes, pry bars, and wrenches),
- Survey equipment,
- Winch or turning sheave, and
- Splicing equipment, small genset and splicing tent.

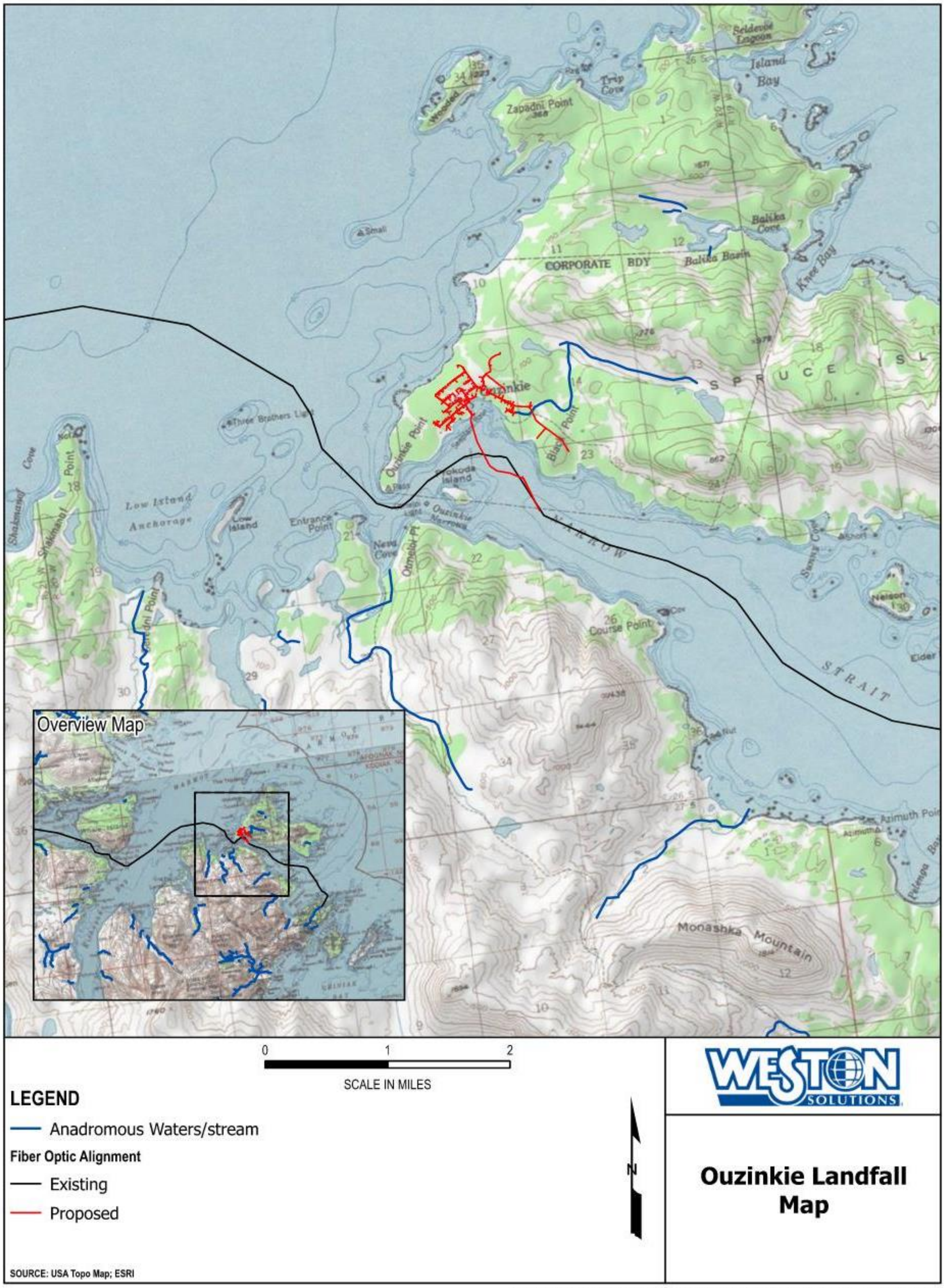

Figure 2. Ouzinkie Landfall Map

Figure 3. Ouzinkie Landing Site

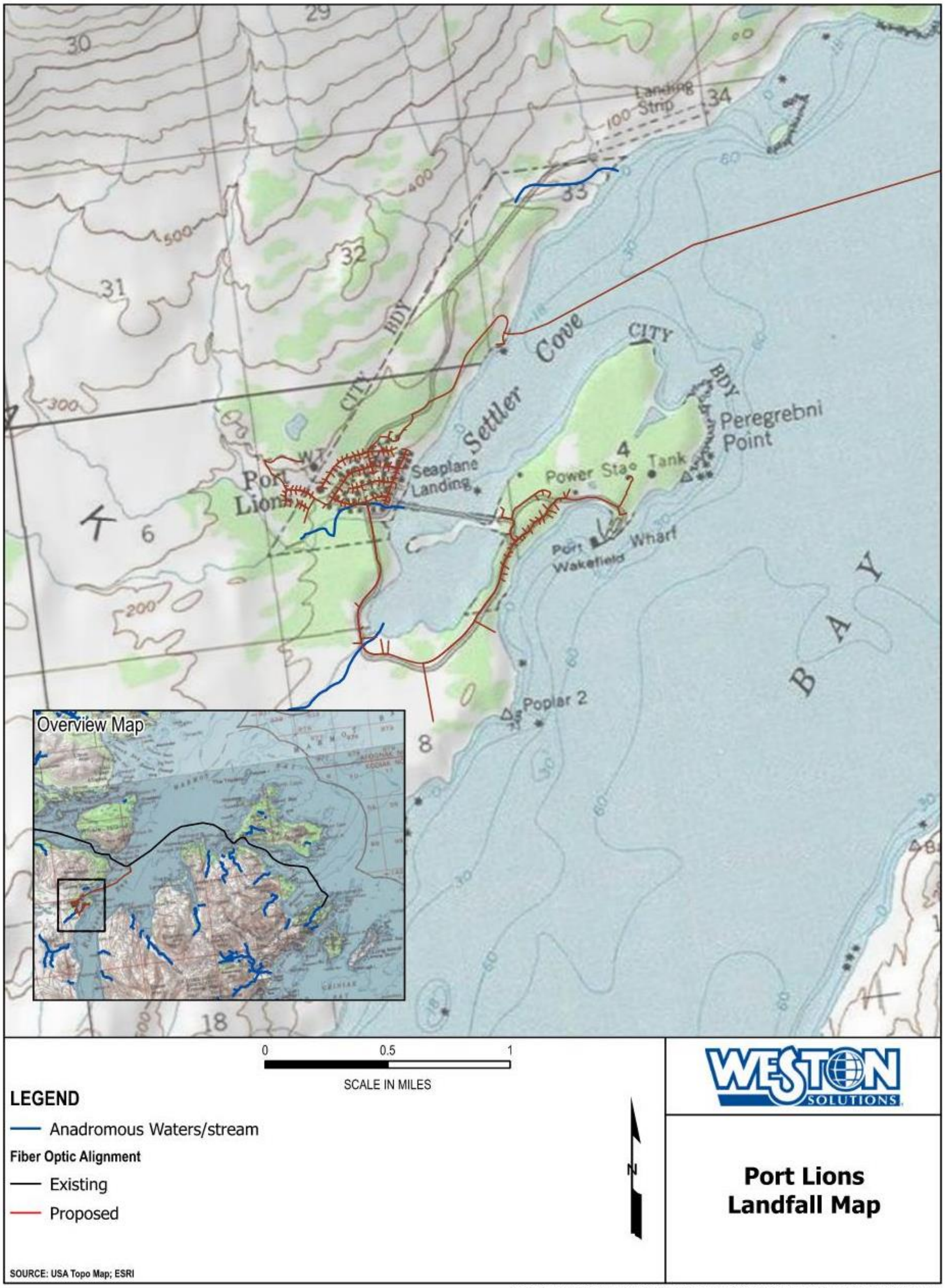

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Figure 4. Port Lions Landfall Map

Figure 5. Port Lions Landing Site

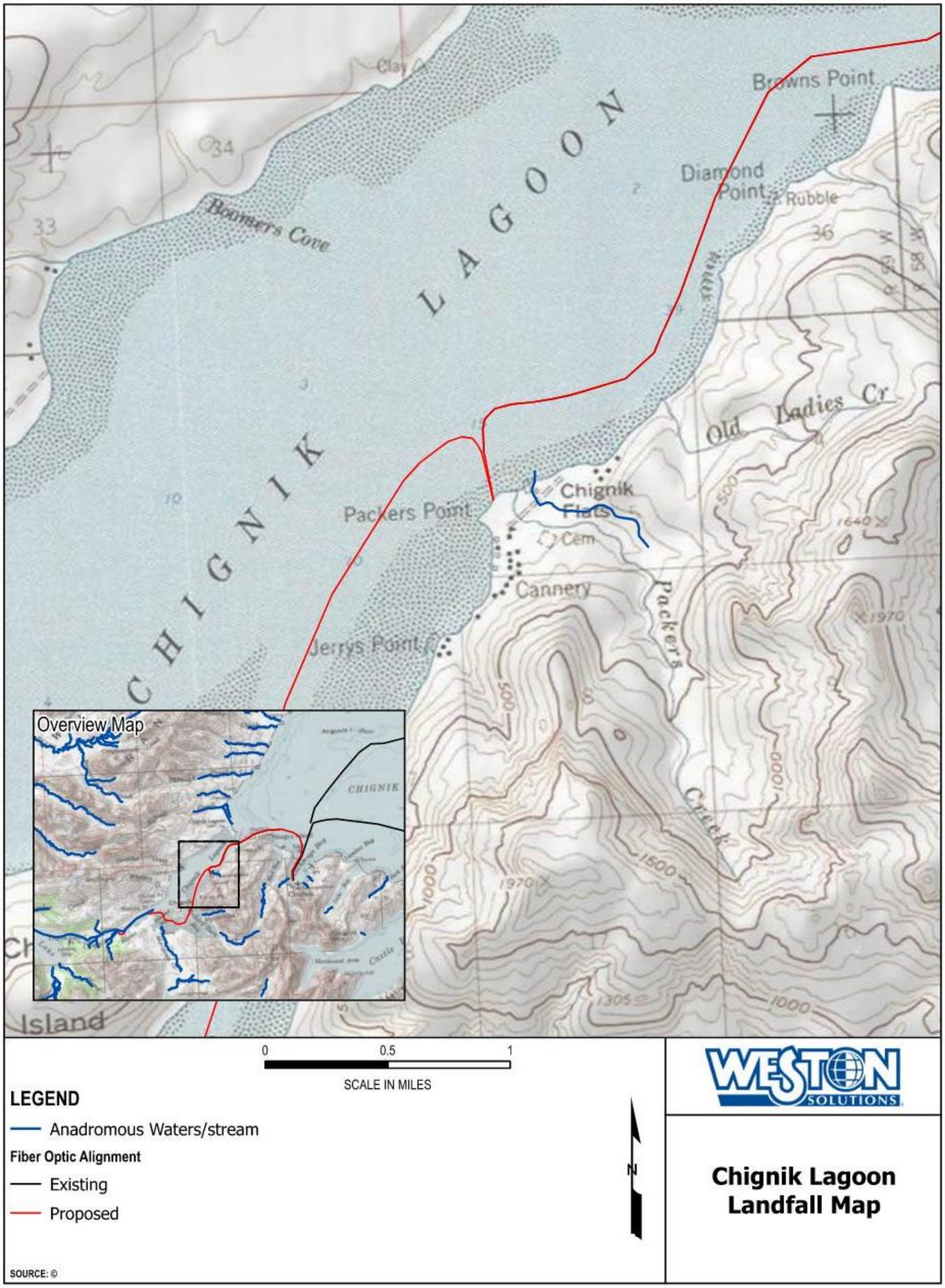

Figure 6. Chignik Lagoon Landfall Map

Figure 7. Chignik Lagoon Landing Site

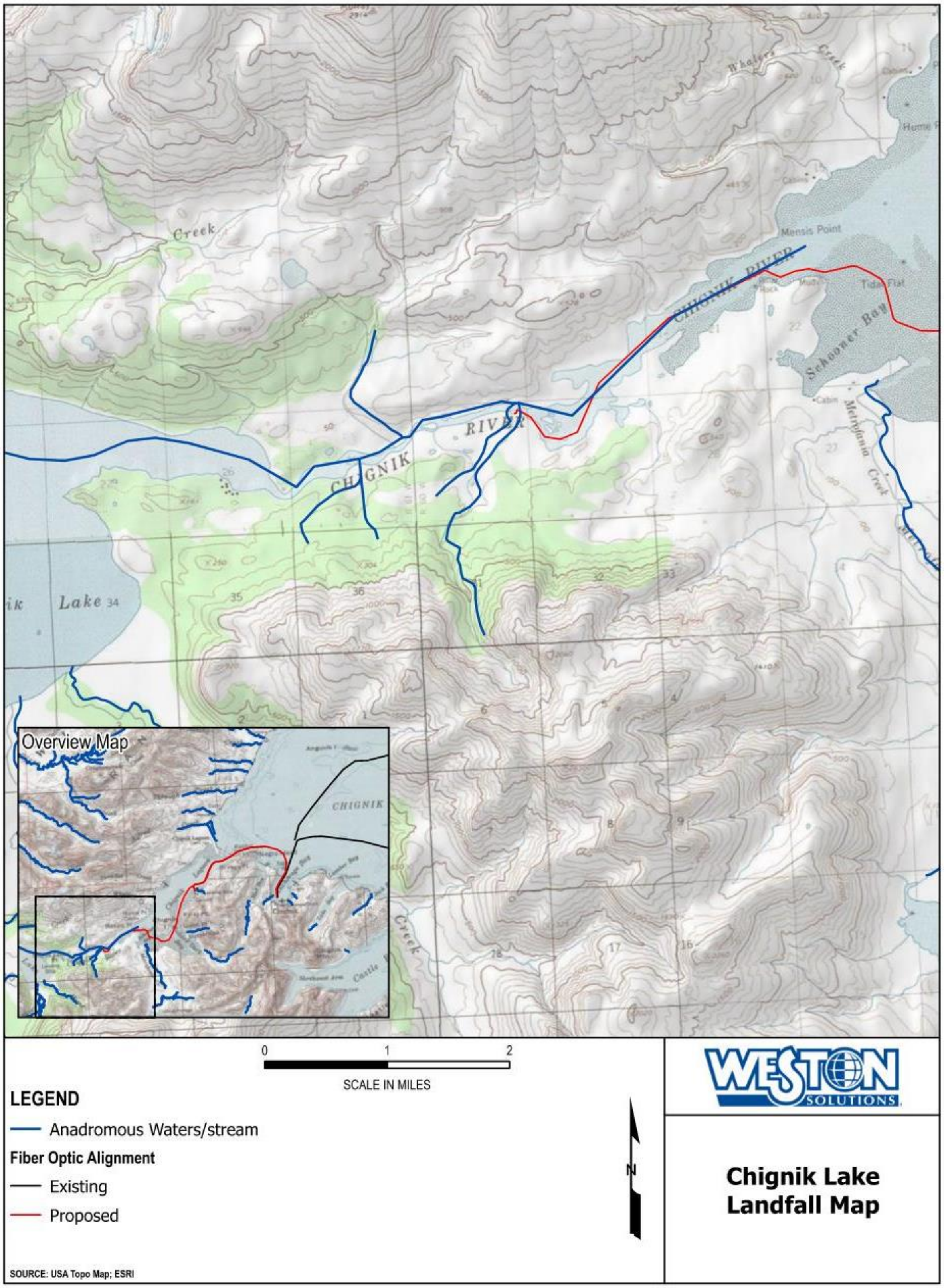

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Figure 8. Chignik Lake Landfall Map

