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.

Year	Project Component	Anticipated Schedule	
		Start	Complete
2024	Terrestrial Installation of BMHs in all communities	5/1	10/31
	Subsea FOC for Ouzinkie, Port Lions, Chignik Lagoon, Perryville, Cold Bay, and False Pass	6/30	10/15
	Terrestrial FOC installation for Ouzinkie and Port Lions	6/3	9/3
2025	Terrestrial FOC installation for Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass	5/1	10/31
	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

WESTON SOLUTIONS
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>
Subject: Re: [EXT]:AKRO-2023-03226 AU-Aleutian II Fiber project (Grant # NT22TBC0290091)

***** External Message *** -- PROBE message before clicking links or opening attachments.**

Hi Stacey-
Thanks for the information. I will double check my write up and make sure all references to the ship are corrected. I have been reading both the recent BA and the previous consultation records and the 2 names got mixed up in my head.
Once we get the updated action area calculations, I should be able to initiate the consultation and move it along.

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:

> Good afternoon, Leanne,
> Please find the following responses (in red) to your questions. As we state for #2 below, we will revise the Action Area extent and send separately.
>
> 1. The BA describes the intertidal cable laying, but doesn't get very specific about any boats that will support the divers. Will a barge/ other vessel be part of the support for the nearshore activities as in the original project, or will they just do the work from shore?
>   Equipment in the nearshore marine and riverine environment may include:
>
> - Small utility boats (both an 80- and 40-ft landing craft) to run pull line to beach (each less than 3,000 horsepower engine)
> - Dive boat with hand jetting tools
> - Hand jetting would take 1 day (12 hours) per landing
>
> 2. Does the calculated action area include the vessel transit between sites? We need to assess the potential for effects when the Intrepid is moving from one site to the next as well as when it is laying cable. If it will be moving at different speeds getting from one site to another, that should also be described. If the calculated action area does not include the transit between sites, that should be revised.

The calculated action area does not currently include vessel transit between the sites. We will revise to include transit between the sites and send separately. Vessel speed during transit is generally 10 knots.

3. Why is the monitoring zone (1,500 m) specified in the mitigations less than the calculated ensonified zone (1,800 m)?
   1,500 m (4,921 ft.) is the distance to which NMFS has generally agreed PSOs can adequately observe the smaller marine mammals. All marine mammal sightings will be recorded and included in the Monitoring Report, regardless of distance from the source.

Please let me know if these responses don't answer your questions adequately. I also wanted to clarify that in your email you referenced the vessel *Intrepid*; however, we are using the *IT Integrity* for this project. The Intrepid was used for the AU-A Project (in the initial 2019 consultation for the FOC backbone).
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

From: Leanne Roulson - NOAA Affiliate <leanne.roulson@noaa.gov>
Sent: Thursday, January 25, 2024 6:29 AM
To: Korsmo (Aughe), Stacey <Stacey.Aughe@WestonSolutions.com>
Subject: Re: [EXT]:AKRO-2023-03226 AU-Aleutian II Fiber project (Grant # NT22TBC0290091)

***** External Message *** -- PROBE message before clicking links or opening attachments.**

Hi Stacey-
I am working on the LOC for the Aleutians II project and I have a couple of questions I'm hoping you can help me with.

1. The BA describes the intertidal cable laying, but doesn't get very specific about any boats that will support the divers. Will a barge/ other vessel be part of the support for the nearshore activities as in the original project, or will they just do the work from shore?
2. Does the calculated action area include the vessel transit between sites? We need to assess the potential for effects when the Intrepid is moving from one site to the next as well as when it is laying cable. If it will be moving at different speeds getting from one site to another, that should also be described. If the calculated action area does not include the transit between sites, that should be revised.
3. Why is the monitoring zone (1,500 m) specified in the mitigations less than the calculated ensonified zone (1,800 m)?

That's it for now, I will keep working on the doc while waiting for your reply.
Thanks,
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 22, 2024 at 10:50 AM Leanne Roulson - NOAA Affiliate <leanne.roulson@noaa.gov> wrote:

> Hi Stacey-
> This letter looks very helpful. I will review the BA and let you know if I need any further clarification before we can initiate consultation.
> Thank you,
> 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 Fri, Jan 19, 2024 at 4:24 PM Korsmo (Aughe), Stacey <Stacey.Aughe@westonsolutions.com> wrote:
>
>> Good afternoon, Ms. Roulson,
>>
>> Please find attached a cover letter describing the type of consultation being requested and delineating aspects of the project which are changed from the initial AU-A consultation (AKRO-2019-00892). I've also attached the BA which was originally submitted on 21 December 2023 for ease of reference. Please let me know if you have any questions or concerns.
>>
>> Kind regards,
>> Stacey Korsmo

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: 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)

***** External Message *** -- PROBE message before clicking links or opening attachments.**

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.

In reviewing the BA, it appears that this should be handled as a reinitiation of the previously completed consultation mentioned in the introduction (AKRO-2019-00892).

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.

As an example, a table noting which of the connecting sections/ sites of the fiber system were included in the 2019 consultation and which are new sites (with coordinates). If any of the sites or project components previously consulted on have been changed (proposed cable routes, landfall sites, methods, etc) please also call that out. You can also note that your request includes a conference on the proposed species, sunflower sea star, since its listing was proposed since the 2019 LOC was issued, and it is included in your species table.

Once we have a clear description of the project aspects the action agency is requesting consultation on, I will have a better idea of the context of the materials in the BA since it seems to cover a mix of previously submitted/ reviewed and new materials.

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

Thank you,

Leanne

Leanne H. Roulson
Consultation Biologist
Salus Resources, Inc.
Certified Fisheries Professional

406-690-4223 (mobile)
leanne.roulson@noaa.gov

CAUTION: This email originated outside of the organization. **DO NOT CLICK** links or open attachments unless you recognize the sender and know the content is safe.

CAUTION: This email originated outside of the organization. **DO NOT CLICK** links or open attachments unless you recognize the sender and know the content is safe.

CONFIDENTIALITY: This email and attachments may contain information which is confidential and proprietary. Disclosure or use of any such confidential or proprietary information without the written permission of Weston Solutions, Inc. is strictly prohibited. If you received this email in error, please notify the sender by return e-mail and delete this email from your system. Thank you.

CAUTION: This email originated outside of the organization. **DO NOT CLICK** links or open attachments unless you recognize the sender and know the content is safe.

CONFIDENTIALITY: This email and attachments may contain information which is confidential and proprietary. Disclosure or use of any such confidential or proprietary information without the written permission of Weston Solutions, Inc. is strictly prohibited. If you received this email in error, please notify the sender by return e-mail and delete this email from your system. Thank you.

From:	Leanne Roulson - NOAA Affiliate
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

You don't often get email from leanne.roulson@noaa.gov. Learn why this is important

Hi Stacey-
I will take a look and let you know if I have any questions.
Thanks so much,
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 Wed, Jan 31, 2024 at 9:58 PM Korsmo (Aughe), Stacey <Stacey.Aughe@westonsolutions.com> wrote:

> 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.

Year	Project Component	Anticipated Schedule	
		Start	Complete
2024	Terrestrial Installation of BMHs in all communities	5/1	10/31
	Subsea FOC for Ouzinkie, Port Lions, Chignik Lagoon, Perryville, Cold Bay, and False Pass	6/30	10/15
	Terrestrial FOC installation for Ouzinkie and Port Lions	6/3	9/3
2025	Terrestrial FOC installation for Chignik Lagoon, Chignik Lake, Perryville, Cold Bay, and False Pass	5/1	10/31
	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>
Subject: Re: [EXT]:AKRO-2023-03226 AU-Aleutian II Fiber project (Grant # NT22TBC0290091)

Hi Stacey-

Thanks for the information. I will double check my write up and make sure all references to the ship are corrected. I have been reading both the recent BA and the previous consultation records and the 2 names got mixed up in my head.

Once we get the updated action area calculations, I should be able to initiate the consultation and move it along.

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:

> Good afternoon, Leanne,
>
> Please find the following responses (in red) to your questions. As we state for #2 below, we will revise the Action Area extent and send separately.
>
> 1. The BA describes the intertidal cable laying, but doesn't get very specific about any boats that will support the divers. Will a barge/ other vessel be part of the support for the nearshore activities as in the original project, or will they just do the work from shore?
>
>   Equipment in the nearshore marine and riverine environment may include:
>
> - Small utility boats (both an 80- and 40-ft landing craft) to run pull line to beach (each less than 3,000 horsepower engine)
> - Dive boat with hand jetting tools
> - Hand jetting would take 1 day (12 hours) per landing
>
> 2. Does the calculated action area include the vessel transit between sites? We need to assess the potential for effects when the Intrepid is moving from one site to the next as well as when it is laying cable. If it will be moving at different speeds getting from one site to another, that should also be described. If the calculated action area does not include the transit between sites, that should be revised.
>
>   The calculated action area does not currently include vessel transit between the sites. We will revise to include transit between the sites and send separately.

Vessel speed during transit is generally 10 knots.

3. Why is the monitoring zone (1,500 m) specified in the mitigations less than the calculated ensonified zone (1,800 m)?

   1,500 m (4,921 ft.) is the distance to which NMFS has generally agreed PSOs can adequately observe the smaller marine mammals. All marine mammal sightings will be recorded and included in the Monitoring Report, regardless of distance from the source.

Please let me know if these responses don't answer your questions adequately. I also wanted to clarify that in your email you referenced the vessel *Intrepid*; however, we are using the *IT Integrity* for this project. The Intrepid was used for the AU-A Project (in the initial 2019 consultation for the FOC backbone).

Kind regards,

Stacey Korsmo

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

Stacey Korsmo

Senior Project Scientist

(907) 301-5815 Stacey.Aughe@WestonSolutions.com

From: Leanne Roulson - NOAA Affiliate <leanne.roulson@noaa.gov>
Sent: Thursday, January 25, 2024 6:29 AM
To: Korsmo (Aughe), Stacey <Stacey.Aughe@WestonSolutions.com>
Subject: Re: [EXT]:AKRO-2023-03226 AU-Aleutian II Fiber project (Grant # NT22TBC0290091)

Hi Stacey-

I am working on the LOC for the Aleutians II project and I have a couple of questions I'm hoping you can help me with.

1. The BA describes the intertidal cable laying, but doesn't get very specific about any boats that will support the divers. Will a barge/ other vessel be part of the support for the nearshore activities as in the original project, or will they just do the work from shore?
2. Does the calculated action area include the vessel transit between sites? We need to assess the potential for effects when the Intrepid is moving from one site to the next as well as when it is laying cable. If it will be moving at different speeds getting from one site to another, that should also be described. If the calculated action area does not include the transit between sites, that should be revised.
3. Why is the monitoring zone (1,500 m) specified in the mitigations less than the calculated ensonified zone (1,800 m)?

That's it for now, I will keep working on the doc while waiting for your reply.

Thanks,

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 22, 2024 at 10:50 AM Leanne Roulson - NOAA Affiliate <leanne.roulson@noaa.gov> wrote:

> Hi Stacey-
>
> This letter looks very helpful. I will review the BA and let you know if I need any further clarification before we can initiate consultation.
>
> Thank you,
>
> 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 Fri, Jan 19, 2024 at 4:24 PM Korsmo (Aughe), Stacey <Stacey.Aughe@westonsolutions.com> wrote:

Good afternoon, Ms. Roulson,

Please find attached a cover letter describing the type of consultation being requested and delineating aspects of the project which are changed from the initial AU-A consultation (AKRO-2019-00892). I've also attached the BA which was originally submitted on 21 December 2023 for ease of reference. Please let me know if you have any questions or concerns.

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

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)

***** External Message *** -- PROBE message before clicking links or opening attachments.**

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.

In reviewing the BA, it appears that this should be handled as a reinitiation of the previously completed consultation mentioned in the introduction (AKRO-2019-00892).

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.

As an example, a table noting which of the connecting sections/ sites of the fiber system were included in the 2019 consultation and which are new sites (with coordinates). If any of the sites or project components previously consulted on have been changed (proposed cable routes, landfall sites, methods, etc) please also call that out. You can also note that your request includes a conference on the proposed species, sunflower sea star, since its listing was proposed since the 2019 LOC was issued, and it is included in your species table.

Once we have a clear description of the project aspects the action agency is requesting consultation on, I will have a better idea of the context of the materials in the BA since it seems to cover a mix of previously submitted/ reviewed and new materials.

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

Thank you,

Leanne

Leanne H. Roulson

Consultation Biologist

Salus Resources, Inc.

Certified Fisheries Professional

406-690-4223 (mobile)

leanne.roulson@noaa.gov

CAUTION: This email originated outside of the organization. **DO NOT CLICK** links or open attachments unless you recognize the sender and know the content is safe.

CONFIDENTIALITY: This email and attachments may contain information which is confidential and proprietary. Disclosure or use of any such confidential or proprietary information without the written permission of Weston Solutions, Inc. is strictly prohibited. If you received this email in error, please notify the sender by return e-mail and delete this email from your system. Thank you.

CAUTION: This email originated outside of the organization. **DO NOT CLICK** links or open

From:	Korsmo (Aughe), Stacey
To:	Leanne Roulson - NOAA Affiliate
Cc:	Emily Creely; Larson, Meghan; NMennen@gci.com; Cameron Miller; Pereira, Amanda; Andrew.Bielakowski
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

---

Good afternoon, Ms. Roulson,

Please find attached a cover letter describing the type of consultation being requested and delineating aspects of the project which are changed from the initial AU-A consultation (AKRO-2019-00892). I've also attached the BA which was originally submitted on 21 December 2023 for ease of reference. Please let me know if you have any questions or concerns.

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

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.

In reviewing the BA, it appears that this should be handled as a reinitiation of the previously completed consultation mentioned in the introduction (AKRO-2019-00892).

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.
As an example, a table noting which of the connecting sections/ sites of the fiber system were included in the 2019 consultation and which are new sites (with coordinates). If any of the sites or project components previously consulted on have been changed (proposed cable routes, landfall sites, methods, etc) please also call that out. You can also note that your request includes a conference on the proposed species, sunflower sea star, since its listing was proposed since the 2019 LOC was issued, and it is included in your species table.

Once we have a clear description of the project aspects the action agency is requesting consultation on, I will have a better idea of the context of the materials in the BA since it seems to cover a mix of previously submitted/ reviewed and new materials.
Let me know if you have questions or want to discuss anything related to the project.
Thank you,
Leanne

Leanne H. Roulson
Consultation Biologist

Salus Resources, Inc.

Certified Fisheries Professional

406-690-4223 (mobile)
leanne.roulson@noaa.gov

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
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

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
www.fisheries.noaa.gov

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>
Sent: Monday, October 23, 2023 9:41 AM
To: andrew.bielakowski@firstnet.gov; apereira@ntia.gov; cmiller3@gci.com; Emily Creely <ecreely@dowl.com>; Greg Balogh - NOAA Federal <greg.balogh@noaa.gov>; Leah Davis - NOAA Federal <leah.davis@noaa.gov>; Larson, Meghan <Meghan.Larson@WestonSolutions.com>; Sharee Tserlentakis (Marin) <smarin@gci.com>
Subject: [EXT]:Previous AU GCI Monitoring Report

Bonnie Easley-Appleyard
Marine Mammal Specialist
NOAA Fisheries, Alaska Region
Office: (907) 271-5172
www.fisheries.noaa.gov

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

Endangered Species Act (ESA) Section 7(a)(2) Conference Opinion and Concurrence

Activity: AU-Aleutians II Fiber Optic Cable Project, Alaska

Action Agencies: National Telecommunications and Information Administration

Consulting Agency: National Marine Fisheries Service, Alaska Region

NMFS Consultation Number: AKRO-2023-03226

Issued by: ______________________

Jonathan M. Kurland

Regional Administrator

Date Issued: June 7, 2024

Affected Species and Determinations:

ESA-Listed Species	Status	Is the Action Likely to Adversely Affect the Species?	Is the Action Likely to Adversely Affect Critical Habitat?	Is the Action Likely To Jeopardize the Species?	Is the Action Likely To Destroy or Adversely Modify Critical Habitat?
Gray Whale, Western North Pacific DPS (*Eschrichtius robustus*)	Endangered	No	N/A	No	N/A
North Pacific Right Whale (*Eubalaena japonica*)	Endangered	No	No	No	No
Humpback Whale, Mexico DPS (*Megaptera novaeangliae*)	Threatened	No	No	No	No

ESA-Listed Species	Status	Is the Action Likely to Adversely Affect the Species?	Is the Action Likely to Adversely Affect Critical Habitat?	Is the Action Likely To Jeopardize the Species?	Is the Action Likely To Destroy or Adversely Modify Critical Habitat?
Humpback Whale, Western North Pacific DPS (*Megaptera novaeangliae*)	Endangered	No	No	No	No
Blue Whale (*Balaenoptera musculus*)	Endangered	No	N/A	No	N/A
Fin Whale (*Balaenoptera physalus*)	Endangered	No	N/A	No	N/A
Sperm Whale (*Physeter macrocephalus*)	Endangered	No	N/A	No	N/A
Steller Sea Lion, Western DPS (*Eumetopias jubatus*)	Endangered	No	No	No	No
Sunflower Sea Star (*Pycnopodia helianthoides*)	Proposed	Yes	N/A	No	N/A

N/A = Not Applicable

Accessibility of this Document

Every effort has been made to make this document accessible to individuals of all abilities in compliance with Section 508 of the Rehabilitation Act. The complexity of this document may make access difficult for some. If you encounter information that you cannot access or use, please email us at Alaska.webmaster@noaa.gov or call us at 907-586-7228 so that we may assist you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

AKR	Alaska Region
AKRO	Alaska Regional Office
BA	Biological Assessment
BHP	Brake Horsepower
BIA	Biologically Important Area
BMH	Beach manhole
CFR	Code of Federal Regulations
cm	Centimeter(s)
CV	Coefficient of Variation
dB rms re 1µPa	Decibel root-mean-squared as measured at 1 micropascal (in water)
DPS	Distinct Population Segment
DQA	Data Quality Act
ECO	Environmental Consultation Organizer
ESA	Endangered Species Act
FOC	Fiber Optic Cable
FR	Federal Register
ft	Foot/Feet
GCI	GCI Communication Corporation
in	Inch(es)
ITS	Incidental Take Statement
IWC	International Whaling Commission
kg	Kilogram(s)
km	Kilometer(s)
km^2	Square Kilometer(s)
KMA	Kodiak Management Area
km/hr	Kilometer(s)/Hour
kn	Knot(s)
kW	Kilowatt(s)
lb	Pound
lin ft	Linear Foot/Feet
m	Meter(s)
m^2	Square Meter(s)

mi	Mile(s)
mi^2	Square Mile(s)
MHW	Mean High Water
MLW	Mean Low Water
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
µPa	Micro Pascal(s)
N/A	Not Applicable
NEPA	National Environmental Policy Act
nm	Nautical Mile(s)
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NTIA	National Telecommunications and Information Administration
NVPL	Native Village of Port Lions
Opinion	Biological Opinion
Pa	Pascal(s)
RMS	Root Mean Square
RPM	Reasonable and Prudent Measure
SSWS	Sea Star Wasting Syndrome
SSL	Steller Sea Lion
TTS	Temporary Threshold Shift
Unicom	Unicom Incorporated
U.S.	United States
Weston	Weston Solutions, Incorporated
WNP	Western North Pacific
yd	Yard

1 INTRODUCTION

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. § 1536(a)(2)) requires each Federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a Federal agency's action "may affect" a protected species, that agency is required to consult with the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending upon the endangered species, threatened species, or designated critical habitat that may be affected by the action (50 CFR § 402.14(a)). Federal agencies may fulfill this general requirement informally if they conclude that an action may affect, but "is not likely to adversely affect" endangered species, threatened species, or designated critical habitat, and NMFS or the USFWS concurs with that conclusion (50 CFR § 402.14(b)).

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

Section 7(a)(4) of the ESA provides a mechanism for identifying and resolving potential conflicts between a proposed action and species or critical habitat proposed to be listed at an early planning stage. While consultations are required when the proposed action may affect listed species, a conference is required only when the proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. However, Federal action agencies may request a conference on any proposed action that may affect proposed species or proposed critical habitat. Conferences follow the same procedures, contents, and format as formal consultation and biological opinion. However, the incidental take statement provided with a conference opinion does not take effect until the Services adopt the conference opinion as a biological opinion on the proposed action - after the species is listed.

Updates to the regulations governing interagency consultations (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 89 Fed. Reg. at 24268; 84 Fed Reg. at 45015. We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

In this document, the action agency is the National Telecommunications and Information Administration (NTIA), which proposes to add connecting fiber optic cable (FOC) to service seven communities along the Aleutian Islands. NTIA has contracted with Weston Solutions, Incorporated (Weston) to provide concept planning and environmental review (Biological

Assessment (BA)) for the project. The consulting agency for this proposal is the NMFS Alaska Region (AKR). This document represents NMFS's concurrence on the effects of the proposed action on the endangered Western North Pacific distinct population segment (DPS) gray whale, endangered North Pacific right whale, threatened Mexico DPS humpback whale, endangered Western North Pacific DPS humpback whale, endangered blue whale, endangered fin whale, endangered sperm whale, and endangered Western DPS Steller sea lion and a conference opinion (opinion) on the effects of the proposed action on the sunflower sea star, which is proposed for listing at threatened under the ESA (88 FR 16212, March 16, 2023).

The opinion and ITS were prepared by the NMFS AKR in accordance with Section 7(b) of the ESA (16 U.S.C. § 1536(b)) and implementing regulations at 50 CFR part 402.

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

1.1 Background

This opinion is based on information provided in the December 21, 2023, BA and subsequent revisions prepared and submitted by Weston. A complete record of this consultation is on file at NMFS's Alaska Regional Office (AKRO).

The proposed action involves the laying of FOC to provide high speed internet (broadband) to seven communities located on the south side of the Aleutian Islands, Alaska (Figure 1) with an expected start in June 2024.

The project would consist of several components completed over two phases with construction occurring from June 2024, to November 1, 2024, and then a final phase to complete the Chignik Lake site occurring in June 2025.

This opinion considers the effects of the following in-water activities on listed species likely to occur within the action area:

1. Laying FOC on the sea floor in areas more than 300 meters (m) (985 feet [ft]) offshore.
2. Connecting FOC to onshore stations via cables jetted into place within 300 m (985 ft) of the shoreline.
3. Operating the *IT Integrity* cable-laying ship for support and material supply vessel transit.

In addition, the action agency requested a conference on the proposed listing of the sunflower sea star (*Pycnopodia helianthoides*) (88 FR 16212, March 16, 2023) in the consultation, and requested concurrence with a likely to adversely affect determination. This opinion considers the effects of the project activities on the proposed threatened sunflower sea star. NMFS is not currently proposing designating critical habitat for the sunflower sea star.

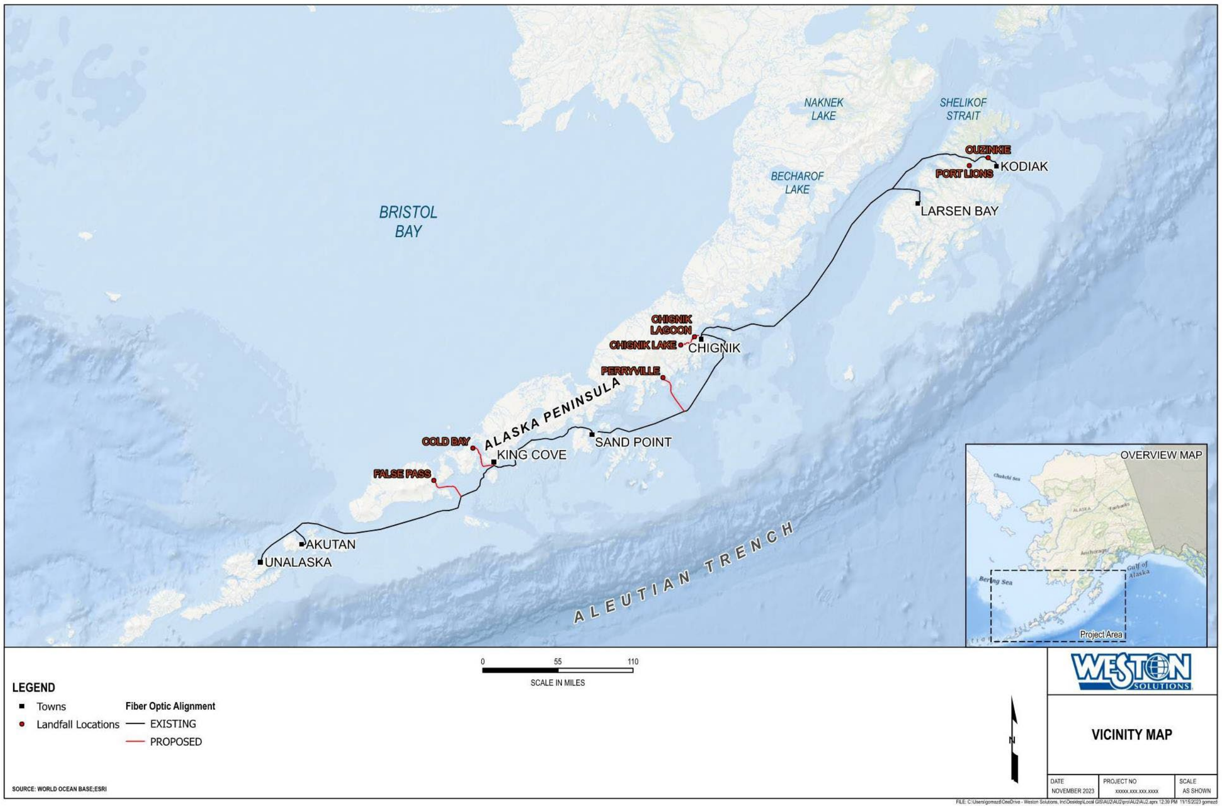


Figure 1. Vicinity map for the Aleutians II project showing the completed (blue) and proposed (red) segments of the fiber optic cable route (Weston 2024).

1.2 Consultation History

- August 22, 2019: NMFS issued a letter of concurrence on the Aleutians Fiber I Project (AKRO-2019-00892).
- November 2022: NMFS received a copy of the Protected Species Observer (PSO) Monitoring Report for the AKRO-2019-00892 project.
- December 21, 2023: NMFS received a request for reinitiation of consultation from NTIA and correspondence identifying Weston as NTIA's non-Federal representative for this project.
- December 21, 2023: Weston provided a BA for the proposed project.
- January 11, 2024: NMFS requested via email information about the project, including the aspects of the project that triggered NTIA to reinitiate consultation.
- January 19, 2024: Weston provided NMFS with information regarding the modified project components and the species that had changes to listing status or critical habitat, including the following:
    - change in lead Federal agency from U.S. Department of Agriculture Rural Utility Service to NTIA;
    - two new branch segments to the communities of Ouzinkie and Port Lions;
    - modified branch segments to Chignik Lagoon and Chignik Lake;
    - newly designated humpback whale critical habitat; and

    - the addition of sunflower sea stars, which were proposed for listing under the ESA in March 2023.
- January 25, 2024: NMFS requested revisions to add the transit routes to the action area.
- January 31, 2024: Weston provided an updated BA which included the requested changes.
- January 31, 2024: NMFS initiated informal consultation.
- February 16, 2024: Upon review of the potential for adverse effects to the sunflower sea star, NMFS informed the applicant that the project will require a formal conference opinion to assess the potential for proposed action to cause jeopardy for the species.
- February 23, 2024: NTIA's designee, Weston, submitted a request for a formal conference opinion and requested example mitigation language for the sunflower sea star.
- March 4, 2024: NMFS requested a breakdown of the FOC alignment in waters less than 120 m (394 ft) to allow a more accurate estimate of sunflower sea star impacts.
- March 4, 2024: NMFS provided the current sunflower sea star mitigation language for projects likely to encounter sea stars.
- March 11, 2024: Weston provided a breakdown of the FOC laying depths along the alignment and details on the dimensions and weight of the FOC.

2 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

2.1 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the U.S. or upon the high seas. 50 C.F.R. § 402.02.

Unicom, Incorporated (Unicom), a wholly owned subsidiary of GCI Communication Corporation (GCI) is proposing to provide high speed internet (broadband) service to seven communities in Alaska by extending broadband service from the main cable to connect with onshore sites. The Aleutians II project will build upon work completed in 2021, which laid the main FOC line. Unicom is undertaking the project on behalf of the Native Village of Port Lions (NVPL) and with support from the NTIA Tribal Broadband Connectivity Program.

Construction is expected to occur over two summers spanning from May 1, 2024, through October 31, 2024, and from May 1, 2025, through October 31, 2025. However, the in-water work will not begin until June 1 each year, and in-water work the second season will focus on Chignik Lake and occur during June and July 2025.

2.1.1 Proposed Activities

The Aleutians II project is located along the south side of Aleutian Islands stretching from the west side of Kodiak Island to the community of False Pass (Figure 1). The Aleutians I (2021) project completed the baseline route beginning near Kodiak, continuing southwest down the Shelikof Strait, and then paralleling the Alaska Peninsula to the south until its final connection at Unalaska. The work for this portion of the project (Aleutians II) will stem off the baseline route with the final connection installed at False Pass.

Aleutians II will connect the FOC to the following communities:

- Ouzinkie
- Port Lions
- Chignik Lake
- Chignik Lagoon
- Perryville
- Cold Bay
- False Pass

The project will build upon the 2021 project (AKRO-2019-00892) which has completed approximately 1287.5 kilometers (km) (800 miles [mi]) of subsea FOC to extend broadband service to six remote communities for the Aleutians I project. The communities served by the 2021 project include:

- Larsen Bay
- Chignik Bay
- Sand Point
- King Cove
- Akutan
- Unalaska

The Aleutians II project will consist of approximately 176 km (109 mi) of submerged (laid on the sea floor) FOC. Detailed maps and photographs of each of the landing sites are provided in Figures 2 through 15 of the project BA (Weston 2024).

This project includes FOC installation by laying the cable on the sea floor, with the exception of nearshore areas within 298.8 m (980 ft) of mean low water (MLW) where the FOC is proposed to be encased in a sectioned, articulated pipe within the intertidal area at each of the seven landings by divers (Figure 2). The articulated pipe that will encase the cable is approximately 11.5 centimeters (cm) (4.5 inches (in.) in diameter. In the area within approximately 91m (300 ft) from MLW, the encased pipe will be buried by a diver using a hand-held water jet. In these nearshore areas where burial will occur, the burial depth will be no deeper than 0.9 m (3 ft) and there would be no resulting side cast. Once the encased FOC reaches the MLW line, it will be laid directly on the sea floor for up to 300 m (980 ft). The bare FOC has a diameter up to 2.6 cm (1.02 in)).

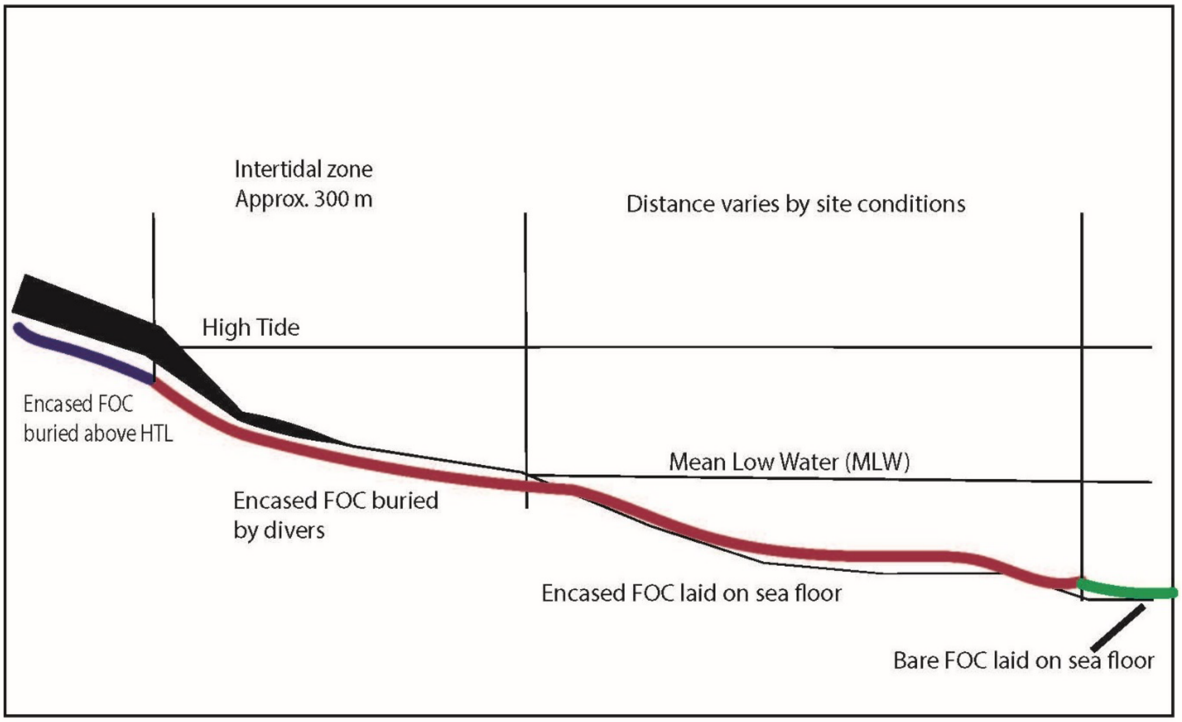


Figure 2. Illustration of the installation methods for sections of the fiber optic cable at nearshore sites for the Aleutians II project.