Figure 9. Chignik Lake Landing Site

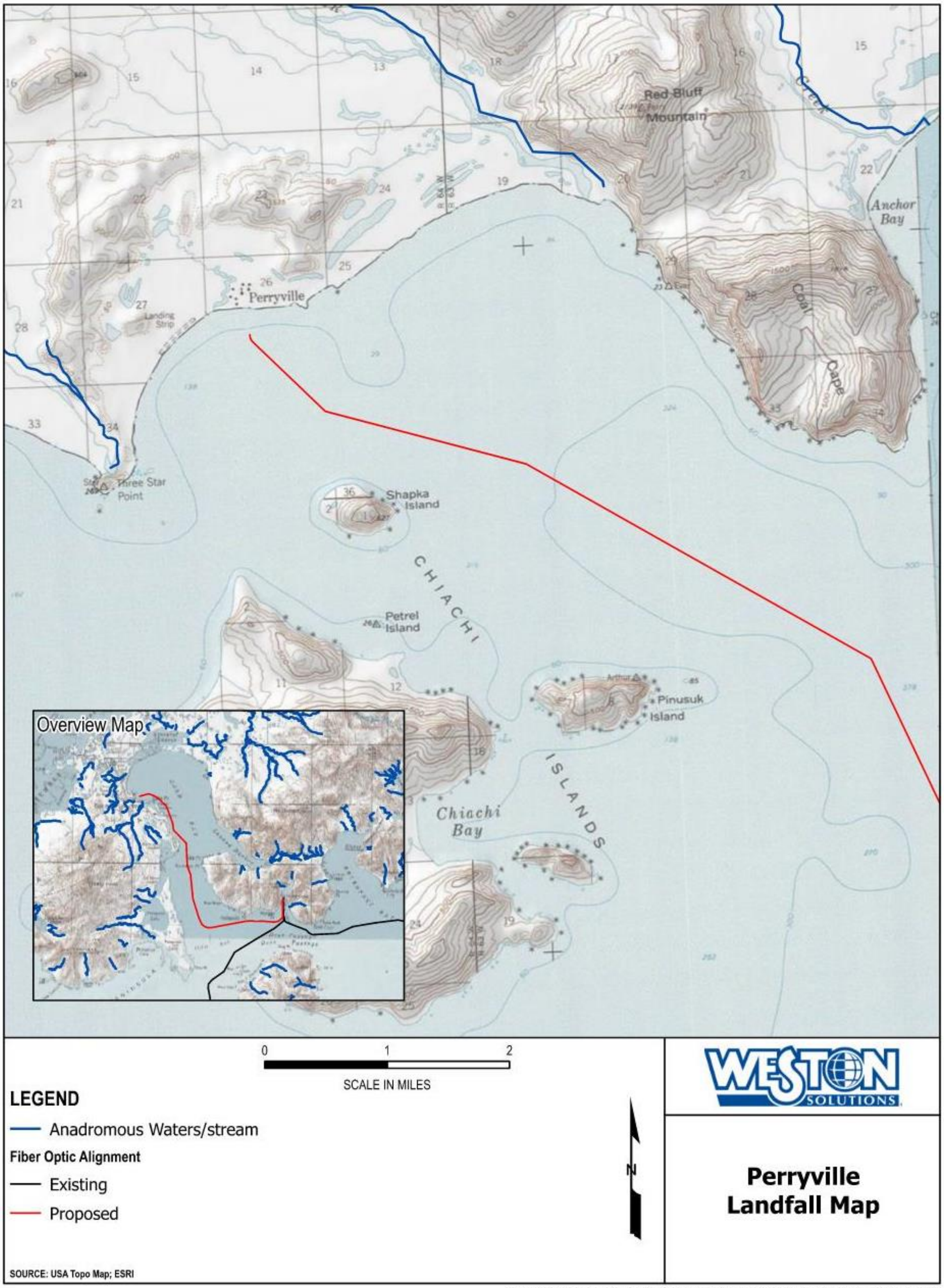

Figure 10. Perryville Landfall Map

Figure 11. Perryville Landing Site

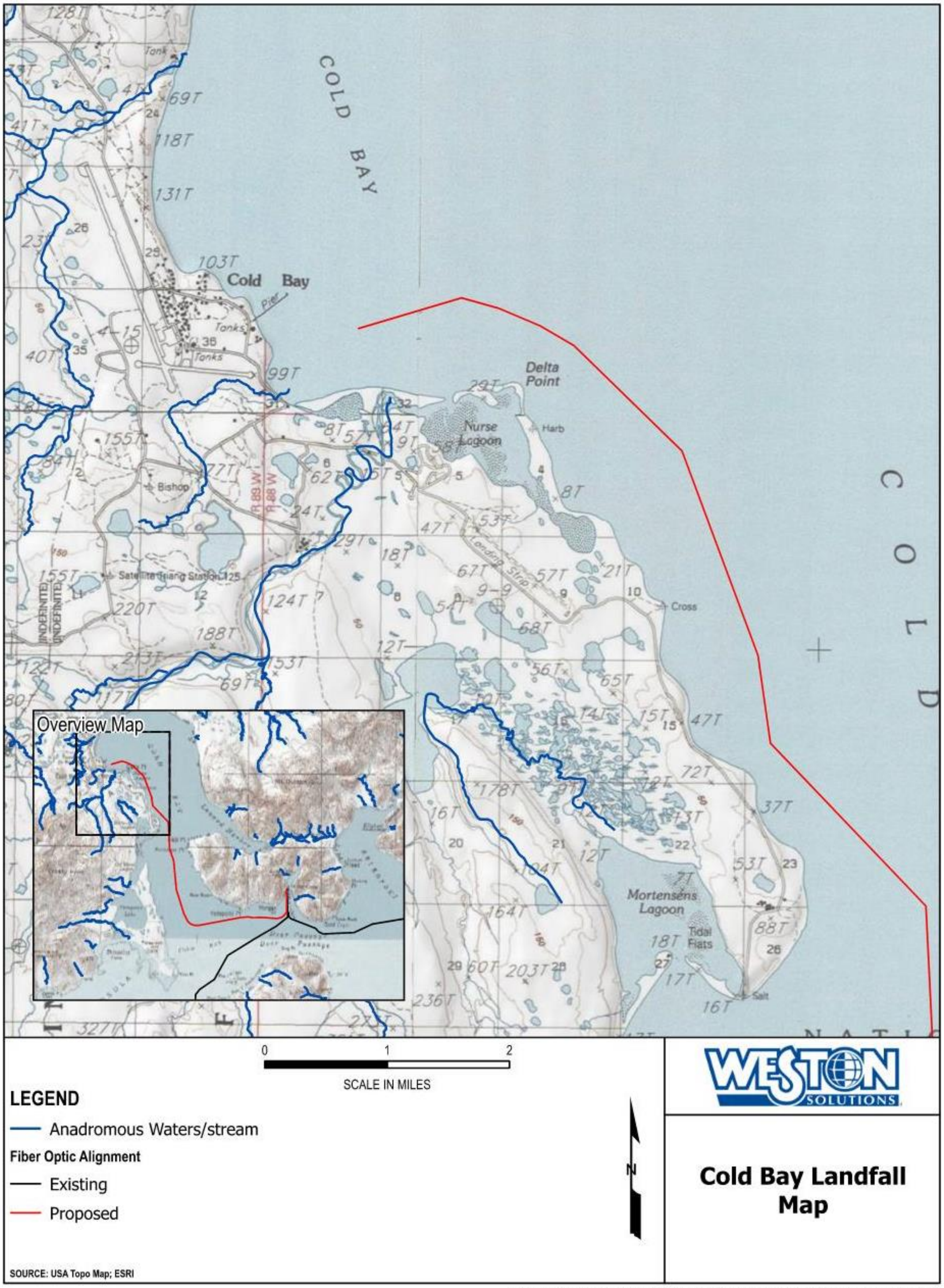

Figure 12. Cold Bay Landfall Map

Figure 13. Cold Bay Landing Site

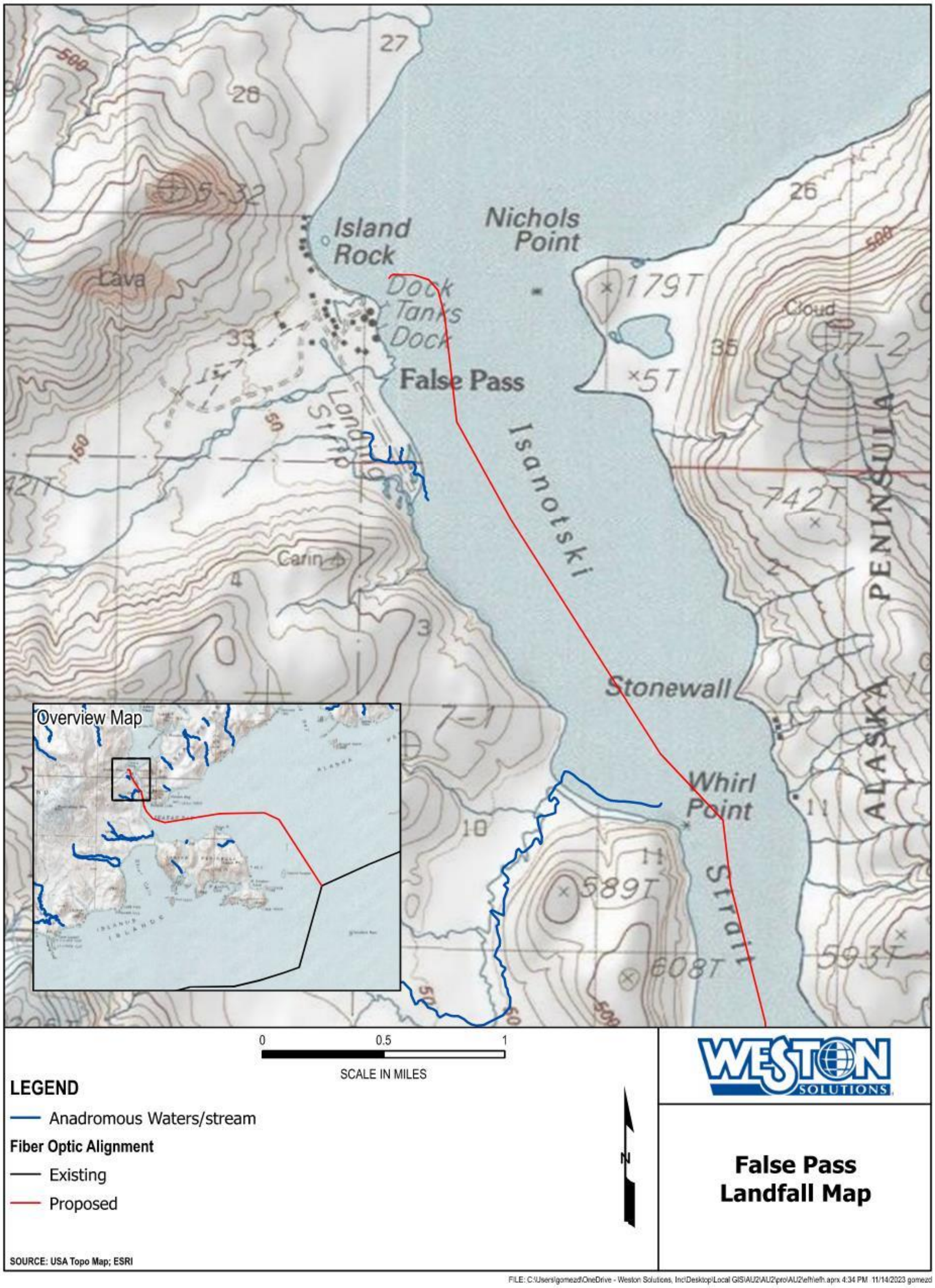

Figure 14. False Pass Landfall Map

Figure 15. False Pass Landing Site

3.4.2 Description of Marine and Riverine Operations

The following text describes operations that would occur in the marine environment, outside of intertidal areas. Over 99 percent of the FOC would be surface laid directly on the sea floor. In waters within approximately 91 m (300 ft.) from MLW, the FOC would be buried by a diver using a hand-held water jet (maximum burial depth of 0.9 m [3 ft.]).

Offshore (waters deeper than 15 m [49 ft.] deep) cable-lay operations would be conducted from the main lay cable ship, *IT Integrity* (Figure 16). Details of the ship specifications are provided in Appendix A. The ship is 72 m (236 ft.) in length and 16 m (52.5 ft.) in breadth, with berths for a crew of 38. The ship is propelled by two 2,032 kilowatt (kW) (2,725 brake horsepower [BHP]) main engines. Dynamic positioning (DP) is maintained by two 745 kW (1,000 BHP) azimuth thrusters. DP is used only as needed for safety – the frequency depends on weather and currents in the region. Average speed for surface laid cable is approximately 1.9 to 5.5 km per hour (1 to 3 knots).

Source: https://www.fleetmon.com/vessels/it-integrity_9239343_11680/

Figure 16. Photo of Cable-Laying Ship, *IT Integrity*

For work in the Chignik River, installation of the FOC would not occur when water is not present in the channel, and to the extent possible, would occur during periods of high water. No post-lay inspection and burial would be conducted. In general, equipment in the nearshore marine and riverine environment may include:

- Two small utility boats (24.4 m (80 ft.) and 12.2 m (40 ft.) landing crafts) to run pull line to the beach. Each boat is equipped with engines that are less than 3,000 horsepower;
- A dive boat; and
- Hand jet for work estimated to take 1 day (12 hours).

3.5 SUMMARY OF PROJECT ELEMENTS FOR EACH LANDING

Length of marine portions of each branch segment is provided below in Table 4.

Table 4. Project Elements by Community

Branch Segment	Total Route Length in Water (km[mi.])
Ouzinkie	1.15 km (1.85 mi.)
Port Lions	4.81 km (7.74 mi.)
Chignik Lagoon	10.55 km (16.98 mi.)
Chignik Lake	9.62 km (15.48 mi.)
Cold Bay	26.18 km (42.13 mi.)
False Pass	26.87 km (43.24 mi.)
Perryville	30.19 km (48.59 mi.)

3.6 DATES AND DURATION

The following anticipated construction schedule would be contingent upon receipt of permits and environmental authorizations:

- May 2024: Begin terrestrial FOC installation of BMHs in all communities.
- June 2024: Start and complete subsea FOC for Ouzinkie, Port Lions, Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass.
- Late Summer 2024: Begin terrestrial FOC installation for Ouzinkie and Port Lions.
- Summer 2025: Begin terrestrial FOC installation for Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass.
- Fall 2025: Complete terrestrial FOC installation in remaining communities.

Anticipated service dates for each community:

- Ouzinkie- Quarter 1, 2025
- Port Lions- Quarter 1, 2025
- Chignik Lagoon- Quarter 3, 2025
- Chignik Lake- Quarter 3, 2025
- Perryville-Quarter 3, 2025
- Cold Bay- Quarter 3, 2025
- False Pass- Quarter 3, 2025

4.0 DESCRIPTION OF THE SPECIES AND THEIR HABITAT

ESA-listed species likely occurring within the Action Area are presented in Table 5.

Table 5. ESA-Listed Species in the Action Area.

Species	Status	Stock	Population Estimate
Blue whale (*Balaenoptera musculus*)	Endangered	Central North Pacific	133[1]
Fin whale (*Balaenoptera physalus*)	Endangered	Northeast Pacific	3,168[2] (Nmin)
North Pacific right whale (*Eubalaena japonica*)	Endangered	Eastern North Pacific	31[3] in Bering Sea and Aleutian Islands
Gray whale (*Eschrichtius robustus*)	Endangered	Western North Pacific	140[4]
Humpback whale (*Megaptera novaeangliae*)	Endangered	Western North Pacific	127[3,5]
Humpback whale (*Megaptera novaeangliae*)	Threatened	Mexico- North Pacific	918[3]
Humpback whale (*Megaptera novaeangliae*)	Threatened	Mainland Mexico – CA-OR-WA	3,477[3]
Sperm whale (*Physeter macrocephalus*)	Endangered	North Pacific	102,112[3,6]
Steller sea lion (*Eumetopias jubatus*)	Endangered	Western United States	52,932[3]
Sunflower sea star (*Pycnopodia helianthoides*)	Proposed Threatened	N/A	600 million[7]

[1]Bradford et al. 2017; This is likely an underestimate as most blue whales would be expected to be outside the survey area (Hawaii) during summer and fall (Caretta et al. 2023).
[2]Muto et al. 2021
[3]Young et al. 2023
[4]Carretta et al. 2017
[5]The abundance estimate is for western North Pacific humpback whales migrating to U.S. waters.
[6]Sperm whale population estimate not considered reliable due to age of data.
[7]Gravem et al. 2021

4.1 BLUE WHALE

4.1.1 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 (Bradford et al. 2017); 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 (Caretta et al. 2023). There is currently insufficient data to assess population trends for this species.

4.1.2 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).

4.1.3 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 may 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).

4.1.4 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).

4.1.5 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 (2018). 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).

4.1.6 Critical Habitat

Critical habitat has not been designated for blue whales.

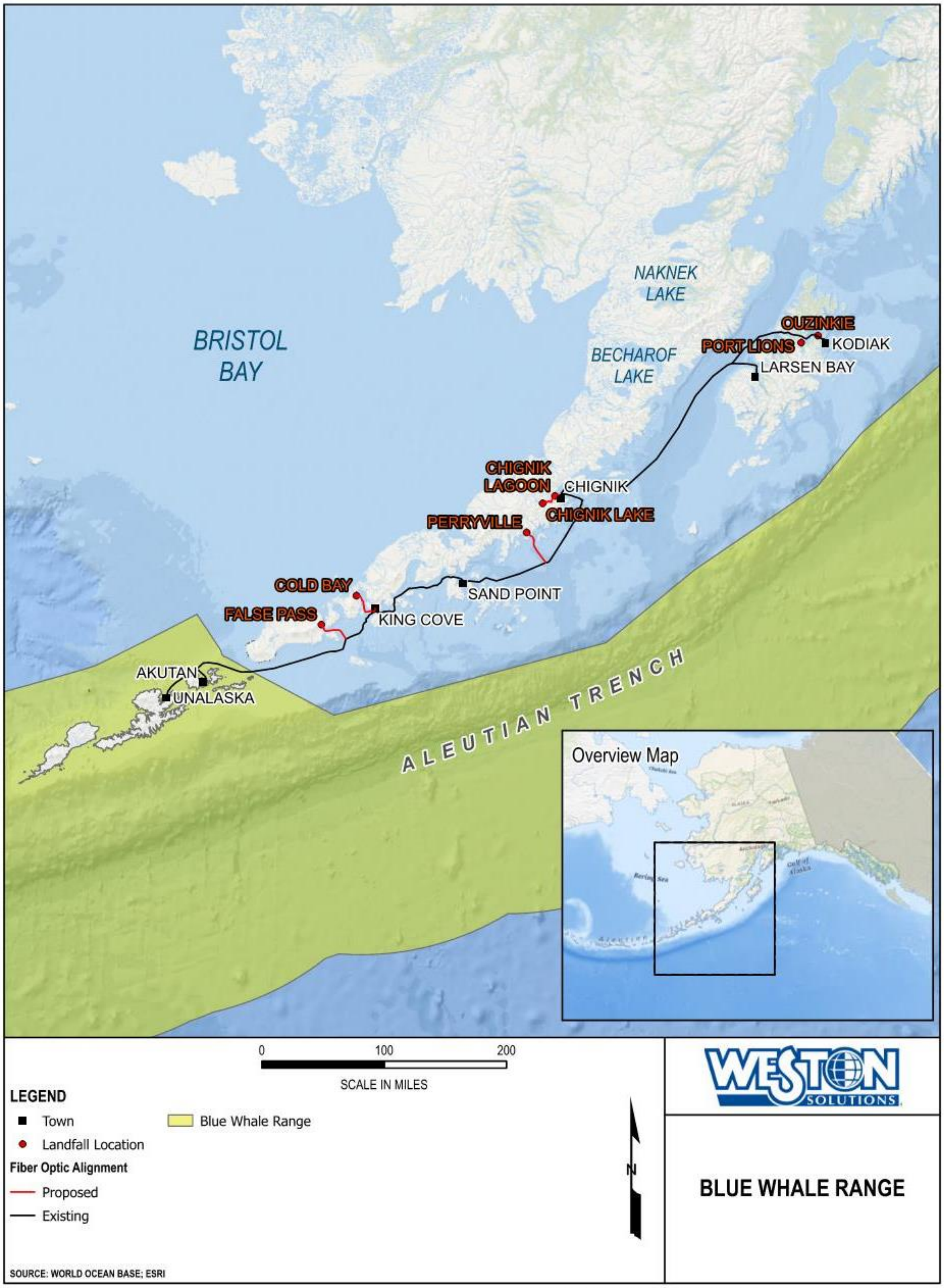

Figure 17. Blue Whale Distribution in the Action Area

4.2 FIN WHALE

4.2.1 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. There are currently no reliable estimates of fin whale abundances for the entire Northeast Pacific stock (Muto et al. 2021). The most reliable minimum population estimate (Nmin) of 2,554 fin whales was estimated using data from a dedicated line-transect survey conducted in the offshore waters of the Gulf of Alaska in 2013 (Rone et al. 2017; Muto et al. 2021). This estimate best 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. 2021).

4.2.2 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 degrees (°) North (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).

4.2.3 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.

4.2.4 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.

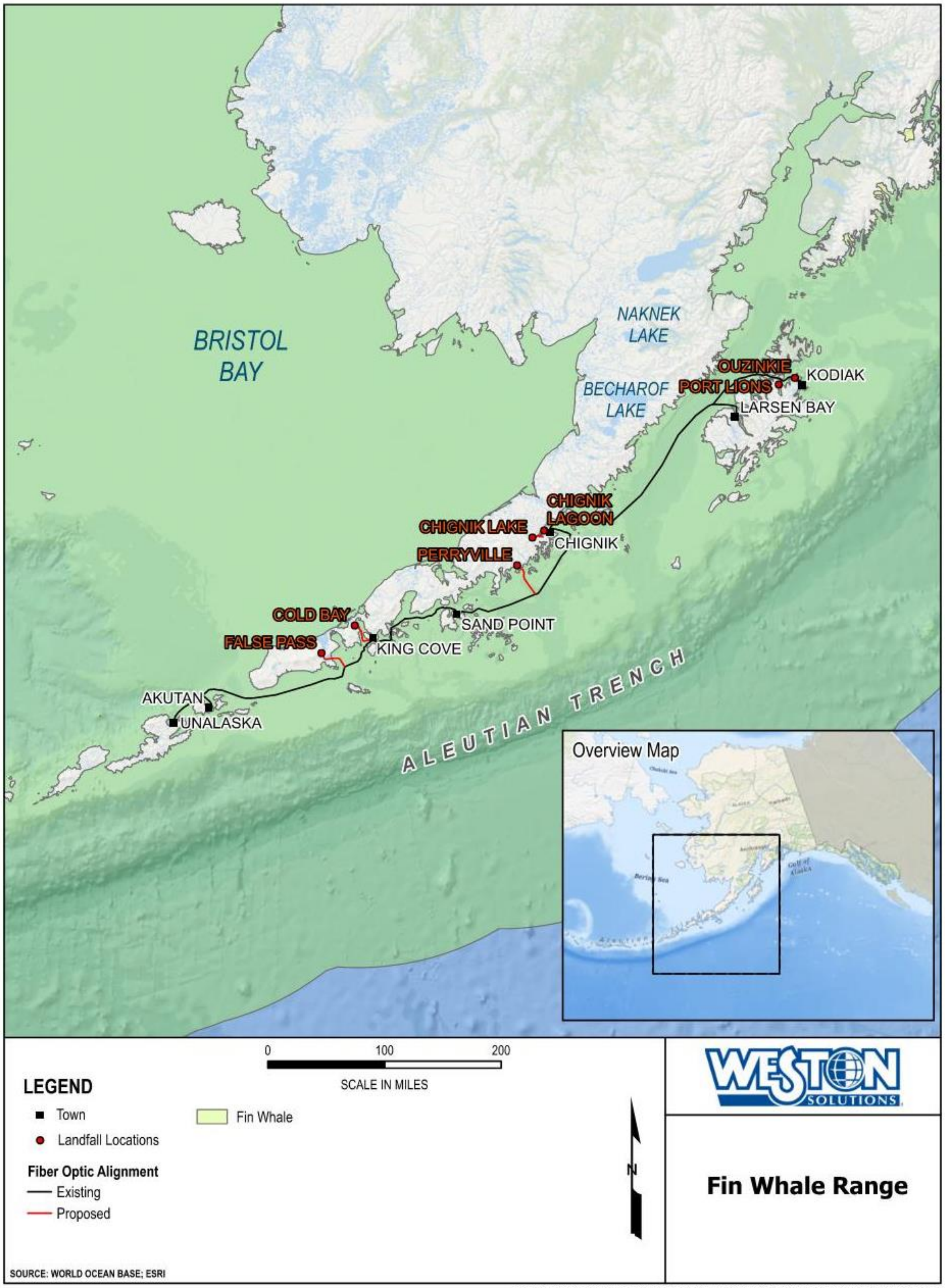

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Figure 18. Fin Whale Distribution in the Action Area

4.2.5 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 (2018). 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).

4.2.6 Critical Habitat

Critical habitat has not been designated for fin whales.

4.3 NORTH PACIFIC RIGHT WHALE

4.3.1 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 track lines 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 on mark-recapture data collected from 1998-2008. The minimum population estimate of abundance for North Pacific right whales is 26, based on photo-identification estimates (Muto et al. 2021); however, this estimate is 15 years old and is not a reliable current estimate.

4.3.2 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.

4.3.3 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.

4.3.4 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).

4.3.5 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 (2018). 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).

4.3.6 Critical Habitat

4.3.6.1 Description

The final designation of critical habitat for North Pacific right whales was issued in 2006 (73 Federal Register [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.

4.3.6.2 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).

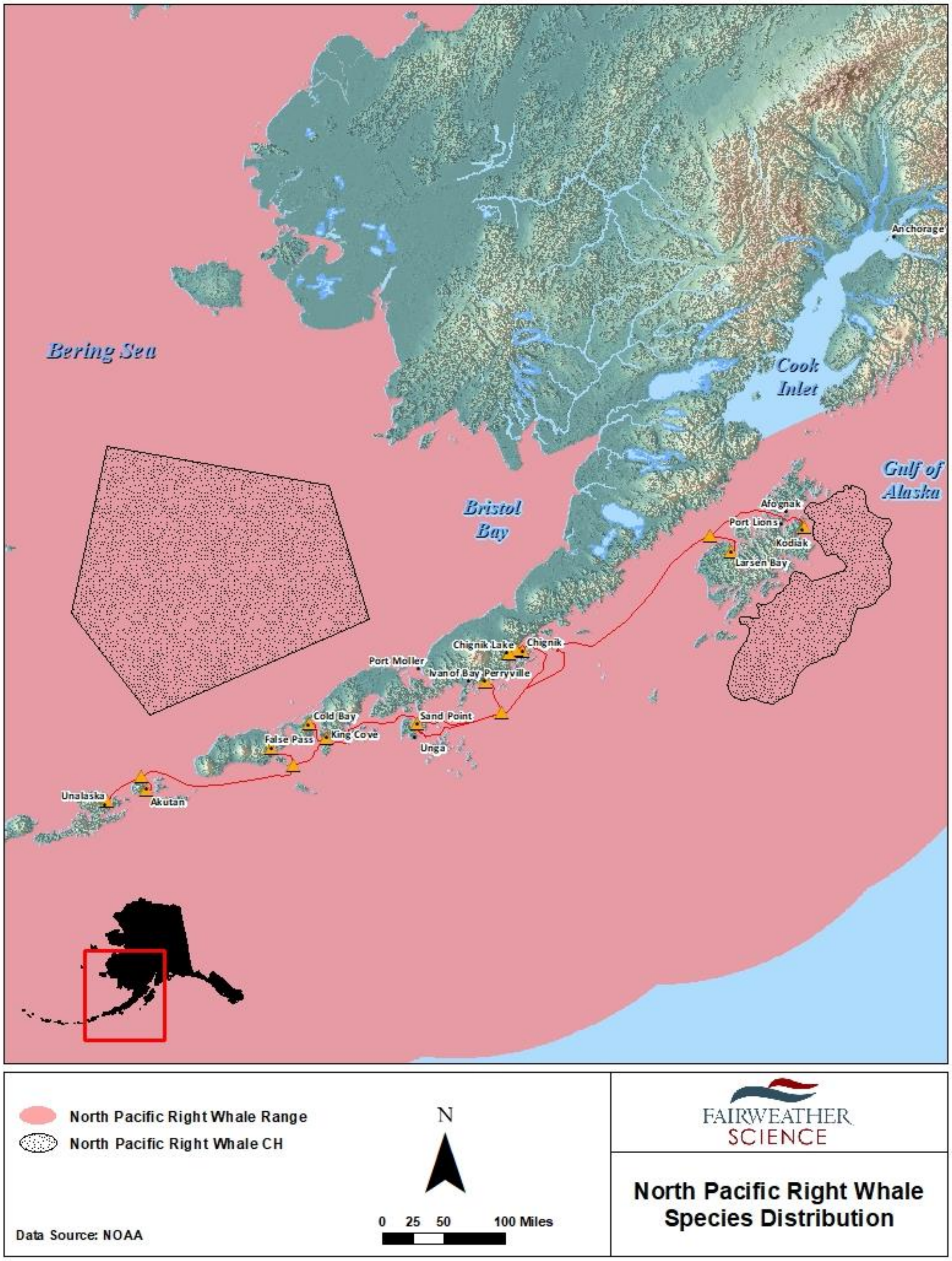


Figure 19. North Pacific Right Whale Distribution in the Action Area

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.

4.4 WESTERN NORTH PACIFIC GRAY WHALE

4.4.1 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. The stock most likely to occur in the Action Area is the western North Pacific stock. In 2012, NMFS convened a scientific task force to assess the currently recognized and emerging stock structure of gray whales in the North Pacific (Weller et al. 2013). 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 and Kamchatka in 2016 were used to calculate an abundance estimate of 290 in the 1-year plus category (Cooke et al. 2018; Cooke et al. 2017); however, Cooke et al. (2017) estimated an upper limit of approximately 100 whales that could belong to the western North Pacific breeding population. The minimum population estimate of the western North Pacific stock is 271 gray whales (Carretta et al. 2023). The stock is estimated to have increased at a rate of 2 to 5 percent annually between 2005 and 2016 (Cooke 2017).

4.4.2 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; Caretta et al. 2023). 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 (Caretta et al. 2023).

4.4.3 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 (Caretta et al. 2023).

4.4.4 Breeding and Calving Habitat

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

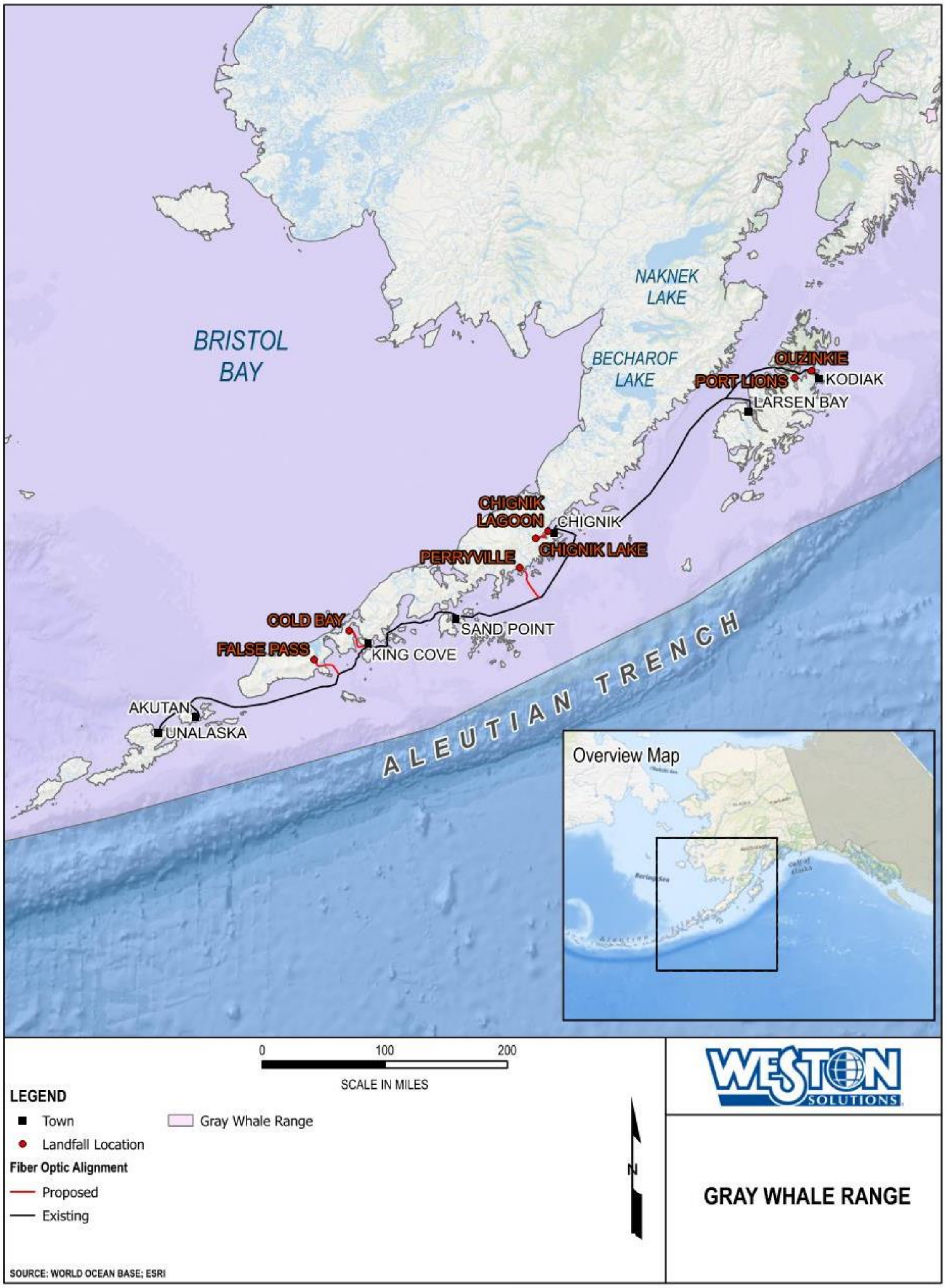


Figure 20. Western North Pacific Gray Whale Distribution in the Project Area

4.4.5 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 (2018). 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 (NMFS 2018). Gray whales produce knocks and pulses with most of the energy from <100 Hz to 2 kHz (NMFS 2018).

4.4.6 Critical Habitat

Critical habitat has not been designated for gray whales.

4.5 HUMPBACK WHALE

4.5.1 Population

NMFS Stock Assessment Reports recognize five distinct stocks of humpback whales in the North Pacific Ocean: The Central America/Southern Mexico – CA-OR-WA stock, The Mainland Mexico – CA-OR-WA stock, the Mexico – North Pacific stock, the Hawai'i stock, and the western North Pacific Stock (Young et al. 2023). The newly redefined stocks are based on delineation of demographically independent populations (DIPs) and units that comprise the four distinct population segments (DPSs) of the North Pacific subspecies of humpback whales (81 FR 62259; Young et al. 2023).

I Hawai'i stock includes the Hawaii DPS (comprised of the Hawai'i - Southeast Alaska/Northern British Columbia DIP and the Hawai'i – North Pacific unit)(Young et al. 2023). The Mexico DPS (comprised of the Mainland Mexico – CA-OR-WA DIP and the Mexico North Pacific unit) occurs in both the Mainland Mexico stock and the Mexico – North Pacific stock (Young et al. 2023). 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 (Young et al. 2023).