The project will begin work near Ouzinkie and progress along the Aleutians to the southwest, ending at False Pass. The intention in the project plan is to begin the subsea FOC laying in June 2024, and complete all sites by November 1, 2024, except for Chignik Lake which will be completed in June 2025. Cable-laying operations will occur 24 hours per day. The beach manhole (BMH) at Chignik Bay, installed in 2021, will be connected via intertidal FOC to the Chignik Lagoon landfall site near Packers Point as part of the 2024 work.

2.1.1.1 Offshore Cable Laying

Depending on bottom substrate, water depth, and distance from shore, the FOC will be laid on the sea floor. In offshore waters greater than 15 m (49 ft) deep, cable-lay operations will be conducted from a lay/burial cable ship (*IT Integrity*). The *IT Integrity* 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. A more detailed description of the ship can be found in Appendix A in the BA. Average speed for surface-laid cable is approximately 1.9 to 5.5 km/hour (1 to 3 kn. Dynamic positioning, maintained by two 750-kW gill thrusters, will be used only as needed for safety. The frequency would depend on weather and currents in the region. Support vessels may include a tug in the vicinity of the main lay/burial vessel. The FOC is approximately 2.6 cm (1.02 in) in diameter and weighs 1.5 kg/m (1.0 lb/linear foot (lin ft) in air.

2.1.1.2 Intertidal Cable Burial

The FOC will be laid from offshore to the BMH onshore to complete the cable installation.

Initially, the FOC will be spooled out along a preliminary alignment from the *IT Integrity* to shore. As the FOC is brought to shore for the preliminary placement, it will have floats attached at 10-m increments. The floats will be removed by divers sequentially, and the FOC will settle gradually to the sea floor rather than being dragged along the bottom.

After the FOC is resting on the bottom, FOC installation will proceed across three regions and levels of FOC protection. In the region that will be exposed during low tide (from Mean High Water [MHW] extending out to approximately 91 m [300 ft] from Mean Lower Low Water [MLLW]), the FOC will be encased in articulated split pipe and be trenched during low tide. Trenching will only occur along portions of the shoreline exposed during low tide, and jetting or trenching will not occur in water. In the region below MLLW out to a varying distance based on the sea floor slope and depth of waters offshore (Table 2-1), the FOC will be encased in articulated split pipe and laid directly on the sea floor. The split pipe weighs 57 kg/m (38.1 lbs/lin ft) in air. Beyond this region, the FOC will be laid directly on the sea floor with no additional armoring out to where it will be connected to the AU I cable already in place.

Table 2-1. Distances for Intertidal Installation Methods for each Fiber Optic Cable Landfall Site (Weston 2024)

Location	**Distance (m) Articulated Encasement will be Trenched** (MHW to MLLW, trenched at low tide)	**Distance (m) Articulated Encasement will be Laid on Sea Floor** (into open water from MLLW)	**Total Intertidal Distance (m)**
Ouzinkie	5	145	150
Port Lions	25	75	100
Chignik Bay[1]	135	65	200
Chignik Lagoon 1	25	0	25
Chignik Lagoon 2	75	0	75
Chignik Lake[2]	64*	36	100
Perryville	20	80	100
Cold Bay	15	85	100
False Pass	6	44	50

1. Chignik Bay was connected to the offshore FOC in 2021. In 2024 it will be connected to the Chignik Lagoon sites.
2. Includes 60 m of swampy area between the BMH and MHW.

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

- All trenching will have a maximum width of 0.9 m (3 ft) and depth of 0.9 m (3 ft).
- Any work below MHW will occur during low tide.
- Small utility boats (80-ft and 40-ft landing craft) will assist with pulling lines to the beach (3000-horsepowered engines).
- A small dive boat will carry the hand-jetting tools.

- Heavy equipment needing to operate in intertidal areas and wetlands will 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 expected to be produced.
- Alterations to shorelines would be temporary.
- Trenches would be constructed and backfilled to prevent them from acting as a drain.
- Hand jetting at each site will take approximately 1 day (12 hours).

2.1.2 Construction Sequence and Duration

The applicant expects to initiate terrestrial activities in May 2024, with the marine activities (cable laying) beginning by June 2024, and complete the final site for the project in Fall 2025. Intertidal cable activities are expected to occur for a total of approximately 12 hours over a single day at each site. The intertidal cable laying days will not necessarily be consecutive.

Uplands work will be completed independently of cable laying activities. The FOC will be linked to a new BMH at each landfall site. The BMH will be setback from MHW of the adjacent waterbody with a stub of conduit. Digging and sediment management will ensure that no aspect of the terrestrial construction has the potential to affect the in-water environment.

2.1.3 Mitigation Measures

For all reporting that results from implementation of these mitigation measures, NMFS will be contacted using the contact information specified in Table 2-3. In all cases, notification will reference the NMFS consultation tracking number AKRO-2023-03226.

The NTIA's representative, Weston, informed NMFS via the updated BA delivered via email on January 31, 2024, that the proposed action will incorporate the following mitigation measures:

2.1.3.1 General Mitigation Measures

1. The project proponent will inform NMFS of impending in-water activities a minimum of one week prior to the onset of those activities (email information to akr.prd.records@noaa.gov).

2. If construction activities will occur outside of the time window specified in this letter, the applicant will notify NMFS of the situation at least 60 days prior to the end of the specified time window to allow for reinitiation of consultation.

3. Nearshore in-water work will be conducted at the lowest points of the tidal cycle when feasible.

4. Consistent with AS 46.06.080, trash will be disposed of in accordance with state law. The project proponent will ensure that all closed loops (e.g., packing straps, rings, bands) will be cut prior to disposal. In addition, the project proponent will secure all ropes, nets, and other marine mammal entanglement hazards so they cannot enter marine waters.

2.1.3.2 PSO Requirements

5. At least one PSO will have either prior experience as a PSO in Alaska or will have completed a NMFS-approved PSO or marine mammal observer training course.

6. PSO training will include:

    a. field identification of marine mammals and marine mammal behavior;

    b. ecological information on marine mammals and specifics on the ecology and management concerns of those marine mammals;

    c. ESA and Marine Mammal Protection Act (MMPA) regulations;

    d. proper equipment use;

    e. methodologies in marine mammal observation and data recording and property reporting protocols; and

    f. an overview of PSO roles and responsibilities.

7. PSOs will be individuals independent from the project proponent and must have no other assigned tasks during monitoring periods.

8. The action agency or its designated non-Federal representative will provide resumes or qualifications of PSO candidates to the consultation biologist and akr.prd.records@noaa.gov for approval at least one week prior to in-water work. NMFS will provide a brief explanation of lack of approval in instances where an individual is not approved.

9. PSOs will:

    a. collectively be able to effectively observe the entirety of the shutdown zone;

    b. be able to identify marine mammals and accurately record the date, time, and species of all observed marine mammals in accordance with project protocols;

    c. be able to identify listed marine mammals that may occur in the action area at a distance equal to the outer edge of the applicable ensonified zone and determine marine mammal’s location and distance from sound source;

    d. have the ability to effectively communicate orally, by radio or in person, with project personnel to provide real-time information on listed marine mammals;

    e. possess a copy of mitigation measures; and

    f. possess data forms.

10. PSOs will not scan for marine mammals for more than four hours without at least a one-

hour break from monitoring duties between shifts. PSOs will not perform PSO duties for more than 12 hours in a 24-hour period.

2.1.3.3 Protected Species Observer Measures

11. PSOs will have the ability, authority, and obligation to order appropriate mitigation responses, including slowing the vessel and/or switching to neutral, to avoid takes of listed marine mammals.

12. One or more PSOs will perform PSO duties onsite throughout the duration of the authorized activity.

13. Where a team of three or more PSOs are required, a lead observer or monitoring coordinator will be designated.

14. For each in-water activity, PSOs will monitor all marine waters within the indicated ensonified zone radius for that activity (Table 2-2).

Table 2-2. Ensonified Zones for Each Activity

Activity	Zone Radius (m)
Offshore cable laying (*IT Integrity*)	1,800
Nearshore cable laying (divers/support vessel)	None

15. PSOs will be positioned such that they will collectively be able to monitor the entirety of each activity's ensonified zone.

16. Prior to commencing any activity listed in Table 2-2, PSOs will scan waters within the appropriate ensonified zone and confirm that no listed marine mammals are within the ensonified zone for at least 30 minutes immediately prior to initiation of the in-water activity. If one or more listed marine mammals are observed within the ensonified zone, the in-water activity will not begin until the listed marine mammals exit the ensonified zone of their own accord, or the ensonified zone has remained clear of listed marine mammals for 30 minutes immediately prior to the commencement of the activities listed in Table 2-2.

17. The on-duty PSOs will continuously monitor the ensonified zone and adjacent waters for the presence of listed marine mammals during daylight hours when any of the activities listed in Table 2-2 is ongoing.

18. The PSOs will order the vessel to reduce speed during activities listed in Table 2-2 if one or more listed marine mammals has entered, or appears likely to enter, the ensonified zone.

19. If a mitigative action (e.g., speed reduction or course alteration) is taken during any of the

activities listed in Table 2-2 for less than 30 minutes due to the presence of listed marine mammals in the ensonified zone, the activities may commence when the PSO provides assurance that listed marine mammals were observed exiting the ensonified zone. Otherwise, the activities may only commence after the PSO provides assurance that listed marine mammals have not been seen in the ensonified zone for 30 minutes (for cetaceans) or 15 minutes (for pinnipeds).

20. If a listed marine mammal is observed within an ensonified zone or is otherwise harassed, harmed, injured, or disturbed, the PSO will immediately report that occurrence to NMFS using the contact information specified in Table 2-3.

2.1.3.4 Vessels

21. Vessel operators will:

    a. During cable-laying operations, it is unsafe to stop activities; therefore, there are no shutdown procedures for this project. PSOs will observe a 1,500-m (4,921-ft) monitoring zone and report sightings to NMFS.

    b. maintain a watch for marine mammals at all times while underway;

    c. stay at least 91 m (100 yards [yds]) away from listed marine mammals but remain at least 460 m (500 yds) away from endangered North Pacific right whales;

    d. travel at less than 5 kn (9 km/hour) when within 274 m (300 yds) of a whale;

    e. avoid changes in direction and speed when within 274 m (300 yds) of a whale unless doing so is necessary for maritime safety;

    f. not position vessel(s) in the path of a whale and will not cut in front of a whale in a way or at a distance that causes the whale to change direction of travel or behavior (including breathing/surfacing pattern);

    g. check the waters immediately adjacent to the vessel(s) to ensure that no whales will be injured when the vessel gets underway; and

    h. reduce vessel speed to 10 kn or less when weather conditions reduce visibility to 1.6 km (1 mi) or less.

22. Vessel operators will adhere to the Alaska Humpback Whale Approach Regulations when vessels are transiting to and from the project site (see 50 CFR §§ 216.18, 223.214, and 224.103(b)). These regulations apply to all humpback whales. Specifically, the captain and crew will not:

    a. approach by any means, including by interception (i.e., placing a vessel in the path of an oncoming humpback whale), within 91 m (100 yds) of any humpback whale;

b. cause a vessel or other object to approach within 91 m (100 yds) of a humpback whale; or

c. disrupt the normal behavior or prior activity of a whale by any other act or omission.

d. If a whale's course and speed are such that it will likely cross in front of a vessel that is underway or approach within 91 m (100 yds) of the vessel and if maritime conditions safely allow, the engine will be put in neutral and the whale will be allowed to pass beyond the vessel, except that vessels will remain 460 m (500 yds) from North Pacific right whales.

23. Vessels will take reasonable steps to alert other vessels in the vicinity of whale(s).

24. Vessels will not allow lines to remain in the water unless both ends are under tension and affixed to vessels or gear. No materials capable of becoming entangled around marine mammals will be discarded into marine waters.

25. Project-specific vessels will travel at 12 kn or less.

Vessel Transit, Western Distinct Population Segment (DPS) Steller Sea Lions, and their Critical Habitat

26. Vessels will not approach within 5.5 km (3 nautical miles [nm]) of rookery sites listed in 50 CFR § 224.103(d).

27. Vessels will not approach within 914 m (3,000 ft) of any Steller sea lion haulout or rookery which is not listed in 50 CFR § 224.103(d).

28. 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 kn) 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 kn).

29. 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.

30. The transit route for the vessels will avoid known Steller sea lion Biologically Important Areas (BIAs) and designated critical habitat to the extent practicable.

31. 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.

32. The ensonified zones (Table 2-2) Associated with each project activity will not extend into the area between the shoreline and the MLLW line.

2.1.3.5 Sunflower Sea Stars

The following mitigation measures would apply for all intertidal FOC placement activities:

33. Conduct a sunflower sea star survey prior to, but no more than 24 hours prior to, intertidal in-water work and jetting. These pre-work surveys will be conducted every day that work will be occurring within marine waters or exposed intertidal zones. Surveyors will systematically examine all substrate surfaces that will be affected by cable-laying work on that particular day. Survey transects should run roughly along isobaths, with 2-m separation between each transect line, until the area that will be jetted for FOC burial is surveyed. Surveys may be done on foot at low tide or by divers for areas where the substrate is not visible by foot during low tide.

34. Sunflower sea stars that are found will be gently moved into a container of water collected at the site and taken to a location away from the area to be jetted (or modified/disturbed) and gently released onto the substrate. Individuals will be held in a nylon net within the bucket of water for no more than 30 minutes. The number and approximate diameter of sunflower sea stars moved will be recorded and reported to NMFS. If it appears that a sunflower sea star has sea star wasting syndrome or if any dead sunflower sea stars are observed, take pictures of the individuals and count how many appear to be infected, but do not touch or move these individuals. Attachment A provides information on sunflower sea star identification, additional details on the survey design, sea star wasting syndrome, and templates for estimation of sunflower sea star size. Those individuals working with sunflower sea stars, such as divers and surveyors, will be trained on necessary information as included in Attachment A.

35. If a sunflower sea star is attached to a rock or structure being removed from the water, the sunflower sea star will be gently removed by the Lead PSO, or a crew delegate due to possible safety concerns, and immediately released into an intertidal location outside of the disturbed area where harm or injury cannot occur.

Reporting

36. If it appears that a sunflower sea star has sea star wasting syndrome or if any dead sunflower sea stars are observed, pictures of the individuals will be taken, and infected individuals will be counted. The infected sunflower sea stars will not be touched or moved. These and all sunflower sea star survey findings will be reported to NMFS, including latitude/longitude and transect line, at akr.prd.records@noaa.gov.

2.1.3.6 General Data Collection and Reporting

Data Collection

1. PSOs will record observations on data forms or into electronic data sheets.

2. The action agency will ensure that PSO data will be submitted electronically in a format that can be queried such as a spreadsheet or database (i.e., digital images of data sheets

are not sufficient).

3. PSOs will record the following:

    a. the date, shift start time, shift stop time, and PSO identifier;

    b. date and time of each reportable event (e.g., a marine mammal observation, operation shutdown, reason for operation shutdown, change in weather);

    c. weather parameters (e.g., percent cloud cover, percent glare, visibility) and sea state where the Beaufort Wind Force Scale will be used to determine the sea state (https://www.weather.gov/mfl/beaufort);

    d. species, numbers, and, if possible, sex and age class of observed marine mammals and observation date, time, and location;

    e. the predominant anthropogenic sound-producing activities occurring during each marine mammal observation;

    f. observations of marine mammal behaviors and reactions to anthropogenic sounds and human presence;

    g. initial, closest, and last known location of marine mammals, including distance from observer to the marine mammal and minimum distance from the predominant sound-producing activity or activities to marine mammals;

    h. whether the presence of marine mammals necessitated the implementation of mitigation measures to avoid acoustic impact and the duration of time that normal operations were affected by the presence of marine mammals; and

    i. geographic coordinates for the observed animals (or location noted on a chart) with the position recorded using the most precise coordinates practicable (coordinates will be recorded in decimal degrees or similar standard and defined coordinate system).

Data Reporting

4. Observations of humpback whales will be transmitted to akr.prd.records@noaa.gov by the end of the calendar year and will include information specified in this General Data Collection and Reporting section and photographs and videos obtained of humpback whales, most notably those of the whale's flukes.

Unauthorized Take

5. If a listed marine mammal is determined by the PSO to have been disturbed, harassed, harmed, injured, or killed (e.g., a listed marine mammal is observed entering a shutdown zone before operations can be shut down or is injured or killed as a direct or indirect result of this action), the PSO will report the incident to NMFS

(akr.prd.records@noaa.gov) within one business day. The report will include:

a. digital, queryable documents containing PSO observations and records and digital, queryable reports;

b. the date, time, and location of each event (provide geographic coordinates);

c. description of the event;

d. number of individuals of each listed marine mammal species affected;

e. the time the animal(s) was first observed or entered the shutdown zone and, if known, the time the animal was last seen or exited the zone and the fate of the animal;

f. mitigation measures implemented prior to and after the animal was taken;

g. if a vessel struck a marine mammal, the contact information for the PSO on duty or the contact information for the individual piloting the vessel if there was no PSO on duty; and

h. photographs or video footage of the animal(s) (if available).

Stranded, Injured, Sick or Dead Marine Mammal (not associated with the project)

6. If PSOs observe an injured, sick, or dead marine mammal (i.e., stranded marine mammal), they will notify the Alaska Marine Mammal Stranding Hotline at 877-925-7773. The PSOs will submit photos and available data to aid NMFS in determining how to respond to the stranded animal. If possible, data submitted to NMFS in response to stranded marine mammals will include date, time, location of stranded marine mammal, species and number of stranded marine mammals, description of the stranded marine mammal's condition, event type (e.g., entanglement, dead, floating), and behavior of live-stranded marine mammals.

Illegal Activities

7. If PSOs observe marine mammals being disturbed, harassed, harmed, injured, or killed (e.g., feeding or unauthorized harassment), these activities will be reported to NMFS AKR Office of Law Enforcement at 1-800-853-1964 (Table 2-3).

8. Data submitted to NMFS will include date, time, location, description of the event, and any photos or videos taken.

North Pacific Right Whales

9. All observations of North Pacific right whales will be reported to NMFS within 24 hours via (akr.prd.records@noaa.gov). If possible, please include the location the right whale was seen and any video or photographs taken.

Monthly Report

10. Submit interim monthly PSO monitoring and sunflower sea star survey reports, including data sheets. These reports will include a summary of marine mammal species and behavioral observations, shutdowns or delays, and work completed.

11. Monthly reports will be submitted to akr.prd.records@noaa.gov by the 15th day of the month following the reporting period. For example, the report for activities conducted in June 2024, will be submitted by July 15, 2024.

Final Report

12. A draft of the final report will be submitted to NMFS within 90 calendar days of the completion of the project summarizing the data recorded and submitted to akr.prd.records@noaa.gov. A final report must be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report. If no comments are received from NMFS within 30 calendar days of receipt of the draft report, the report may be considered final. The report will summarize all in-water activities associated with the proposed action, and results of PSO monitoring conducted during the in-water project activities.

13. The final report will include:

    a. summaries of monitoring efforts, including dates and times of FOC laying, dates and times of monitoring, dates and times and duration of shutdowns due to marine mammal presence;

    b. date and time of marine mammal observations, geographic coordinates of marine mammals at their closest approach to the project site, marine mammal species, numbers, age/size/sex categories (if determinable), and group sizes;

    c. number of marine mammals observed (by species) during periods with and without project activities (and other variables that could affect detectability);

    d. observed marine mammal behaviors and movement types versus project activity at time of observation;

    e. numbers of marine mammal observations/individuals seen versus project activity at time of observation;

    f. distribution of marine mammals around the action area versus project activity at time of observation;

    g. number, size, and location of all sunflower sea stars encountered during intertidal surveys and activities, including how many were observed to have symptoms of sea star wasting disease; and

    h. digital, queryable documents containing PSO observations and records and digital, queryable reports.

Table 2-3. Summary of Agency Contact Information

Reason for Contact	Contact Information
Consultation Questions & Unauthorized Take	mailto:AKR.prd.section7@noaa.gov and Leanne Roulson (leanne.roulson@noaa.gov)
Reports & Data Submittal	AKR.prd.records@noaa.gov (please include NMFS tracking number AKRO-2023-03226 in subject line)
Stranded, Injured, or Dead Marine Mammal (*not related to project activities*)	Stranding Hotline (24/7 coverage): 877-925-7773
Oil Spill & Hazardous Materials Response	U.S. Coast Guard National Response Center: 1-800-424-8802 & AKRNMFSSpillResponse@noaa.gov
Illegal Activities (*not related to project activities; e.g., feeding, unauthorized harassment, or disturbance to marine mammals*)	NMFS Office of Law Enforcement (Alaska Hotline): 1-800-853-1964
In the event that this contact information becomes obsolete	NMFS Anchorage Main Office: 907-271-5006 or NMFS Juneau Main Office: 907-586-7236

2.2 Action Area

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

NMFS defines the action area for this project as the area within which project-related noise levels are ≥120 decibel (dB) root-mean square (rms) as measured in water (dB rms re 1μPa) or approaching ambient noise levels (i.e., the point where project-related sound attenuates to levels below nonanthropogenic sound).[1] Ambient noise refers only to natural sounds like that produced by wind, waves, fish, and crustaceans. It does not include sounds from a busy port, frequent ship

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

traffic, or any other man-made sound. Received sound levels associated with vessel operation are expected to decline to 120 dBrms re 1µPa within 1.8 km (1.1 mi) on either side of the source. To define the action area, we considered the size and type of vessels being used, the speed and equipment being used to lay the cable, characteristics of the marine environment such as depth and bottom compositions, and empirical measurements of noise from similar projects (Illingworth and Rodkin 2016). The *IT Integrity* is smaller than the *Ile de Brehat*, the ship assessed in Illingworth and Rodkin (2016), and the cable-laying operations used a plow to bury the FOC. This project will not include the use of a plow to bury the FOC. The FOC will be laid on the sea floor 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*, and NMFS expects the use of this sound level to be a conservative proxy for the *IT Integrity*.

NMFS defines the action area for this project to include the vessel cable-laying routes (Figure 1), bounded by a buffer of 1.8 km (1.1 mi) on each side of the route for areas in which the cable-laying ship will be used based on the area of increased noise from vessel operations. The action area also includes the vessel transit route between branch segments plus a buffer of 8 m (26.25 ft) (a total width equal to the width of the *IT Integrity*) on each side of the transit route in areas where the *IT Integrity* is transiting between branch segment locations (i.e., not using dynamic positioning/laying FOC). The total action area encompasses approximately 673.27 square kilometers (km^2) (260 square miles [mi^2]) as summarized in Table 2-4.

Table 2-4. Action Area Dimensions and Total Area for the Cable-laying Operations and Transit between Sites for the Aleutian II Project

Description	Length of Route (km/mi)	Width of Route including Buffer (km/mi)	Total Area (km^2)	Total Area (mi^2)
Cable-laying ship operations (*IT Integrity*)	176.01/109.37	3.6/2.2	651.12[a]	251.4[a]
Vessel transit between segments	1,384.37/ 860.21	0.016/0.01	22.15	8.6
Totals	**1,560.38/ 969.58**		**673.27**	**260.0**

[a] 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 RANGEWIDE STATUS OF THE SPECIES AND CRITICAL HABITAT

This opinion and concurrence consider the effects of the proposed action on the species and designated critical habitats specified in Table 3-1 and Table 3-2.

We have assessed the critical habitats and their overlap with the action area. There is no overlap with critical habitat for North Pacific right whale in the action area; therefore, NTIA concluded that there will be no effect to critical habitat due to the proposed action for this species and it is not considered further in this opinion. The FOC alignment passes through Mexico DPS and WNP DPS humpback whale and Western DPS Steller sea lion designated critical habitat. Critical habitat has not been designated for the gray whale, fin whale, blue whale, sperm whale, or sunflower sea star.

Please note the following abbreviations are only used in Table 3-1 and Table 3-2 and are not, therefore, included in the list of acronyms: E = endangered; T = threatened; LAA = likely to adversely affect; NLAA = may affect, not likely to adversely affect, NE= no effect.

3.1 Effects Determinations for ESA-Listed Species and Critical Habitat

Table 3-1. ESA-listed Species in the Action Area and Effect Determinations

Species	Status	Listing	NMFS Effect Determination
Gray Whale, Western North Pacific (WNP) DPS (*Eschrichtius robustus*)	E	NMFS 1970, 35 FR 18319	NLAA
North Pacific Right Whale (*Eubalaena japonica*)	E	NMFS 2008, 73 FR 12024	NLAA
Fin Whale (*Balaenoptera physalus*)	E	NMFS 1970, 35 FR 18319	NLAA
Blue whale (*Balaenoptera musculus*)	E	NMFS 1970, 35 FR 18319	NLAA
Sperm Whale (*Physeter macrocephalus*)	E	NMFS 1970, 35 FR 18319	NLAA
Humpback Whale, Mexico DPS (*Megaptera novaeangliae*)	T	NMFS 2016, 81 FR 62260	NLAA
Humpback Whale, WNP DPS (*Megaptera novaeangliae*)	E	NMFS 2016, 81 FR 62260	NLAA
Steller Sea Lion, Western DPS (*Eumetopias jubatus*)	E	NMFS 1997, 62 FR 24345	NLAA
Sunflower Sea Star (*Pycnopodia helianthoides*)	Proposed	N/A	LAA

Table 3-2. Listed Species and Determinations of Effect to Their Critical Habitat from the Proposed Action

Species	Critical Habitat Overlap with the Action Area (km^2/mi^2)	Critical Habitat Rule/ Date	NMFS Effect Determination (Critical Habitat)
North Pacific Right Whale (*Eubalaena japonica*)	No overlap	NMFS 2008, 73 FR 19000	---
Humpback Whale, Mexico DPS (*Megaptera novaeangliae*)	992.5/ 383.11	NMFS 2021, 86 FR 21082	NLAA
Humpback Whale, Western North Pacific DPS (*Megaptera novaeangliae*)	992.5/ 383.11	NMFS 2021, 86 FR 21082	NLAA
Steller Sea Lion, Western DPS (*Eumetopias jubatus*)	1,261.9/ 487.1	NMFS 1993, 58 FR 45269	NLAA

3.2 Climate Change

Global climate change is a threat that affects all species. Because it is a shared threat, we present this narrative here rather than in each of the species-specific effect analyses that follow. A vast amount of literature is available on climate change and for more detailed information we refer the reader to these websites which provide the latest data and links to the current state of knowledge on the topic:

https://www.ipcc.ch/reports/

https://climate.nasa.gov/evidence/

http://nsidc.org/arcticseaicenews/

https://arctic.noaa.gov/Report-Card

The listed and proposed species we consider in this opinion live in the ocean and depend on the ocean for nearly every aspect of their life history. Factors which affect the ocean, like temperature and pH, can have direct and indirect impacts on listed and proposed species and the resources they depend upon. Global climate change may affect all the species we consider in this opinion, but it is expected to affect them differently. First, we provide background on the physical effects climate change has caused on a broad scale; then we focus on changes that have occurred in Alaska.

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

NMFS uses two criteria to identify those endangered or threatened species that are likely to be adversely affected. The first criterion is exposure or some reasonable expectation of a co-occurrence between one or more potential stressors associated with the proposed activities and a listed species or designated critical habitat. The second criterion is the probability of a response given exposure. The applicable standard to find that a proposed action is "not likely to adversely affect" listed species or critical habitat is that all of the effects of the action are expected to be insignificant, discountable, or wholly beneficial. Insignificant effects relate to the size of the impact and would not be able to be meaningfully measured or detected and should never reach the scale where take occurs. Discountable effects are those that are extremely unlikely to occur. Beneficial effects are contemporaneous positive effects without any adverse effects to the species.

3.3.1 Project Stressors Evaluated

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

3.3.1.1 Vessel Strike Risk

Ship strikes can cause major wounds or death to marine mammals. An animal at the surface could be struck directly by a vessel, a surfacing animal could hit the bottom of a vessel, or a vessel propeller could injure or kill an animal below the water's surface. From 1978 to 2011, there were at least 108 recorded whale-vessel collisions in Alaska, with the majority occurring in Southeast Alaska between May and September (Neilson et al. 2012). Small recreational vessels traveling at speeds over 13 kn (24 km/hour [hr]) were most commonly involved in ship strike encounters; however, all types and sizes of vessels were reported (Neilson et al. 2012).

The majority of vessel strikes involved humpback whales (86 percent), and the number of humpback strikes increased annually by 5.8 percent from 1978 to 2011. Fin whales accounted for 2.8 percent of reported collisions, while gray whales were 0.9 percent, and sperm whales were 0.9 percent.

The probability of strike depends on the frequency, speed, and route of the marine vessels, as well as the distribution and density of marine mammals in the area. Vanderlaan and Taggart (2007) used observations to develop a model of the probability of lethal injury based on vessel speed. They projected that the chance of lethal injury to a whale struck by a vessel travelling at speeds over 15 kn (27.78 km/hr) is approximately 80 percent, while for vessels travelling between 8.6 and 15 kn (15.92 km/hr), the probability of lethal injury drops to about 20 percent. The *IT Integrity* cable-laying vessel will be travelling at much slower speeds (typically 0.5-2.0 kn [1-4 km/hr]), essentially eliminating the possibility of vessel strike.

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

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

3.3.1.2 Disturbance Due to Vessel Presence

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

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

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

The lack of adverse effects to marine mammals from cable-laying vessels is supported by recent marine mammal observations in the Arctic and the PSO report from the 2022 Aleutians I FOC project (Smultea Sciences 2022). In 2016, NMFS conducted a formal consultation for Quintillion Subsea Operations, a similar cable-laying project in the Arctic. Final marine mammal PSO reports (2016 and 2017) for the Quintillion project (Blees et al. 2017; Green et al. 2018) provided the following information.

- In 2016 and 2017, reactionary behaviors were documented during only 2 to 3 percent of all cetacean observations. Reactions included change of direction, avoidance, and swimming speed increase.
- None of the remaining 299 groups or 669 cetacean individuals encountered over the two years of monitoring exhibited a reaction to the presence of the cable ship.
- A majority of pinniped groups and individuals in 2016 and 2017, respectively, did not react to vessel activities. The most commonly observed reaction was "look", meaning the animal acknowledged the presence of the vessel. Other reactions included diving, increased swimming speed, or clearly changing travel direction. No reactions were indications of the animals exhibiting threat or flee responses but were rather more curiosity or avoidance behaviors.
- The 2022 PSO report from the Aleutians I FOC project recorded similar results. Out of 196 observations comprising 378 marine mammals, only 1.5 percent of individuals were observed to react to the presence of the FOC vessel. All reactions recorded were incidences of Steller sea lions (3) or sea otters (2) orienting to look at the vessel.