Individuals from the western North Pacific DPS, Mexico DPS, and the Hawaii DPS may occur in the Action Area; however only the ESA-listed western North Pacific and Mexico DPSs are considered here. To develop an abundance estimate of Mexico – North Pacific stock of humpback whales, NOAA multiplied the abundance estimate determined during Structure, Population Levels, and Status of Humpbacks study (SPLASH) in 2004-2006 by the probability of movement between each feeding area and the Mexican wintering area (Wade 2021) then added them together (Young et al. 2023). The resulting abundance estimate is 918 animals (CV=0.217)(Young et al. 2023). The current minimum population estimate for the Mexico – North Pacific stock is 2,241 individuals, and abundance estimates suggested the Mexico-North Pacific stock is increasing at a rate of approximately 6.9 percent annually over 1990s estimates; however, decline in encounter rate and number of calves (Arimitsu et al. 2021) and a large whale Unusual Mortality Even in 2015-2016 (Savage 2017) introduce uncertainty of the current stock population trend (Young et al. 2023).

The most reliable abundance estimate of the Mainland Mexico – CA-OR-WA stock of humpback whales is 3,477 animals (CV-0.101), determined by calculating the difference between mark-recapture estimates (Calambokidis and Barlow 2020) and estimates of the abundance of the Central America/Southern Mexico DIP (Curtis et al. 2022, Young et al. 2023). The minimum population estimate of the Mainland Mexico – CA-OR-WA stock is 3,185 whales (Young et al. 2023). The stock abundance is reportedly increasing (Calambokidis and Barlow 2020) similar to observed increases for the entire North Pacific (Young et al. 2023).

The most reliable abundance estimate of the western North Pacific stock of humpback whales migrating to U.S. waters is 127 (0.741) (Young et al. 2023). Similar to methodology used to determine an abundance estimate of the Mexico – North Pacific stock, NOAA multiplied the abundance estimate determined during the SPLASH study conducted in 2004-2006 (Calambokidis et al. 2008, Barlow et al. 2011, Baker et al. 2013, Wade 2021) by the probability of movement between each U.S. feeding area and the western North Pacific wintering areas (Wade 2021) then added them together to determine the abundance estimate of the western North Pacific stock (Young et al. 2023).

4.5.2 Distribution

The migratory destinations of the North Pacific subspecies of humpback whales are not completely known. Whales inhabiting a common summer feeding are known to migrate to multiple wintering areas, with significant genetic differences between whales at the summer feeding areas (due to strong maternal site fidelity) and those at wintering areas (due to natal philopatry) (Baker et al. 2013). Whales occurring in the Action Area most likely overwinter in Mexico or Hawaii (Young et al. 2023); however, a smaller number of humpback whales may overwinter near island chains in the western North Pacific (Young et al. 2023).

4.5.3 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 (Darlings 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 (91 percent probability); however, some go to the Aleutian Islands, Bering Sea, and Gulf of Alaska (3 percent probability) (Calambokidis et al. 2008, Wade 2021, NMFS 2021). The majority of whales from the Mexico DPS forage in waters spanning from southern British Columbia (25 percent probability) to California (58 percent probability) (Young et al. 2023, Wade 2021, NMFS 2021). Some migrate farther north to feed off of the coast of Alaska, and the probability of encountering a whale from the Mexico DPS in Alaskan waters ranges from approximately 7 to 11 percent (Wade 2021, NMFS et al. 2021, Wade et al. 2016).

Ferguson et. al (2015a,b) determined Biologically Important Areas (BIAs), or important feeding areas, as part of the NOAA Cetacean Density and Distribution Mapping Working Group (CetMap) effort. Three of these BIAs occur in the vicinity of the Action Area. A portion of the Kodiak Island Area BIA overlaps with the Action Area (Ferguson et al. 2015a,b; Figure 21). The Aleutian Islands Area and Shumagin Islands Area BIAs occur in nearby waters southwest of the Action Area.

4.5.4 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 (Young et al. 2023). 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).

4.5.5 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 (2018). 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.

4.5.6 Critical Habitat

4.5.6.1 Description

Critical habitat comprising approximately 203,774 km^2 (59,411 nm^2) of marine habitat in the North Pacific Ocean was designated for the Mexico, Central America, and western North Pacific DPSs of humpback whales on 21 April 2021 (86 FR 21082). Critical habitat for the western North Pacific DPS and the Mexico DPS occur in or near the Action Area and are defined as such in Alaska waters (86 FR 21082):

Mexico DPS - The nearshore boundaries are generally defined by the 1-m (3.3-ft.) isobath relative to Mean Lower Low Water (MLLW). On the north side of the Aleutian Islands, the seaward boundary of the critical habitat is defined by a line extending from 55° 41 N, 162° 41′ W to 55° 41′ N, 169° 30′ W, then southward through Samalga Pass to a boundary drawn along the 2,000-m (6,562-ft.) isobath on the south side of the islands. This isobath forms the southern boundary of the critical habitat, eastward to 164° 25′ W. From this point, the 1,000-m (3,281-ft.) isobath forms the offshore boundary, which extends eastward to 158° 39′ W. Critical habitat also includes the waters around Kodiak Island and the Barren Islands. The western boundary for this area runs southward along 154° 54′ W to the 1,000-m (3,281-ft.) depth contour, and then extends eastward to a boundary at 150° 40′ W. The area also extends northward to the mouth of Cook Inlet where it is bounded by a line that extends from Cape Douglas across the inlet to Cape Adam. Critical habitat also includes the Prince William Sound area and associated waters defined by an eastern boundary at 148° 31′ W, a western boundary at 145° 27′ W, and a seaward boundary drawn along the 1,000-m (3,281-ft.) isobath.

Western North Pacific DPS - The nearshore boundaries are generally defined by the 1-m (3.3-ft.) isobath relative to MLLW. On the north side of the Aleutian Islands, the seaward boundary of the critical habitat is defined by a line extending due west from 55° 41′ N, 162° 41′ W to 55° 41′ N, 169° 30′ W, then southward through Samalga Pass to a boundary drawn along the 2,000-m (6,562-ft.) isobath on the south side of the islands. This isobath forms the southern boundary of the critical habitat, eastward to 164° 25′ W. From this point, the 1,000-m (3,281-ft.) isobath forms the offshore boundary, which extends eastward to 158° 39′ W. Critical habitat also includes the waters around Kodiak Island and the Barren Islands. The western boundary for this area runs southward along 154° 54′ W to the 1,000-m (3,281-ft.) depth contour, and then extends eastward to a boundary at 150° 40′ W. The area also extends northward to the mouth of Cook Inlet where it is bounded by a line that extends from Cape Douglas across the inlet to Cape Adam.

As described in Section 3.3, *Definition of the Action Area*, the Action Area is defined as the route length plus a buffer of 1.8 km (1.1 mi.) on each side of the route (3.6 km [2.2 mi.] total width) for areas in which the cable laying ship would be used. The total Action Area within humpback whale critical habitat encompasses approximately 478.64 km^2 (184.69 mi^2).

4.5.6.2 Primary Constituent Elements

The designation was based on prey within humpback whale feeding areas as the essential feature of the habitat (86 FR 21082). This essential feature was defined as follows for each of the ESA-listed DPSs potentially occurring in the Action Area:

Mexico DPS - Prey species, primarily euphausiids (*Thysanoessa*, *Euphausia*, *Nyctiphanes*, and *Nematoscelis*) 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.

Western North Pacific DPS - Prey species, primarily euphausiids (*Thysanoessa* and *Euphausia*) and small pelagic schooling fishes, such as 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.

Figure 21 shows portions of designated humpback whale critical habitat in or near the Action Area.

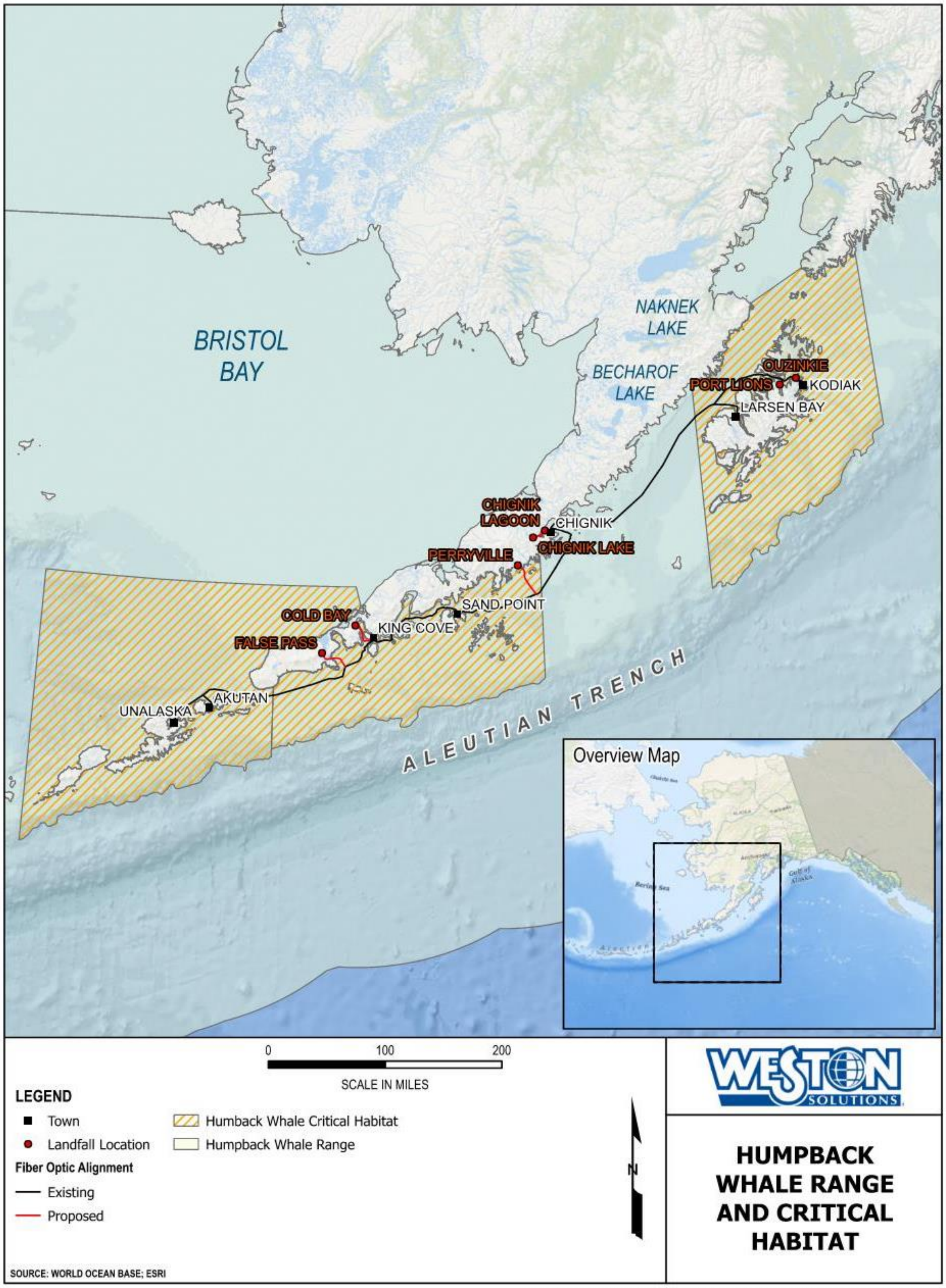


Figure 21. Humpback Whale Distribution in the Action Area

4.6 SPERM WHALE

4.6.1 Population

There is currently no reliable estimate for the total number of sperm whales worldwide, including the North Pacific (Muto et al. 2021). 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. 2021). The number of sperm whales in Alaska waters is unknown and a reliable estimate of abundance for the North Pacific stock is not available. The minimum population estimate for the North Pacific stock of sperm whales is 244 based on survey data in the Gulf of Alaska in 2015 (Rone et al. 2017); however, this is considered an underestimate for the stock due to the small survey area compared to the extent of the whales' range. It also does not consider animals missed on the survey track line or females/juveniles in tropical and subtropical waters (Muto et al. 2021).

4.6.2 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).

4.6.3 Foraging Habitat

Sperm whales are primarily found in deep waters (greater than 1,000 m [3,281 ft.]). They live and forage in areas with water depths of 600 m (1,969 ft.) or more and are generally not found in waters less than 300 m (984 ft.) deep. Sperm whales feed primarily on giant squid, octopus, other cephalopods, fish, and shrimp.

4.6.4 Breeding and Calving Habitat

Sperm whale breeding occurs during the summer months in deep offshore waters and 3.7-4 m (12-13 ft.) calves are born after a 14- to 16- month gestation period.

4.6.5 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 (2018). 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).

4.6.6 Critical Habitat

Critical habitat has not been designated for sperm whales.

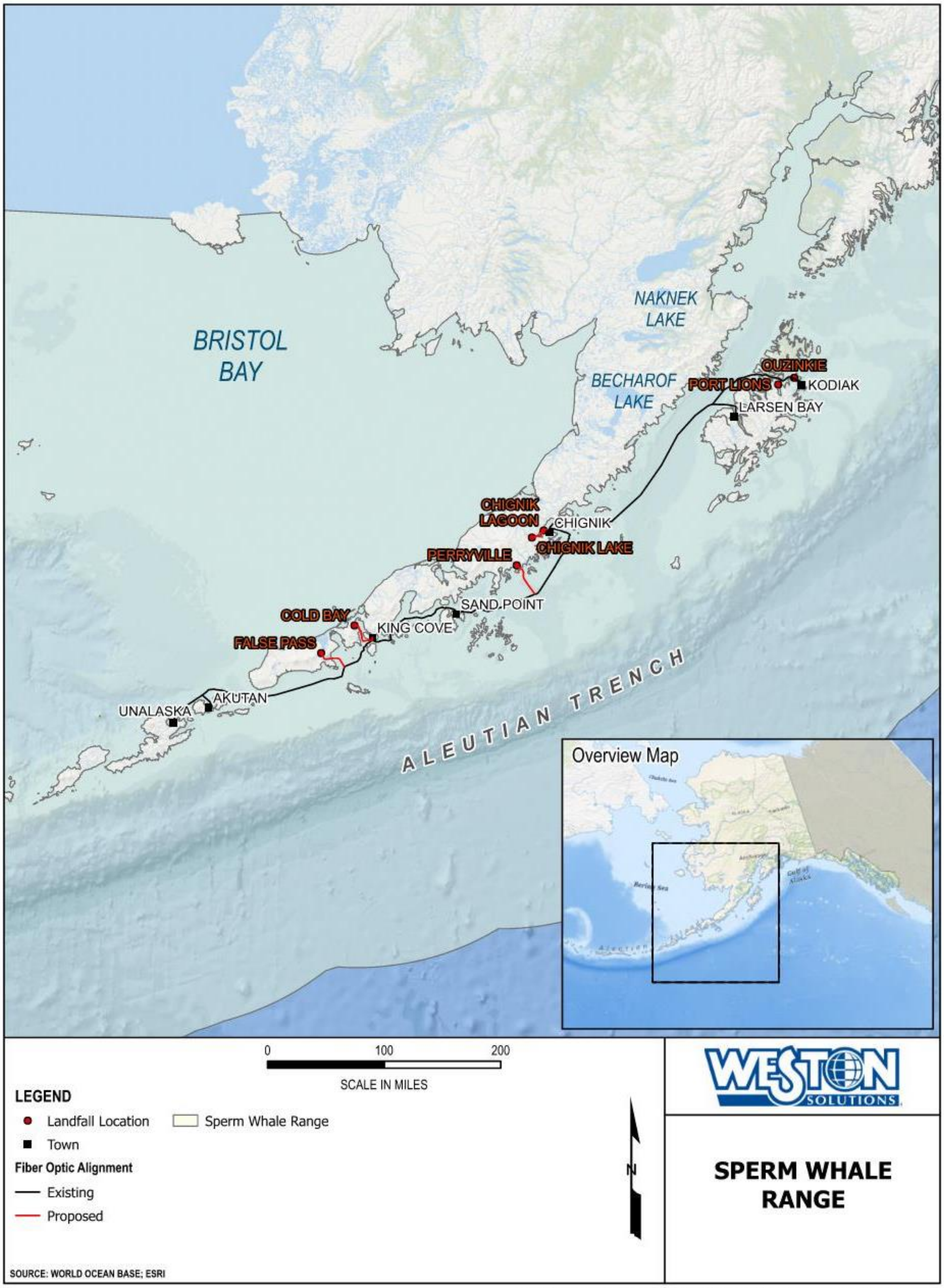


Figure 22. Sperm Whale Distribution in the Action Area

4.7 STELLER SEA LION

4.7.1 Population

Steller sea lions occurring in or near the action area 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 the sum of pup and non-pup counts made in 2019 (Sweeney et al. 2019), and running the counts through the agTrend model, the current minimum population estimate for the western stock of Steller sea lions is 52,932 (Muto et al. 2021). 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 2019 indicate that pup and non-pup counts of the western stock of Steller sea lions in Alaska were at their lowest in 2002and have increased at a rate of 1.63percent and 1.82percent per year, respectively, between 2003 and 2019 (Sweeney et al. 2019). 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.

4.7.2 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).

4.7.3 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.

4.7.4 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.

4.7.5 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).

4.7.6 Critical Habitat

4.7.6.1 Description

Steller sea lion critical habitat for the western DPS was designated by NMFS on August 27, 1993. 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).

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 (Figure 23). 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 mile [nm]) 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 nm) 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 FOC would be laid within the 37 km (20 nm) aquatic zones of several major haulouts and rookeries. Landfall locations, with the exception of 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 nm) area surrounding major rookeries. It is anticipated that the presence of Steller sea lions would be high in the Action Area and animals may be attracted to the vessels during cable installation. However, there are no major rookeries or haulouts in close proximity to the planned landfall locations or cable laying route. Through the ESA consultation process for the original AU-Aleutian project, NMFS prepared maps of Steller sea lion haul out sites relative to the Action Area, as shown in Figure 24 through Source: NMFS 2019

Figure 28 (NMFS 2019).