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

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

3.3.1.3 Project Stressors Summary

We applied these criteria to the species listed in Table 3-1 and determined that the proposed project **may affect and is not likely to adversely affect** the WNP DPS gray whale, North Pacific right whale, fin whale, blue whale, sperm whale, humpback whale, and Western DPS Steller sea lion due to the noise and vessel operation associated with the FOC installation activity. NMFS determined that noise associated with the installation will not result in behavioral effects that will have biologically significant impacts. Further, these cetacean species are primarily associated with deeper waters in the Gulf of Alaska, and several are extremely unlikely to occur in the action area where they would be affected by the vessel operation. The applicant has agreed to implement the Alaska Standard Mitigation Measures (See Section 2.1.3) 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 when a marine mammal is sighted. We provide species-specific assessments of each stressor in the following sections.

The 2022 PSO report from the Aleutians I project was used as a data source to evaluate the likelihood of listed species along the alignment (Smultea Sciences 2022). Throughout the Aleutians I project, PSOs recorded a total of 196 protected species detections composed of an estimated 378 individuals, all of which were marine mammals. Of these detections, 143 were identified as listed species, including 26 fin whale (38 individuals), 103 humpback whale (171 individuals), and 14 Steller sea lion (22 individuals). The cable-laying vessel implemented mitigation measures and reduced vessel speed each of the four times that a marine mammal was observed in the prescribed detection zone (1.8 km [1.12 mi]).

3.3.2 Western North Pacific DPS Gray Whale

The gray whale (*Eschrichtius robustus*) was originally listed as endangered in 1970 (35 FR 8491, June 2, 1970 [baleen whales listing]; 35 FR 18319, December 2, 1970 [gray whale listing]). The Eastern North Pacific DPS stock was delisted on June 16, 1994 (59 FR 31094), when it reached pre-exploitation numbers. The WNP population of gray whales remains listed as endangered. Critical habitat has not been designated for this DPS. The WNP DPS gray whales are considered to be gray whales that spend all or part of their lives in the western North Pacific waters off Vietnam, China, Japan, Korea (Republic of Korea and/or Democratic People's Republic of Korea), or the Russian Far East, including southern and southeastern Kamchatka but not necessarily areas north of 55°N in eastern Kamchatka (NMFS 2023). Some WNP DPS gray whales spend part of their time in U.S. waters. The population size of the WNP DPS gray whales was estimated from photo-identification data for Sakhalin and Kamchatka at 290 non-calf whales in 2016 (90 percentile intervals = 271-311; Cooke et al. 2017; Cooke 2018). The non-ESA-listed Eastern North Pacific DPS gray whale population is estimated at approximately 14,526 individuals (Eguchi et al. 2023).

The specific migration route and timing of the WNP DPS gray whales are unknown, making it very difficult to predict when and where they might pass through the Aleutian Island chain or along the coast of Alaska.

It is expected that approximately 0.4 to 1.6 percent of the gray whales found in the eastern North Pacific Ocean wintering areas (Mexico) and migratory corridor (U.S. West Coast [Alaska, Washington, Oregon, and California], Canada, and Mexico) are from the WNP DPS (Damon-Randall 2023). Therefore, there is a low likelihood that a gray whale from the WNP DPS will be encountered in Alaskan waters along the Aleutian Islands, Gulf of Alaska, and Southeast Alaska.

More information can be found at:

Gray Whale Species Description

Marine Mammal Stock Assessment Report: Cetaceans-Large Whales

2023 WNP DPS Gray Whale Status Review

3.3.2.1 Western North Pacific Gray Whales in the Action Area

The FOC alignment is within WNP DPS gray whale habitat. However, as stated above, there is a low likelihood that a gray whale from the WNP DPS will be encountered in Alaskan waters along the Aleutian Islands, Gulf of Alaska, and Southeast Alaska. The 2022 PSO report did not include any sightings of gray whales but did include 67 unidentified whale individuals from July 27, to September 29, 2022 (Smultea Sciences 2022).

Though we do not expect WNP DPS gray whales to occur in the action area where FOC-laying activities will occur, it is possible these species may be encountered during transit from site to site. Therefore, it is possible the species will be at risk for vessel strike. However, it is extremely unlikely that vessels will strike WNP DPS gray whales for the following reasons.

- Few, if any, WNP DPS gray whales are likely to be encountered because they make up a very small percentage of the gray whales in Alaskan waters and are generally found in deeper waters than those in which the transit route will occur.
- Although the project duration will encompass the summer season for two years, transits between sites will take one day or less per transit.
- All FOC laying will be completed by a single vessel, travelling at slow speeds (typically 1-4 km/hr [0.5-2.0 kn]), essentially eliminating the possibility of lethal vessel strike.
- NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yds of marine mammals.

For these reasons, we conclude the majority of stressors associated with the proposed action would have no adverse effects on WNP DPS gray whales because they are not expected to overlap in time and space, and the effects of ship strike are discountable because they are extremely unlikely to occur. Therefore, WNP DPS gray whales are not likely to be adversely affected by this action.

3.3.3 North Pacific Right Whale

The right whale (*Eubalaena* spp.) was listed as an endangered species under the ESA in 1970 (35 FR 8491, June 2, 1970 [baleen whales listing]; 35 FR 18319, December 2, 1970 [right whales listing]), and continued to be listed as endangered following passage of the ESA. NMFS later divided northern right whales into two separate endangered species: North Pacific right whales (*E. japonica*) and North Atlantic right whales (*E. glacialis*) (73 FR 12024, March 6, 2008). There are likely fewer than 500 North Pacific right whales remaining. Only about 26 individuals are estimated to remain of the Eastern stock that visits Alaskan waters (Muto et al. 2022).

Information on biology and habitat of the North Pacific right whale is available at:

North Pacific Right Whale Species Description

2017 Status Review

Marine Mammal Stock Assessment Reports: Cetaceans-Large Whales

North Pacific Right Whale Critical Habitat

3.3.3.1 North Pacific Right Whales in the Gulf of Alaska

Recent detections of right whales have been very rare in the Gulf of Alaska even though large numbers of whales were caught there in the 1800s. From 2004 to 2006, four sightings occurred in the Barnabas Trough region on Albatross Bank, southeast of Kodiak Island. This area represents important habitat for the relic population of North Pacific right whales, and a portion of this area was included in the critical habitat designation (50 CFR § 226.215). There have been a handful of sightings in more recent years with one spotted in the northeast Gulf of Alaska in 2018, two in Barnabas Trough and two in the Trinity Islands of western Kodiak Island in 2021, and two near Unimak Island in 2022. Acoustic monitoring from August through September 2023, at sites in the Gulf of Alaska detected right whale calls and visually identified four individual whales southeast of the Aleutian peninsula (NOAA 2023).

3.3.3.2 North Pacific Right Whales in the Action Area

Overlap of North Pacific right whale individuals with project activities could occur during the transit route for the *IT Integrity* as it moves from site to site. It is possible that the vessel would pass through areas occupied by North Pacific right whales. The rarity of the whales and the plan for limited project-specific trips make the likelihood of encounters extremely rare. The 2022 PSO report did not include any sightings of right whales but did include 67 unidentified whale individuals from July 27 to September 29, 2022 (Smultea Sciences 2022).

Though we do not expect North Pacific right whales to occur in the action area where FOC-laying activities will occur, it is possible these species may be encountered during transit from site to site. Therefore, it is possible the species will be at risk for vessel strike. However, it is extremely unlikely that vessels will strike North Pacific right whales for the following reasons.

- Few, if any, right whales are likely to be encountered because they are generally found in deeper waters than those in which the transit route will occur.
- Although the project duration will encompass the summer season for two years, transits between sites will take one day or less per transit.
- All FOC laying will be completed by a single vessel, travelling at slow speeds (typically 1-4 km/hr [0.5-2.0 kn), essentially eliminating the possibility of lethal vessel strike.
- NMFS’s guidelines for approaching marine mammals discourage vessels approaching within 100 yds of marine mammals.

For these reasons, we conclude the majority of stressors associated with the proposed action would have no adverse effects on North Pacific right whales because they are not expected to overlap in time and space, and the effects of ship strike are discountable because they are extremely unlikely to occur. Therefore, North Pacific right whales are not likely to be adversely affected by this action.

3.3.4 Fin Whales

The fin whale (*Balaenoptera physalus*) was decimated by commercial whaling in the 1800s and early 1900s. It was listed as an endangered species under the ESCA in 1970 (35 FR 8491, June 2, 1970 [baleen whales listing]; 35 FR 18319, December 2, 1970 [fin whale listing]), and continued to be listed as endangered following passage of the ESA. Critical habitat has not been designated for fin whales. The best provisional abundance estimate for the Northeast Pacific stock, which occurs in Alaskan waters, is 3,168; however, this is an underestimate because it is based on surveys which covered only a small portion of the stock's range (Muto et al. 2022).

Additional information on fin whale biology and habitat is available at:

Fin Whale Species Description

Marine Mammal Stock Assessment Reports: Cetaceans-Large Whales

2019 Status Review

3.3.4.1 Fin Whales in the Action Area

Fin whales are typically found outside of coastal areas (Matsuoka et al. 2013; Rone et al. 2017) away from the immediate coast (Clarke et al. 2020). Consequently, it is unlikely that they would overlap with effects from the nearshore cable-laying activities. However, the *IT Integrity* could pass through waters occupied by fin whales. The 2022 PSO report included 28 sightings of fin whales, totaling 38 individuals from July 27 to September 29, 2022 (Smultea Sciences 2022) (Figure 3). In two instances, the cable-laying vessel reduced speed due to the presence of a fin whale in the prescribed detection zone (1.8 km [1.12 mi]) (Smultea Sciences 2022).

The 2022 PSO report documented fin whales in the action area where FOC-laying activities will occur, and it is possible this species may be encountered during transit from site to site in this phase of the project. Therefore, it is possible the species will be at risk for vessel strike. However, it is extremely unlikely that vessels will strike fin whales for the following reasons.

- Few fin whales are likely to be encountered because they are generally found outside of coastal waters in deeper waters than those in which the transit route will occur.
- Although the project duration will encompass the summer season for two years, transits between sites will take one day or less per transit.
- All FOC laying will be completed by a single vessel, travelling at slow speeds (typically 1-4 km/hr [0.5-2.0 kn]), essentially eliminating the possibility of lethal vessel strike.
- NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yds of marine mammals.
- The operator has successfully implemented mitigation actions to avoid interactions with the individuals when marine mammals were sighted.

For these reasons, we conclude the majority of stressors associated with the proposed action would be unlikely to have adverse effects on fin whales because although they may overlap in time and space, the effects of ship strike are discountable because the slow speeds and mitigative actions taken in previous years demonstrate that they are extremely unlikely to occur. Therefore, fin whales are not likely to be adversely affected by this action.

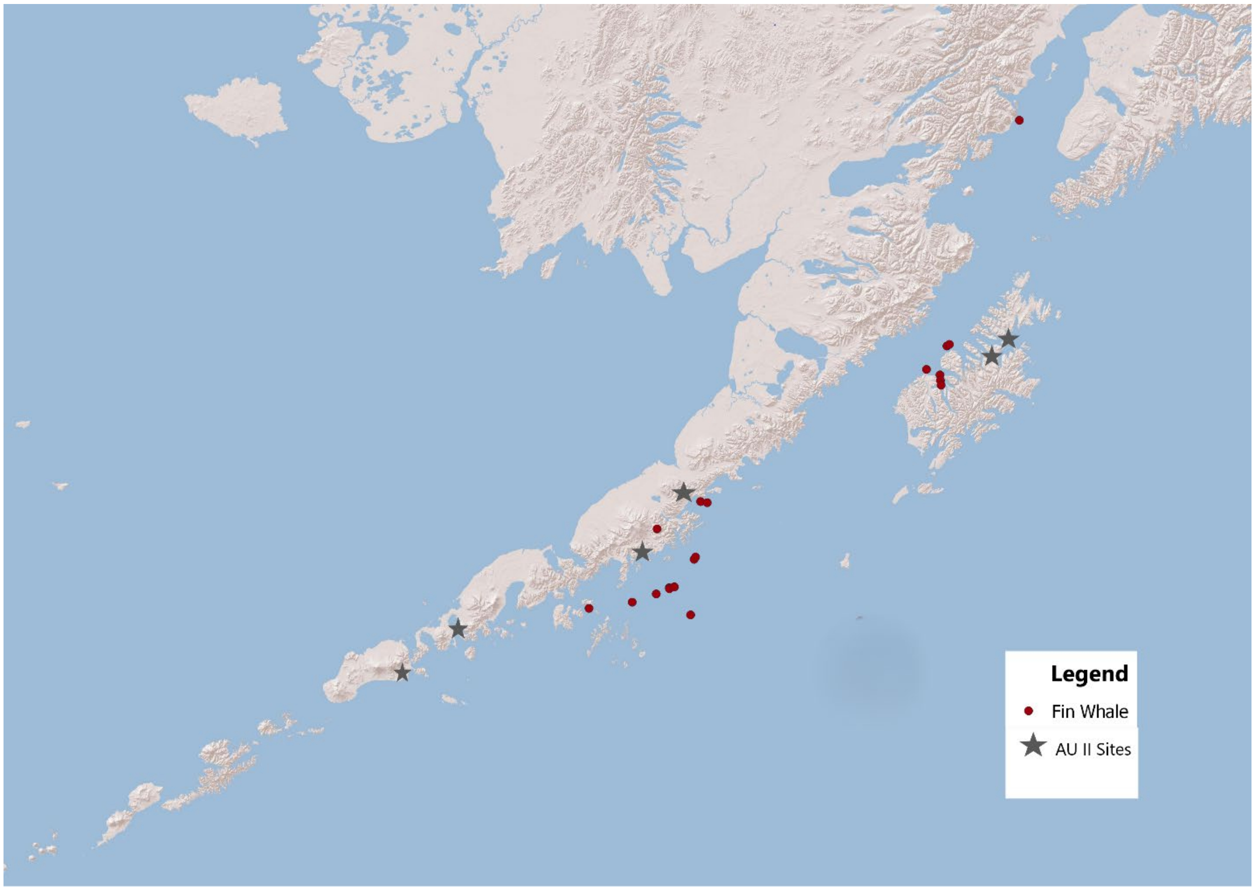


Figure 3. Map of fin whale sightings recorded during the Aleutians I project (created from PSO data in Smultea Sciences 2022) and location of sites for the Aleutians II project.

3.3.5 Blue Whales

The blue whale (*Balaenoptera musculus*) was listed as an endangered species under the ESCA in 1970 (35 FR 8491, June 2, 1970 [baleen whales listing]; 35 FR 18319, December 2, 1970 [blue whale listing]), and continued to be listed as endangered following the passage of the ESA. Although blue whales have been divided into stocks for management purposes under the MMPA, DPSs have not been adopted under the ESA. Blue whales from both the Northeast Pacific and Central/Western Pacific populations are found in Alaska (Rice et al. 2020). A recovery plan was published in 1998 (NMFS 1998), but critical habitat has not been designated. Ship strike and entanglement with commercial fishing gear are two current sources of mortality (Carretta et al. 2020).

More information on blue whale biology and habitat is available at:

Blue Whale Species Description

Marine Mammal Stock Assessment Reports: Cetaceans-Large Whales

2020 Status Review

3.3.5.1 Blue Whales in the Action Area

The blue whale is primarily a deep-water species (Matsuoka et al. 2013; Rone et al. 2017) and not expected to overlap with effects of intertidal and nearshore cable-laying activities. However, the *IT Integrity* could pass through habitat occupied by blue whales. The 2022 PSO report did not include any sightings of blue whales but did record 67 unidentified whale individuals from July 27 to September 29, 2022 (Smultea Sciences 2022). However, it is extremely unlikely that vessels will strike blue whales for the following reasons.

- Few, if any, blue whales are likely to be encountered because they are generally found in deeper waters than those in which the transit route will occur.
- Although the project duration will encompass the summer season for two years, transits between sites will take one day or less per transit.
- All FOC laying will be completed by a single vessel, travelling at slow speeds (typically 1-4 km/hr [0.5-2.0 kn), essentially eliminating the possibility of lethal vessel strike.
- NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yds of marine mammals.
- The operator has successfully implemented mitigation actions when marine mammals were sighted to avoid interactions with the individuals.

For these reasons, we conclude the majority of stressors associated with the proposed action would have no adverse effects on blue whales because they are not expected to overlap in time and space, and the effects of ship strike are discountable because they are extremely unlikely to occur. Therefore, blue whales are not likely to be adversely affected by this action.

3.3.6 Sperm Whale

The sperm whale (*Physeter macrocephalus*) was listed as an endangered species under the ESCA in 1970 (35 FR 8491, June 2, 1970; 35 FR 18319, December 2, 1970), and continued to be listed as endangered following passage of the ESA. Critical habitat has not been designated for sperm whales.

Sperm whales are primarily found in deep, offshore waters except in cases where the shelf break or submarine canyons occur close to land (Mizroch and Rice 2013). They feed primarily on medium-sized to large-sized squids but also take substantial quantities of large demersal and mesopelagic sharks, skates, and fishes (Rice 1989). The northern extent of their known range is 62°N, where Soviet catches of females occurred in Olyutorsky Bay (Muto et al. 2018). During summer, males are found in the Gulf of Alaska, Bering Sea, and waters around the Aleutian Islands (Mizroch and Rice 2013). There are no recent and reliable estimates for population size or trend for sperm whales off Alaska (i.e., the North Pacific Stock).

Additional information on sperm whale biology and habitat is available at:

Sperm Whale Species Description

2015 Status Review

Marine Mammal Stock Assessment Reports: Cetaceans-Large Whales

Critical habitat has not been designated for the sperm whale.

3.3.6.1 Sperm Whales in the Bering Sea/Aleutian Islands

Sperm whales have been frequently documented in the western Aleutian Islands, from Unalaska to the east out to the far islands. During 12 cetacean surveys in the summers of 2001 through 2007 and 2009 through 2010, 393 sightings of adult male sperm whales were made (Fearnbach et al. 2012). They were considered the most frequently sighted large cetacean in coastal waters around the central and western Aleutian Islands (Allen and Angliss 2011). In February 2008, a group of approximately 50 female and immature sperm whales were seen near Koniuji Island in the central Aleutian Islands (Fearnbach et al. 2012). This was the first time such a large aggregation of females and juveniles were seen so far north since whaling ended.

3.3.6.2 Sperm Whales in the Gulf of Alaska

Results from acoustic surveys indicate that sperm whales are present in the Gulf of Alaska year-round where they are most common in the summer months along the continental shelf waters (Mellinger et al. 2004a; Straley et al. 2014; Diogou et al. 2019). They have been documented interacting with demersal longline fisheries in the Gulf of Alaska since the 1970s (Straley et al. 2014; Wild et al. 2017; Hanselman et al. 2018). In July of 2021, a sperm whale became entangled in gear used by the Alaska Fisheries Science Center's Alaska Longline Survey. The interaction resulted in a live release; the whale swam away with no visible gear wrapped around it and is assumed to have survived with no major effects (Eco49 2022).

3.3.6.3 Sperm Whales in the Action Area

Because sperm whales occur in coastal waters of the central Aleutian Islands, there is the possibility that they might be near the action area during the project. Near Kodiak and the Gulf of Alaska, they are typically found in deep water (Matsuoka et al. 2013; Rone et al. 2017); therefore, it is less likely that individual whales would overlap with the effects of the nearshore cable laying in these areas. However, the *IT Integrity* could pass through habitat occupied by sperm whales. The 2022 PSO report did not include any sightings of sperm whales but did include 67 unidentified whale individuals from July 27 to September 29, 2022 (Smultea Sciences 2022). However, it is extremely unlikely that vessels will strike sperm whales for the following reasons.

- Few sperm whales are likely to be encountered because they are generally found in deeper waters than those in which the transit route will occur.
- Although the project duration will encompass the summer season for two years, transits between sites will take one day or less per transit.
- All FOC laying will be completed by a single vessel, travelling at slow speeds (typically 1-4 km/hr [0.5-2.0 kn), essentially eliminating the possibility of lethal vessel strike.
- NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yds of marine mammals.
- The operator has successfully implemented mitigation actions when marine mammals

were sighted to avoid interactions with the individuals.

For these reasons, we conclude the majority of stressors associated with the proposed action would have no adverse effects on sperm whales because they are not expected to overlap in time and space, and the effects of ship strike are discountable because they are extremely unlikely to occur. Therefore, sperm whales are not likely to be adversely affected by this action.

3.3.7 Humpback Whales

The humpback whale (*Megaptera novaeangliae*) was listed as endangered under the ESCA in 1970 (35 FR 8491, June 2, 1970 [baleen whales listing]; 35 FR 18319, December 2, 1970 [humpback whale listing]). Congress replaced the ESCA with the ESA in 1973, and humpback whales continued to be listed as endangered. NMFS conducted a global status review that led to changing the status of humpback whales under the ESA and dividing the species into 14 DPSs (81 FR 62259, September 8, 2016). Of these 14 DPSs, NMFS listed four as endangered, listed one as threatened, and delisted the remaining nine. Three DPSs occur in Alaskan waters: the WNP DPS is listed as endangered, the Mexico DPS is listed as threatened, and the Hawaii DPS is not listed (81 FR 62259, September 8, 2016).

The Hawaii DPS population is estimated to be 11,540 animals (Coefficient of Variation [CV]=0.04) with an annual growth rate between 5.5 and 6.0 percent. The Mexico DPS comprises approximately 2,913 animals (CV=0.7; Wade 2021) with an unknown, but likely declining, population trend (81 FR 62259; September 8, 2016). Approximately 1,084 animals (CV=0.09) comprise the WNP DPS (Wade 2021). Humpback whales in the WNP remain rare in some parts of their former range, such as the coastal waters of Korea, and have shown little sign of recovery in those locations.

Whales from these three DPSs overlap on feeding grounds off Alaska and are visually indistinguishable unless individuals have been photo-identified on breeding grounds and again on feeding grounds. All waters off the coast of Alaska may contain ESA-listed humpbacks.

3.3.7.1 Humpback Whales in the Bering Sea/Aleutian Islands/Chukchi and Beaufort Seas

Recent abundance estimates from the 2023 Marine Mammal Stock Assessment Report for humpback whales are 7,758 for the Bering Sea and Aleutian Islands (CV=0.20), 2,129 for the Gulf of Alaska (including the Shumagin Islands, CV=0.081), and 5,890 (CV=0.075) for Southeast Alaska and northern British Columbia (Wade 2021; Young et al. 2023). In all of those areas, the abundance estimates represent a mixture of whales from up to three winter areas, the western North Pacific (Asia), Hawaii, and Mexico and so cannot represent the abundance of just the Mexico-North Pacific stock in its summer areas. To determine the number of animals in these feeding areas belonging to the Mexico-North Pacific stock, the abundance estimate for each feeding area was multiplied by the probability of movement between that feeding area and the Mexican wintering area, as estimated by Wade (2021), and then added together. This resulted in an estimate of 918 animals (CV=0.217). Humpback whales have increasingly been recorded during surveys in the eastern Chukchi Sea (67°–72°N, 157°–169°W) from July to October primarily over the continental shelf (Brower et al. 2018). During similar aerial surveys in 1982 through 1991, there was a complete lack of sightings of these whales (Brower et al. 2018). It is unknown if this is an indicator of population recovery, climate change, or increased survey effort (Brower et al. 2018).

3.3.7.2 Humpback Whales in the Gulf of Alaska

The abundance estimate for humpback whales in the Gulf of Alaska is 2,129 (CV=0.08) animals, which includes whales from the unlisted Hawaii DPS (89 percent), threatened Mexico DPS (11 percent), and endangered WNP DPS (1 percent;) (Wade 2021) (Table 3-3). Humpback whales occur throughout the central and western Gulf of Alaska from Prince William Sound to the Shumagin Islands. Seasonal concentrations are found in coastal waters of Prince William Sound, Barren Islands, Kodiak Archipelago, Shumagin Islands, and south of the Alaska Peninsula. Large numbers of humpbacks have also been reported in waters over the continental shelf, extending up to 185 km (100 nautical miles [nm]) offshore in the western Gulf of Alaska (Rone et al. 2017; Wade 2021).

Table 3-3. Percent Probability of Encountering Humpback Whales from each DPS in the North Pacific Ocean in Summer Feeding Areas (Wade 2021)

Summer Feeding Areas	North Pacific DPSs (percent)			
	WNP (endangered)	Hawaii (not listed)	Mexico (threatened)	Central America (endangered)
Kamchatka	91	9	0	0
Aleutian Islands/Bering and Chukchi Seas	2	91	7	0
Gulf of Alaska	1	89	11	0
Southeast Alaska/Northern British Columbia	0	98	2	0
Southern British Columbia/Washington	0	69	25	6
Oregon/California	0	0	58	42
Note that in the past iteration of this guidance, upper confidence intervals were used for endangered DPSs. However, the revised estimates do not have associated CVs to cite. Therefore, the point estimate is being used for each probability of occurrence.				

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

Humpback Whale Species Description

Marine Mammal Stock Assessment Reports: Cetaceans-Large Whales

Humpback Whale Critical Habitat

Occurrence of Listed Humpback Whales off Alaska

3.3.7.3 Humpback Whales in the Action Area

The area around the Aleutian Islands from Umnak Island northeastward along the Alaska Peninsula has been identified as a BIA for humpback whales (Brower et al. 2022). Telemetry data from Kennedy et al. (2014) supported findings of historical data showing that humpback whales congregate in the shallow, highly productive coastal waters north of the eastern Aleutian Islands, between Unimak and Samalga Passes. The extremely high proportion of foraging within the narrow band 200 km (124.3 mi) east and west of Unalaska Bay further emphasizes the importance of the waters off the eastern Aleutian Islands for humpback whales (Kennedy et al. 2014). Annual vessel-based, photo-identification surveys in the Shumagin Islands from 1999 to 2015 identified 654 unique individual humpback whales between June and September (Witteveen and Wynne 2017).

Because of their size and preference for deeper waters, it is unlikely that humpback whales would overlap with effects from the nearshore cable-laying activities. However, the *IT Integrity* could pass through waters occupied by humpback whales. The 2022 PSO report included 103 sightings of humpback whales, totaling 171 individuals from July 27 to September 29, 2022 (Smultea Sciences 2022) (Figure 4). In 2022, there were no instances when the cable-laying vessel needed to reduce speed or change course due to the presence of a humpback whale in the prescribed detection zone (1.8 km [1.12 mi]) (Smultea Sciences 2022).

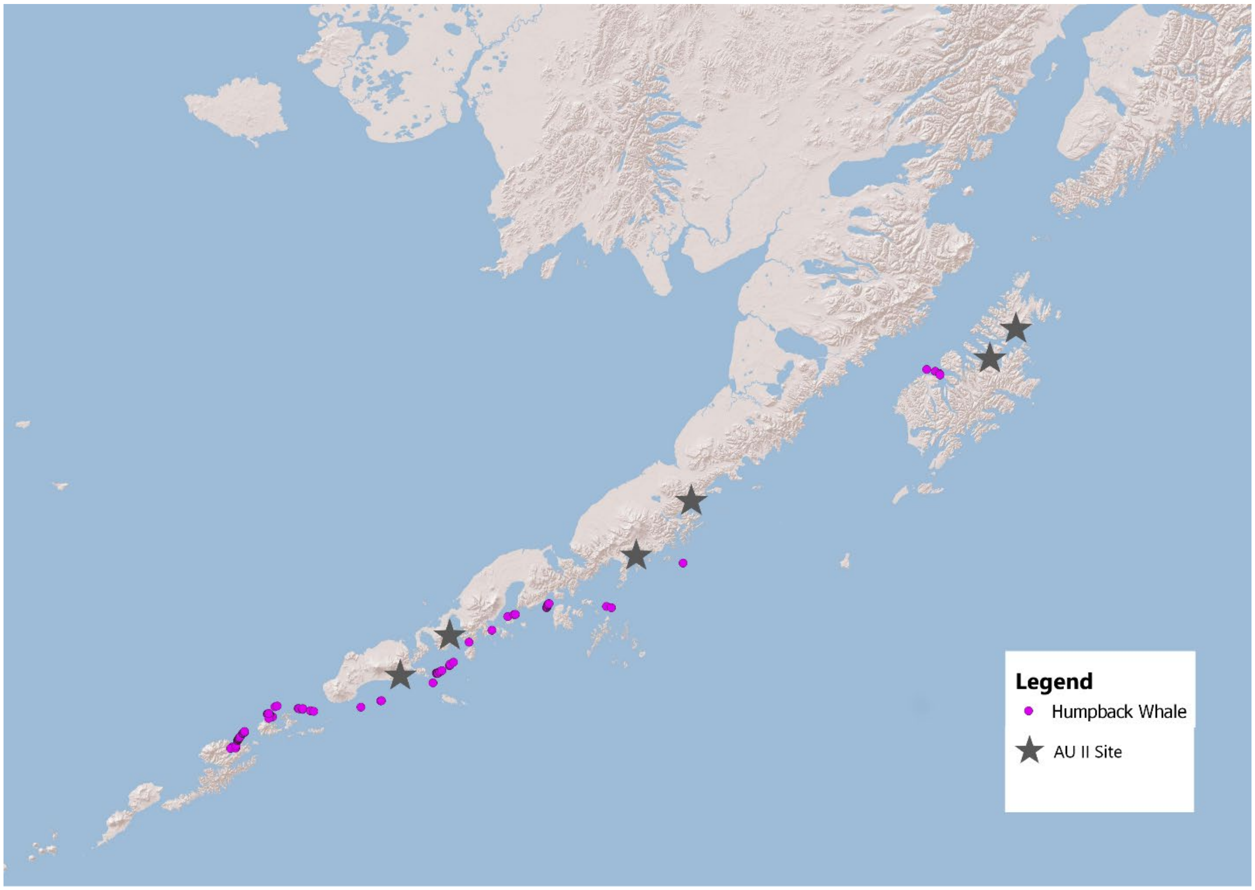


Figure 4. Map of humpback whale sightings recorded during the Aleutians I project (created from PSO data in Smultea Sciences 2022) and location of sites for the Aleutians II project.

The 2022 PSO report documented humpback whales in the action area where 2024 FOC laying activities will occur, and it is possible these species may be encountered during transit from site to site in this phase of the project. Therefore, it is possible the species will be at risk for vessel strike. However, it is extremely unlikely that vessels will strike humpback whales for the following reasons.

- Although the project duration will encompass the summer season for two years, transit between sites will take one day or less per transit.
- All FOC laying will be completed by a single vessel, travelling at slow speeds (typically 1-4 km/hr [0.5-2.0 kn), essentially eliminating the possibility of vessel strike.
- NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yds of marine mammals.
- The operator has successfully implemented mitigation actions when marine mammals were sighted to avoid interactions with the individuals.

For these reasons, we conclude the majority of stressors associated with the proposed action would have no adverse effects on humpback whales because they are not expected to overlap in time and space, and the effects of ship strike are discountable because they are extremely unlikely to occur. Therefore, humpback whales are not likely to be adversely affected by this action.

3.3.7.4 Humpback Whale Critical Habitat

Critical habitat for the Mexico and WNP DPS humpback whale was designated effective May 21, 2021 (86 FR 21082, April 21, 2021). Critical habitat for the WNP DPS includes areas in the eastern Aleutian Islands, the Shumagin Islands, and around Kodiak Island. Critical habitat for the Mexico DPS includes those same areas plus the Prince William Sound area (50 CFR 226.227) (Figure 5).

For the Mexico DPS, the physical and biological features associated with critical habitat include prey species, primarily euphausiids (*Thysanoessa, Euphausia, Nyctiphanes,* and *Nematoscel*is) and small pelagic schooling fishes, such as Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), and Pacific herring (*Clupea pallasii*), of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth.

For the WNP DPS, the physical and biological features associated with critical habitat include prey species, primarily euphausiids (*Thysanoessa* and *Euphuasia*) 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.

The proposed action will transit humpback critical habitat (Figure 5). However, a single ship transiting the area is unlikely to affect the quality, abundance, or accessibility of prey species for humpback whales. The presence of the *IT* Integrity will not represent a measurable increase in overall vessel traffic along the south side of the Aleutian Islands and near Kodiak Island. The FOC installation activity in the deeper areas where humpback whales would be more likely to occur will be transitory and localized and will not measurably impact the prey species important to the physical and biological features associated with the critical habitat designation. Therefore, we conclude that any effects to humpback whale critical habitat would be insignificant.

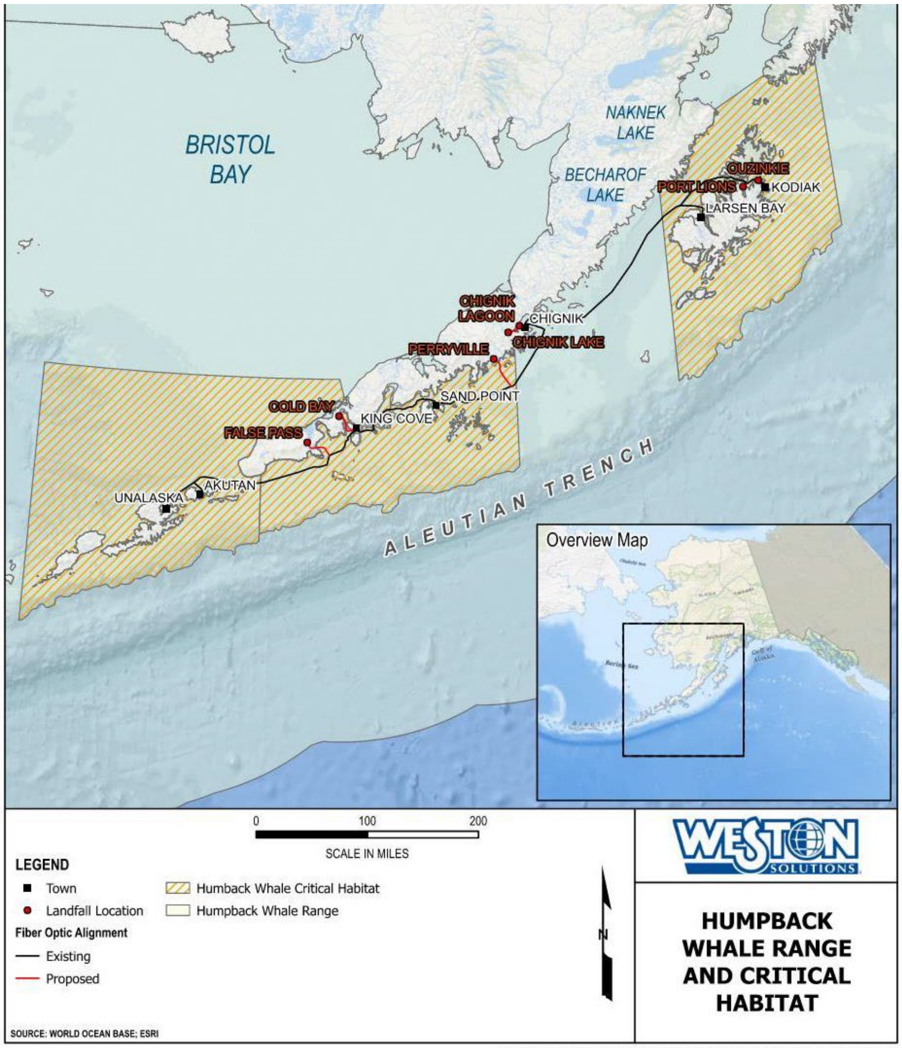


Figure 5. Critical habitat for Mexico DPS and Western North Pacific DPS humpback whales in Alaskan waters in and around the proposed action area (Weston 2023).

3.3.8 Western DPS Steller Sea Lion

More detailed background information on the status of Western DPS Steller sea lions can be found in the latest stock assessment report (Muto et al. 2019) and the recovery plan for Steller sea lions (NMFS 2008). Information on Steller sea lion biology, threats, and habitat (including critical habitat) is available online at: https://www.fisheries.noaa.gov/species/steller-sea-lion.

On November 26, 1990, NMFS issued the final rule to list the Steller sea lion as a threatened species under the ESA (55 FR 49204). In 1997, NMFS reclassified Steller sea lions as two DPSs based on genetic studies and other information (62 FR 24345; May 5, 1997) (Figure 6). At that time, the eastern DPS was listed as threatened, and the western DPS was listed as endangered. On November 4, 2013, the eastern DPS was removed from the endangered species list (78 FR 66140).

Data from 1978-2017 suggest the Western DPS Steller sea lions were at their lowest levels in 2002, but they have shown an increasing trend in abundance in much of their range since then although strong regional differences exist. While most regions show positive trends, regions of the Aleutian Islands exhibit generally negative trends (Muto et al. 2019). Contrary to the general population increase since 2002, pup counts in the eastern (-33%) and central (-18%) Gulf of Alaska declined sharply between 2015 and 2017. The most recent surveys of Western DPS Steller sea lions in Alaska suggest a minimum population estimate of 54,267 individuals; estimates for Western DPS in Russia suggest there may be approximately 23,000 animals, which is less than the 1960 levels but more than the low in 2005 (Muto et al. 2019). Overall, the Western DPS Steller sea lion population in Alaska (non-pups only) was estimated to be increasing at about 2.14 percent per year between 2002 and 2017 (Muto et al. 2019).

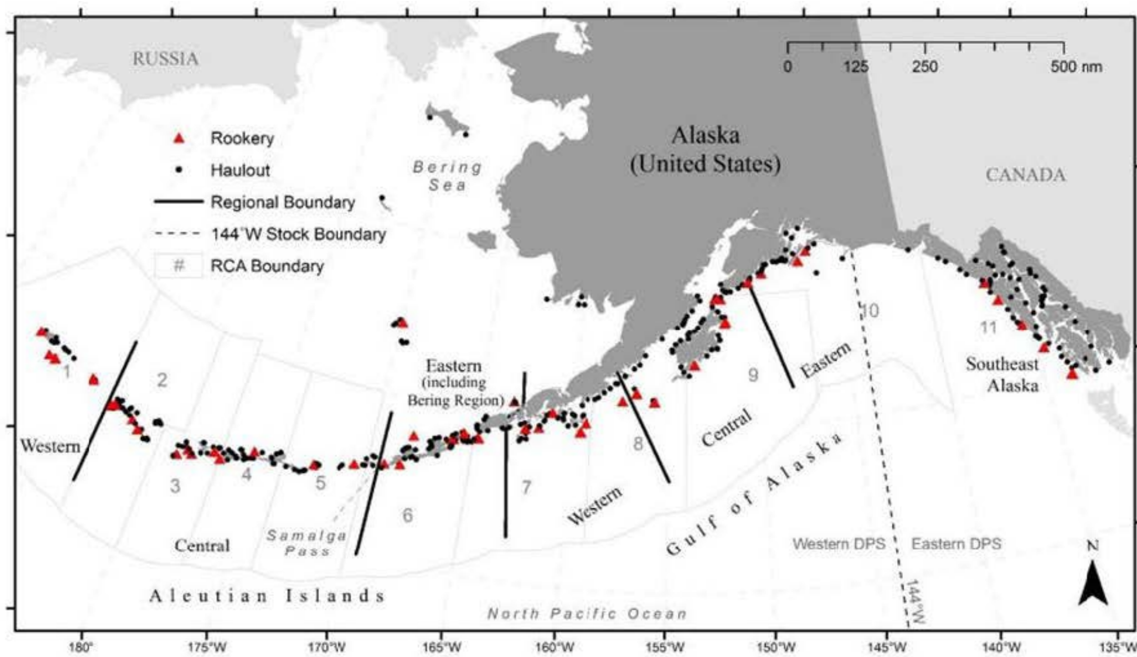


Figure 6. Steller sea lion survey regions, rookeries, and haulouts and a line at 144°W depicting the separation of eastern and western distinct population segments (Fritz et al. 2016).

The Western DPS of Steller sea lions includes animals west of Cape Suckling, Alaska (144°W; 62 FR 24345). However, individuals move between rookeries and haulout sites regularly, even over long distances between eastern and western DPS locations (Calkins and Pitcher 1982a, Raum-Suryan et al. 2002, Raum-Suryan et al. 2004). Most adult Steller sea lions occupy rookeries during the summer pupping and breeding season and exhibit a high level of site fidelity. During the breeding season, some juveniles and non-breeding adults occur at or near the rookeries, but most are on haulouts (sites that provide regular retreat from the water on exposed rocky shoreline, gravel beaches, and wave-cut platforms or ice) (Rice 1998a, Ban 2005, Call and Loughlin 2005). Adult males may disperse widely after the breeding season. Males that breed in California move north after the breeding season and are rarely seen in California or Oregon except from May through August (Mate 1973). During fall and winter many sea lions disperse from rookeries and increase use of haulouts, particularly on terrestrial sites but also on sea ice in the Bering Sea.

3.3.8.1 Steller Sea Lions in the Action Area

Because the action area is fully west of the 144°W latitude line, Steller sea lions are expected to be predominantly from the Western DPS, but a small number of Eastern DPS Steller sea lions may occur (Fritz et al. 2016). Based on surveys and genetic analysis conducted by Hastings et al. (2020), Steller sea lions in the vicinity of the project are presumed to be Western DPS Steller sea lions. Therefore, for the purposes of this opinion, NMFS considers that Steller sea lions in the action area are from the endangered Western DPS, and very few would be likely to originate from the delisted Eastern DPS.

Steller sea lions do not migrate, but they often disperse widely outside of the breeding season. An area of high occurrence extends from the shore to water depths of 1,638 ft (500 m). In the Gulf of Alaska, foraging habitat is primarily shallow, nearshore, and continental shelf waters 4.3 to 13 nm offshore with a secondary occurrence inshore of the 3,280-ft (1,000-m) isobath, and a rare occurrence seaward of the 3,280-ft (1,000-m) isobath.

Steller sea lions occur year round in the action area. Because of the proximity of the FOC alignment to known Steller sea lion habitat, it is likely that Steller sea lions may be near areas where the nearshore cable-laying activities will occur. The *IT Integrity* could also pass through waters occupied by Steller sea lions. The 2022 PSO report included 14 sightings of Steller sea lions totaling 22 individuals from July 27 to September 29, 2022, and clustered in four main areas (Smultea Sciences 2022) (Figure 7). In 2022, there was one instance when the cable-laying vessel needed to reduce speed or change course due to the presence of a Steller sea lion in the prescribed detection zone (1.8 km [1.12 mi]) (Smultea Sciences 2022).

Figure 7. Map of Steller sea lion sightings recorded during the Aleutians I project (created from PSO data in Smultea Sciences 2022) and location of sites for the Aleutians II project.

The 2022 PSO report documented Steller sea lions in the action area where 2024 FOC-laying activities will occur, and it is possible this species may be encountered during transit from site to site and at the nearshore cable laying sites in this phase of the project. Therefore, it is possible the species will be at risk for vessel strike. However, it is extremely unlikely that vessels will strike or adversely affect Steller sea lions for the following reasons.

- Steller sea lions are highly mobile and agile and would be able to avoid the slower moving cable-laying vessel.
- Vessels will not enter the 5.6-km (3-nm) area surrounding major rookeries.
- Although the project duration will encompass the summer season for two years, transits between sites will take one day or less per transit.
- All FOC laying will be completed by a single vessel, travelling at slow speeds (typically 1-4 km/hr [0.5-2.0 kn), essentially eliminating the possibility of lethal vessel strike.
- NMFS's guidelines for approaching marine mammals discourage vessels approaching within 100 yds of marine mammals.
- The operator has successfully implemented mitigation actions when marine mammals were sighted to avoid interactions with the individuals.

For these reasons, we conclude the majority of stressors associated with the proposed action would have minimal potential for adverse effects on Steller sea lions because although they may overlap in time and space with the project, the effects of ship strike are discountable because they are extremely unlikely to occur. Therefore, Steller sea lions are not likely to be adversely affected by this action.

3.3.8.2 Steller Sea Lion Critical Habitat

NMFS designated critical habitat for the Steller sea lion on August 27, 1993 (58 FR 45269). Steller sea lion 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, critical habitat includes an aquatic zone (or buffer) that extends 37 km (20 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 prohibited vessel entry within 5.6 km (3 nm) of all Steller sea lion rookeries west of 150°W. The designation was based on terrestrial access (haulouts, rookery areas) and aquatic needs for foraging, refuge, and other seasonal needs.

The cable-laying route, as well as several landfall locations, are within the 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 expected 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.

The total action area within Steller sea lion critical habitat encompasses approximately 1,261.9 km^2 (487.09 mi^2). Figure 8 displays the landing sites and proposed cable routes in relation to Steller sea lion critical habitat. However, a single ship transiting the areas is unlikely to affect the quality or accessibility of haulouts, rookeries, or foraging areas for Steller sea lions. The presence of the *IT Integrity* will not represent a measurable increase in overall vessel traffic along the south side of the Aleutian Islands and near Kodiak Island. The mitigation measures are designed to limit the ship's proximity to haulouts and rookeries and, thereby, limit the potential for affecting the physical and biological features associated with the critical habitat designation such that any impacts would not be measurable or detectable. Therefore, we conclude that any effects to Steller sea lion critical habitat would be insignificant.

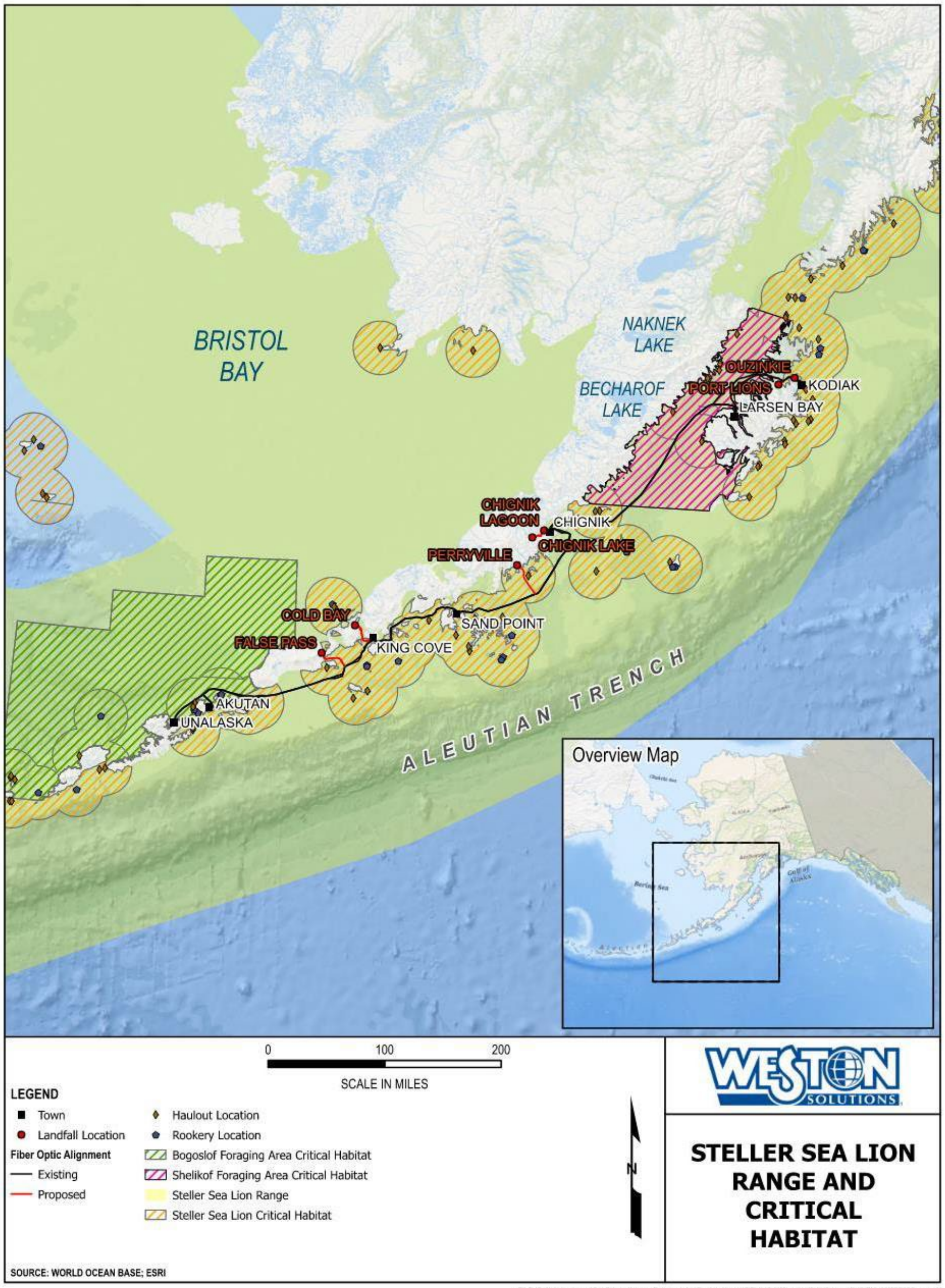


Figure 8. Steller sea lion range and designated critical habitat in and around the proposed action area (Weston 2024).

3.4 Status of Listed Species Likely to be Adversely Affected by the Action

This opinion examines the status of each species that is likely to be adversely affected by the proposed action. Species status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR § 402.02. The opinion also examines the condition of critical habitat throughout the designated area, and discusses the current function of the essential PBFs that help to form that conservation value.

For each species, we present a summary of information on the population structure and distribution of the species to provide a foundation for the exposure analyses that appear later in this opinion. Then we summarize information on the threats to the species and the species' status given those threats to provide points of reference for the jeopardy determinations we make later in this opinion. That is, we rely on a species' status and trend to determine whether an action's effects are likely to increase the species' probability of becoming extinct.

This opinion examines the status of the proposed threatened sunflower sea star, which is likely to be adversely affected by the proposed action.

3.4.1 Sunflower Sea Star

On August 18, 2021, the Center for Biological Diversity petitioned NMFS to list the sunflower sea star (*Pycnopodia helianthoides*) under the ESA. NMFS determined that the proposed action may be warranted (86 FR 73230, December 27, 2021) and began a full status review to evaluate overall extinction risk for the species. NMFS issued a proposed rule to list the species as threatened on March 16, 2023 (88 FR 16212). NMFS has not proposed to designate critical habitat at this time.

Prior to 2013, the global abundance of sunflower sea star was estimated at several billion animals, but from 2013 to 2017, sea star wasting syndrome (SSWS) reached pandemic levels killing an estimated 90 percent or more of the population (Lowry 2022). Sunflower sea stars are currently estimated to number approximately 600 million (Lowry 2022). Declines in the northern portion of its range (i.e., Alaska and British Columbia) were less pronounced than in the southern portion, but still exceeded 60 percent. Species-level impacts from SSWS, both during the pandemic and on an ongoing basis, have been identified as the major threat affecting the long-term persistence of the sunflower sea star (Lowry 2022).

Recent counts in areas of Alaska near Cook Inlet, Prince William Sounds, and the Kenai Fjords showed large increases in sunflower sea star abundance in 2022, compared to previous years (Coletti et al. 2023).

3.4.1.1 Distribution and Habitat Use

The sunflower sea star is a large (up to one meter in diameter), fast-moving (up to 160 cm/minute), many-armed (up to 24) echinoderm native to the west coast of North America (Lowry et al. 2022). Sunflower sea stars occur in a wide range of intertidal and subtidal habitats from northern Baja California, Mexico, to the central Aleutian Islands, Alaska (Jewett et al. 2015; Gravem et al. 2021; Lowry 2022). They occupy waters from the intertidal to at least 435 m deep but are most common at depths less than 25 m and rare in waters deeper than 120 m (Lambert 2000; Hemery et al. 2016; Gravem et al. 2021). Sunflower sea stars occur over a broad array of soft, mixed, and hard bottom habitats and are most abundant in Alaska and British Columbia (Gravem et al. 2021).

They are found along the outer coasts and inside waters, which have complex geophysical features including glacial fjords, sounds, embayments, and tidewater glaciers. Preferring temperate waters, they inhabit kelp forests and rocky intertidal shoals (Shivji et al. 1983; Lowry 2022) and are also regularly found in eelgrass meadows (Dean and Jewett 2001; Gravem et al. 2021).

3.4.1.2 Sunflower Sea Star Presence in the Action Area

No recent surveys have been conducted at the landing sites along the FOC route. The citizen science site iNaturalist (https://www.inaturalist.org) has 38 sunflower sea stars records on Kodiak Island and along the FOC route. Each sighting has accompanying photos for verification (https://www.inaturalist.org/observations?place_id=any&subview=map&taxon_id=47673). Therefore, it is reasonable to assume that there may be sunflower sea stars present in the action area.

3.4.1.3 Reproduction and Growth

The species has separate sexes and is a broadcast spawner with a planktonic larval stage (Lundquist and Botsford 2011). Females can release a million eggs or more (Strathmann 1987; Chia and Walker 1991; Byrne 2013). Reproduction also occurs via larval cloning, enhancing potential reproductive output beyond female fecundity (Bosch et al. 1989; Balser 2004). Sea stars also have the ability to regenerate lost rays/arms and parts of the central disc (Chia and Walker 1991). Rays may detach when a sea star is injured or as a defense reaction when attacked by a predator. The longevity of *P. helianthoides* in the wild is unknown, as is the age at first reproduction and the period over which a mature individual is capable of reproducing (Lowry et al. 2022).

3.4.1.4 Feeding and Prey Selection

The sunflower sea star hunts a range of bivalves, gastropods, crustaceans, and other invertebrates using chemosensory stimuli and will dig for preferred prey in soft sediment (Mauzey et al. 1968; Paul and Feder 1975; Herrlinger 1983). It preys on sea urchins and plays an important role in controlling sea urchin numbers in kelp forests (Lowry et al. 2022). While generally solitary, they are also known to seasonally aggregate, perhaps for spawning purposes.

3.4.1.5 Threats to the Species

Brief descriptions of threats to sunflower sea stars follow. More detailed information can be found in the draft ESA Status Review report for the species (Lowry et al. 2022).

As mentioned previously, species-level impacts from SSWS, both during the pandemic (2013 to 2017) and on an ongoing basis, have been identified as the major threat affecting the long-term persistence of the sunflower sea star (Lowry et al. 2022). The causative agent of SSWS is currently unknown and various hypotheses regarding transmission dynamics and the lethality of SSWS under diverse physiochemical conditions exist. A number of factors ranging from environmental stressors to the microbiome in sea stars may play a role (Lloyd and Pespeni 2018; Konar et al. 2019; Aquino et al. 2021). Ocean warming has also been linked to SSWS outbreaks, hastening disease progression and severity (Harvell et al. 2019; Aalto et al. 2020).

4 ENVIRONMENTAL BASELINE

The "environmental baseline" in this instance refers to the condition of the proposed listed species in the action area without the consequences to the proposed listed species caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the expected impacts of all proposed Federal projects in the action areas that have already undergone formal or early Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation process. The consequences to listed or proposed listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR § 402.02).

The project is located in the Gulf of Alaska, south of the Aleutian Islands (Figure 1). 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. The Alaska Marine Highway system serves the Aleutian Islands and has ports at several of the FOC landing sites, but service beyond Kodiak Island is only available in the summer months. There are small, sheltered bays along the island chain, but the chain is open to the Pacific Ocean west of Kodiak Island. Several commercial 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 nonresidents. The action area crosses 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 nonresidents during peak fishing seasons. All of these areas have strong subsistence fishing traditions.

The 2023 U.S. Census lists the total resident population in the boroughs along the FOC alignment at approximately 20,000 people, but populations are concentrated at Kodiak Island and Unalaska. The communities that will be served along the alignment have populations ranging from tens to hundreds of people. The action area is large, but the station at Sand Point provides a representative picture of the semidiurnal tides with a mean range of tide of 1.58 m (5.19 ft), a diurnal tide level of 1.10 m (3.62 ft), and an extreme range of 2.20 m (7.23 ft) (data for Station 9459450, NOAA 2024). The bathymetry of the south side of the Alaska Peninsula and Aleutian Islands is variable depending on location and proximity to shore, islands, or rocks. Depths along the FOC alignment are predominantly less than 120 m (394 ft) (Weston 2024).

4.1 Sea Star Wasting Syndrome

SSWS is the primary threat and stressor to sunflower sea stars across their range. SSWS is thought to be exacerbated by warming ocean temperatures and other climate-change-related characteristics. Other potential stressors in the action area include pollution, bycatch/overexploitation, and coastal development activities.

A SSWS pandemic occurred across the range of the sunflower sea star from 2013 to 2017. SSWS is known to occur in sunflower sea stars and other species at smaller geographic and temporal scales and is expected to occur in the future. But the magnitude of future outbreaks is unknown. The pathogen that caused the 2013-2017 pandemic is unknown. As stated above, the 2022 Status Review report for this species identified SSWS as the factor of greatest concern for the species throughout its range, which includes the action area.

4.2 Climate Change

Climate change is expected to lead to warming ocean temperatures, more extreme fluctuations in ocean temperatures, and more storm events. These characteristics may exacerbate SSWS events in sunflower sea stars or result in marine habitat or ecological shifts that negatively affect the species (Lowry 2022). Warming ocean temperatures, extreme fluctuations in ocean temperature, harmful algal blooms, ocean acidification, and low dissolved oxygen events, which are all byproducts of anthropogenic climate change, could impose direct and indirect stress on *P. helianthoides* and increase their vulnerability over the coming decades. There is uncertainty regarding causal links between climate change and impacts to *P. helianthoides* and the scale over which these potential impacts are taking place. For example, local temperature-related stress, low dissolved oxygen events, and harmful algal blooms may be buffered by the refuge that a broad geographic and depth range provides to this species.

4.3 Pollution

Pollution into the marine environment from runoff, spills, or outfall pipes may compromise the microbiome of sunflower sea stars leading to death or making them vulnerable to other stressors (Aquino et al. 2021; McCracken et al. 2023). Relative to SSWS, this is minor threat that is limited in spatial and temporal scope. There is no direct evidence that this stressor is directly impacting sunflower sea stars in the action area.

4.4 Bycatch/Overexploitation

Sunflower sea stars may be caught as bycatch in pot gear in the action area. Most of these are likely returned to the marine environment without serious injury. Handling stress in sea stars is not well understood, but it is not likely to be significantly impacting the species in the action area. We note that the Alaska Sealife Center successfully keeps sunflower sea stars in their touch tank exhibit. Some sunflower sea stars may be collected by the public, but these numbers are expected to be small and may not result in significant stress if the animals are quickly returned to the marine environment.

4.5 Coastal Development

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. 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). Tourism is also a major source of economic development. However, the limited and high cost of access as well as a relatively short season restricts growth of the industry. There are a few harbor, power, and road projects proposed or in process at some of the landing sites communities (see Section 5.2 of the NTIA's BA), but none of these is likely to substantially increase the population or use of these more remote villages. Much of the vessel traffic is freight, fishing, and general transportation, including interstate commerce and seasonal tourism. The expected levels of vessel activity and coastal development are not likely to result in changes to sunflower sea star habitats.

4.6 Prior Section 7 Consultations

Based on a search of the Environmental Consultation Organizer (ECO), there have been 16 Section 7 consultations conducted for projects along the Aleutian Islands and in the Kodiak Island area since 2017, including this project. There are two informal Section 7 consultations in process at Sand Point, one of the sites completed under the Aleutians I FOC project in 2022 (Table 4-1) (AKRO-2023-03225 and AKRO-2024-00553). The main stressor being assessed in these concurrent consultations is acoustic disturbance.

Table 4-1. Recent and Ongoing Section 7 Consultations along the Alignment of the Aleutians II Fiber Optic Cable Project

Project ID	Project Title	Consultation Category
AKRO-2017-00580	Women's Bay Cargo Wharf and Fuel Pier Repair LOC	Informal
AKRO-2017-00602	F/V Elizabeth Taylor Grounding, Women's Bay, Kodiak	Informal
AKRO-2017-00612	F/V Predator Oil Spill Response	Informal
AKRO-2017-00639	Reinitiation of Jewel Beach Storm Drainage Outfall	Informal
AKRO-2019-00892	GCI AU-Aleutian Fiber Optic Cable	Informal
AKRO-2020-00963	Women's Bay Reinitiation	Informal
AKRO-2020-01266	Aquatic Farmsite Lease Application for ADL 233403 Myrick and Monson dba Alaskan Sea Greens	Informal
AKRO-2020-01861	November 2019 Kitoi Bay Hatchery Oil Spill: USCG Authorized Emergency Response	Informal
AKRO-2021-00184	FV Pacific Knight Scuttle	Informal
AKRO-2021-00318	USCG Kodiak Cargo Pier Pile Replacement eLOC	Informal, expedited
AKRO-2021-01340	Tigalda Island FUDS CON/HTRW Removal Action at Formerly Used Defense Site F10AK0376-01	Informal
AKRO-2021-01392	F/V Seabrook Emergency Spill Response	Informal
AKRO-2021-03122	St. Paul Harbor Dock Replacement, City of Kodiak	Informal
AKRO-2023-03225	Humboldt Harbor ADA Float Access	Informal, expedited
AKRO-2023-03226	AU-Aleutian II Fiber Project	Formal
AKRO-2024-00553	Trident Fuel Dock Repairs, Sandpoint	Informal

The records are linked in the ECO at
https://appscloud.fisheries.noaa.gov/suite/sites/eco/page/home

5 EFFECTS OF THE ACTION

"Effects of the action" are all consequences to listed or proposed listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR § 402.02).

This conference opinion relies on the best scientific and commercial information available. We try to note areas of uncertainty or situations where data are not available. In analyzing the effects of the action, NMFS aims to minimize the likelihood of false negative conclusions (i.e., concluding that adverse effects are not likely when such effects are, in fact, likely to occur).

We organize our effects analysis using a stressor identification – exposure – response – risk assessment framework for the proposed activities.

We conclude this section with an *Integration and Synthesis of Effects* section that integrates information presented in the *Status of the Species* and *Environmental Baseline* sections of this opinion with the results of our exposure and response analyses to estimate the probable risks the proposed action poses to endangered and threatened species.

NMFS identified and addressed all potential stressors and considered all consequences of the proposed action, individually and cumulatively, in developing the analysis and conclusions in this opinion regarding the effects of the proposed action on ESA-listed species and designated critical habitat.

5.1 Project Stressors

Stressors are any physical, chemical or biological phenomena that can induce an adverse response. This effects section starts with identification of the stressors produced by the constituent parts of the proposed action.

Based on our review of the data available, the proposed FOC laying and nearshore installation activities may cause the following primary stressors:

1. injury to sunflower sea stars due to removal/relocation during the intertidal installation;

2. stress and disturbance due to being handled and relocated to an alternative site;

3. injury to a sunflower sea star due to unintentional contact from workers moving in the exposed intertidal areas during pre-work surveys or from divers during the laying of the articulated pipe segments;

4. increased risk of predation due to relocation;

5. temporary loss of habitat and prey sources due to intertidal area disturbance;

6. injury to a sunflower sea star due to impacts from the FOC landing on a sea star; and

7. pollution from unauthorized spills.

5.1.1 Minor Stressors on the proposed Sunflower Sea Star

Based on a review of available information, we determined the following stressors are either unlikely to occur or likely to have minimal impacts on sunflower sea stars:

1. injury to a sunflower sea star due to impacts from the FOC landing on a sea star; and

2. pollution from unauthorized spills.

The potential for sea stars to be hit by the descending, unencased FOC does exist as the cable comes to rest on the sea floor, but given the size and low weight of the bare cable (approximately 2.6 cm [1.02 in] in diameter and weight of 1.5kg/m [1.0 lbs/lin ft] in air), we expect that a sea star could move out from under the cable without injury.

The applicant has agreed to implement the Alaska Standard Mitigations (see Section 2.1.3), including several specific to the sunflower sea star. The project work that would require handling fuel or other potential pollutants will all take place on land rather than on the ship or near the water. These factors limit the risk of a sea star being hit or interacting with the FOC in offshore waters where sea stars are more likely to occur in depths less than 120 m (394 ft) or being affected by inadvertent spills; therefore, we conclude that such interactions are extremely unlikely to occur.

5.1.2 Major Stressors on Sunflower Sea Stars

The primary stressor for sunflower sea stars will be removal and relocation from the substrate during the FOC laying and installation process. In addition, workers walking in the exposed intertidal areas or divers wading in shallow waters may inadvertently step on or touch a sea star during the pre-work surveys or during the FOC cable laying.