As described in Section 3.3, *Definition of the Action Area*, the Action Area is defined as the route length plus a buffer of 1.8 km (1.1 mi.) on each side of the route (3.6 km [2.2 mi.] total width) for areas in which the cable laying ship would be used. The total Action Area within Steller sea lion critical habitat encompasses approximately 449.72 km^2 (173.64 mi^2).

4.7.6.2 Essential Features

Critical habitat designations are based on PCEs that make the habitat essential for conservation of the species. In the case of Steller sea lions, PCEs were not specifically identified, but the designation was based on the terrestrial and aquatic needs of the species. Essential features for Steller sea lion aquatic habitat primarily revolve around feeding. Diet varies geographically, seasonally, and over years in response to the availability and abundance of food resources. Foraging strategies and ranges 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).

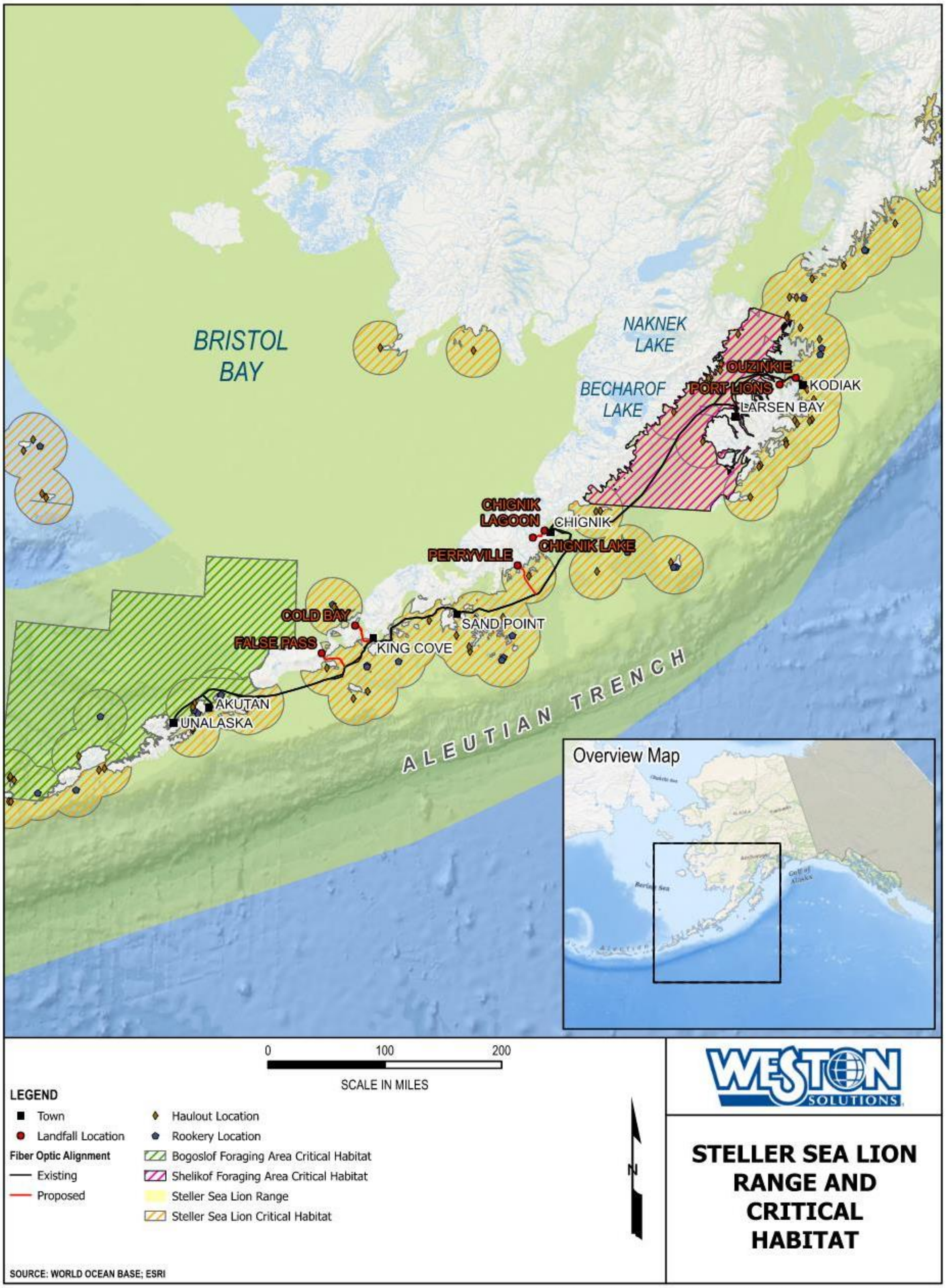


Figure 23. Steller Sea Lion (Western DPS) Distribution in the Action Area

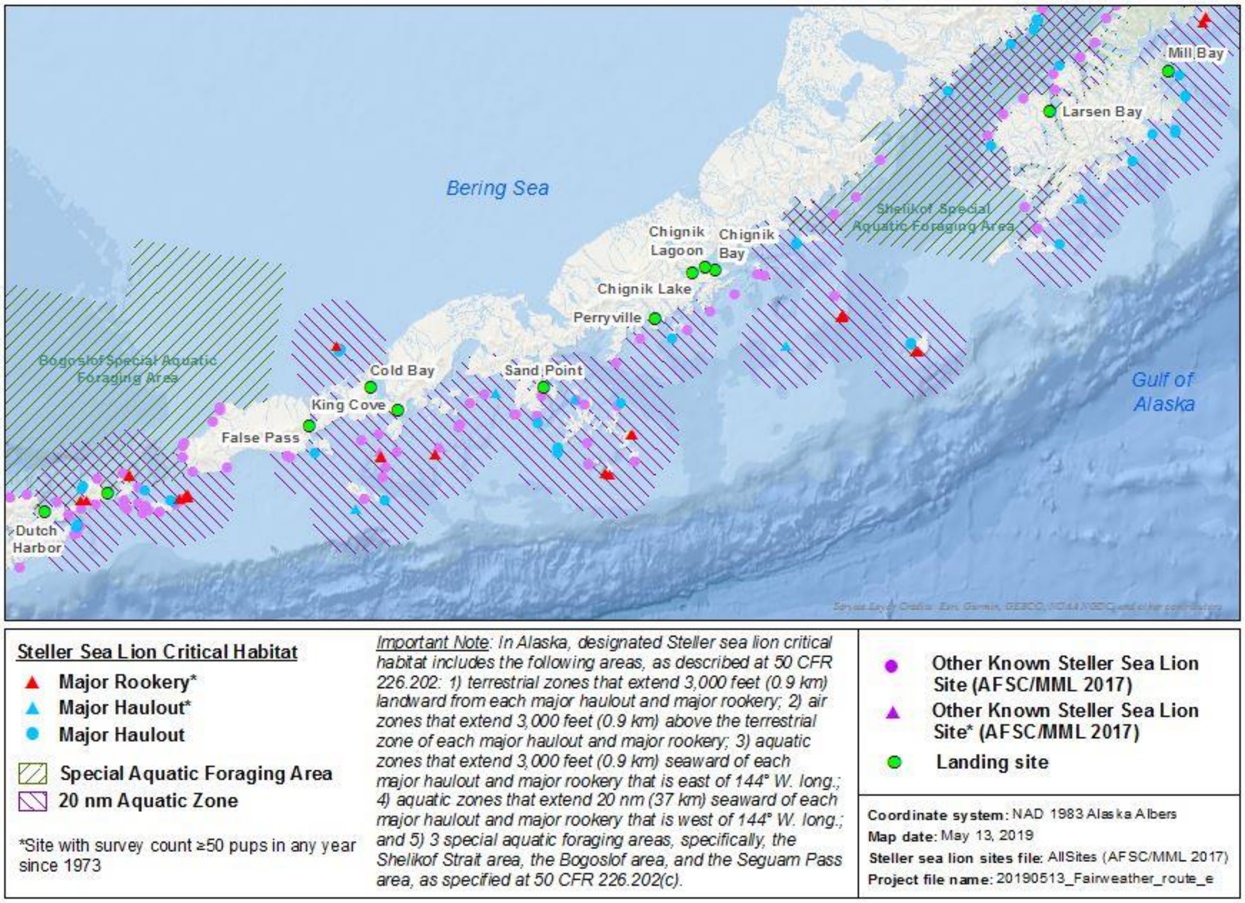
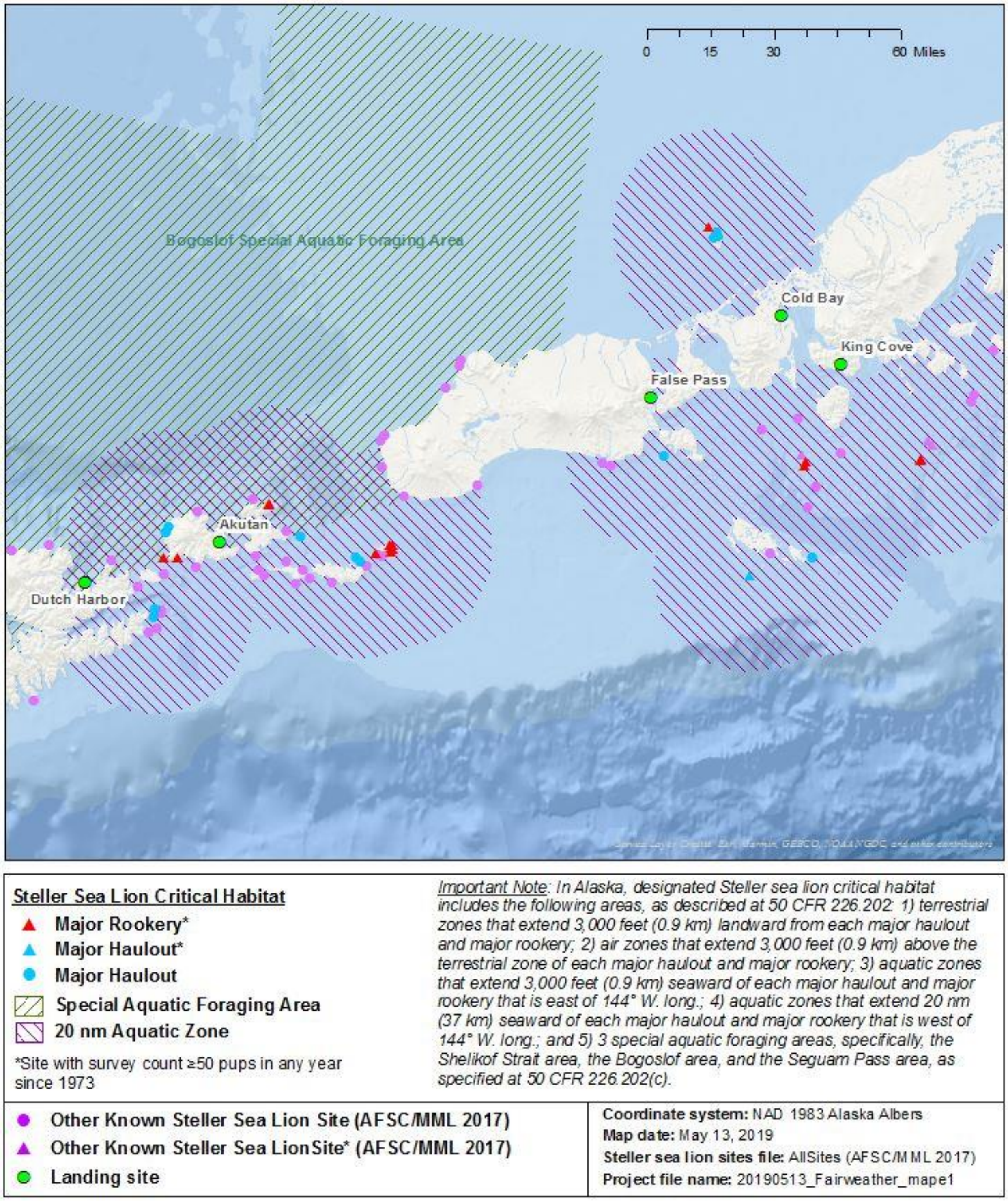
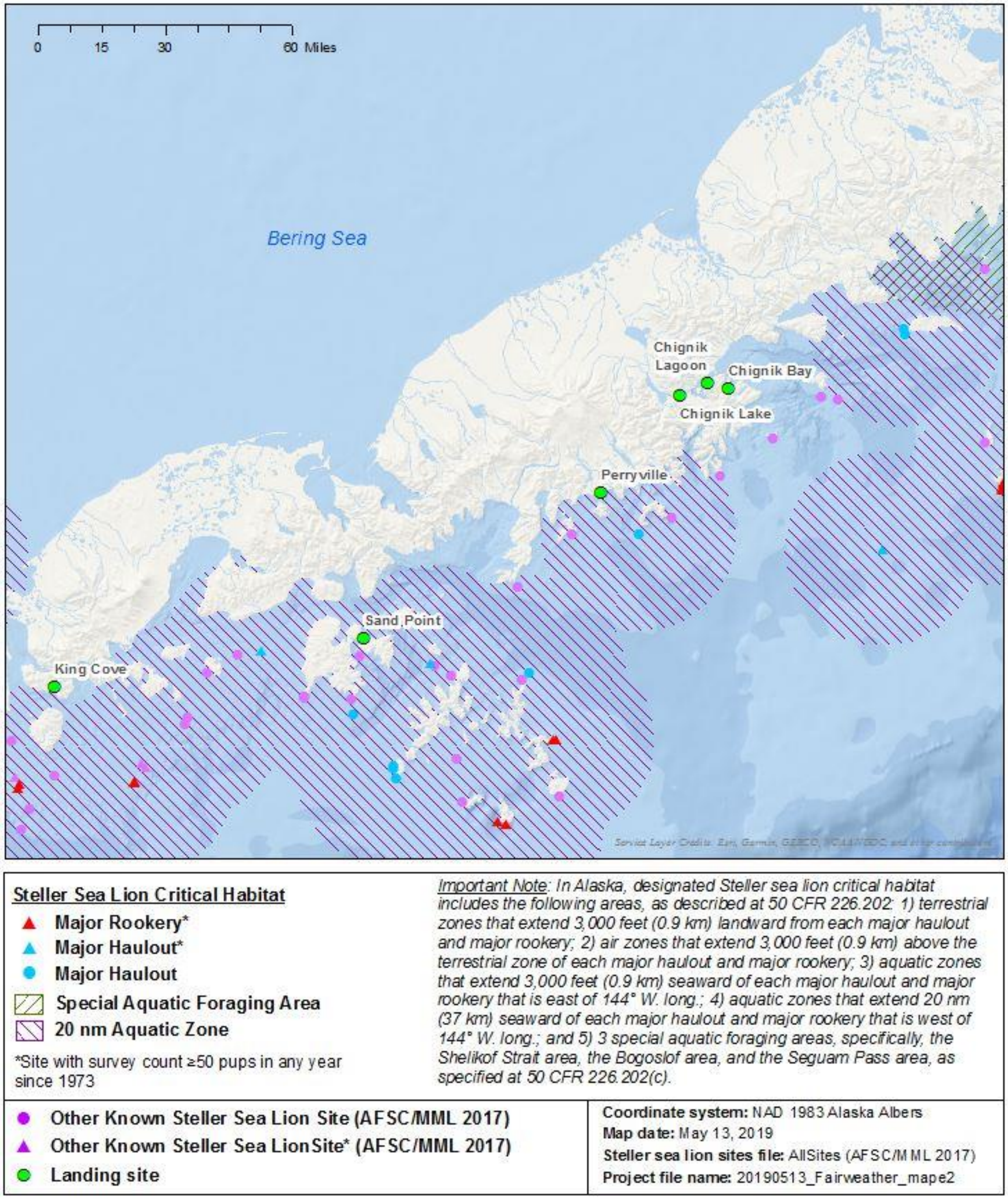