Activities impacting the benthic environment due to the pre-work surveys, FOC laying, jetting, and FOC encasement in the heavy articulated pipe may interact with sunflower sea stars on the sea floor or on intertidal rocky substrate. These activities have the potential to directly impact (e.g., harm, wound, kill, collect) sunflower sea stars, as well as impacting sunflower sea star habitat. Sunflower sea stars could be injured or stressed when they are removed from the substrate. A sea star may be more likely to be preyed upon after being released during the relocation process before it is able to attach to the substrate or find shelter. Although the intertidal zone areas are likely to continue to support attached benthic organisms and provide habitat for sea stars after the project is completed, the sea stars and other attached organisms will lose access to this habitat until they are able to recolonize the areas subject to jetting. The narrow width of the jetting area (0.9 m [3 ft]) will likely recover relatively quickly depending on the substrate type (e.g., rocky areas, soft sediments).

Sunflower sea stars may be affected if they are temporarily unable to use the site for forage or refuge habitat due to FOC-laying activities and physical relocation. Although sea stars and their prey will be temporarily unable to access the narrow alignment subject to jetting, these effects will be insignificant given the project's limited footprint and availability of similar habitat nearby (intertidal habitat and similar rocky areas). Any disturbances to sea stars or their prey would be temporary, limited to one to two days of in-water work at each site, after which animals will be able to return to the site.

Because there is similar available habitat nearby where sea stars will be relocated and the applicant has agreed to implement mitigation measures for sunflower sea stars (See Section 2.1.3) that will ensure that individual sea stars will be relocated quickly, we do not expect relocation to cause long-term stress or reduction in fitness for sunflower sea stars.

5.2 Exposure Analysis for the Sunflower Sea Star

Exposure analyses are designed to identify the listed or proposed species that are likely to co-occur with the stressors in space and time and the nature of that co-occurrence. In this step of our analysis, we estimate the number of individuals that are likely to be exposed to an action's effects and the populations or subpopulations those individuals represent.

As discussed in Section 2.1.3, NTIA proposed mitigation measures that should avoid or minimize exposure of listed species to one or more stressors from the proposed action.

5.2.1 Sunflower Sea Star Occurrence and Exposure Estimates

Prior to the SSWS pandemic, abundance varied geographically in Alaska. They were reported as quite common in western Prince William Sound (average $0.233/m^2$) (Konar et al.2019). Post-pandemic densities are much lower and range from 0 to $0.04/m^2$ at the sites that once had the highest density (western Prince William Sound) (Traiger et al. 2022).

No recent surveys have been conducted along the Aleutian Islands or Kodiak Island. The citizen science site iNaturalist (https://www.inaturalist.org) has 38 records (many from 2023) of sunflower sea stars at sites in the Aleutian Islands and Kodiak Island. Therefore, it is reasonable to assume that there may be sunflower sea stars present in the action area.

The proposed project would install the 2.6-cm (1.02-in) diameter cable from the onshore structures out to where the cable will connect with the main FOC alignment installed in 2022. The total nearshore distance for each landing site was estimated at 298.8 m (980 ft). Weston (NTIA's consultant) provided detailed estimates for each landing site broken out into lengths (1) where the FOC will be encased in a heavy articulated pipe and buried in a trench using a water jet from the MHW to the MLLW and (2) where the articulated encased FOC will be laid directly on the sea floor from the MLLW out to open water (Table 5-1).

Table 5-1. Lengths of Fiber Optic Cable and Installation Methods for each of the Seven Landfall Sites for the Aleutians II Fiber Optic Cable Project (Weston 2024)

Location	**Distance (m) Articulated Encasement will be Trenched** (MHW to MLLW, trenched at low tide)	**Distance (m) Articulated Encasement will be Laid on Seafloor** (into open water from MLLW)	**Total Intertidal Distance (m)**
Ouzinkie	5	145	150
Port Lions	25	75	100
Chignik Bay[1]	135	65	200
Chignik Lagoon 1	25	0	25
Chignik Lagoon 2	75	0	75
Chignik Lake	64	36	100
Perryville	20	80	100
Cold Bay	15	85	100
False Pass	6	44	50
Totals	**370**	**530**	**900**

1. Chignik Bay was connected to the offshore FOC in 2021. In 2024 it will be connected to the Chignik Lagoon sites.

Each section of trenched FOC would be approximately 0.9 m (3 ft) wide. The total length of encased FOC across all seven sites is 900 m (2,9552.76 ft). This portion of the FOC will disturb approximately 810 m^2 (8,718.77 ft^2) of intertidal area. Based on the pre-pandemic estimated density of sunflower sea stars present and the estimated decline in the population, the expected density in the action area would be 0.04/m^2, and approximately 32.4 sea stars would be likely to be encountered/impacted in the 810-m^2 area affected by the FOC installation.

As noted earlier, the offshore portions of the FOC laying are unlikely to result in injury of sea stars due to the small size and low density of the FOC cable. However, it is likely that a sunflower sea star would be startled or move in response (behavioral response) to the FOC landing on them as it settles to the sea floor. Therefore, we calculate the likelihood of this occurring by assessing the portions of the FOC alignment in waters less than 120 m (394 ft) deep where sunflower sea stars are more likely to be encountered (Lambert 2000; Hemery et al. 2016; Gravem et al. 2021). Weston provided a bathymetric breakdown of the Aleutians II FOC alignment. Approximately 134,046 m (83.29 mi) of the 176,000 m (109 mi) of FOC will be laid in waters less than 120 m deep. Since the FOC will be laid directly on the sea floor without any encasement in these areas, the total width is much narrower at 2.6 cm (1.02 in). This portion of the FOC will disturb approximately 3,485.20 m^2 (37,514.34 ft^2) of sea floor area. Using the same expected sunflower sea star density of 0.04/m^2, approximately 139.41 sea stars would be likely to be encountered/impacted in the 3,485.20-m^2 area affected by the FOC cable laying in offshore areas. We believe this estimate is conservative since portions of the cable will be laid in depths greater than 25 m where sunflower sea stars are less common.

5.3 Response Analysis

Response analyses determine how listed species or proposed listed species and/or critical habitats are likely to respond after being exposed to an action's effects on the environment or directly on listed species themselves. Our assessments try to detect the probability of lethal responses, physical damage, physiological responses (particular stress responses), behavioral responses, and social responses that might result in reducing the fitness of listed individuals. Ideally, our response analyses consider and weigh evidence of adverse consequences, beneficial consequences, or the absence of such consequences.

As described in the *Exposure Analysis* section, sunflower sea stars are expected to occur in the action area and are expected to overlap with disturbance and possible relocations associated with FOC placement, jetting, and articulated pipe installation activities. We assume that some individuals are likely to be exposed and respond to these disturbances. The mitigations provide for greater care in removal of any sunflower sea stars encountered, which will reduce the likelihood of injury or mortality due to being relocated. In addition, sea stars can regenerate tube feet and arms if injured during removal or relocation, which may reduce potential for long-term effects. Sunflower sea stars that are alive and not exhibiting SSWS will be relocated quickly and placed in areas of similar or better quality habitat. Relocation will introduce some stress for sea stars and, as noted previously, may expose them to greater predation risk as they move to find shelter and attach to the substrate. Because each landing site installation is expected to take a single day of work, we expect most relocated animals will not return to the area until after FOC-laying activities are completed.

Although we do not have specific research on sea star response to being handled as part of a relocation it is reasonable to conclude that gentle removal and relocation is less likely to incur injury than leaving the sea stars where they would be subject to possible injury from the jetting or being crushed by the heavy pipe or people working in the area at low tide. There are large sea stars held at the Alaska Sea Life Center where they are touched and handled gently without apparent behavioral or survival effects.

Some sea stars are also expected to encounter the FOC as it settles to the sea floor in offshore areas where the cable will not be encased. However, the cable is small and light enough that we expect a sea star could move out from under it without injury and, therefore, would only result in short-term behavioral responses.

The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to increase the energy budgets of sunflower sea star individuals, and their probable exposure to these stressors are not likely to reduce their fitness.

6 CUMULATIVE EFFECTS

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

We searched for information on non-Federal actions reasonably certain to occur in the action area. We did not find any information about non-Federal actions other than what has already been described in the Environmental Baseline (Section 4 of this opinion). Some continuing non-Federal activities are reasonably certain to contribute to climate change within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline versus cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the Environmental Baseline (Section 4).

7 INTEGRATION AND SYNTHESIS

The Integration and Synthesis section is the final step of NMFS's assessment of the risk posed to listed species and critical habitat as a result of implementing the proposed action. In this section, we add the Effects of the Action (Section 5) to the Environmental Baseline (Section 4) and the Cumulative Effects (Section 6) to formulate the agency's conference opinion as to whether the proposed action is likely to: (1) result in appreciable reductions in the likelihood of both the survival or recovery of the species in the wild by reducing its numbers, reproduction, or distribution or (2) result in the adverse modification or destruction of critical habitat as measured through direct or indirect alterations that appreciably diminish the value of designated critical habitat as a whole for the conservation of the species. These assessments are made in full consideration of the Status of the Species (Section 3).

The risk analysis begins by asking whether the probable physical, physiological, behavioral, or social responses of endangered or threatened species are likely to reduce the fitness of endangered or threatened individuals or the growth, annual survival or reproductive success, or lifetime reproductive success of those individuals.

As part of our risk analyses, we identified and addressed all potential stressors and considered all consequences of exposing the proposed sunflower sea star, individually and cumulatively, to all the stressors associated with the proposed action given that the individuals in the action area for this consultation are also exposed to other stressors in the action area and elsewhere in their geographic range.

7.1 Sunflower Sea Star Risk Analysis

Our consideration of probable exposures and responses of proposed threatened sunflower sea stars to cable-laying activities associated with the proposed action is designed to help us assess whether those activities are likely to increase the extinction risk or jeopardize the continued existence of the species. Assuming a density of 0.04 sea stars/m^2 (Lowry 2023), we estimate that a maximum of ~32.4 sea stars could be impacted by direct human contact during the proposed activities. We also calculated that a maximum of ~139.4 sea stars could be impacted by contact with the FOC during offshore cable-laying operations and experience non-injurious stress and behavioral impacts.

Sea stars may also be impacted by direct human contact during relocation prior to FOC-laying activities or crushed inadvertently by workers or equipment when the intertidal areas are exposed. If a sea star is found in the vicinity of an area where materials will be staged or during the pre-work surveys, it will be moved out of the work area. As discussed in Section 5, the major stressors are the relocation, potential injury during removal, injury due to unintentional contact from workers, the exposure to increased predation after relocation, and the potential exclusion from previously occupied habitat until recolonization can occur. Compared to the amount of habitat the species can occupy throughout Alaska and other parts of its range (e.g., low intertidal and subtidal zones down to 435 m, but most common above 25 m), and the expected non-lethal impacts of direct human contact and other project activities due to mitigation measures in place, the proposed action is not expected to decrease the likelihood of survival or recovery of the sunflower sea star.

Despite spanning over 100 mi, the geographic scope of this project is small relative to the entire range of the species. Habitat and prey impacts for the sunflower sea star are expected to be extremely small. The number of individuals that will be affected is very small relative to the estimated population of sunflower sea stars (over 600 million) (Lowry 2022). Based on some evidence of recent recruitment and localized abundance increases, the current coastal construction regime in Alaska does not appear to be limiting sunflower sea star recovery.

The primary threat to sunflower sea stars identified in the Status Review report (Lowry 2022) and proposed rule to list the sunflower sea star as threatened (88 FR 16212; March 16, 2023) is SSWS. Based on our analysis and the limited geographic and temporal scope of the project, no aspect of the proposed action is expected to increase the prevalence of SSWS in sunflower sea stars. Other threats include pollution and by-catch/overexploitation. These risk factors are in addition to those operating on a larger scale, such as climate change. Sunflower sea stars may be affected by multiple threats at any given time, compounding the impacts of the individual threats. All of these activities are expected to continue to occur into the foreseeable future.

8 CONCLUSION

After reviewing the current status of the proposed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS's conference opinion that the proposed action is not likely to jeopardize the continued existence of sunflower sea star. No critical habitat has been designated or proposed for this species; therefore, none will be affected. Further, it is NMFS's opinion that the proposed action is not likely to adversely affect endangered Western North Pacific DPS gray whale, endangered North Pacific right whale, threatened Mexico DPS humpback whale, endangered Western North Pacific DPS humpback whale, endangered blue whale, endangered fin whale, endangered sperm whale, and endangered Western DPS Steller sea lion. The proposed action is also not likely to adversely affect designated critical habitat for Mexico DPS humpback whale, Western North Pacific DPS humpback whale, or Steller sea lion. No critical habitat has been designated for Western North Pacific DPS gray whale, blue, fin, or sperm whales, and none is currently proposed for sunflower sea stars, therefore none will be affected.

This concludes the conference for the Aleutians II Fiber Optic Cable Project. You may ask NMFS to confirm the conference opinion as a biological opinion issued through formal consultation if the species is listed. The request must be in writing. If NMFS reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, NMFS will confirm the conference opinion as the biological opinion on the project and no further Section 7 consultation will be necessary.

9 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA prohibits the take of endangered species unless there is a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 U.S.C. § 1532(19)). "Incidental take" is defined as take that results from, but is not the purpose of, the carrying out of an otherwise lawful activity conducted by the action agency or applicant (50 CFR § 402.02). Based on NMFS guidance, the term "harass" under the ESA means to: "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016).

The ESA does not prohibit the take of proposed or threatened species unless special regulations have been promulgated, pursuant to ESA Section 4(d), to promote the conservation of the species. ESA Section 4(d) rules have not been promulgated for sunflower sea star; therefore, ESA Section 9 take prohibitions do not apply to this species. This ITS includes numeric limits on the take of sunflower sea star because specific amounts of take were analyzed in our jeopardy analysis. These numeric limits provide guidance to the action agency on its requirement to re-initiate consultation if the amount of take estimated in the jeopardy analysis of this opinion is exceeded. This ITS includes reasonable and prudent measures and terms and conditions designed to minimize and monitor take of these threatened species.

In order to monitor the impact of incidental take, NTIA or its designated representative, Unicom or its contractors, must monitor and report on the progress of the action and its impact on the species as specified in the ITS (50 CFR § 402.14(i)(3)).

9.1 Amount or Extent of Take

Section 7 regulations require NMFS to estimate the number of individuals that may be taken by proposed actions or utilize a surrogate (e.g., other species, habitat, or ecological conditions) if we cannot assign numerical limits for animals that could be incidentally taken during the course of an action (50 CFR § 402.14(i)(1); see also 80 FR 26832; May 11, 2015).

For this consultation, the NTIA anticipates that take is reasonably certain to occur. The primary source of take will be due to handling; however, injury or mortality are possible as sea stars may be injured during the removal and relocation process or suffer predation shortly after relocation.

Individual sunflower sea stars may be encountered in the intertidal area during pre-work surveys or during the encased FOC installation process. Seas stars are likely to be adults or subadults. Incidental take would occur when these individuals are removed from the substrate and relocated to a suitable site away from the active action area.

The intertidal portions of the FOC at the seven landing sites will disturb approximately 810 m^2

(8,718.77 ft^2) of intertidal area. Based on the pre-pandemic estimated density of sunflower sea stars present and the estimated decline in the population, the expected density in the action area would be 0.04-sunflower sea star per m^2, and approximately ~32.4 sea stars would be likely to be encountered/impacted in the 810-m^2 area affected by the FOC installation.

The offshore portion of the FOC in waters less than 120 m deep will disturb approximately 3,485.20 m^2 (37,514.34 ft^2) of sea floor area. Using the same expected density of 0.04-sunflower sea star per m^2, approximately 139.41 sea stars would be likely to be encountered/impacted in the 3,485.20-m^2 area affected by the FOC cable-laying operations in offshore areas.

Based on the estimated density of sunflower sea stars in the action area and calculations of the areas to be affected by FOC installation, we expect that less than 172 sunflower sea stars in total will be taken due to FOC installation and relocation of the sea stars encountered (e.g., harm, wound, kill, collect) (see Section 5.2.1).

Table 9-1. Summary of Expected Incidental Take of Species Proposed for ESA Listing

Species	Activity	Expected Number of Takes	Anticipated Temporal Extent of Take
Sunflower sea star (*Pycnopodia helianthroides*)	Intertidal cable laying	32	May 1, 2024, through October 15, 2024, and June 1, 2025, to July 1, 2025 (Chignik Lake only)
Sunflower sea star (*Pycnopodia helianthroides*)	Offshore cable laying	139	May 1, 2024, through October 15, 2024, and June 1, 2025, to July 1, 2025 (Chignik Lake only)

9.2 Effect of the Take

In Section 8 of this opinion, NMFS determined that the level of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species. We estimate that the proposed activities could affect ~32 sunflower sea stars as they are removed from the FOC alignment in the intertidal zone prior to in-water work at each site, inadvertently injured by workers or equipment, or subjected to predation after relocation. We estimate that the proposed activities could affect ~139 sunflower sea stars if they come into contact with the FOC in deeper waters and are disturbed by or move away from the cable. The current range-wide (*i.e.,* global) population estimate for the sunflower sea star is nearly 600 million individuals, based on a compilation of the best available science and information (Gravem et al. 2021). The proposed activities will impact, at most, 0.0000003 percent of the population. Therefore, we do not expect the project to affect the viability of the population, or the species' survival or recovery.

9.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" (RPMs) are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

RPMs are distinct from the mitigation measures that are included in the proposed action (described in Section 2.1.3). We presume that the mitigation measures will be implemented as described in this conference opinion. The failure to do so will constitute a change to the action that may require reinitiation of consultation pursuant to 50 CFR § 402.16.

The RPMs included below, along with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. NMFS concludes that the following RPM is necessary and appropriate to minimize or to monitor the incidental take of sunflower sea stars resulting from the proposed action.

1. NTIA must implement, or require Unicom and its contractors to implement, a monitoring program that reports the total amount of take so that NMFS AKR can evaluate the exposure estimates contained in this conference opinion and that underlie this ITS.

9.4 Terms and Conditions

"Terms and conditions" implement the reasonable and prudent measures (50 § 402.14(i)(2)).

These terms and conditions are in addition to the mitigation measures included in the proposed action, as set forth in Section 2.1.3 of this opinion. NTIA or Unicom has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR § 402.14(i)(3)).

These terms and conditions constitute no more than a minor change to the proposed action because they are consistent with the basic design of the proposed action.

To carry out RPM #1, NTIA must undertake (or require their lessees or permittees to undertake) the following:

a) The individuals completing the FOC installation in the intertidal areas must be able to accurately identify sunflower sea stars in order to document observed incidents of harassment as described in the mitigation measures associated with this action; and

b) If take of any sunflower sea stars totals 80 percent of take for either intertidal activity (26) or offshore (111) individuals) takes authorized in the ITS, NTIA will notify NMFS by email (attention: leanne.roulson@noaa.gov and cc sierra.franks@noaa.gov) to discuss if there is a need for reinitiation of consultation.

10 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR § 402.02).

1. NTIA or its representatives should ensure that the entities responsible for conducting the sunflower sea star surveys have practice and expertise with the methodology they use to conduct the survey prior to conducting the actual surveys. In addition, NTIA or its representatives should invite NMFS biologists to the site when a sunflower sea star survey is being conducted or the equipment to do the survey is being tested to enable NMFS to better understand the efficacy of the selected methods and equipment.

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

11 REINITIATION OF CONSULTATION

As provided in 50 CFR § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount of incidental take is exceeded, Section 7 consultation must be reinitiated immediately (50 CFR § 402.14(i)(4)).

12 DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) (Data Quality Act (DQA)) specifies three components contributing to the quality of a document: utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

12.1 Utility

This document records the results of an interagency consultation. The information presented in this document is useful to NTIA, NMFS and the general public. These consultations help to fulfill multiple legal obligations of the named agencies. The information is also useful and of interest to the general public as it describes the manner in which public trust resources are being managed and conserved. The information presented in these documents and used in the underlying consultations represents the best available scientific and commercial information and has been improved through interaction with the consulting agency.

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

12.2 Integrity

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

12.3 Objectivity

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

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

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

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

13 REFERENCES

Aalto, E., K. D. Lafferty, S. Sokolow, R. Grewelle, T. Ben-Horin, C. Boch, P. Raimondi, S. Bograd, E. Hazen, and M. Jacox. 2020. Models with environmental drivers offer a plausible mechanism for the rapid spread of infectious disease outbreaks in marine organisms. Scientific Reports 10(1):5975.

Allen, B. M., and R. P. Angliss. 2011. Alaska marine mammal stock assessments, 2010. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Alaska Fisheries Science Center, Seattle, WA, May 2011. NOAA Technical Memorandum NMFS-AFSC-223, 292 p.

Aquino, C. A., R. M. Besemer, C. M. DeRito, J. Kocian, I. R. Porter, P. T. Raimondi, J. E. Rede, L. M. Schiebelhut, J. P. Sparks, and J. P. Wares. 2021. Evidence that microorganisms at the animal-water interface drive sea star wasting disease. Frontiers in Microbiology 11:3278.

Au, W. W. L. 2000. Hearing in whales and dolphins: An overview. Pages 1-42 *in* W. W. L. Au, A. N. Popper, and R. R. Fay, editors. Hearing by Whales and Dolphins. Springer-Verlag, New York.

Au, W. W. L., A. A. Pack, M. O. Lammers, L. M. Herman, M. H. Deakos, and K. Andrews. 2006. Acoustic properties of humpback whale songs. Journal of the Acoustical Society of America 120(2):1103-1110.

Balser, E. J. 2004. And then there were more: cloning by larvae of echinoderms. Pages 3–9 *in* T. Heinzeller, and J. H. Nebelsick, editors. Echinoderms: München. A. A. Balkema Publishers, Leiden, London, New York, Philadelphia, Singapore.

Barlow, J., and P. J. Clapham. 1997. A new birth-interval approach to estimating demographic parameters of humpback whales. Ecology 78(2):535-546.

Bosch, I., R. B. Rivkin, and S. P. Alexander. 1989. Asexual reproduction by oceanic planktotrophic echinoderm larvae. Nature 337:169–170.

Brower, A., A. Willoughby, and M. Ferguson. 2022. Distribution and relative abundance of bowhead whales and other marine mammals in the western Beaufort Sea, 2020. U.S. Dept. of Commerce, National Oceanic and Oceanic Administration, National Marine Fisheries Service, Alaska Fisheries Science Center, Seattle, WA, July 2022. NOAA Technical Memorandum NMFS-AFSC-439, 155 p.

Brower, A. A., J. T. Clarke, and M. C. Ferguson. 2018. Increased sightings of subArctic cetaceans in the eastern Chukchi Sea, 2008–2016: population recovery, response to climate change, or increased survey effort? Polar Biology 41(5):1033-1039.

Byrne, M. 2013. Chapter 5: Asteroid evolutionary developmental biology and ecology. Pages 51-58 *in* J. M. Lawrence, editor. Starfish: biology and ecology of the Asteroidea. The Johns Hopkins University Press, Baltimore, MD.

Carretta, J. V., K. A. Forney, E. M. Oleson, D. W. Weller, A. R. Lang, J. Baker, M. M. Muto, B. Hanson, A. J. Orr, H. Huber, M. S. Lowry, J. Barlow, J. E. Moore, D. Lynch, L. Carswell, and R. L. B. Jr. 2020. U.S. Pacific marine mammal stock assessments: 2019. U.S. Dep. Commer., NOAA, NMFS, Southwest Fisheries Science Center, August 2020. NOAA Technical Memorandum NMFS-SWFSC-629.

Chia, F. S., and C. W. Walker. 1991. Ch. 5. Echinodermata: Asteroidea. Pages pp. 301–353 *in* A. C. Giese, J. S. Pearse, and V. B. Pearse, editors. Reproduction of Marine Invertebrates Vol. VI-Echinoderms and Lophophorates. Boxwood Press.

Clapham, P. J. 1992. Age at attainment of sexual maturity in humpback whales, *Megaptera novaeangliae*. Canadian Journal of Zoology 70(7):1470-1472.

Clapham, P. J. 1993. Social organization of humpback whales on a North Atlantic feeding ground. Pages 131-145 *in*.

Clarke, J., A. Brower, M. Ferguson, A. Willoughby, and A. Rotrock. 2020. Distribution and relative abundance of marine mammals in the eastern Chukchi Sea, eastern and western Beaufort Sea, and Amundsen Gulf, 2019 annual report. U.S. Dept. of Interior, Bureau of Ocean Energy Management (BOEM), Alaska OCS Region, Anchorage, AK, June 2020. OCS Study BOEM 2020-027 prepared under Interagency Agreement M17PG00031 by the NOAA, Alaska Fisheries Science Center, Marine Mammal Laboratory.

Cooke, J. G. 2018. Abundance estimates for western North Pacific gray whales for use with stock structure hypotheses of the range-wide review of the population structure and status of North Pacific gray whales. IWC SC/67b/ASI, 15 p.

Cooke, J. G., D. W. Weller, A. L. Bradford, O. Sychenko, A. M. Burdin, A. R. Lang, and R. L. Brownell Jr. 2017. Population assessment update for Sakhalin gray whale, with reference to stock identity, 15-17 November 2017.

D'Vincent, C. G., R. M. Nilson, and R. E. Hanna. 1985. Vocalization and coordinated feeding behavior of the humpback whale in southeastern Alaska. Scientific Reports of the Whales Research Institute 36:41–47.

Damon-Randall, K. 2023. Occurrence and Distribution of Eastern North Pacific and Western North Pacific Populations of Gray Whales in the North Pacific Ocean. Office of Protected Resources.

Dean, T. A., and S. C. Jewett. 2001. Habitat-specific recovery of shallow subtidal communities following the Exxon Valdez oil spill. Ecological Applications 11(5):1456-1471.

Diogou, N., D. M. Palacios, J. A. Nystuen, E. Papathanassiou, S. Katsanevakis, and H. Klinck. 2019. Sperm whale (*Physeter macrocephalus*) acoustic ecology at Ocean Station PAPA in the Gulf of Alaska–Part 2: oceanographic drivers of interannual variability. Deep Sea Research Part I: Oceanographic Research Papers 150:103044.

Eco49. 2022. ESA Section 7 Biological Assessment for fisheries research conducted and funded by the Alaska Fisheries Science Center and the International Halibut Commission. Eco49 Consulting, Contract analysis prepared for the National Marine Fisheries Service, Bend, OR, June 2022, 127 p.

Eguchi, T., A. R. Lang, and D. W. Weller. 2023. Abundance of eastern North Pacific gray whales 2022/2023. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center, Marine Mammal and Turtle Division, La Jolla, CA, June 2023. NOAA Technical Memorandum NMFS-SWFSC-680.

Erbe, C. 2002. Hearing abilities of baleen whales. Defense Research and Development Canada, Ottawa, Ontario, October 2002. DRDC Atlantic CR 2002-065.

Fearnbach, H., J. W. Durban, S. A. Mizroch, S. Barbeaux, and P. R. Wade. 2012. Winter observations of a group of female and immature sperm whales in the high-latitude waters near the Aleutian Islands, Alaska. Marine Biodiversity Records 5:e13.

Goldbogen, J. A., J. Calambokidis, D. A. Croll, J. T. Harvey, K. M. Newton, E. M. Oleson, G. Schorr, and R. E. Shadwick. 2008. Foraging behavior of humpback whales: kinematic and respiratory patterns suggest a high cost for a lunge. Journal of Experimental Biology 211(23):3712-3719.

Gravem, S., W. Heady, V. Saccomanno, K. Alvstad, A. Gehman, T. Frierson, and S. Hamilton. 2021. IUCN Red List Assessment: Sunflower sea star *(Pycnopodia helianthoides)*. IUCN Red List of Threatened Species 2021 20.

Hanselman, D. H., B. J. Pyper, and M. J. Peterson. 2018. Sperm whale depredation on longline surveys and implications for the assessment of Alaska sablefish. Fisheries Research 200:75-83.

Harvell, C., D. Montecino-Latorre, J. Caldwell, J. Burt, K. Bosley, A. Keller, S. Heron, A. Salomon, L. Lee, and O. Pontier. 2019. Disease epidemic and a marine heat wave are associated with the continental-scale collapse of a pivotal predator (*Pycnopodia helianthoides*). Science advances 5(1):eaau7042.

Heather Coletti, N. P. S., U. S. G. S. Dan Esler, Alaska Science Center, U. o. A. F. Katrin Iken, U. o. A. F. Brenda Konar, U. S. G. S. E. Brenda Ballachey, Alaska Science Center, U. S. G. S. E. James Bodkin, Alaska Science Center, U. S. G. S. George Esslinger, Alaska Science Center, U. S. G. S. Kim Kloecker, Alaska Science Center, N. O. a. A. A. Mandy Lindeberg, U. S. G. S. Dan Monson, Alaska Science Center, U. S. G. S. Brian Robinson, Alaska Science Center, U. S. G. S. Sarah Traiger, Alaska Science Center, and U. S. F. a. W. S. Benjamin Weitzman, Marine Mammal Management. 2023. Exxon Valdez Oil Spill Trustee Council

Long-Term Research and Monitoring, Mariculture, Education and Outreach

Annual Project Reporting Form.

Hemery, L. G., S. R. Marion, C. G. Romsos, A. L. Kurapov, and S. K. Henkel. 2016. Ecological niche and species distribution modelling of sea stars along the Pacific Northwest continental shelf. Diversity and Distributions 22(12):1314-1327.

Herrlinger, T. J. 1983. The diet and predator-prey relationships of the sea star *Pycnopodia helianthoides* (Brandt) from a central California kelp forest. Master's thesis. San Jose State University, Moss Landing Marine Laboratories, San Jose, CA, 57 p.

Jewett, S. C., R. N. Clark, H. Chenelot, S. Harper, and M. K. Hoberg. 2015. Field guide to sea stars of the Aleutian Islands. Alaska Sea Grant, University of Alaska Fairbanks. Vol. SG-ED-79.

Johnson, J. H., and A. A. Wolman. 1984. The Humpback Whale, *Megaptera novaeangliae*. Marine Fisheries Review 46(4):300-337.

Kennedy, A. S., A. N. Zerbini, B. K. Rone, and P. J. Clapham. 2014. Individual variation in movements of satellite-tracked humpback whales Megaptera novaeangliae in the eastern Aleutian Islands and Bering Sea. Endangered Species Research 23(2):187-195.

Ketten, D. R. 1997. Structure and function in whale ears. Bioacoustics 8:103-135.

Konar, B., T. J. Mitchell, K. Iken, H. Coletti, T. Dean, D. Esler, M. Lindeberg, B. Pister, and B. Weitzman. 2019. Wasting disease and static environmental variables drive sea star assemblages in the Northern Gulf of Alaska. Journal of Experimental Marine Biology and Ecology 520:151209.

Lambert, P. 2000. Sea Stars of British Columbia, Southeast Alaska, and Puget Sound. Royal British Columbia Museum Handbook. University of British Columbia Press, Vancouver, British Columbia.

Lloyd, M. M., and M. H. Pespeni. 2018. Microbiome shifts with onset and progression of Sea Star Wasting Disease revealed through time course sampling. Scientific Reports 8(1):16476.

Lowry, D., S. Wright, M. Neuman, D. Stevenson, J. Hyde, M. R. Lindeberg, N. Tolimieri, S. Lonhart, S. B. Traiger, and R. G. Gustafson. 2022. Draft Endangered Species Act status review report: sunflower sea star (*Pycnopodia helianthoides*). U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, WA, October 2022. Report to NMFS Office of Protected Resources, 89 p. + appendices.

Lowry, D., Wright, S., Neuman, M., Stevenson, D., Hyde, J., Lindeberg, M., Tolimieri, N., Lonhart, S., Traiger, S., Gustafson, R. 2022. Draft Endangered Species Act status review report: sunflower sea star (*Pynopodia helianthoides*). Final Report to the National Marine Fisheries Service, Office of Protected Resources. October 2022. 89 pp. +App.

Lundquist, C. J., and L. W. Botsford. 2011. Estimating larval production of a broadcast spawner: the influence of density, aggregation, and the fertilization Allee effect. Canadian Journal of Fisheries and Aquatic Sciences 68:30-42.

Matsuoka, K., S. A. Mizroch, and H. Komiya. 2013. Cruise report of the 2012 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). International Whaling Commission, Cambridge, 43 p.

Mauzey, K. P., C. Birkeland, and P. K. Dayton. 1968. Feeding behavior of asteroids and escape responses of their prey in the Puget Sound region. Ecology 49(4):603-619.

McCracken, A. R., B. M. Christensen, D. Munteanu, B. Case, M. Lloyd, K. P. Herbert, and M. H. Pespeni. 2023. Microbial dysbiosis precedes signs of sea star wasting disease in wild populations of Pycnopodia helianthoides. Frontiers in Marine Science 10:1130912.

Mellinger, D. K., K. M. Stafford, and C. G. Fox. 2004a. Seasonal occurrence of sperm whale (*Physeter macrocephalus*) sounds in the Gulf of Alaska, 1999–2001. Marine Mammal Science 20(1):48-62.

Mellinger, D. K., K. M. Stafford, S. E. Moore, U. Munger, and C. G. Fox. 2004b. Detection of North Pacific right whale (*Eubalaena japonica*) calls in the Gulf of Alaska. Marine Mammal Science 20(4):872-879.

Mizroch, S., and D. Rice. 2013. Ocean nomads: Distribution and movements of sperm whales in the North Pacific shown by whaling data and Discovery marks. Marine Mammal Science 29:E136-E165.

Muto, M. M., V. T. Helker, R. P. Angliss, B. A. Allen, P. L. Boveng, J. M. Breiwick, M. F. Cameron, P. J. Clapham, S. P. Dahle, M. E. Dahlheim, B. S. Fadely, M. C. Ferguson, L. W. Fritz, R. C. Hobbs, Y. V. Ivashchenko, A. S. Kennedy, J. M. London, S. A. Mizroch, R. R. Ream, E. L. Richmond, K. E. W. Shelden, R. G. Towell, P. R. Wade, J. M. Waite, and A. N. Zerbini. 2018. Alaska marine mammal stock assessments, 2017. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Alaska Fisheries Science Center, Seattle, WA, June 2018. NOAA Technical Memorandum NMFS-AFSC-378, 382 p.

Muto, M. M., V. T. Helker, B. J. Delean, N. C. Young, J. C. Freed, R. P. Angliss, N. A. Friday, P. L. Boveng, J. M. Breiwick, B. M. Brost, M. F. Cameron, P. J. Clapham, J. L. Crance, S. P. Dahle, M. E. Dahlheim, B. S. Fadely, M. C. Ferguson, L. W. Fritz, K. T. Goetz, R. C. Hobbs, Y. V. Ivashchenko, A. S. Kennedy, J. M. London, S. A. Mizroch, R. R. Ream, E. L. Richmond, K. E. W. Shelden, K. L. Sweeney, R. G. Towell, P. R. Wade, J. M. Waite, and A. N. Zerbini. 2022. Alaska marine mammal stock assessments, 2021. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Alaska Fisheries Science Center, Seattle, WA, August 2022. NOAA Technical Memorandum NMFS-AFSC-441, 398 p.

Neilson, J. L., C. M. Gabriele, A. S. Jensen, K. Jackson, and J. M. Straley. 2012. Summary of reported whale-vessel collisions in Alaskan waters. Journal of Marine Biology 2012:106282.

NMFS. 1998. Recovery plan for the blue whale (*Balaenoptera musculus*). National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Silver Spring, MD, 42 p.

NMFS. 2018. Revision to technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing (Version 2.0): underwater acoustic thresholds for onset of permanent and temporary threshold shifts. U.S. Dept. of Commerce, National Oceanic and Atmospherica Administraiton, National Marine Fisheries Service, Office of Protected Resources, Silver Spring, MD. NOAA Tech. Memo. NMFS-OPR-55, 178 p.

NMFS. 2023. Gray whale, Western North Pacific Distinct Population Segment (*Eschrichtius robustus*) 5-year review: summary and evaluation. U.S. Department of Commerce, National Oceanic and Atmospheric Administraiton, National Marine Fisheries Service, Office of Protected Resources, Silver Spring, MD, 42 p.

Paul, A. J., and H. M. Feder. 1975. The food of the sea star *Pycnopodia helianthoides* (Brandt) in Prince William Sound, Alaska. Ophelia 14:15-22.

Payne, R. S. 1970. Songs of the humpback whale. Capitol Records, Hollywood, CA.

Perry, S. L., D. P. DeMaster, and G. K. Silber. 1999. The Great Whales: History and Status of Six Species Listed as Endangered Under the U.S. Endangered Species Act of 1973: a special issue of the Marine Fisheries Review. Marine Fisheries Review 61(1):1-74.

Rice, A. C., N. Posdaljian, M. A. Rafter, J. S. Trickey, S. M. Wiggins, S. Baumann-Pickering, and J. A. Hildebrand. 2020. Passive acoustic monitoring for marine mammals in the Gulf of Alaska Temporary Maritime Activities Area September 2017 to September 2019. Marine Physical Laboratory, Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA. Technical Memorandum #646 under Cooperative Ecosystems Study Unit Cooperative Agreement N62473-18-2-0016 for U.S. Navy, U.S. Pacific Fleet, Pearl Harbor, HI.

Rice, D. W. 1989. Sperm whale *Physeter macrocephalus* Linnaeus, 1758. Pages 177-233 *in* S. Ridgway, and R. Harrison, editors. Handbook of marine mammals, 4. Academic Press, New York, New York.

Richardson, W. J., C. R. Greene Jr, C. I. Malme, and D. H. Thomson. 1995. Marine mammals and noise. Academic Press, Inc., San Diego, CA.

Rone, B. K., A. N. Zerbini, A. B. Douglas, D. W. Weller, and P. J. Clapham. 2017. Abundance and distribution of cetaceans in the Gulf of Alaska. Marine Biology 164(23).

Sharpe, F. A., and L. M. Dill. 1997. The behavior of Pacific herring schools in response to artificial humpback whale bubbles. Canadian Journal of Zoology-Revue Canadienne De Zoologie 75(5):725-730.

Shivji, M., D. Parker, B. Hartwick, M. Smith, and N. Sloan. 1983. Feeding and distribution study of the sunflower sea star *Pycnopodia helianthoides* (Brandt, 1835). Pacific Science

37(2):133-140.

Silber, G. K. 1986. The relationship of social vocalizations to surface behavior and aggression in the Hawaiian humpback whale (*Megaptera novaeangliae*). Canadian Journal of Zoology 64(10):2075-2080.

Simon, M., M. Johnson, and P. T. Madsen. 2012. Keeping momentum with a mouthful of water: behavior and kinematics of humpback whale lunge feeding. Journal of Experimental Biology 215(21):3786-3798.

Smultea Environmental Sciences (Smultea Sciences). 2022. Intrepid Protected Species Observer Report for GCI during the AU-Aleutians Fiber Cable Installation Project 2022. Prepared by M.A. Smultea, R. Wachtendonk, B. Snyder, and V. Schaefer. Prepared for General Communication Inc. 2550 Denali St # 1000, Anchorage, AK, 99503.

Straley, J. M., J. R. Moran, K. M. Boswell, J. J. Vollenweider, R. A. Heintz, T. J. Quinn Ii, B. H. Witteveen, and S. D. Rice. 2018. Seasonal presence and potential influence of humpback whales on wintering Pacific herring populations in the Gulf of Alaska. Deep Sea Research Part II: Topical Studies in Oceanography 147:173-186.

Straley, J. M., G. Schorr, A. Thode, J. Calambokidis, C. Lunsford, E. M. Chenoweth, V. O. Connell, and R. Andrews. 2014. Depredating sperm whales in the Gulf of Alaska: local habitat use and long distance movements across putative population boundaries. Endangered Species Research 24(2):125-135.

Strathmann, M. F. 1987. Chapter 26. Phylum Echinodermata. Class Asteroidea. Pages 535-555 *in* M. F. Strathmann, editor. Reproduction and development of marine invertebrates of the northern Pacific Coast. Univ. of Washington Press, Seattle, WA.

Thompson, P. O., W. C. Cummings, and S. J. Ha. 1986. Sounds, source levels, and associated behavior of humpback whales, Southeast Alaska. Journal of the Acoustical Society of America 80(3):735-740.

Thompson, T. J., H. E. Winn, and P. J. Perkins. 1979. Mysticete sounds. Pages 403-431 *in* H. E. Winn, and B. L. Olla, editors. Behavior of Marine Animals: Current Perspectives in Research Vol. 3: Cetaceans. Plenum Press, New York, NY.

Tomilin, A. 1967. Mammals of the USSR and adjacent countries. Cetacea 9:666-696.

Tyack, P., and H. Whitehead. 1983. Male competition in large groups of wintering humpback whales. Behaviour 83(1/2):132-154.

Tyack, P. L. 1981. Interactions between singing Hawaiian humpback whales and conspecifics nearby. Behavioral Ecology and Sociobiology 8:105-116.

Vu, E. T., D. Risch, C. W. Clark, S. Gaylord, L. T. Hatch, M. A. Thompson, D. N. Wiley, and S. M. Van Parijs. 2012. Humpback whale song occurs extensively on feeding grounds in the western North Atlantic Ocean. Aquatic Biology 14(2):175-183.

Wade, P. R. 2021. Estimates of abundance and migratory destination for North Pacific humpback whales in both summer feeding areas and winter mating and calving areas. National Marine Fisheries Service, Alaska Fisheries Science Center, Seattle, WA. Paper submitted to the International Whaling Commission SC/68C/IA/03.

Weston Solutions, Inc. 2024. National Marine Fisheries Service Biological Assessment for the AU-Aleutians II Fiber Project, Bering Sea, Alaska. Revision 1. Prepared for Unicom, Anchorage, Alaska. 114 p.

Wild, L., A. Thode, J. Straley, S. Rhoads, D. Falvey, and J. Liddle. 2017. Field trials of an acoustic decoy to attract sperm whales away from commercial longline fishing vessels in western Gulf of Alaska. Fisheries Research 196:141-150.

Winn, H. E., P. J. Perkins, and T. C. Poulter. 1970. Sounds of the humpback whale. Pages 39-52 *in* 7th Annual Conference on Biological Sonar and Diving Mammals, Stanford Research Institute, Menlo Park.

Witteveen, B. H., and K. M. Wynne. 2017. Site fidelity and movement of humpback whales (*Megaptera novaeangliae*) in the western Gulf of Alaska as revealed by photo-identification. Canadian Journal of Zoology 95(3):169-175.

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
101 12th Avenue, Room 110
Fairbanks, AK 99701

Best number: 907-987-2213
Office Phone (907) 456-0277

From: Korsmo (Aughe), Stacey <Stacey.Aughe@WestonSolutions.com>
Sent: Thursday, December 21, 2023 5:12 PM
To: AK Marine Mammals, FW7 <FW7_AK_Marine_Mammals@fws.gov>
Cc: Emily Creely <ecreely@dowl.com>; Larson, Meghan <Meghan.Larson@WestonSolutions.com>; NMennen@gci.com <NMennen@gci.com>; CMiller3@gci.com <CMiller3@gci.com>; apereira@ntia.gov <apereira@ntia.gov>; andrew.bielakowski@firstnet.gov <andrew.bielakowski@firstnet.gov>; Ott, Kaithryn <Kaithryn_Ott@fws.gov>
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

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

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.

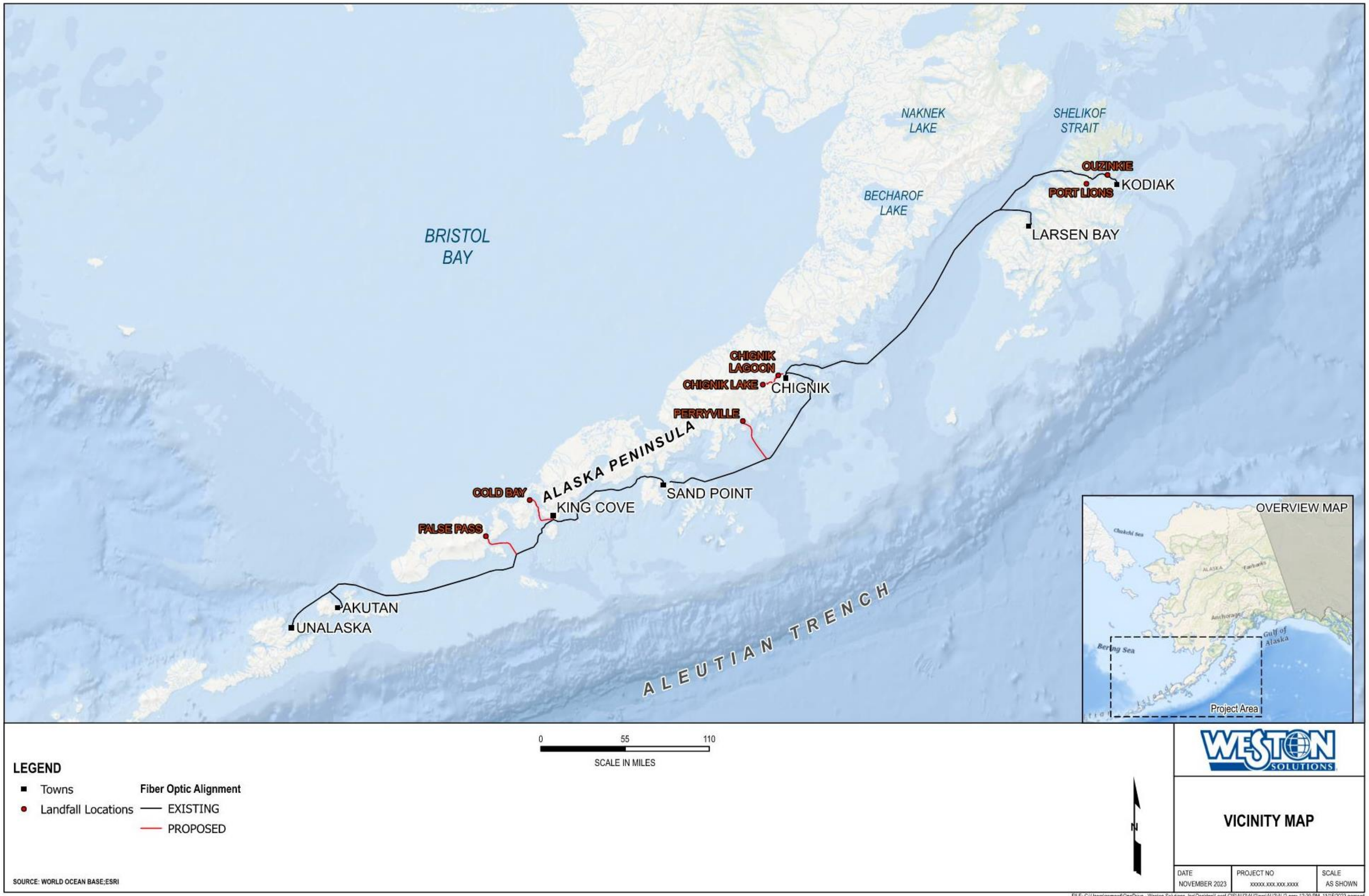


Figure 1. Project Vicinity Map

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.