Figure 24. Steller Sea Lion (Western DPS) Haul Out Sites in Action Area



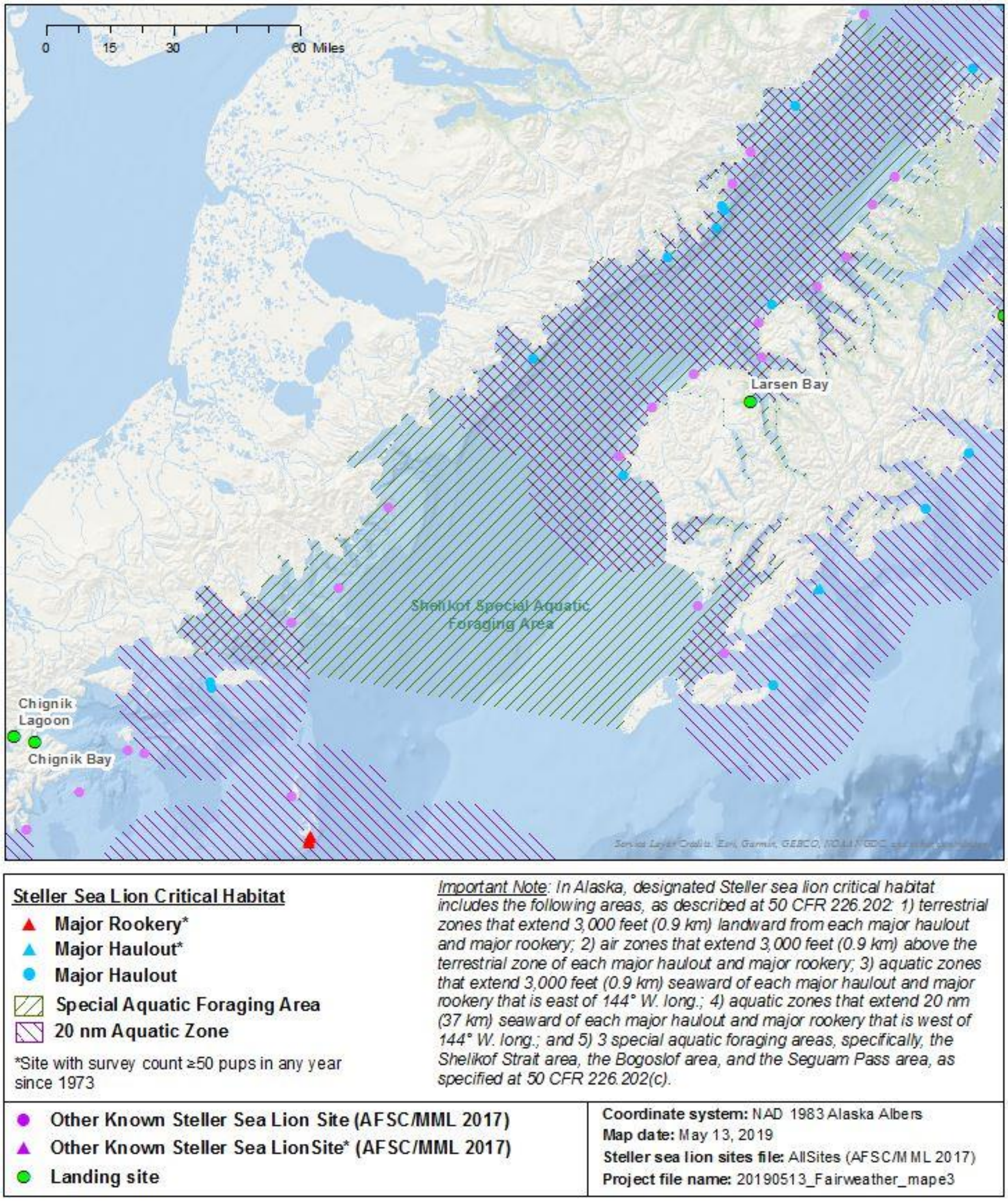
Source: NMFS 2019

Figure 25. Steller Sea Lion (Western DPS) Haul Out Sites in Western Region of Action Area



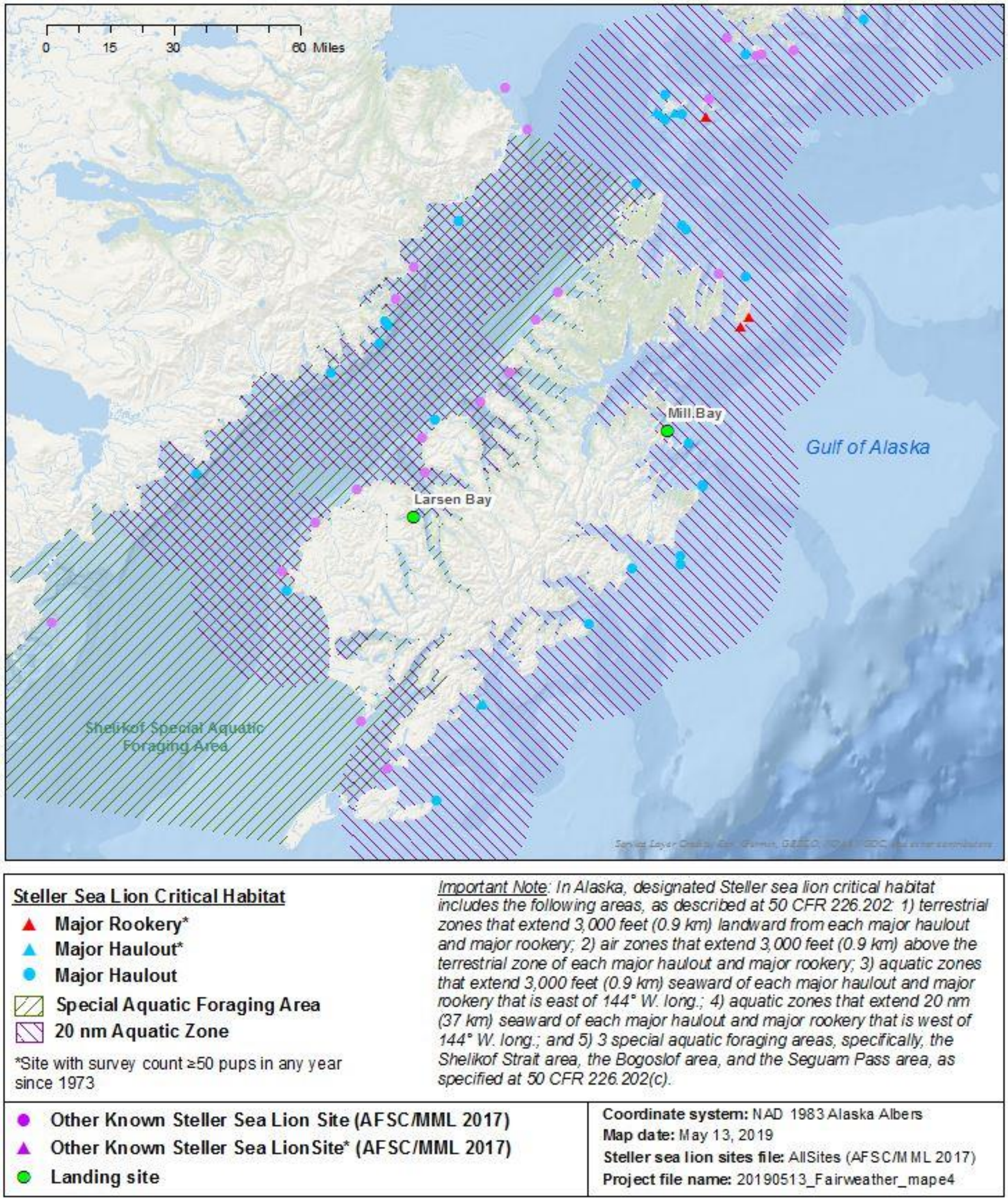
Source: NMFS 2019

Figure 26. Steller Sea Lion (Western DPS) Haul Out Sites in Western/Central Region of Action Area



Source: NMFS 2019

Figure 27. Steller Sea Lion (Western DPS) Haul Out Sites in Eastern/Central Region of Action Area



Source: NMFS 2019

Figure 28. Steller Sea Lion (Western DPS) Haul Out Sites in Eastern Region of Action Area

4.8 SUNFLOWER SEA STAR

The sunflower sea star (*Pycnopodia helianthoides*) is a sea star found in coastal marine waters and is distinctive because it has many rays, resembling a sunflower (Lowry et al. 2022). The sunflower sea star is among the largest known sea stars and can reach up to one meter in diameter.

4.8.1 Population

On 16 March 2023, NMFS issued a proposed rule to list the sunflower sea star as a threatened species under the ESA after a steep decline in population estimates theoretically caused by the onset of sea star wasting syndrome (88 FR 16212; Hamilton et al. 2021). Though the species has experienced declines in population since 2016, they may be present year-round within the Action Area during the Project.

4.8.2 Distribution

The species ranges across the Northeastern Pacific Ocean, from the Aleutian Islands in the west to Baja California in the east but is more common between the Alaska Peninsula to Monterey, California. The entire Action Area is within the range of sunflower sea stars (Figure 29). Konar et al. (2019) monitored intertidal populations in the Gulf of Alaska beginning in 2012 and described sunflower sea stars as “common” toward the northwest part of its range in the Katmai National Park and Preserve near Kodiak Island, prior to the 2016 wasting outbreak (Konar et al. 2019).

4.8.3 Habitat

Sunflower sea stars are considered habitat generalists and are well adapted for a variety of habitat types; although they are well known to inhabit soft, mixed, and hard-bottom habitats including kelp forests rocky intertidal shoals, and eelgrass meadows (Lowry et al. 2022). Hodin et al. 2021; Gravem et al. 2021). They also prefer a variety of seafloor substrates in depths of up to 435 m (1,427 ft.), but they more commonly inhabit depths of less than 25 m (82 ft.). The species is a voracious predator, feeding on epibenthic invertebrates, including sea urchins, snails, crabs, sea cucumbers, and other sea stars (Mauzey et al. 1968; Shivji et al. 1983).

4.8.4 Critical Habitat

Critical habitat has not been designated for sunflower sea stars.

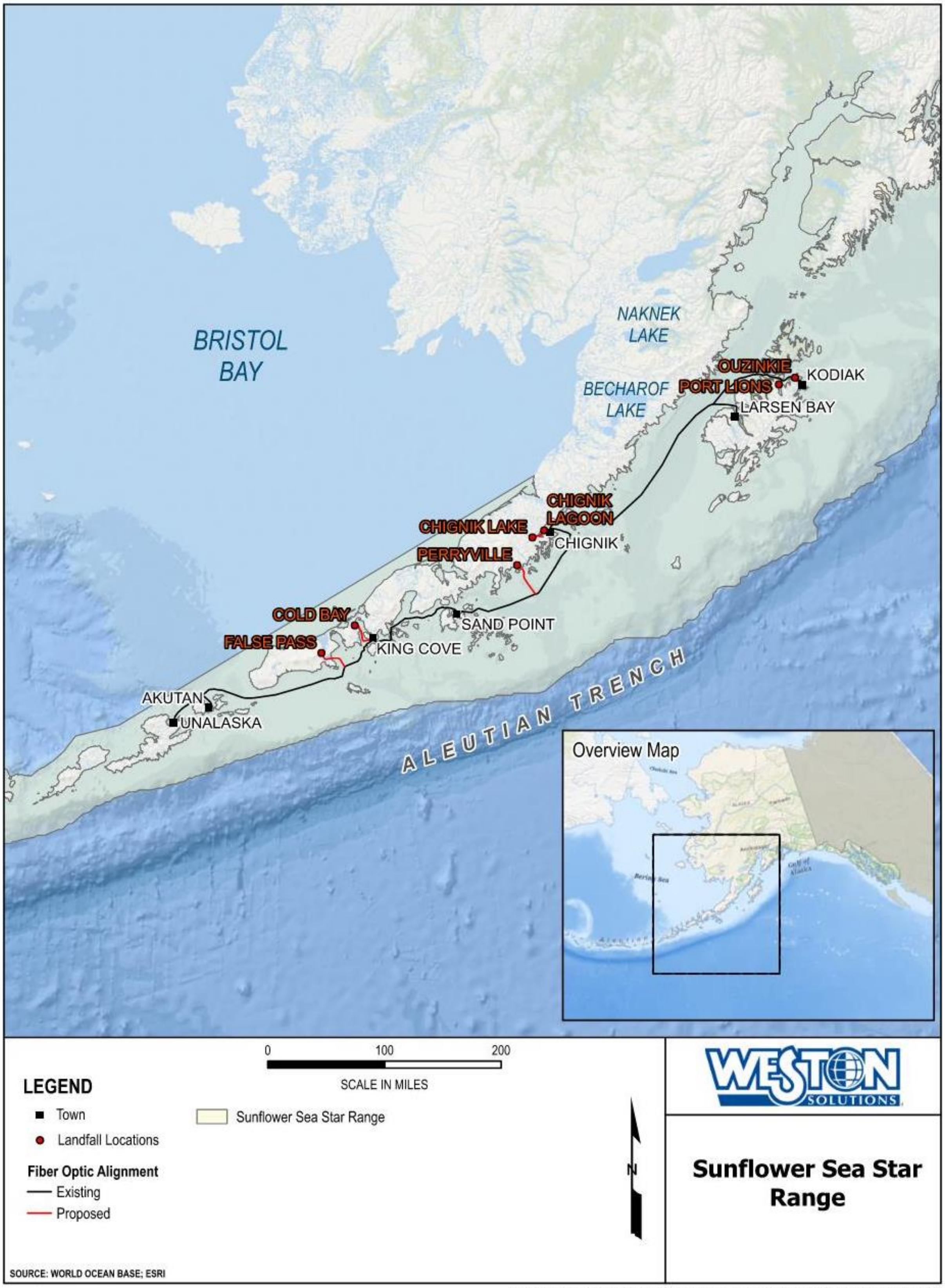


Figure 29. Sunflower Sea Star Distribution in the Action Area

5.0 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.

5.1 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 over6 m (~20 ft.) occur less than 15 percent of the time. Weather events also influence coastal flooding and erosion, which are known to affect the project region (TerraSond Limited 2018).

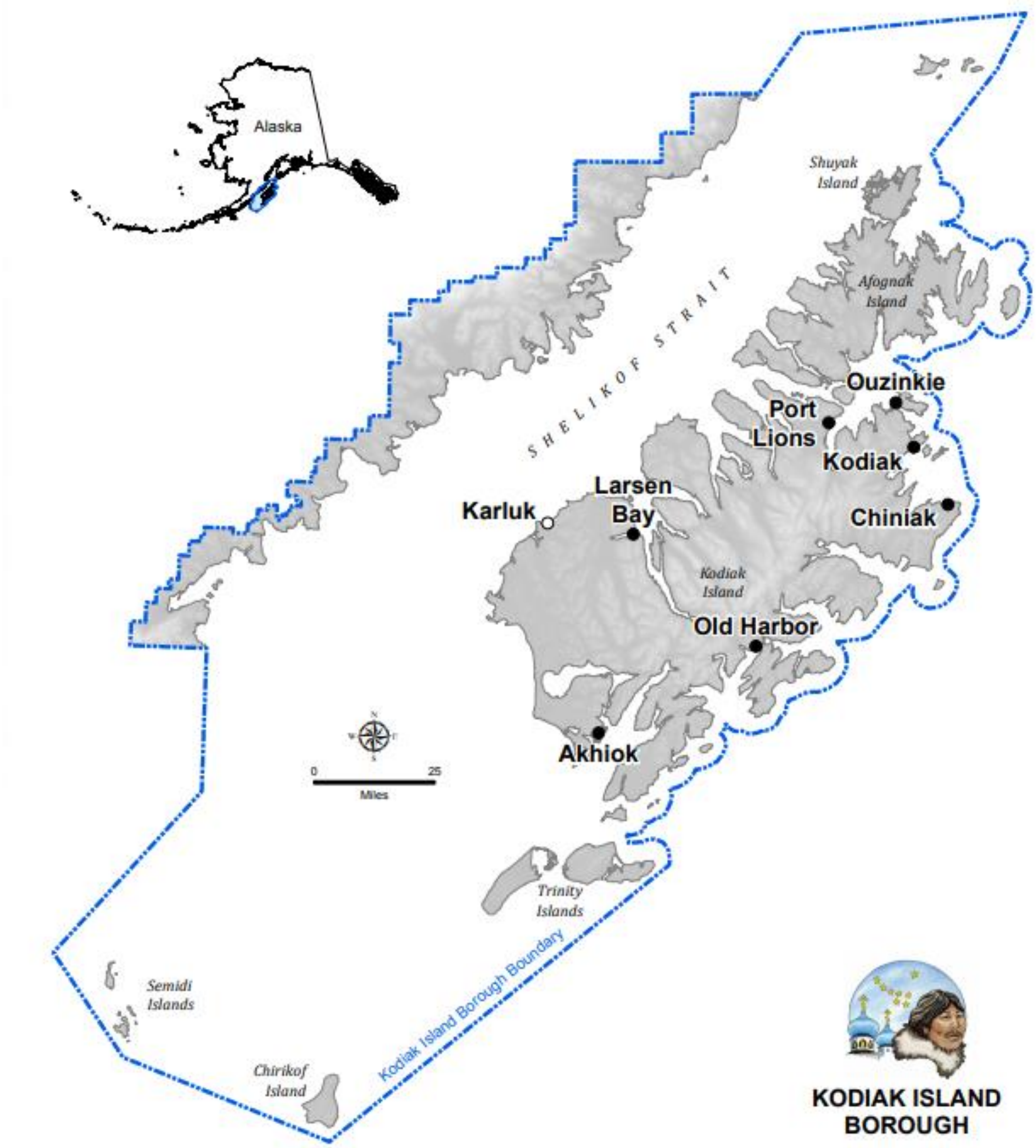
Ocean basin topography, currents, water temperature, and other environmental characteristics influence the high productivity of the region’s saltwater environments, which support many species of fish, marine mammals, crustaceans, and birds. A pre-history of glaciation throughout the region has also significantly 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.

5.1.1 Coastal Development

The Project’s FOC routes would connect two communities on Kodiak Island and five communities along the Alaska Peninsula. The routes would pass through three Alaskan boroughs including the Kodiak Island Borough, Lake and Peninsula Borough, and the Aleutians East Borough.