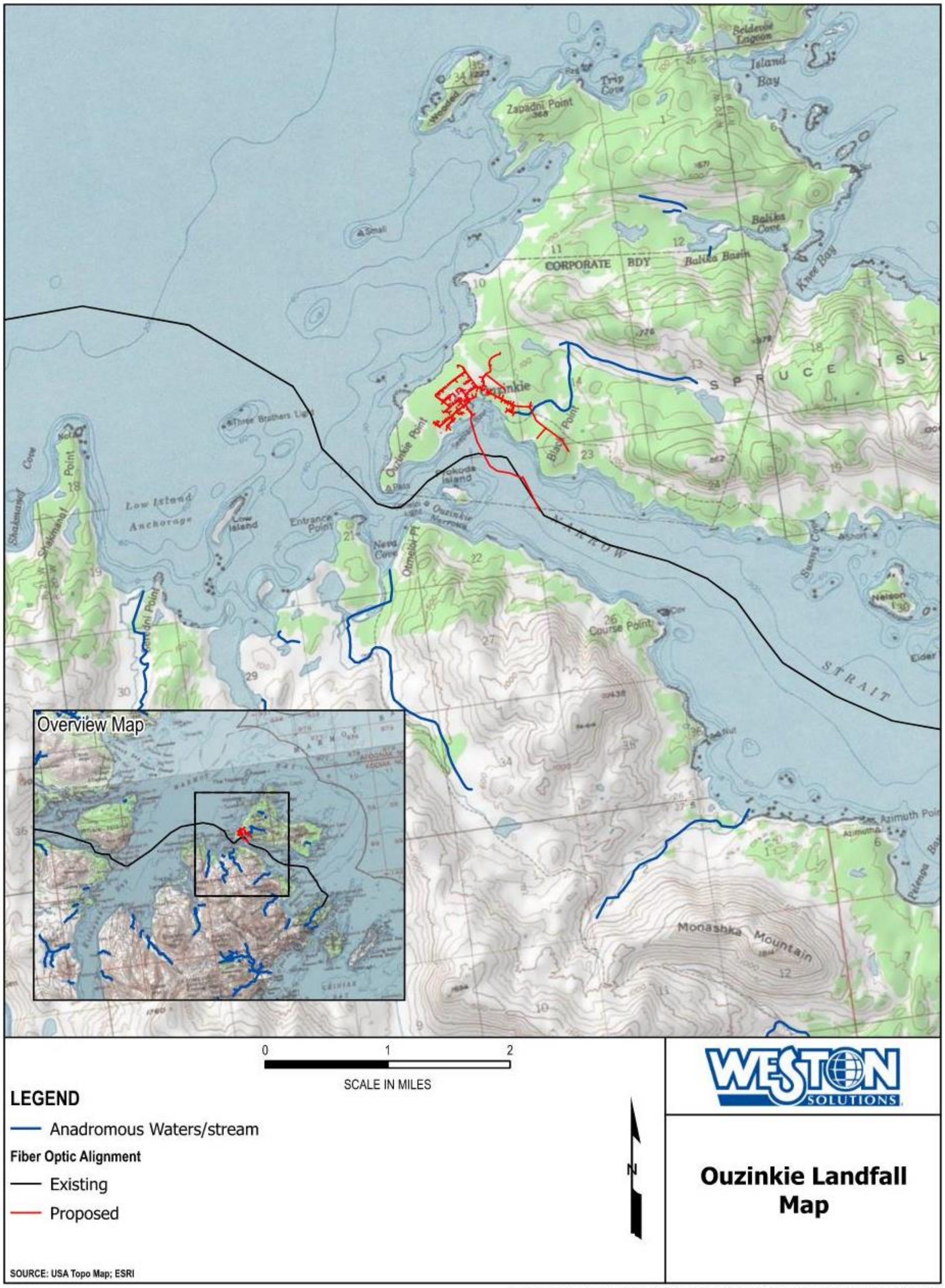


Figure 2. Ouzinkie Landfall Map

Figure 3. Ouzinkie Landing Site

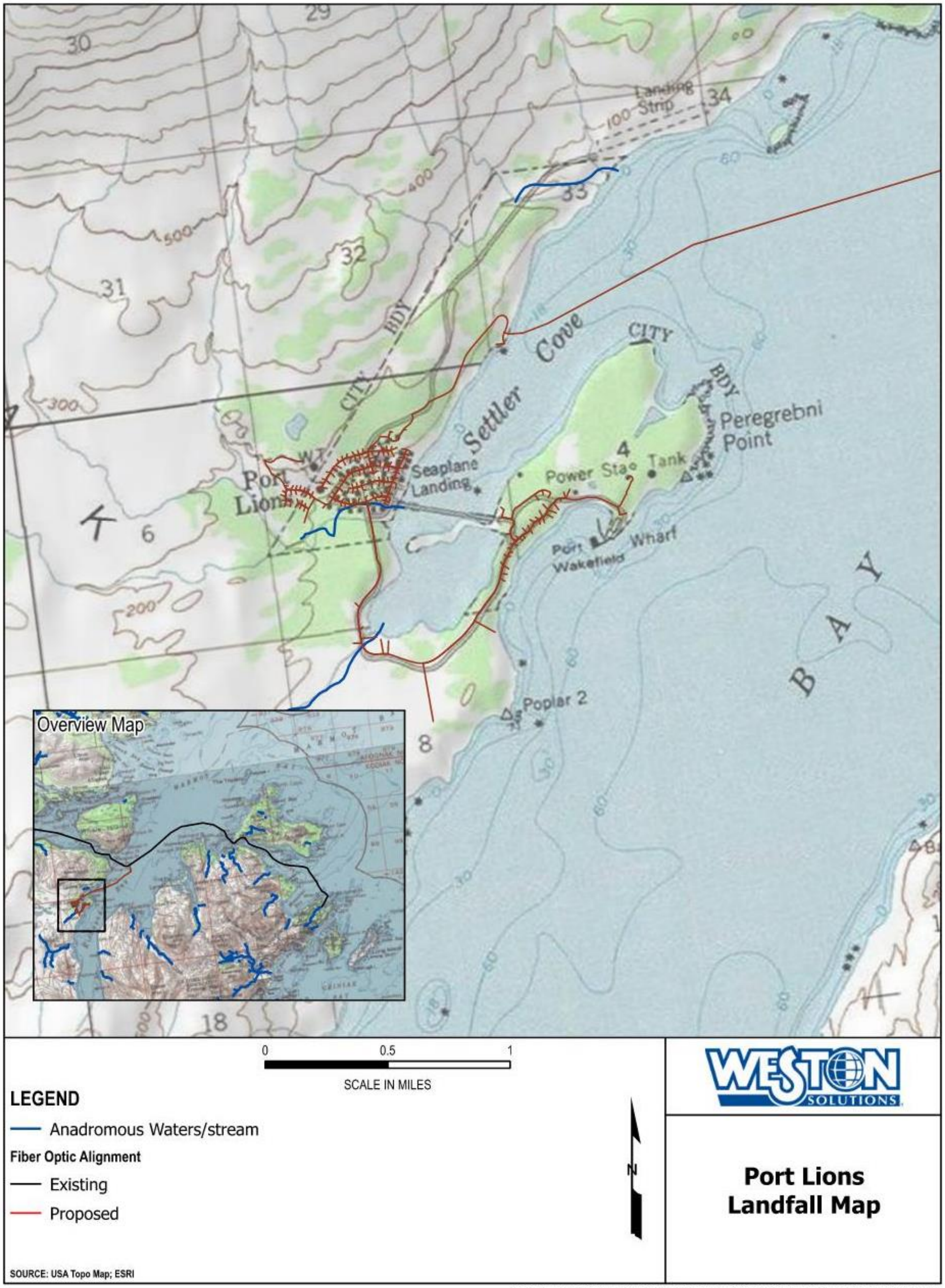


Figure 4. Port Lions Landfall Map

Figure 5. Port Lions Landing Site

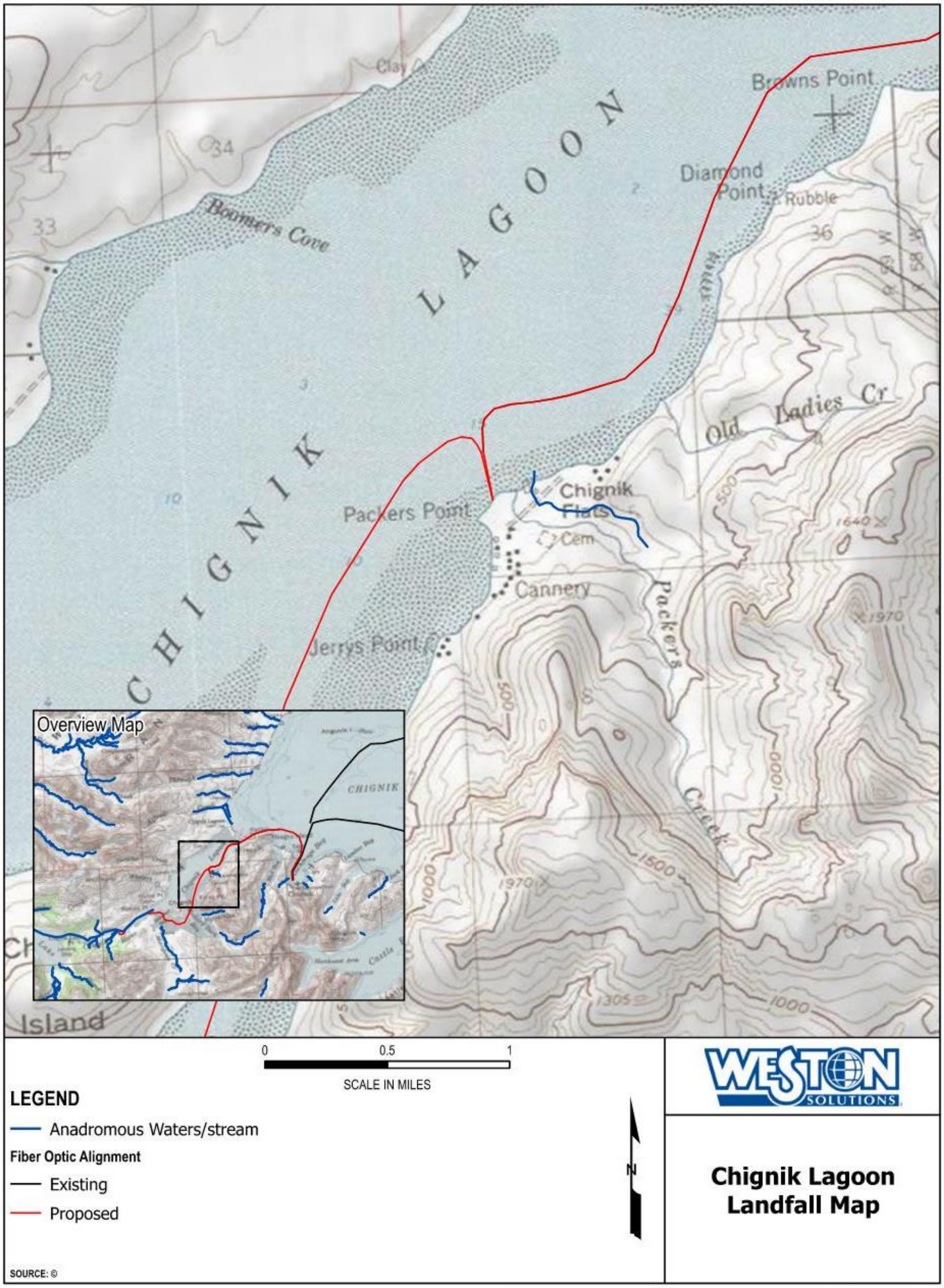


Figure 6. Chignik Lagoon Landfall Map

Figure 7. Chignik Lagoon Landing Site

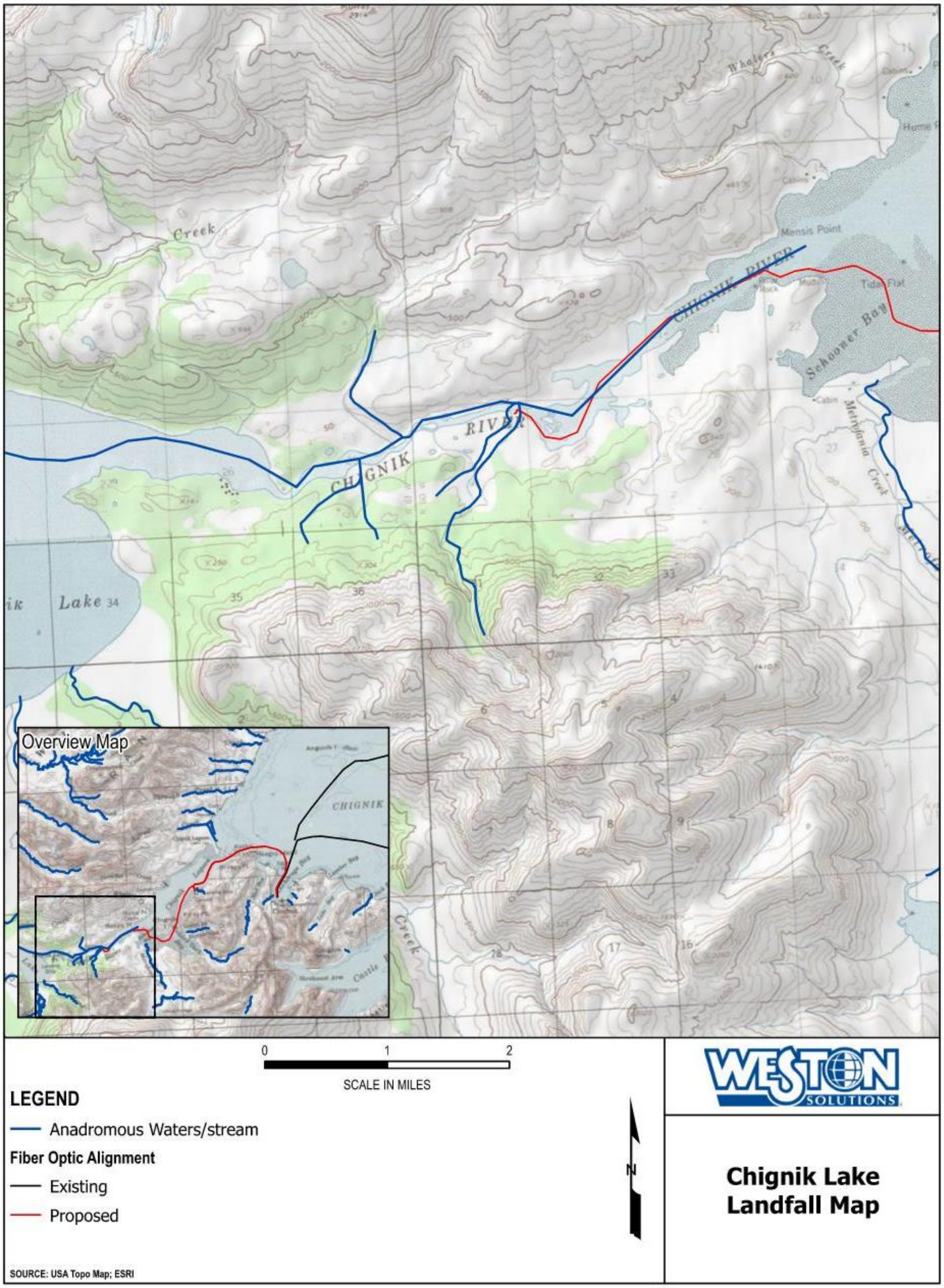


Figure 8. Chignik Lake Landfall Map

Figure 9. Chignik Lake Landing Site

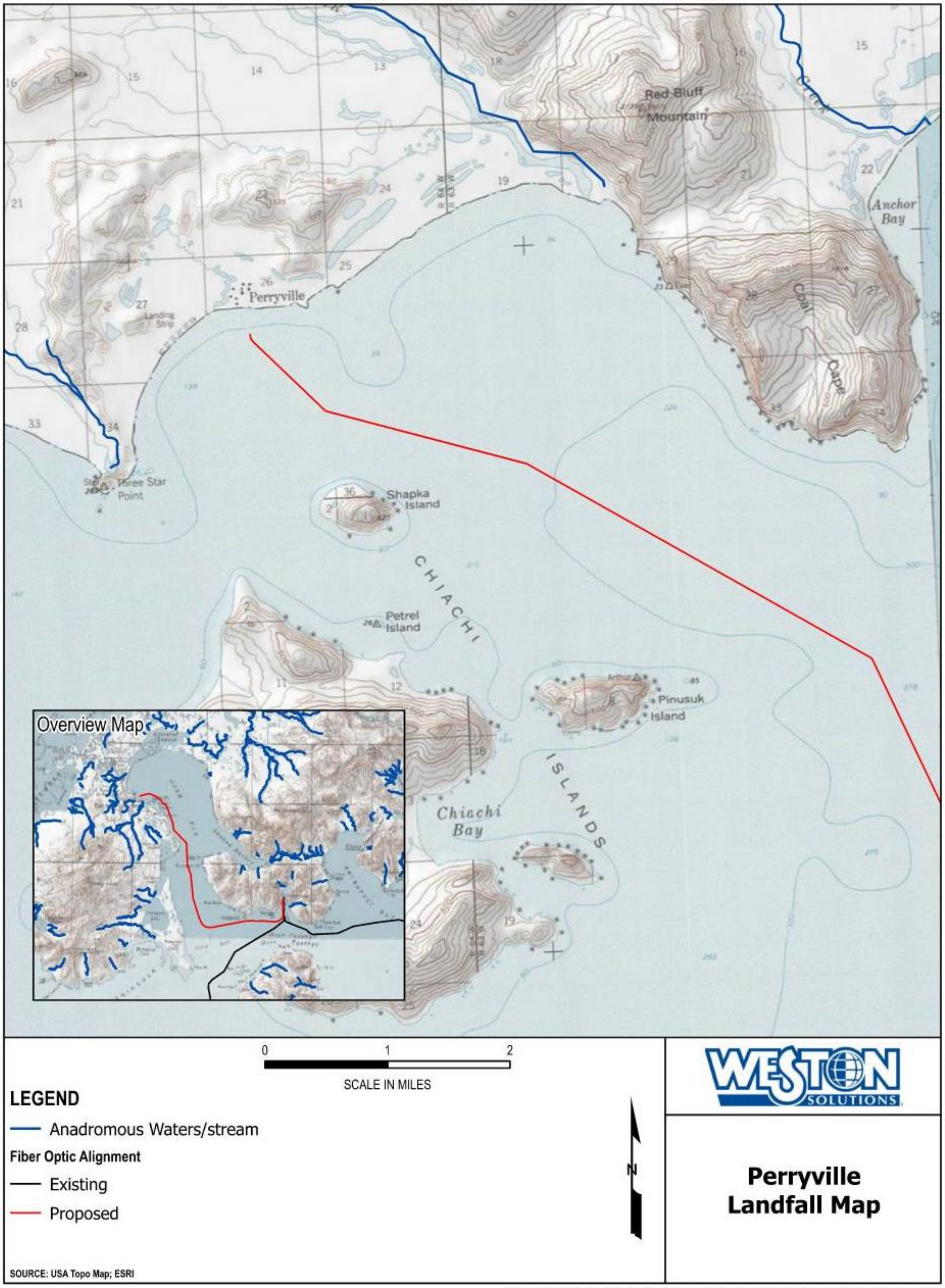


Figure 10. Perryville Landfall Map

Figure 11. Perryville Landing Site

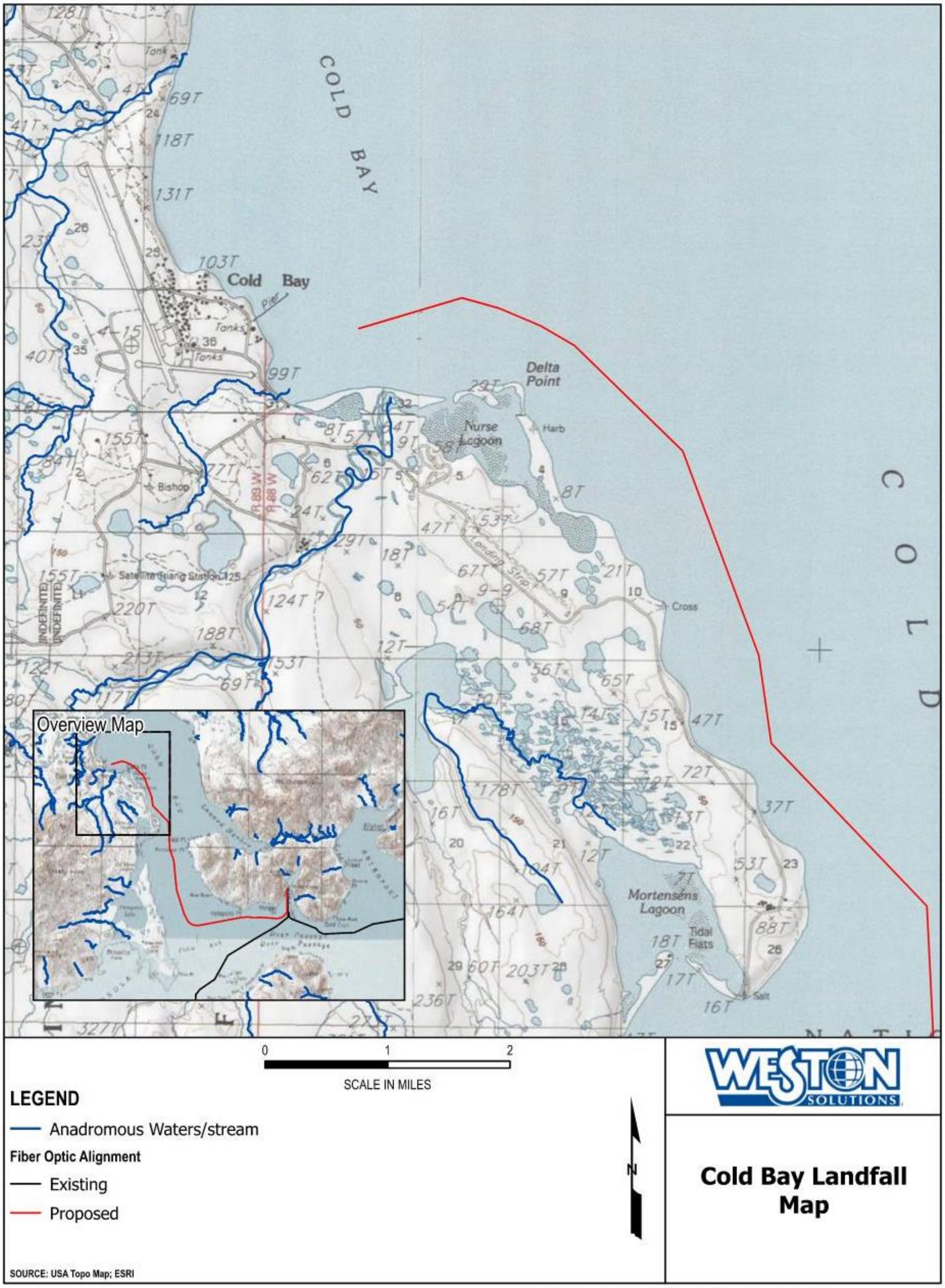


Figure 12. Cold Bay Landfall Map

Figure 13. Cold Bay Landing Site

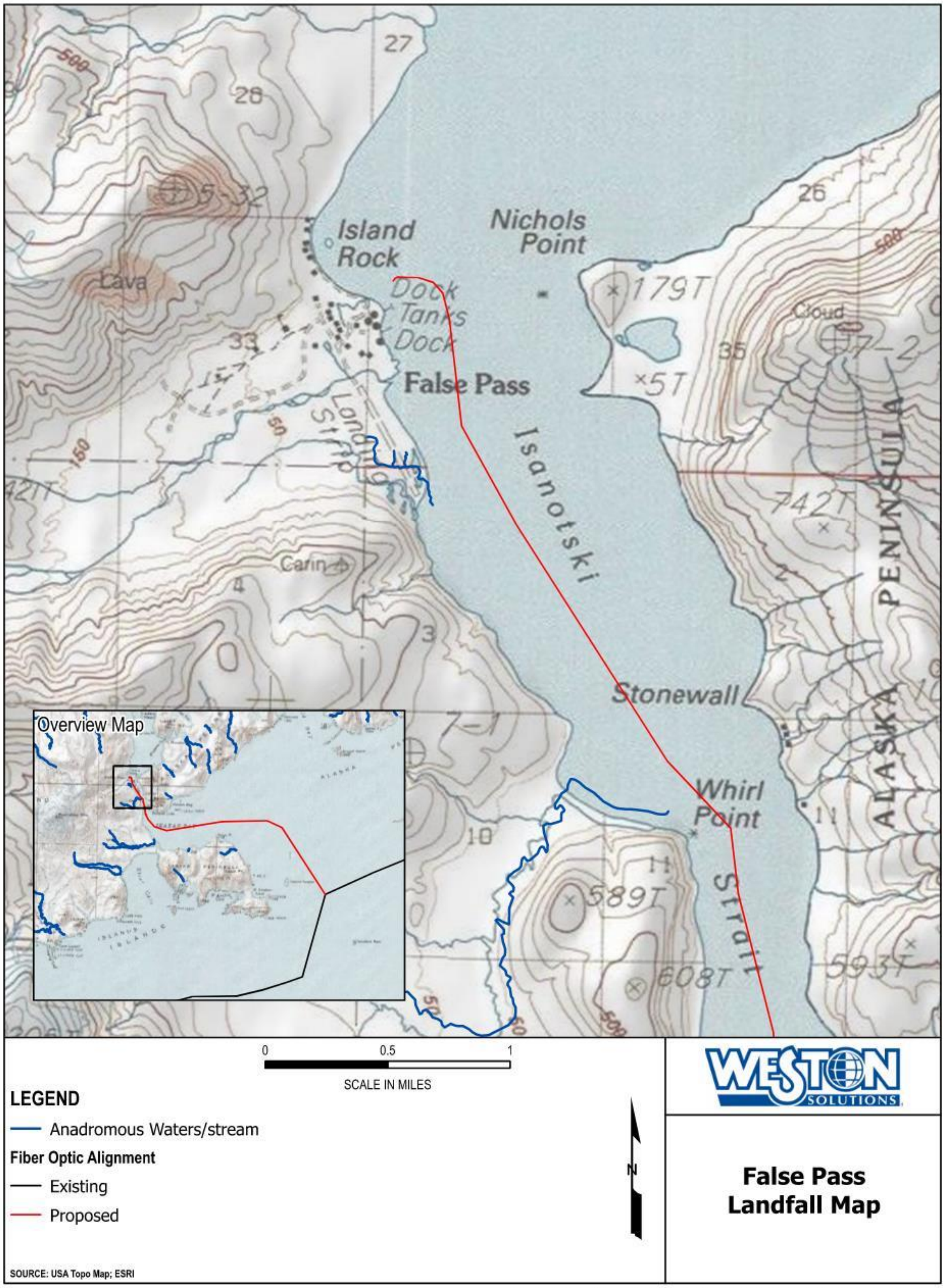


Figure 14. False Pass Landfall Map

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 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.

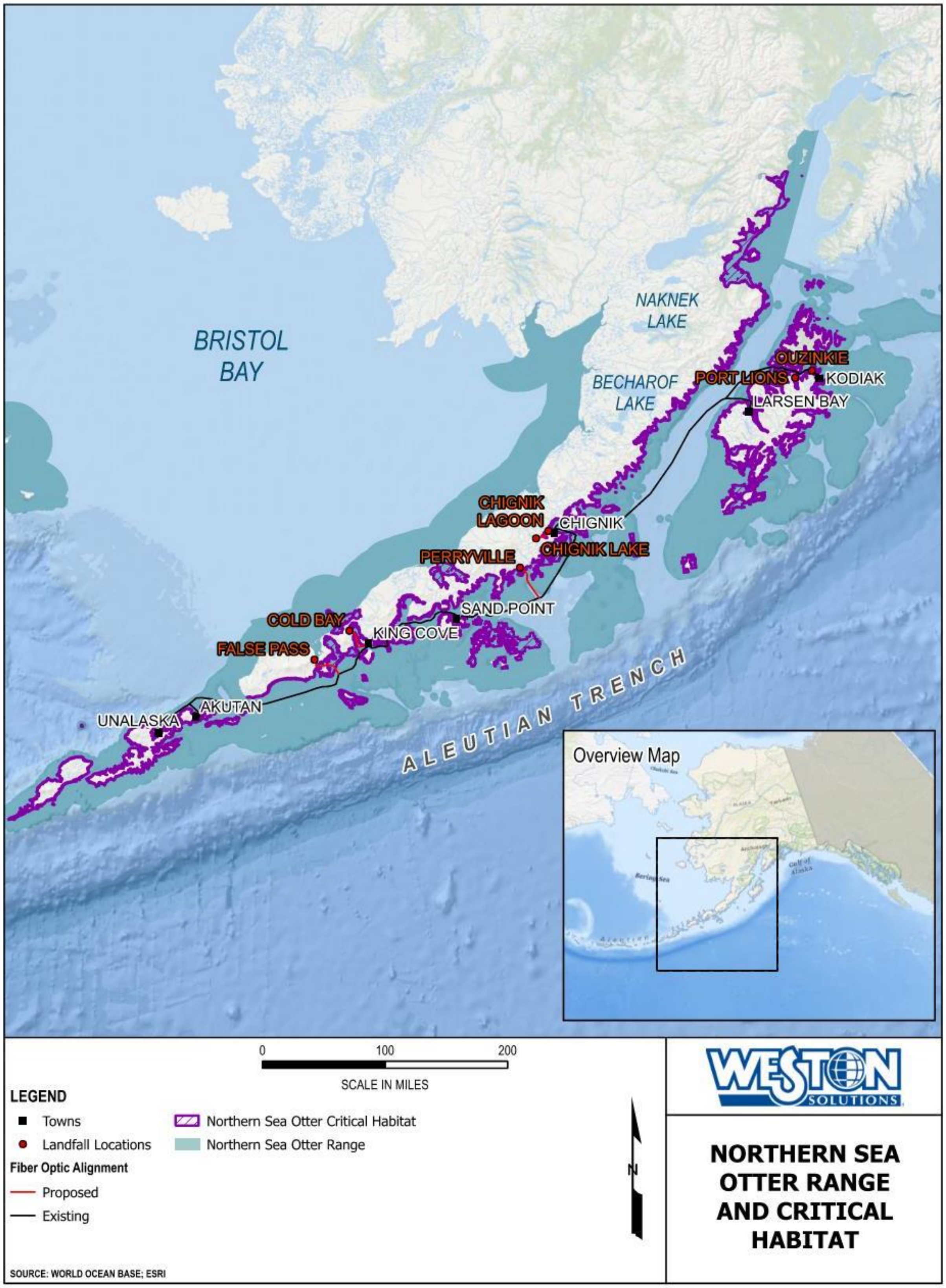


Figure 17. Northern Sea Otter Southwest Alaska Stock Distribution in the Action Area

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).

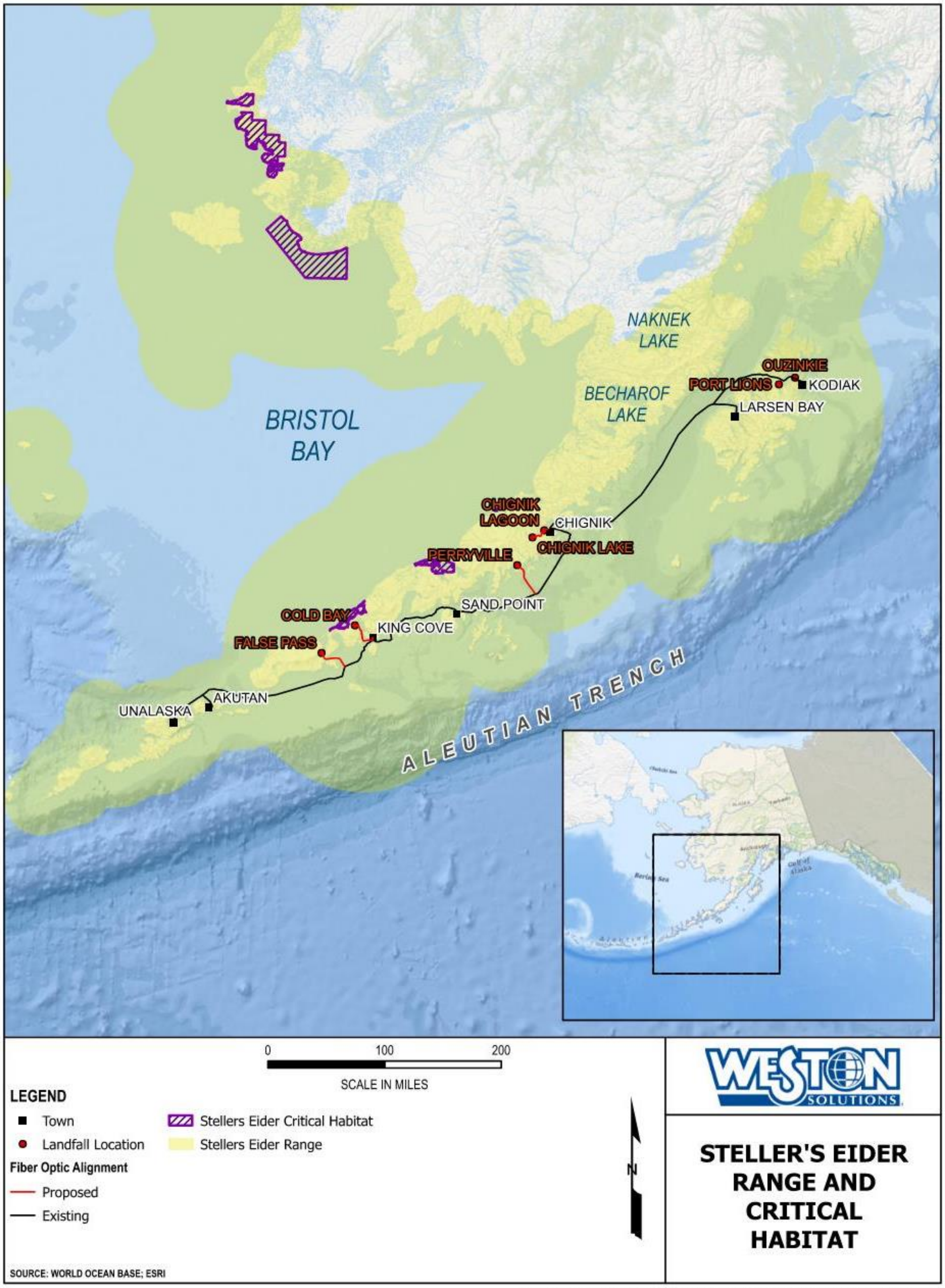


Figure 18. Steller's eider distribution in the Action Area.

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).

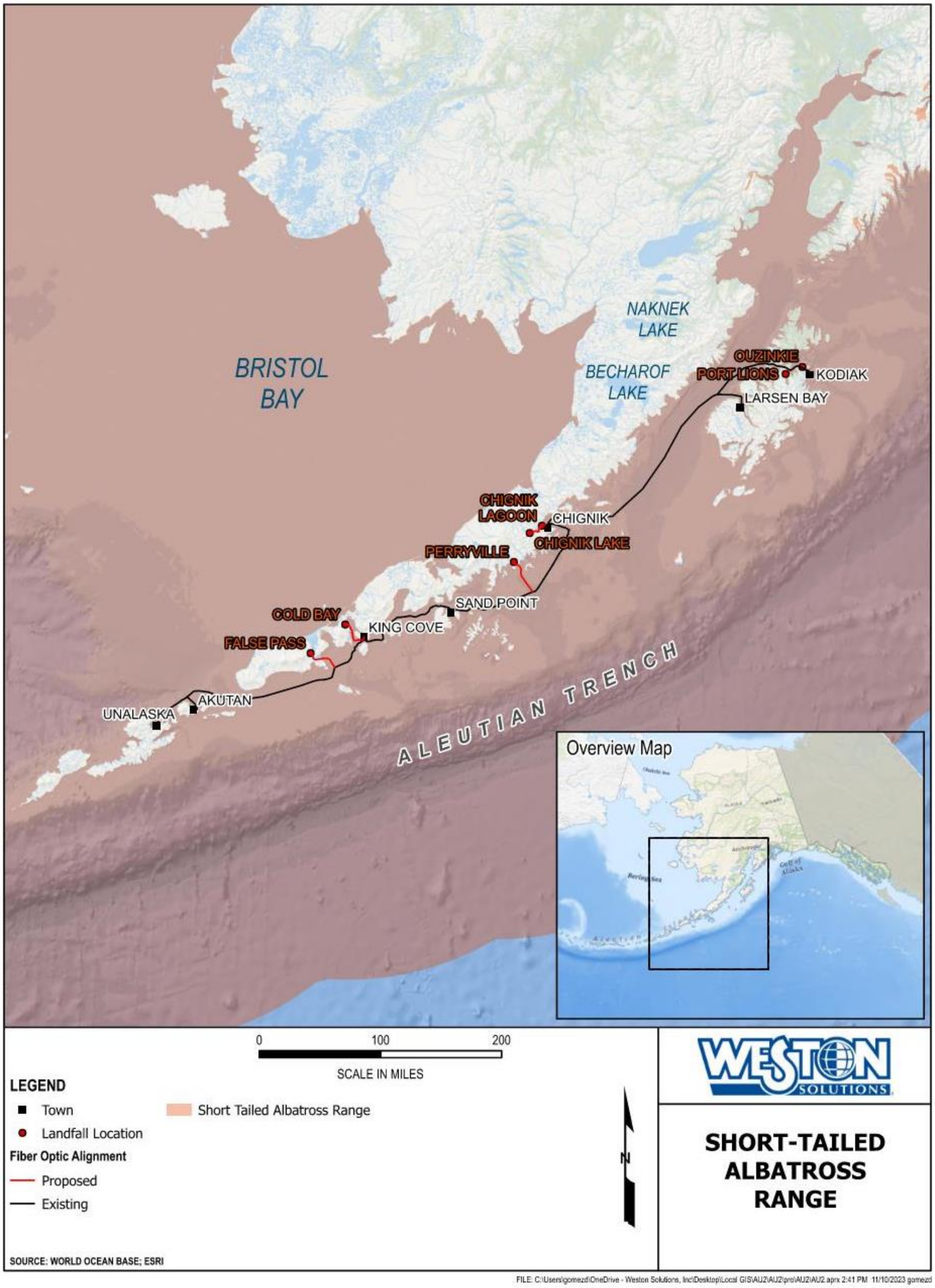


Figure 19. Short-tailed albatross distribution in the Action Area.

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).

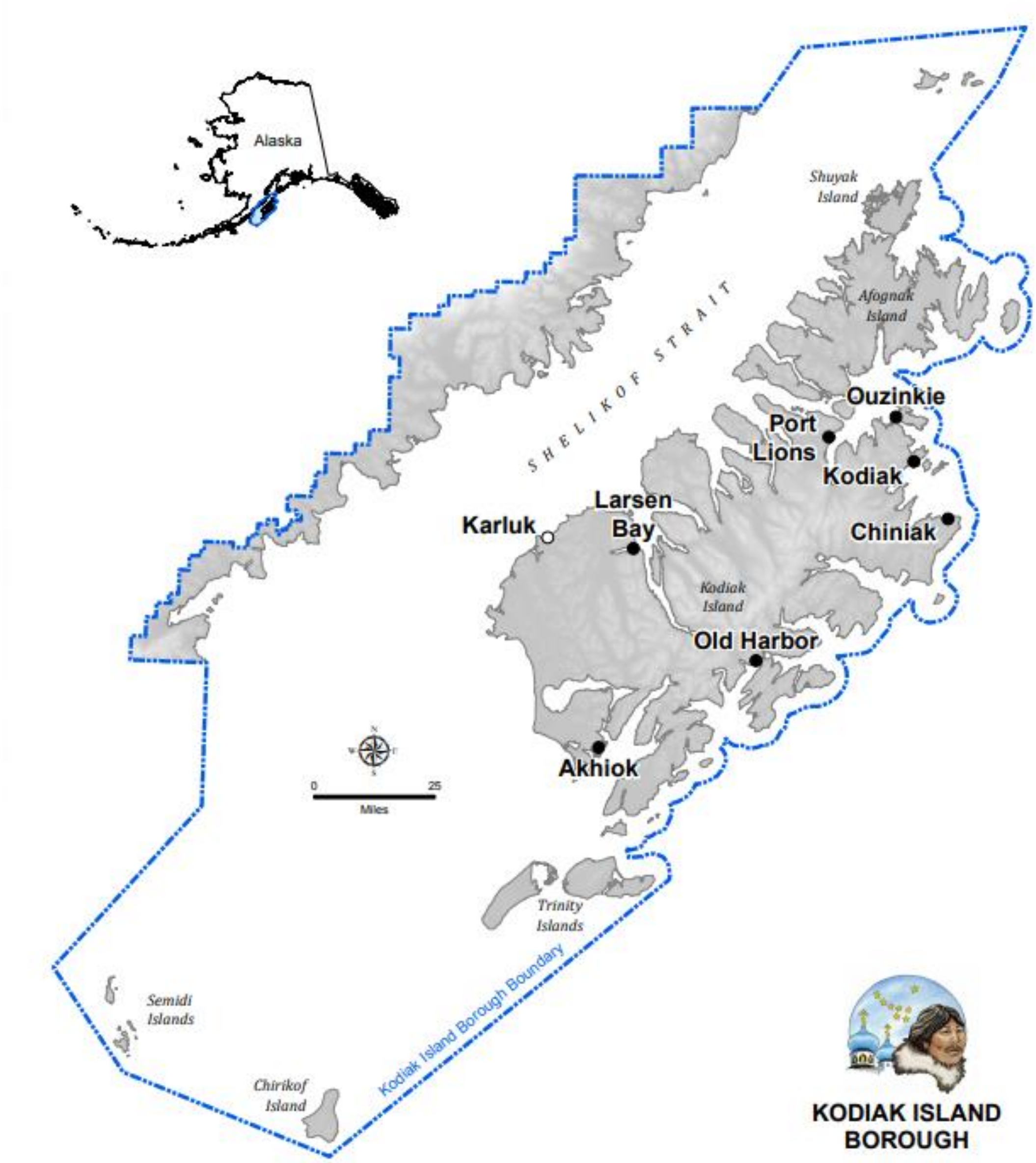
Ocean basin topography, currents, water temperature, and other environmental characteristics influence the high productivity of the region’s saltwater environments, which support many species of fish, marine mammals, crustaceans, and birds. A pre-history of glaciation throughout the region has also significantly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

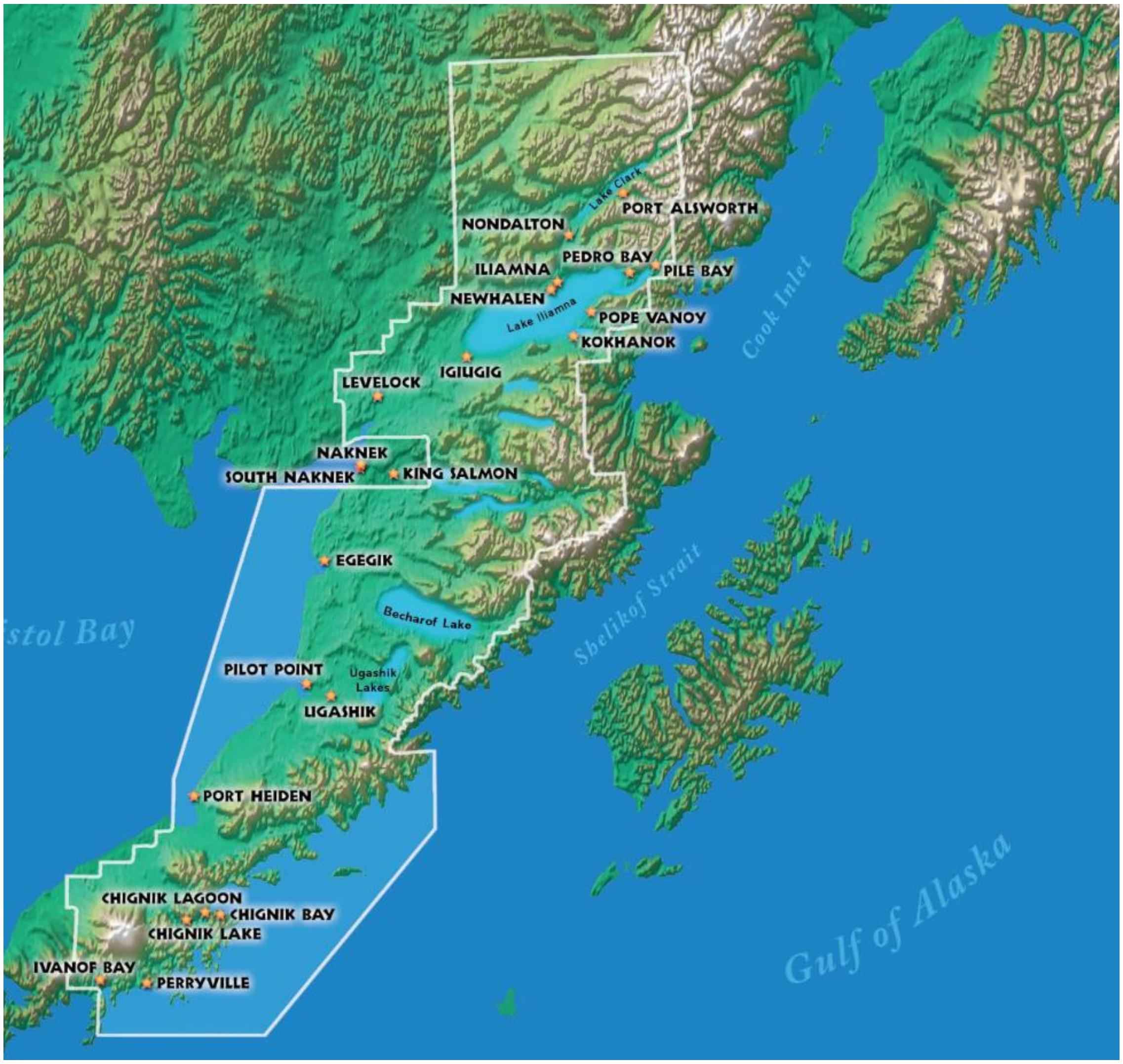


Source: Kodiak Island Borough 2018

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.

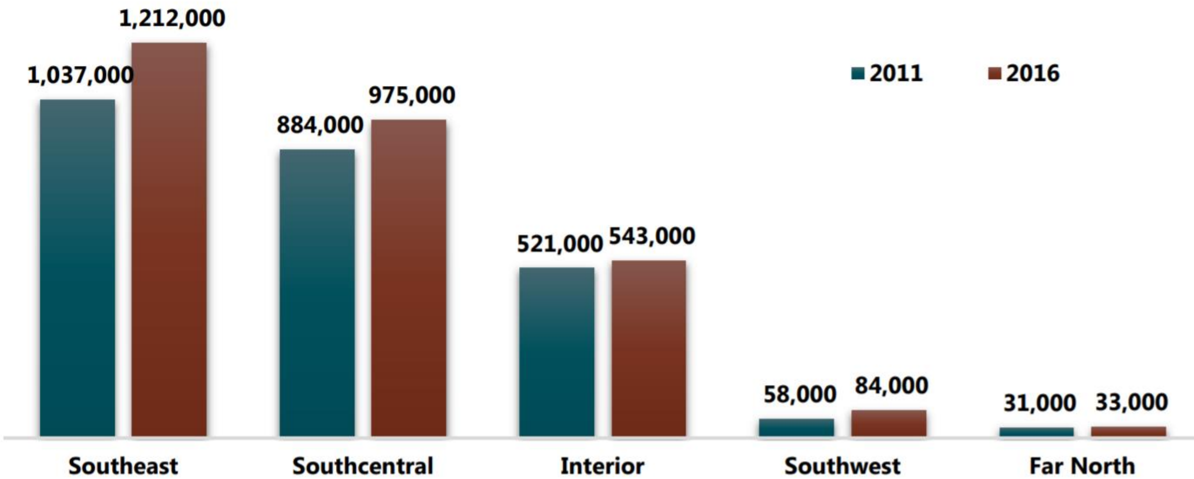
Fishing and commercial seafood processing has occurred on Kodiak Island since the late 1800s (ADFG 2018a), and today Kodiak is home to Alaska’s largest fishing port. The KMA includes the marine waters surrounding the Kodiak Archipelago, as well as drainage from the southeastern portion of the Alaska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

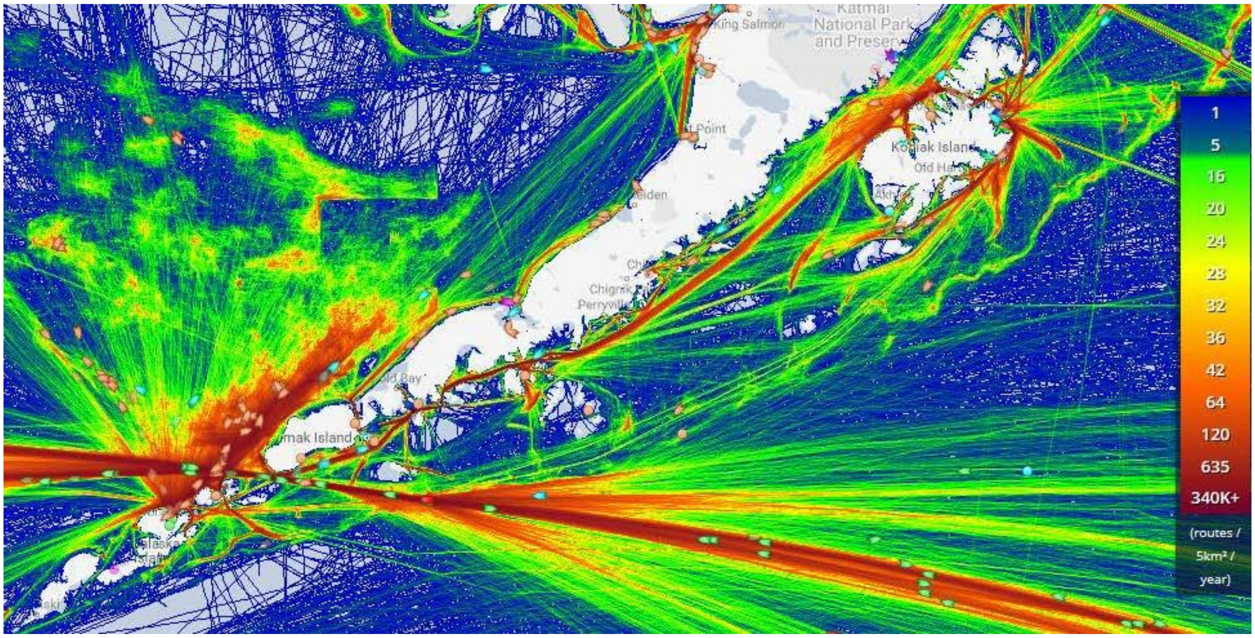
Figure 24. Estimated Visitor Volume to Alaska Regions, Summer 2011 and 2016

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.