5.1.1.1 Kodiak Island Borough

The Kodiak Island Borough encompasses the Kodiak Island Archipelago, Shelikov Strait waterbody, and 284.9 km (177 mi.) of the Katmai Coast along the southeastern Alaska Peninsula (Figure 3030; Kodiak Island Borough 2018). The borough has a total population of approximately 13,101 residents (Alaska Department of Labor and Workforce Development [ADLWD] 2020), most of which live in or near the city of Kodiak (Kodiak Island Borough 2023). Additionally, seven villages are located within the borough; Old Harbor (218 residents), Port Lions (194 residents), Ouzinkie (161 residents), Akhiok (71 residents), Larsen Bay (87 residents), Chiniak (47 residents) and Karluk (37 residents).



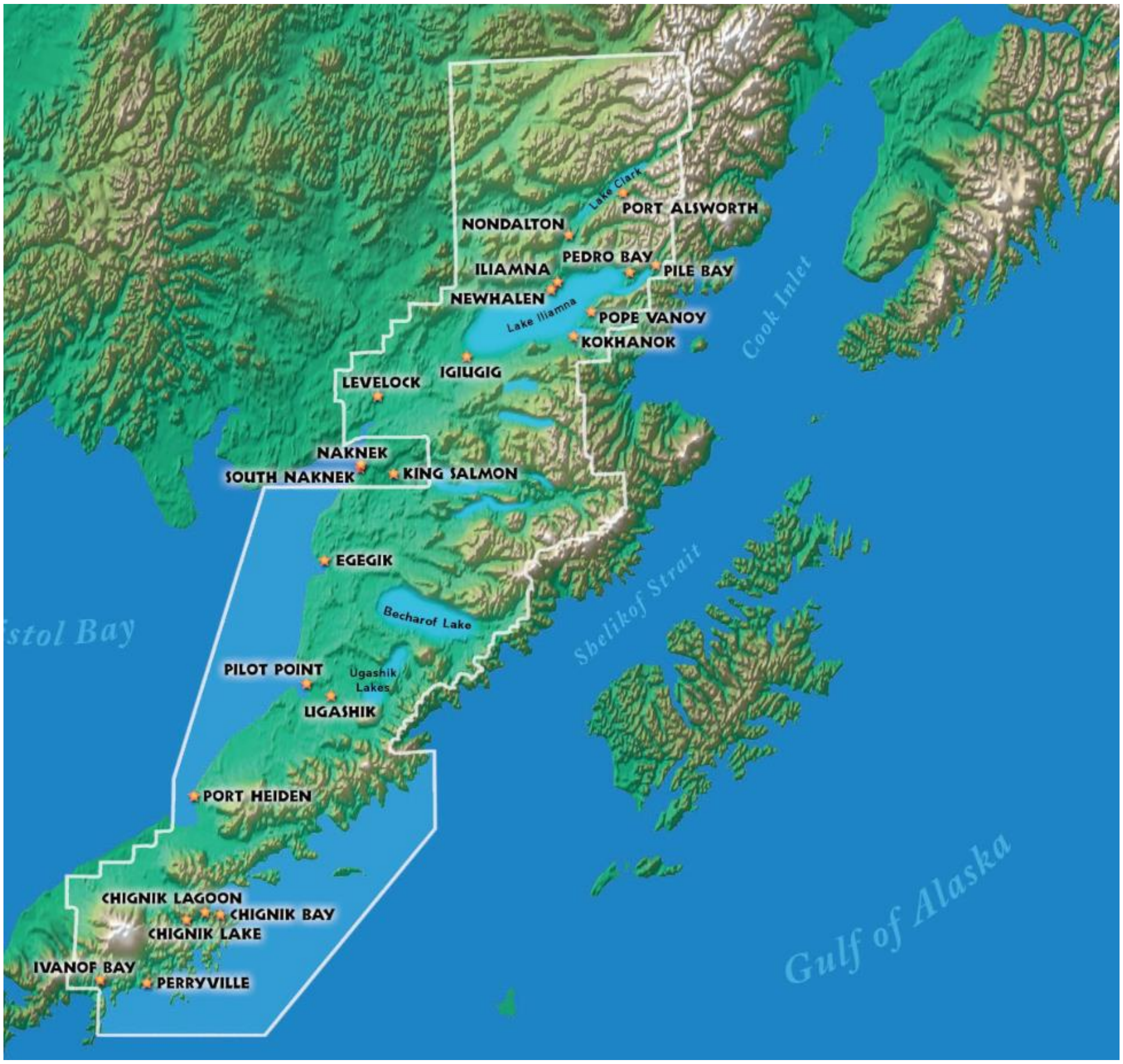
Source: Kodiak Island Borough 2018

Figure 30. Kodiak Island Borough Boundary and Villages

5.1.1.2 Lake and Peninsula Borough

The Lake and Peninsula Borough has a total population of 1,476 residents (ADLWD 2023) comprising 18 communities across three distinct regional areas; Lakes Area, Upper Peninsula Area, and Chignik Area (Figure 31; Lake and Peninsula Borough 2018). The Lakes Area is the northernmost region and includes

8 villages; Nondalton (133 residents), Port Alsworth (186 residents), Kokhanok (152 residents), Newhalen (168 residents), Levelock (69 residents), Iliamna (108 residents), Igiugig (68 residents), and Pedro Bay (43 residents; ADLWD 2023). The villages in the Upper Peninsula Area include; Egegik (39 residents), Port Heiden (100 residents), Pilot Point (70 residents), and Ugashik (4 residents; ADLWD 2023). The southernmost area, Chignik Area, contains 5 villages; Perryville (88 residents), Chignik Lagoon (72 residents), Chignik Lake (61 residents), Chignik (97 residents), and Ivanof Bay (1 resident; ADLWD 2023).



Source: Lake and Peninsula Borough 2018

Figure 31. Lake and Peninsula Borough Boundary and Villages

5.1.1.3 Aleutians East Borough

The Aleutians East Borough includes the westernmost landmass of the Alaska Peninsula, and spans southwest from Mud and Herendeen Bays to Akutan Island (Figure 32). The borough is home to a total of approximately 3,420 residents (ADLWD 2023) who reside within 6 coastal communities; Sand Point (578 residents), King Cove (757 residents), Akutan (1,589 residents), False Pass (397 residents), Cold Bay (50 residents), and Nelson Lagoon (41 residents; ADLWD 2023).

Source: Aleutians East Borough 2018

Figure 32. Aleutians East Borough Boundary and Villages

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 5.1.4, *Tourism*), however many villages in the proposed project region are remote and have few economic opportunities.

5.1.2 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).

5.1.3 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 33).

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

Source: Fey and Ames 2013

Figure 33. Alaska Federally Managed Commercial Fisheries Fleet Crossover

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.

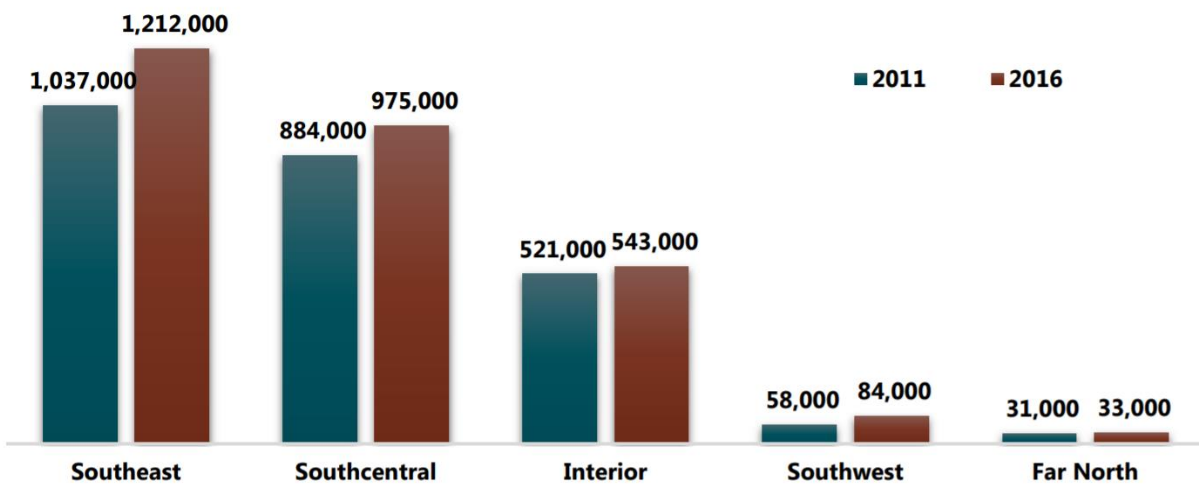
Fishing and commercial seafood processing has occurred on Kodiak Island since the late 1800s (ADF&G 2018a), and today Kodiak is home to Alaska's largest fishing port. The KMA includes the marine waters surrounding the Kodiak Archipelago, as well as drainage from the southeastern portion of the Alaska 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 CMA 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.

Area M 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.

5.1.4 Tourism

The Alaska Peninsula, Kodiak Archipelago, and Aleutian Islands are components of the Southwest Alaska tourism region, which as a whole receives approximately 4 percent of the state's annual visitors (Alaska Department of Commerce, Community, & Economic Development [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. 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, the visitation rate to the Southwest region has remained relatively low over the past decade (Figure 34).



Source: ADCCED 2017

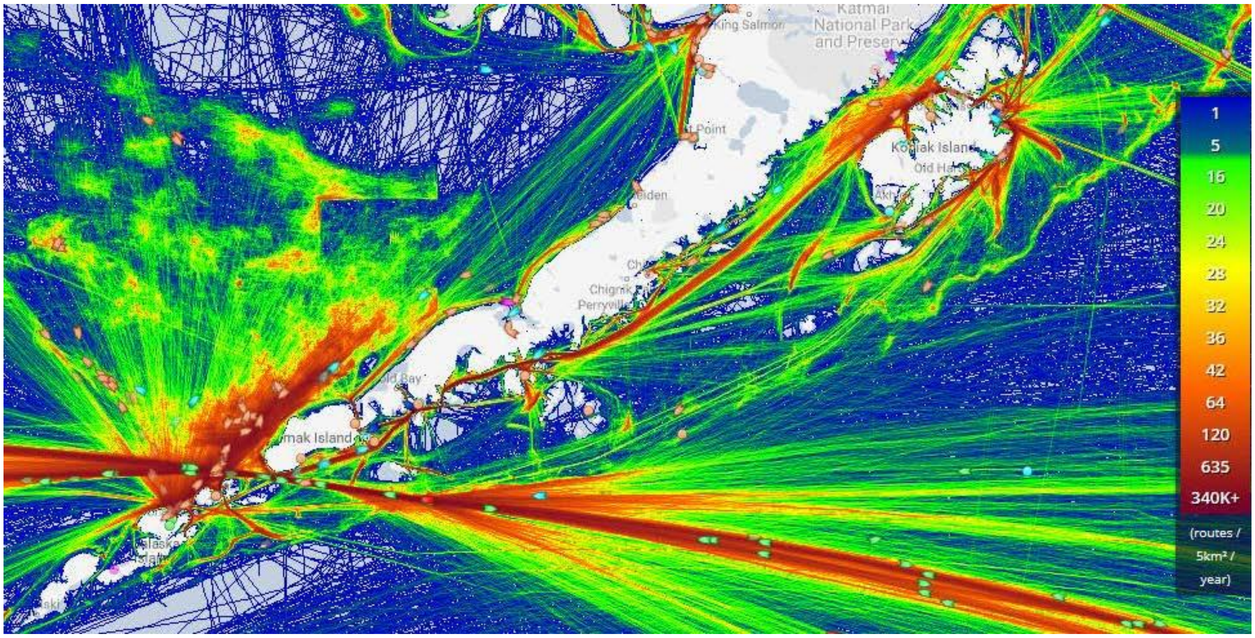
Figure 34. Estimated Visitor Volume to Alaska Regions, Summer 2011 and 2016

5.1.5 Vessel Traffic

Waters adjacent to the Alaskan Peninsula, Kodiak Island, and the eastern Aleutian Islands experience high levels of annual vessel traffic (Figure 35) due to freight, fishing, and general transportation including interstate commerce and occasional tourism. In particular, Unimak 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 United States Coast Guard (USCG) operated vessels , which patrol and perform various operations, ranging from marine inspections to life saving missions, within the Western Alaska USCG area of responsibility.



Source: TerraSond Limited 2018, via MarineTraffic

Figure 35. 2017 Vessel Traffic Density for Southwest Alaska

5.1.6 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 two homeported cutters; the USCGC *Alex Haley,* and USCGC *Cypress.* The USCG Sector Anchorage Waterways Management Division monitors primary shipping waterways and security zones and operates in conjunction with the USCG Aids to Navigation Team 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.

Kodiak Island is the only location in the Action 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).

5.1.7 Oil and Gas

The State of Alaska Department of Natural Resources – Division of Oil and Gas (ADNR-DOG) is conducting a lease sale in the Alaska Peninsula Region (Alaska Peninsula Areawide) In November and December 2023 (ADNR-DOG 2023). Exploratory mining activity is ongoing near Perryville, however impacts on Project activities are unlikely. Overall, according to 20TerraSond Limited's 2018 project-specific desktop study, there are currently no known occurrences of natural resource developments or extraction along the Project route that would interfere with the proposed cable survey or installation.

5.2 PROPOSED PROJECTS

5.2.1 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.

5.2.2 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.

5.2.3 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.

5.2.4 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).

5.2.5 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 Project (TerraSond Limited 2018). Unicom will coordinate with the City.

6.0 EFFECT OF THE ACTION

6.1 DIRECT EFFECTS

In Section 3.3, *Definition of the Action Area*, 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 distance to the 120 dB re 1 µPa rms acoustic threshold were conservatively estimated to be 1.8 km (1.1 mi.) from the *IT Integrity*; therefore, the Action Area is equal to the route length plus a buffer of 1.8 km (1.1 mi.) on each side of the route (3.6 km [2.2 mi.] total width) for areas where the cable laying ship would lay the FOC on the seafloor (area further than 298.8 m (980 ft.) from MLW. The total Action Area encompasses approximately 669.28 km^2 (258.41 mi^2). The area of designated critical habitat for ESA-listed species within the Action Area was calculated and presented in Table 6. It is important to note that the vessel would remain in one place along the route for longer than needed to complete cable-laying operation.

Table 6. Calculated Area of Critical Habitat within the Action Area

Designated Critical Habitat	Action Area in Critical Habitat (km^2 [mi.^{2}])
North Pacific right whale	0 km^2 (0 mi.^{2})
Humpback whale	478.34 km^2 (184.69 mi.^{2})
Steller sea lion	449.72 km^2 (176.64 mi.^{2})

6.1.1 Noise

6.1.1.1 Sounds Produced by the Proposed Action

As described in Section 3.3, *Definition of the Action Area*, results of a sound source verification study to characterize underwater sounds produced by the cable-laying ship *Ile de Brehat* conducting activities similar to the proposed Project indicated the noise from the main propeller's cavitation were the dominant sound over plow activities for burying a subsea cable or support vessel sounds. Sound measurement results ranged from 145 dB re 1 µPa rms at 200 m (656 ft.) to 121 dB re 1 µPa rms at 4,900 m (3 mi.)(Illingworth and Rodkin 2016). One-third octave band spectra show dominant sounds between 100 and 2,500 Hz. The source level was computed to 185.2 dB re 1 µPa rms at 1 m (3.2 ft.) using the measured transmission loss of 17.36 log (Illingworth and Rodkin 2016). Assuming spherical spreading transmission loss (20 log), the distance to the 120 dB re 1 µPa rms acoustic threshold was calculated to be 1.8 km (1.1 mi.) for the cable laying ship *Ile de Brehat*. 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 (TTS) to occur. Received levels must be even higher for a risk of permanent hearing impairment.

6.1.1.2 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).

Whales

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 sonar 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 higher than 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" hearing group (Southall et al. 2007; NMFS 2018). 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 2018), 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 2018). 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 pinnipeds, 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 2018).

6.1.1.3 Potential Effects of Noise from Action on Affected Marine Mammals

Vessel noise can contribute 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 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 slow speeds project vessels and the common occurrence of numerous vessels in the Action Area, it is reasonable to expect that many marine mammals would 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 (2.5 mi.) 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 Action 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 adaptation 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 of 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

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; 21minutes 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 non-impulsive 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 (62 mi.) away and could affect the behavior of a marine mammal at a distance of 52 km (32.3 mi.) 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/. 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 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). 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 (sound exposure level) 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 hours (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 a sufficiently long period of time to incur PTS from the low-intensity ship sounds.

6.1.1.4 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.

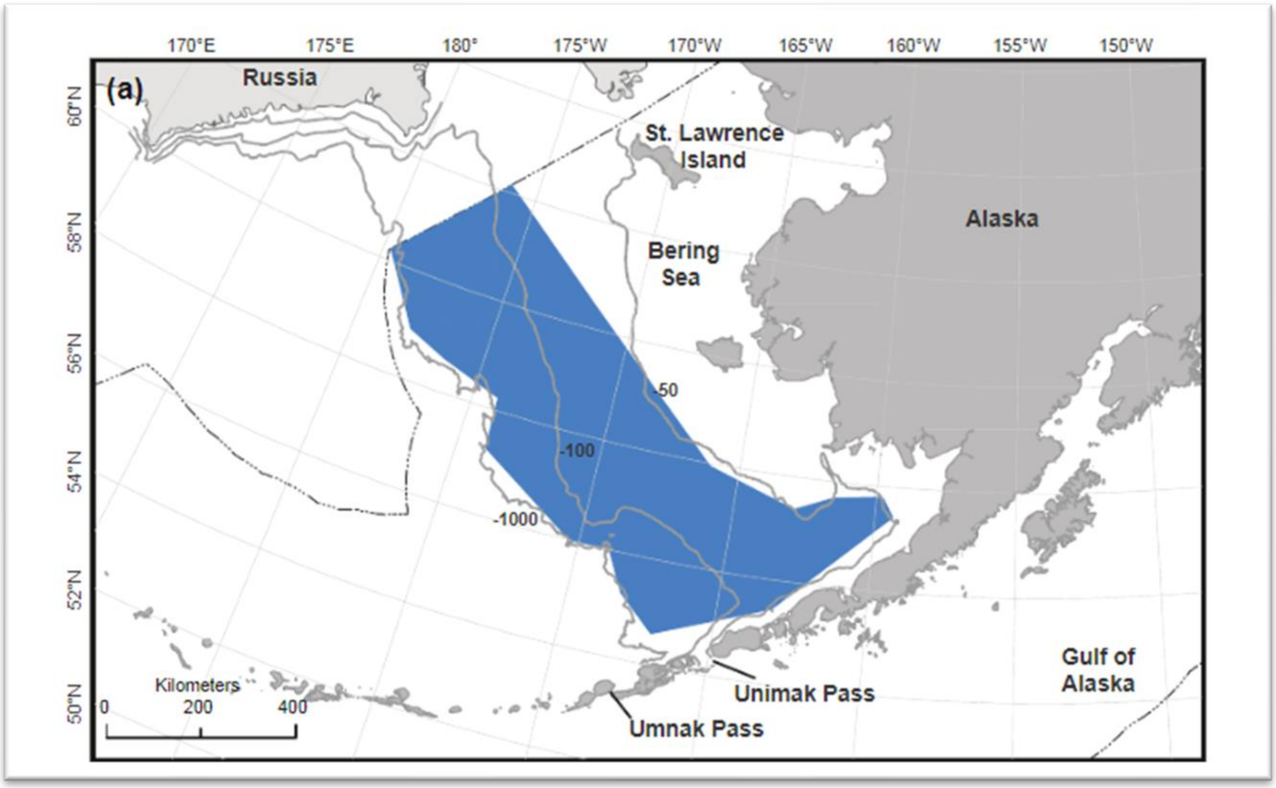
Blue whales are more likely to be encountered further offshore in the deeper waters of the Gulf of Alaska. The slow but continual movement of project vessels along with the rare occurrence of this species in nearshore waters means that any potential encounters are likely to be brief and inconsequential.

6.1.1.5 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 inactivity versus periods of active use of airguns suggest that these whales may show some avoidance of operating vessels out to a distance of 1 km (0.6 mi.) 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.

A BIA for fin whale feeding was identified north of the Alaska Peninsula and the Action Area (Figure 36; 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 no more than minimal and temporary.



Source: Ferguson et al. 2015

Figure 36. Fin Whale Feeding BIA in the Bering Sea Based on Ship Based Surveys, Acoustic Recordings, and Whaling Data

6.1.1.6 Potential Effect of Noise from Action North Pacific Right Whales

The effects of noise on North Pacific right whales are 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 their calls in response to changing ambient noise conditions (Parks et al. 2007b, 2009, 2011). Tenessen 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 would 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 North Pacific Right Whale call characteristics or stress levels are unlikely to result from the activity.

Wright et al. (2018) found that North Pacific Right Whales 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 North Pacific Right Whales are more vulnerable to interactions with vessels. However, the lower levels of vessel activity in this region relative to the northwest Atlantic mean North Pacific Right Whales may be more likely to show avoidance responses to vessel sounds, which may be beneficial in reducing the likelihood of ship strike. Nonetheless, protected species observers (PSOs) will maintain a vigilant watch for North Pacific Right Whales during all cable-laying operations. The slow speeds of the vessels during cable-laying operations should significantly reduce the risk of a possible strike.

Although designated North Pacific right whale critical habitat is in the vicinity, none of the Action Area is located in designated critical habitat for the whales. There is a BIA for North Pacific Right Whale feeding near the Action Area off the Southeast 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 North Pacific Right Whales along the FOC routes, effects on North Pacific Right Whales are not anticipated.

6.1.1.7 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. (1984, 1986) 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 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 (356.5 mi^2) of the western North Pacific gray whale range.

The Action Area overlaps a very small portion of a BIA for gray whale feeding, as well as a migratory BIA for gray whales (Ferguson et al. 2015). low probability of encountering western North Pacific gray whales in this region make it unlikely that effects on this species would occur.

6.1.1.8 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.

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 no more than minimal and temporary in nature.

6.1.1.9 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).

Sperm whales are typically found in waters greater than 300 m (984 ft.) deep; therefore, it is unlikely that sperm whales would be encountered during the Project. In the unlikely event a sperm whale is encountered, the low vessel speeds and associated sound levels are anticipated to have no more than minimal and temporary effects on the whale(s).

6.1.1.10 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 would 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 overlaps with approximately 449.72 km^2 (173.64 mi^2) of designated Steller sea lion 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 on Steller sea lions would occur from in-water sounds produced by the cable laying activities.

6.1.1.11 Potential Effects of Noise from Action on Sunflower Sea Stars

Little is known about the effects of sound on sea stars. 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 over 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).

6.1.2 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. 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 percent (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 strikes 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 common 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 one. 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 is very low.

6.1.3 Habitat Disturbance

The proposed activities would result in primarily temporary impacts on ESA-listed species habitats. The main habitat disturbance on marine mammals associated with the proposed activity would be temporarily elevated noise levels and the associated effects, as discussed in Section 6.1.1, *Noise*. Other potential habitat disturbance effects of the proposed activities on marine mammals include the risk of ship strikes (see Section 6.1.2, *Strandings and Mortality*), the risk of entanglement with cables and seafloor disturbance. Direct disturbance of seafloor sediments als**o** has the potential to affect sunflower sea star habitat. Risk of Entanglements

The presence of the submarine FOC during cable laying activities has potential to interact with ESA-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 (3,281 ft.). 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.

6.1.3.1 Bottom Disturbance

Sea bottom disturbance as a result of FOC placement on the seafloor 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.

Potential for direct physical harm to sunflower sea stars requires they be present in the disturbance footprint. Direct exposure of sunflower sea stars to cable installation activity is limited to the potential impacts from laying the cable on the seafloor and burying of the cable in nearshore waters. Sunflower sea stars are slow-moving invertebrates and may be present on the substrate within the footprint of the cable route.

The Project could incrementally reduce available sunflower sea star habitat due to footprint of the FOC; however, habitat destruction or modification was not identified as posing a substantial risk to sunflower sea stars due to their wide distribution as it buffers the species against significant adverse effects of activities and events limited in spatial and temporal scale (Lowry et al. 2022). The Action Area is an exceedingly small area in comparison to the vast area of habitat available to the species in adjacent and nearby waters surrounding the Action Area. Critical habitat has not been proposed for sunflower sea stars, as a final rule for listing has not been published as of the date this BA was prepared.

6.1.3.2 Potential Effects of Habitat Disturbance on ESA-Listed Species

The direct loss of habitat available to ESA-listed marine mammals due to vessel noise is expected to be minimal. Vessel noises would 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 6.1.1, *Noise*, above.

The risk of entanglement with FOCs 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 ESA-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.

Sunflower sea stars would experience an incremental reduction in available habitat within the FOC footprint; however the relatively small area of disturbance compared to the vast habitat available to the animals would result in no impact on the species.

The limited increase in turbidity as a result of suspension of sediments from bottom disturbance would have minimal direct effect on ESA-listed species. The potential indirect effects of bottom disturbance on

ESA-listed species through reduced feeding opportunities is assessed below in Section 6.2, *Indirect Effects*.

6.1.4 Measures to Reduce Direct Effects

As described above, direct effects on ESA-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 ESA-listed marine mammals, while project vessels are actively laying cable or transiting in the Action Area, Unicom plans for Protected Species Observers (PSOs) to watch for marine mammals and assist vessel operators with following NMFS guidelines for reducing impacts on marine mammals (NOAA 2017).

Project vessels will implement the following procedures:

- During cable-laying operations, it is unsafe to stop activities; therefore, there are no shut down procedures for this project. PSOs will observe a 1,500-m (4,921-ft.) monitoring zone and report sightings to NMFS.
- Prior to the start of cable-laying operations, or when activities have been stopped for longer than a 30-minute period, PSOs will clear the 1,500-m (4,921-ft.) monitoring zone for a period of 30 minutes when activities have been stopped for longer than a 30-minute period. 1,500 m (4,921 ft.) is the distance to which NMFS generally agrees PSOs can adequately observe the smaller marine mammals. 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.
- Consistent with safe navigation, project vessels will avoid travelling within 5.6 km (3 nm) of any of Steller sea lion rookeries or major haulouts (to reduce the risks of disturbance of Steller sea lions and collision with protected species).
- If travel within 5.6 km (3 nm) of major rookeries or major haulouts is unavoidable, transiting vessels will reduce speed to 16.6 km/hour (9 knots) or less while within 5.6 km (3 nm) of those locations. Vessels laying cables are already operating at speeds less than 5.6 km/hour (3 knots).
- Vessels will not allow tow lines to remain in the water, and no trash or other debris will be thrown overboard, thereby reducing the potential for marine mammal entanglement.
- The transit route for the vessels will avoid known Steller sea lion BIAs and designated critical habitat to the extent practicable.
- Vessels may not be operated in such a way as to separate members of a group of marine mammals from other members of the group.

- Vessels should take reasonable steps to alert other vessels in the vicinity of whale(s), and report any stranded, dead, or injured ESA-listed whale or pinniped to the Alaska Marine Mammal Stranding Hotline at 877-925-7773.
- Vessels will not transit within North Pacific right whale critical habitat (Figure 19).
- Although take is not authorized, if an ESA-listed marine mammal is taken (e.g., struck by a vessel), it must be reported to NMFS within 24 hours. The following will be included when reporting take of an ESA-listed species:
  - Number of ESA-listed animals taken.
  - The date, time, and location of the take.
  - The cause of the take (e.g., vessel strike).
  - The time the animal(s) was first observed and last seen.
  - Mitigation measures implemented prior to and after the animal was taken.
  - Contact information for PSOs, if any, at the time of the collision, ship's Pilot at the time of the collision, or ship's Captain.

Unicom will have contracted two PSOs (one on watch at a time) on the cable laying ship. A PSO will be on watch during all daylight hours. Cable-laying activities will take place 24 hours per day in the summer. 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 ESA-listed species, to act if ESA-listed species enter the 1,500-m (4,921-ft.) monitoring zone, and to record these events:
  - Binoculars, range finder, GPS, compass
  - Two-way radio communication with construction foreman/superintendent
  - A logbook of all activities which will be made available to NMFS upon request.
- 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 weekly and monthly basis during active in-water work. An end-of-season report will be sent to NMFS summarizing the sightings and activities.

The results of the surveys will be used to minimize the extent to which trenching is necessary, thereby reducing impact on marine mammal habitat.

6.2 INDIRECT EFFECTS

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

Potential effects of 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.

6.2.1 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 fish. 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).

6.2.1.1 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 higher than 1,000 Hz (Pye and Watson III 2004). A recent study concluded that planktonic coral larvae detect and respond to sound, the first description of an auditory response in the invertebrate phylum Cnidaria (Vermeij et al. 2010).

6.2.1.2 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 lower than 1,500 Hz (Popper and Fay 2010). Some marine fishes, such as shads and menhaden, can detect sound at frequencies higher than 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 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 on ESA-listed species from exposure of fish to project vessel sounds is expected to be very unlikely.

6.2.1.3 Sea Bottom Disturbance

Limited negative effect of sea bottom disturbance would occur during FOC installation activities. 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 would be any significant indirect effect on ESA-listed marine mammals and sunflower sea stars through the activities' disturbance of the sea bottom on invertebrate and fish eggs and larvae in the water column.

6.2.2 Measures to Reduce the Impacts of Noise on Habitat

Measures aimed at reducing the direct effects on ESA-listed species, as described in Section 6.1.4, *Measures to Reduce Direct Effects*, 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.

6.3 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 ESA-listed species 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 potential cumulative effects to the greatest extent practicable.

6.3.1 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 Action Area; therefore, it would be expected that pollutants would likely not increase in its waterways. Further, the Environmental Protection Agency and the Alaska Department of Environmental Conservation will continue to regulate the amount of pollutants that enter the Gulf of Alaska from point and non-point sources through National Pollutant Discharge Elimination System permits. As a result, permittees would 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 would result in a small and temporary increase in vessel traffic and associated noise during the cable-laying operations and temporary disturbance of marine mammal and sunflower sea star habitat. The broadband service would improve communications for communities throughout the region, and it is not expected to result in substantial coastal development.

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

6.3.3 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 would result in temporary and incrementally increased vessel traffic of only a few vessels during the cable-laying operations.

6.3.4 Oil and Gas

The Alaska Department of Natural Resources (ADNR) Division of Oil and Gas (DO&G) published notice of a competitive oil and gas lease sale in the Alaska Peninsula Areawide area during the fourth quarter of 2023. The lease sale area is approximately 5.0 million acres of state-owned land, encompassing onshore and offshore acreage. The lease sale tracts are located on land and water north of the Action Area and associated activities are unlikely to overlap in time and space with this Project. Potential impacts from gas and oil development on ESA-listed species 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 would undergo consultation prior to exploration and development, and activities beyond the exploration phase are unlikely to occur during the timeframe of this Project.

The activity most likely to overlap with this Project would be vessel transportation for moving supplies and equipment to and from exploration activities. Support vessels from increased gas and oil development would likely increase noise in the action areas, and there would be potential for increased ship strikes with marine animals.

7.0 DETERMINATION OF EFFECTS

The following section describes the effects of the proposed Project on the ESA-listed species occurring in the Action Area and their critical habitat (if applicable). A summary of determination by species is provided in Table 1 in the Executive Summary.

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

We conclude that the Project **may affect and is not likely to adversely affect** the blue, fin, gray, and sperm whale due to the noise associated with the FOC 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 6.1.4, *Measures to Reduce Direct Effects*, 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.

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

We conclude that the Project **may affect and is not likely to adversely affect** the North Pacific right whale due to the noise associated with the FOC 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 6.1.4, *Measures to Reduce Direct Effects*, 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 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 would 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.

7.3 EFFECT ON THE HUMPBACK WHALE AND ITS CRITICAL HABITAT

We conclude that the Project **may affect and is not likely to adversely affect** the humpback whale due to the noise associated with the FOC 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 6.1.4, *Measures to Reduce Direct Effects*, 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 Project would result in disturbance due to noise of approximately 478.34 km^2 (184.69 mi^2) of designated humpback whale critical habitat. No permanent modifications from the program on humpback whale critical habitat are anticipated because subsea installation activity would be short-term and localized. Therefore, there would be **no adverse modification to critical habitat** of humpback whales.

7.4 EFFECT ON THE STELLER SEA LION AND ITS CRITICAL HABITAT

We conclude that the Project **may affect and is not likely to adversely affect** the Steller sea lion due to the noise associated with the FOC 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 6.1.4, *Measures to Reduce Direct Effects*, 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 would 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 Project would result in disturbance from noise of approximately 449.72 km^2 (173.64 mi^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 would be short-term and localized. Therefore, there would be **no adverse modification to critical habitat** of Steller sea lion.

7.5 EFFECT ON THE SUNFLOWER SEA STAR

We conclude that the Project **may affect and is not likely to adversely affect** the sunflower sea star due to seafloor disturbance during FOC installation activity. No studies have demonstrated that ship noise affects marine invertebrates, except when exposed to sound levels within a few meters of a strong sound source. Disturbance of the seafloor would not affect the species due to the localized area of impact and the small extent of disturbance relative to the vast extent of available habitat in and near the Action Area.

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APPENDIX A

EQUIPMENT SPECIFICATIONS

C.S. IT INTEGRITY

The IT Integrity is a UT755L - 5,450 BHP Platform supply / ROV support vessel recently acquired and fully retrofitted as a versatile and capable vessel for submarine cable repair, installation, marine route survey, ROV support and more.

SPECIFICATIONS

REGISTRATION

Year Built	2001
Builder	Soviknes Verft, Norway
Flag	Barbados
Classification	DNV 1A1, SF, EO, DK, DYNPOS - AUTR

DIMENSIONS

Length Overall	72 m
Breadth Moulded	16 m
NRT	936 T
Deadweight	3,200 T

SPEED – CONSUMPTION

Cruising Speed	12 kts – 14T/day
Economic Speed	10 kts – 10T/day
DP	Approx 4 to 5T/day

MACHINERY

Main Engines	2 x 2,725 BHP
Thrusters Bow	1 x 800 BHP
Thruster Azimuth	1 x 1,000 BHP
Thruster Azimuth	1 x 1,000 BHP
Rudders	2 x Rolls Royce High Lift
Propellers	2 x CPP
Capstans	2 x 8 T
Deck Crane	1 x 5T @ 10 m
Tugger Winch	2 x 10 T
Deck Load	1,500 T
Fuel Oil	916.8 m3
Potable Water	796.3 m3

ACCOMODATION

14 x 1 man + 12 x 2 man = 38 beds total

CRANES / LIFTING CAPACITIES

Stern A-frame	25 T
Fwd Deck Crane	5T@10m 3T@16m

OTHERS

Moon pool	4.35 x 3.8 m
Survey tube	0.5 m clear hole

PROJECT PERMANENT EQUIPMENT

Survey Cursor in moonpool