8.0 REFERENCES

ADNR-DOG. 2023. Notice of Sale. Alaska Peninsula Areawide 2023, North Slope Areawide 2023W, and North Slope Foothills Areawide 2023 Competitive Oil and Gas Lease Sales. Available online at: Microsoft Word - 2023-10-13_Sale Notice__Notice of Sale.docx (alaska.gov) .

Agness, A.M., J.F. Piatt, J.C. ha, and G.R. VanBlaricom. 2008. Effects of vessel activity on the near-shore ecology of Kittlitz's murrelets (*Brachyramphus brevirostris*) in Glacier Bay, Alaska. Auk 125:346-353.

Alaska Department of Commerce, Community, & Economic Development. 2017. Alaska Visitor Statistics Program 7. Prepared by Alaska Travel Industry Association. May 2017. https://www.alaskatia.org/marketing/AVSP percent20VII/Full percent20AVSP percent20VII percent20Report.pdf. Accessed October 29, 2018.

Alaska Department of Fish and Game. 2018a. Subsistence Fishing Information by Area: Kodiak Island Area. http://www.adfg.alaska.gov/index.cfm?adfg=ByAreaSubsistenceKodiakIS.main. Accessed September 17, 2018.

Alaska Department of Fish and Game. 2018b. Commercial Fisheries Overview: Alaska Peninsula Management Area. http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareaakpeninsula.main. Accessed October 29, 2018.

Alaska Department of Fish and Game. 2018c. Commercial Fisheries Overview: Chignik Management Area. http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareachignik.main. Accessed October 29, 2018.

Alaska Department of Labor and Workforce Development. 2023. 2020 Census Data. Research and Analysis. Available online at: https://live.laborstats.alaska.gov/census-data/redistrict?value%5B0%5D=4821

Alaska Department of Transportation and Public Facilities. 2017. Alaska Airports and Aviation. 2017 Annual Report. http://dot.alaska.gov/documents/aviation/2017Annual_Report.pdf. Accessed November 4, 2018.

Alaska Marine Highway System. 2016. 2015 Annual Traffic Volume Report. Published by the Alaska Marine Highway System for the State of Alaska Department of Transportation.

Aleutians East Borough. 2018. The Communities of the Aleutians East Borough. https://www.aleutianseast.org/vertical/sites/ percent7BEBDABE05-9D39-4ED4-98D4-908383A7714A percent7D/uploads/ percent7BDE883074-5FBA-46DE-BE62-AD3EDE80E864 percent7D.jpg. Accessed November 16, 2018.

Aleutians East Borough. 2017. Strategic Initiatives. Completed Projects with Ongoing Components. December 14, 2017.

Arctic Council. 2009. Arctic Marine Shipping Assessment 2009 Report. Report. 194 p.

Atkinson, S., D. Crocker, D. Houser, and K. Mashburn. 2015. Stress physiology in marine mammals: how well do they fit the terrestrial model? J. Comp. Physiol. B 185:463-486.

Au, W.W.L., A.N. Popper, and R.R. Fay. 2000. Hearing by Whales and Dolphins. Springer Handbook of Auditory Res. Vol. 12. Springer-Verlag, New York, NY. 458 p.

Azzara, A.J., W.M. von Zharen, and J.J. Newcomb. 2013. Mixed-methods analytic approach for determining potential impacts of vessel noise on sperm whale click behavior. J. Acoust. Soc. Am. 134(6):4566-4574.

Beale, C.M. and P. Monaghan. 2004. Behavioural responses to human disturbance: a matter of choice? Anim. Behav. 68(5):1065-1069.

BirdLife International. 2017. Species factsheet: *Polysticta stelleri*. Accessed at http://www.birdlife.org on 21 November 2017.

Black, A. 2005. Light induced seabird mortality on vessels operating in Southern Ocean: incidents and mitigation measures. Antarc. Sci. 17:67-68.

Bodkin, J.L. and D.H. Monson. 2002. Sea otter population structure and ecology in Alaska. Arctic Research of the United States 16:31-35.

Branstetter, B.K., J.S. Trickey, and H. Aihara. J.J. Finneran, and T.R. Liberman. 2013. Time and frequency metrics related to auditory masking of a 10 kHz tone in bottlenose dolphins (*Tursiops truncatus*). J. Acoust. Soc. Am. 134(6):4556-4565.

Branstetter, B.K., K.L. Bakhtiari, J.S. Trickey, and J.J. Finneran. 2016. Hearing mechanisms and noise metrics related to auditory masking in bottlenose dolphins (*Tursiops truncatus*). p. 109-116 In: A.N. Popper and A. Hawkins (eds.), The Effects of Noise on Aquatic Life II. Springer, New York, NY. 1292 p.

Breithaupt, T. 2002. Sound perception in aquatic crustaceans. p. 548-558 In: K. Wiese (ed.). The crustacean nervous system. Springer-Verlag, Berlin-Heidelberg, Germany. 623 p.

Budelmann, B.U. 1992. Hearing in crustacea. p. 131-139 In: D.B. Webster, R.R. Fay, and A.N. Popper (eds.). Evolutionary biology of hearing. Springer-Verlag, New York, NY.

Bustnes, J.O. and G.H. Systad. 2001. Comparative feeding ecology of Steller's Eider and Long-tailed Ducks in winter. Waterbirds 24(3):407-412.

Castellote, M., C.W. Clark, and M.O. Lammers. 2012. Acoustic and behavioural changes by fin whales (*Balaenoptera physalus*) in response to shipping and airgun noise. Biol. Conserv. 147(1):115-122.

Clark, C.W., W.T. Ellison, B.L. Southall, L. Hatch, S.M. Van Parijs, A. Frankel, and D. Ponirakis. 2009. Acoustic masking in marine ecosystems: intuitions, analysis, and implication. Mar. Ecol. Prog. Ser. 395:201-222.

Crowell, S.C. 2016. Measuring in-air and underwater hearing in seabirds. p. 1155-1160 In: A.N. Popper and A. Hawkins (eds.), The Effects of Noise on Aquatic Life II. Springer, New York, NY. 1292 p.

Curland, J.M. 1997. Effects of disturbance on sea otters (Enhydra lutris) near Monterey, California. Master's Thesis 1431, San Jose State University. UMI Company, Ann Arbor, MI.

Dahlheim, M. and M. Castellote. 2016. Changes in the acoustic behavior of gray whales Eschrichtius robustus in response to noise. Endang. Species Res. 31:227-242.

Day, R.H., J.R. Rose, A.K. Prichard and B. Streever. 2015. Effects of gas flaring on the behavior of night-migrating birds at an artificial oil-production island, Arctic Alaska. Arctic 68(3):367-379.

De Robertis, A., V. Hjellvik, N.J. Williamson, and C.D. Wilson. 2008. Silent ships do not always encounter more fish: Comparison of acoustic backscatter recorded by a noise-reduced and a conventional research vessel. ICES J. Mar. Sci. 65: 623-635.

Dick, M.H. and W. Donaldson. 1978. Fishing vessel endangered by Crested Auklet landings. Condor 80:235-236.

Dooling, R.J. and A.N. Popper. 2016. Some lessons from the effects of highway noise on birds. Proceedings of Meetings on Acoustics. 27(1):1-13.

Doroff, A. M., and A. R. DeGange. 1994. Sea otter, Enhydra lutris, prey composition and foraging success in the northern Kodiak Archipelago. *Fisheries Bulletin* 92:704-710.

Doroff, A.M., J.A. Estes, M.T. Tinker, D.M. Burn, and T.J. Evans. 2003. Sea otter population declines in the Aleutian Archipelago. Journal of Mammalogy 84:55-64.

Dunlop, R.A. 2015. The effect of vessel noise on humpback whale, *Megaptera novaeangliae*, communication behaviour. Animal Behav. 111:13-21.

Engås, A., E.K. Haugland, and J.T. Ovredal. 1998. Reactions of cod (*Gadus morhua* L.) in the pre-vessel zone to an approaching trawler under different light conditions. Hydrobiologica 371-372: 199-206.

Erbe, C., C. Reichmuth, K. Cunningham, K. Lucke, and R. Dooling. 2016. Communication masking in marine mammals: a review and research strategy. Mar. Poll. Bull. 103(1-2):15-38.

Fair, P.A. and P.R. Becker. 2000. Review of stress in marine mammals. J. Aquat. Ecosyst. Stress Recov. 7:335-354.

Fey, M. and R. Ames. 2013. Fishing fleet profiles 2012 Addendum. North Pacific Fishery Management Council. 41p.

Finneran, J.J., D.A. Carder, C.E. Schlundt and R.L. Dear. 2010. Growth and recovery of temporary threshold shift (TTS) at 3 kHz in bottlenose dolphins (*Tursiops truncatus*). J. Acoust. Soc. Am. 127(5):3256-3266.

Finneran, J.J. and B.K. Branstetter. 2013. Effects of noise on sound perception in marine mammals. p. 273-308 In: H. Brumm (ed.), Animal communication and noise. Springer Berlin, Heidelberg, Germany. 453 p.

Finneran, J.J. 2015. Noise-induced hearing loss in marine mammals: A review of temporary threshold shift studies from 1996 to 2015. *The Journal of the Acoustical Society of America* 138(3):1702- 1726.

Flint, P.L., J.A. Reed, J.C. Franson, T.E. Hollmén, J.B. Grand, M.D. Howell, R.B. Lanctot, D.L. Lacroix, and C.P. Dau. 2003. Monitoring Beaufort Sea waterfowl and marine birds. U.S. Geological Survey, Alaska Science Center, Anchorage, Alaska OCS Study MMS 2003-037.

Flint, P.L., D.L. Lacroix, J.A. Reed, and R.B. Lanctot. 2004. Movements of flightless long-tailed ducks during wing molt. Waterbirds 27(1):35-40.

Fredrickson, L.H. 2001. Steller's Eider (*Polysticta stelleri*), version 2.0. In: The Birds of North America. Cornell Lab of Ornithology, Ithaca, New York, USA. https://doi.org/10.2173/bna.571

Garshelis, D.L. and J.A. Garshelis. 1984. Movements and management of sea otters in Alaska. Journal of Wildlife Management 48:665-678.

Gauthreaux, S.A., Jr. and C.G. Belser. 2006. Effects of artificial night lighting on migrating birds. pp. 67-93 In: C. Rich and T. Longcore (editors), Ecological Consequences of Artificial Night Lighting, Island Press, Washington, D.C. 478 p

Ghoul, A. and C. Reichmuth. 2012. Sound production and reception in southern sea otters (Enhydra lutris nereis). p. 157-160 In: A.N. Popper and A. Hawkins (eds.) The effects of noise on aquatic life. Springer, New York. 695 p.

Ghoul, A. and C. Reichuth. 2014. Hearing in sea otters (*Enhydra lutris*): audible frequencies determined from a controlled exposure approach. Aquatic Mammals 40(3):243-251.

Gordon, J., D. Gillespie, J. Potter, A. Frantzis, M.P. Simmonds, R. Swift, and D. Thompson. 2004. A review of the effects of seismic surveys on marine mammals. Mar. Technol. Soc. J. 37(4):16-34.

Gospić, N.R. and M. Picciulin. 2016. Changes in whistle structure of resident bottlenose dolphins in relations to underwater noise and boat traffic. Mar. Poll. Bull. 105:193-198.

Gridley, T., S.H. Elwen, G. Rashley, A.B. Krakauer, and J. Heiler. 2016. Bottlenose dolphins change their whistling characteristics in relation to vessel presence, surface behavior and group composition. Proceedings of Meetings on Acoustics 4ENAL 27(1):010030. http://dx.doi.org/doi:10.1121/2.0000312.

Handegard, N.O., K. Michalsen, and D. Tjostheim. 2003. Avoidance behaviour in cod (*Gadus morhua*) to a bottom-trawling vessel. Aquat. Living. Resour. 16: 265-270.

Hansen, K.A., O.N. Larsen, M. Wahlberg, and U. Siebert. 2016. Underwater hearing in great cormorant (*Phalacrocorax carbo sinensis*): methodological considerations. Proceedings of Meetings on Acoustics 4ENAL 27(1):010015. https://doi.org/10.1121/2.0000267

Harris, R.E., G.W. Miller and W.J. Richardson. 2001. Seal responses to airgun sounds during summer seismic surveys in the Alaskan Beaufort Sea. Mar. Mamm. Sci. 17(4):795-812.

Hartin, K.G., C.M. Reiser, D.S. Ireland, R. Rodrigues, D.M.S. Dickson, J. Beland, and M. Bourdon. 2013. Chukchi Sea vessel-based monitoring program. (Chapter 3) In: Funk, D.W., C.M. Reiser, D.S. Ireland, R. Rodrigues, and W.R. Koski (eds.). 2013. Joint Monitoring Program in the Chukchi and Beaufort seas, 2006–2010. LGL Alaska Report P1213-2, Report from LGL Alaska Research Associates, Inc., LGL Ltd., Greeneridge Sciences, Inc., and JASCO Research, Ltd., for Shell Offshore, Inc. and Other Industry Contributors, and National Marine Fisheries Service, U.S. Fish and Wildlife Service. 592 p. plus Appendices.

Hastings, M.C. and A.N. Popper. 2005. Effects of sound on fish. Prepared for Jones & Stokes, Sacramento, CA, for California Dept. Transportation, Sacramento, CA.

Hatch, L.T., C.W. Clark, S.M. Van Parijs, A.S. Frankel, and D.W. Ponirakis. 2012. Quantifying loss of acoustic communication space for right whales in and around a U.S. National Marine Sanctuary. Conserv. Biol. 26(6):983-994.

Havera, S.P., L.R. boens, M.M. Georgi, and R.T. Shealy. 1992. Human disturbance of waterfowl on Keokuk Pool, Mississippi River. Wildl. Soc. Bull. 20:290-298.

HDR Alaska, Inc. 2004. Akuktan Airport master plan Steller's eider winter surveys. HDR Alaska, Anchorage, AK

Heiler, J., S.H. Elwen, H.J. Kriesell, and T. Gridley. 2016. Changes in bottlenose dolphin whistle parameters related to vessel presence, surface behaviour and group composition. Animal Behav. 117:167-177.

Hermannsen, L., J. Tougaard, K. Beedholm, J. Nabe-Nielsen, and P.T. Madsen. 2014. High frequency components of ship noise in shallow water with a discussion of implications for harbor porpoises (*Phocoena phocoena*). J. Acoust. Soc. Am. 136(4):1640-1653.

Heuch P.A, and H.E. Karlsen. 1997. Detection of infrasonic water oscillations by copepodids of Lepeophtheirus salmonis (Copepoda: Caligida). J. Plankton. Res. 19: 735–747.

Hildebrand, J.A. 2005. Impacts of anthropogenic sound. p. 101-124 In: J.E. Reynolds, W.F. Perrin, R.R. Reeves, S. Montgomery, and T. Ragen (eds.) Marine Mammal Research: Conservation Beyond Crisis. Johns Hopkins Univ. Press, Baltimore, MD. 223 p.

Hodges, J.I., and W.D. Eldridge. 2001. Wildfowl. 52:127-142.

Houghton, J., M.M. Holt, D.A. Giles, M.B. Hanson, C.K. Emmons, J.T. Hogan, T.A. Branch, and G.R. VanBlaricom. 2015. The relationship between vessel traffic and noise levels received by killer whales (Orcinus orca). PLoS ONE 10(12): e0140119. http://dx.doi.org/doi:10.1371/journal.pone.0140119.

Houser, D.S., C.D. Champagne, D.E. Crocker. N.M. Kellar, J. Cockrem, T. Romano, R.K. Booth, and S.K. Wasser. 2016. Natural variation in stress hormones, comparisons across matrices, and impacts resulting from induced stress in the bottlenose dolphin. p. 467-471 In: A.N. Popper and A. Hawkins (eds.), The Effects of Noise on Aquatic Life II. Springer, New York, NY. 1292 p.

Illingworth & Rodkin. 2016. Quintillion subsea operations fiber optic cable-laying project sound source verification. Prepared for Owl Ridge Natural Resource Consultants, Inc. by Illingworth & Rodkin, Inc. 15 Pp.

Jensen, F.H., L. Bejder, M. Wahlberg, N. Aguilar Soto, M. Johnson, and P.T. Madsen. 2009. Vessel noise effects on delphinid communication. Mar. Ecol. Prog. Ser. 395:161-175.

Johansen, S., O.N. Larsen, J. Christensen-Dalsgaard, L. Seidelin, T. Huulvej, K. Jensen, S.-G. Linneryrd, M. Boström, and M. Wahlberg. 2016. In-air and underwater hearing in the great cormorant (*Phalacrocorax carbo sinensis*). p. 505-512 In: A.N. Popper and A. Hawkins (eds.), The effects of noise on aquatic life II. Springer, New York, NY. 1292 p.

Jones, E.L., G.D. Hastie, S. Smout, J. Onoufriou, N.D. Merchant, K.L. Brookes, and D. Thompson. 2017. Seals and shipping: quantifying population risk and individual exposure to vessel noise. J. Appl. Ecol. dx.doi.org/doi:10.1111/1365-2664.12911.

Jørgensen, R., N.O. Handegard, H. Gjøsæter, and A. Slotte. 2004. Possible vessel avoidance behaviour of capelin in a feeding area and on a spawning ground. Fish. Res. 69: 251-261.

Kaiser, M.J., M. Galanidi, D.A. Showler, A.J. Elliott, R.W.G. Caldow, E.I.S. Rees, R.A. Stillman, and W.J. Sutherland. 2006. Distribution and behaviour of common scoter *Melanitta nigra* relative to prey resources and environmental parameters. Ibis 148:110-128.

Kenow, K.P., C.E. Korschgen, J.M. Nissen, A. Elfessi, and R. Steinbach. 2003. A voluntary program to curtail boat disturbance to waterfowl during migration. Waterbirds 26:77-87.

Kodiak Island Borough. 2018. About Our Community. https://www.kodiakak.us/621/About-Our-Community. Accessed October 15, 2018.

Kodiak Island Borough. 2023. About Our Community. Available online at: https://www.kodiakak.us/621/About-Our-Community.

Kryter, K.D. 1985. The Effects of Noise on Man. 2nd ed. Academic Press, Orlando, FL. 688 p.

Kujawa, S.G. and M.C. Liberman. 2009. Adding insult to injury: cochlear nerve degeneration after “temporary” noise-induced hearing loss. J. Neurosci. 29(45):14077-14085.

Lacroix, D.L., R.B. Lanctot, J.A. Reed, and T.L. McDonald. 2003. Effect of underwater seismic surveys on molting male long-tailed ducks in the Beaufort Sea, Alaska. Can. J. Zool. 81:1862-1875.

Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet, and M. Podesta. 2001. Collisions between ships and whales. Mar. Mamm. Sci. 17(1):35-75.

Lake and Peninsula Borough. 2018. Villages. http://www.lakeandpen.com/residents/about_l_p_b/villages. Accessed November 16, 2018.

Larned, W. W. 2012. Steller’s eider spring migration surveys southwest Alaska, 2012. U.S. Fish and Wildlife Service, Anchorage, AK. 25 p.

Le Corre, M., A. Ollivier, S. Ribes, and P. Jouventin. 2002. Light-induced mortality of petrels: A 4-year study from Réunion Island (Indian Ocean). Biol. Conserv. 105: 93-102.

Le Prell, C.G. 2012. Noise-induced hearing loss: from animal models to human trials. p. 191-195 In: A.N. Popper and A. Hawkins (eds.), The effects of noise on aquatic life. Springer, New York, NY. 695 p.

LGL. 2000. Steller’s eider and other waterbird numbers and distribution at Akutan Harbor, Alaska, winter of 1999/2000. LGL Alaska Research Associates, Inc., Anchorage, AK

LGL Alaska Research Associates, Inc., JASCO Applied Sciences, Inc., and Greeneridge Sciences, Inc. 2014. Joint Monitoring Program in the Chukchi and Beaufort Seas, 2012. LGL Alaska Final Report P1272-2 for Shell Offshore, Inc. ION Geophysical, Inc., and Other Industry Contributors, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. 320 p. plus Appendices.

Liberman, C. 2016. Noise-induced hearing loss: permanent versus temporary threshold shifts and the effects of hair cell versus neuronal degeneration. p. 1-7 In: A.N. Popper and A. Hawkins (eds.), The Effects of Noise on Aquatic Life II. Springer, New York, NY. 1292 p.

Luís, A.R., M.N. Couchinho, and M.E. Dos Santos. 2014. Changes in the acoustic behavior of resident bottlenose dolphins near operating vessels. Mar. Mamm. Sci. 30(4):1417-1426.

Lusseau, D. and L. Bejder. 2007. The long-term consequences of short-term responses to disturbance experience from whalewatching impact assessment. Intern. J. Compar. Psychol. 20(2-3):228-236.

Lyamin, O.I., S.M. Korneva, V.V. Rozhnov, and L.M. Mukhametov. 2016. Cardiorespiratory responses to acoustic noise in belugas. p. 665-672 In: A.N. Popper and A. Hawkins (eds.), The Effects of Noise on Aquatic Life II. Springer, New York, NY. 1292 p.

Mann, D.A., Z. Lu, and A.N. Popper. 1997. A clupeid fish can detect ultrasound. Nature 389(6649): 341.

Mann, D.A., Z. Lu, M.C. Hastings, and A.N. Popper. 1998. Detection of ultrasonic tones and simulated dolphin echolocation clicks by a teleost fish, the American shad (*Alosa sapidissima*). J. Acoust. Soc. Am. 104(1): 562-568.

Mann, D.A., D.M. Higgs, W.N. Tavolga, M.J. Souza, and A.N. Popper. 2001. Ultrasound detection by clupeiform fishes. J. Acoust. Soc. Am. 109(6): 3048-3054.

Martin, P.D., D.C. Douglas, T. Obritschkewitsch, and S. Torrence. 2015. Distribution and movements of Alaska-breeding Steller's Eiders in the nonbreeding period. 2015. The Condor. 117(3):341-353.

Matthews, L. 2017. Harbor seal (*Phoca vitulina*) reproductive advertisement behavior and the effects of vessel noise. Ph.D. Thesis, Syracuse University. 139 p.

McNeil, R., P. Drapeau and J.D. Goss-Custard. 1992. The occurrence and adaptive significance of nocturnal habits in waterfowl. Biol. Rev. 67:381-419.

McShane, L.J., J.A. Estes, M.L. Riedman, and M.M. Staedler. 1995. Repertoire, structure, and individual variation of vocalizations in the sea otter. Journal of Mammalogy 76(2):414-427.

Melcón, M.L., A.J. Cummins, S.M. Kerosky, L.K. Roche, S.M. Wiggins, and J.A. Hildebrand. 2012. Blue whales respond to anthropogenic noise. PLoS ONE 7(2):e32681. http://dx.doi.org/doi:10.1371/ journal.pone.0032681.

Merkel, F.R. and K.L. Johansen. 2011. Light-induced bird strikes on vessels in Southwest Greenland. Mar. Poll. Bull. 62:2330-2336.

Merkel, F.R. and A. Mosbech. 2008. Diurnal and nocturnal feeding strategies in Common Eiders. Waterbirds 31(4):580-586.

Merkel, F.R., A. Mosbech, and F. Riget. 2009. Common eider *Somateria mollissima* feeding activity and the influence of human disturbances. Ardea 97(1):99-107.

Miles, W., S. Money, R. Luxmoore, and R.W. Furness. 2010. Effects of artificial lights and moonlight on petrels at St. Kilda. Bird Study 57:244-251.

Misund, O.A., J.T. Ovredal, and M.T. Hafsteinsson. 1996. Reactions of herring schools to the sound field of a survey vessel. *Aquat. Living Resour.* 9: 5-11.

Montevecchi, W.A. 2006. Influences of artificial light on marine birds. Pages 128-156 In:C. Rich and T. Longcore (eds). Ecological Consequences of Artificial Night Lighting. Island Press, Washington, D.C. 480 pp.

Montevecchi, W.A., F.K. Wiese, G. Davoren, A.W. Diamond, F. Huettmann, and J. Linke. 1999. Seabird attraction to offshore platforms and seabird monitoring from support vessels and other ships: literature review and monitoring designs. Prepared for Canadian Association of Petroleum Producers by Memorial University of Newfoundland, St. John's, Newfoundland, and University of New Brunswick, Saint John, New Brunswick. 35 p.

Mooney, T.A., P.E. Nachtigall, M. Breese, S. Vlachos, and W.W.L. Au. 2009a. Predicting temporary threshold shifts in a bottlenose dolphin (*Tursiops truncatus*): the effects of noise level and duration. *J. Acoust. Soc. Am.* 125(3):1816-1826.

Mooney, T.A., P.E. Nachtigall and S. Vlachos. 2009b. Sonar-induced temporary hearing loss in dolphins. *Biol. Lett.* 4(4):565-567.

Moulton, V.D., W.J. Richardson, M.T. Williams, R.T. Elliot, T.L. McDonald, C. Nations, and M.T. Williams. 2005. Effects of an offshore oil development on local abundance and distribution of ringed seals (*Phoca hispida*) of the Alaskan Beaufort Sea. *Mar. Mamm. Sci.* 21(2):217-242.

National Academy of Sciences. 2002. Effects of Trawling and Dredging on Seafloor Habitat. National Academy Press, Washington, D.C. 137 pp.

Nowacek, D.P., L.H. Thorne, D.W. Johnston, and P.L. Tyack. 2007. Responses of cetaceans to anthropogenic noise. *Mammal Rev.* 37(2):81-115.

Nuka Research and Planning Group. 2014. Aleutian Island Risk Assessment 2012 Transits of Umiak Pass. Brief to the Aleutian Islands Risk Assessment Advisory Panel and Management Team. September 2014. 13 p.

Ona, E., O.R. Godo, N.O. Handegard, V. Hjellvik, R. Patel, and G. Pedersen. 2007. Silent research vessels are not quiet. *J. Acoust. Soc. Am.* 121: 1-6.

Packard A, Karlsen HE, Sand O.1990. Low frequency hearing in cephalopods. *J Comp Physiol A* 166:501–505.

Papale, E., M. Gamba, M. Perez-Gil, V.M. Martin, and C. Giacoma. 2015. Dolphins adjust species-specific frequency parameters to compensate for increasing background noise. PLoS ONE 10(4):e0121711. http://dx.doi.org/doi:10.1371/journal.pone.0121711.

Parks, S.E. M. Johnson, D. Nowacek, and P.L. Tyack. 2011. Individual right whales call louder in increased environmental noise. *Biol. Lett.* 7(1):33-35.

Parks, S.E., M.P. Johnson, D.P. Nowacek, and P.L. Tyack. 2012. Changes in vocal behaviour of North Atlantic right whales in increased noise. p. 317-320 In: A.N. Popper and A. Hawkins (eds.), The effects of noise on aquatic life. Springer, New York, NY. 695 p.

Parks, S.E., K. Groch, P. Flores, R. Sousa-Lima, and I.R. Urazghildiiev. 2016. Humans, fish, and whales: How right whales modify calling behavior in response to shifting background noise conditions. p. 809-813 In: A.N. Popper and A. Hawkins (eds.), The effects of noise on aquatic life II. Springer, New York, NY. 1292 p.Payne, R. 1978. Behavior and vocalizations of humpback whales (*Megaptera* sp.). In: K.S Norris and R.R. Reeves (eds.), Report on a workshop on problems related to humpback whales (Megaptera novaeangliae) in Hawaii. MCC-77/03. Rep. from Sea Life Inc., Makapuu Pt., HI, for U.S. Mar. Mamm. Comm., Washington, DC.

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

Petersen, M.R. 1981. Populations, feeding ecology and molt of Steller's Eiders. *Condor* 83:256-262.

Piatt, J.F., J. Wetzel, K. Bell, A.R. DeGange, G.R. Balogh, G.S. Drew, T. Geernaert, C. Ladd, and G.V. Byrd. 2006. Predictable hotspots and foraging habitat of the endangered short-tailed albatross (*Phoebastria albatrus*) in the North Pacific: implications for conservation. *Deep Sea Research II* 53: 387-398.

Popper, A.N., M. Salmon, and K.W. Horch. 2001. Acoustic detection and communication by decapod crustaceans. *J. Comp. Physiol.* A 187: 83-89.

Popper, A.N. and R.R. Fay. 2010. Rethinking sound detection by fishes. *Hearing Res.* 273(1-2): 25-36. doi:10.1016/j.heares.2009.12.023.

Pye, H.J. and W.H. Watson, III. 2004. Sound detection and production in the American lobster, *Homarus americanus*: Sensitivity range and behavioural implications. *J. Acoust. Soc. Am.* 115 (5, Pt. 2): 2486.

Quakenbush, L., R. Suydam, T. Obritschkewitsch, and M. Deering. 2004. Breeding biology of Steller's eiders (*Polysticta stelleri*) near Barrow, Alaska, 1991–99. *Arctic* 57(2):166-182.

Redfern, J.V., M.F. McKenna, T.J. Moore, J. Calambokidis, M.L. Deangelis, E.A. Becker,J. Barlow, K.A. Forney, P.C. Fiedler, and S.J. Chivers. 2013. Assessing the risk of ships striking large whales in marine spatial planning. *Conserv. Biol.* 27(2):292-302

Reed, J.R., J.L. Sincock, and J.P. Hailman. 1985. Light attraction in endangered Procellariiform birds: Reduction by shielding upward radiation. *Auk* 102: 377-383.

Rice, A.N., J.T. Tielens, B.J. Estabrook, C.A. Muirhead, A. Rahaman, M. Guerra, and C.W. Clark. 2014. Variation of ocean acoustic environments along the western North Atlantic coast: A case study in context of the right whale migration route. *Ecol. Inform.* 21:89-99.

Richardson, W.J., C.R. Greene, Jr., C.I. Malme, and D.H. Thomson. 1995. Marine mammals and noise. Academic Press, San Diego, CA. 576 p.

Riedman, M.L. and J.A. Estes. 1990. The sea otter Enhydra lutris: behavior, ecology, and natural history. U.S. Fish and Wildlife Service Biological Report 90(14).

Rodríguez, A. and B. Rodríguez. 2009. Attraction of petrels to artificial lights in the Canary Islands: effects of the moon phase and age class. *Ibis* 151:299-310.

Rolland, R.M., S.E. Parks, K.E. Hunt, M. Castellote, P.J. Corkeron, D.P. Nowacek, S.K. Wasser, and S.D. Kraus. 2012. Evidence that ship noise increases stress in right whales. *Proc. Bio Sci.* 279(1737):2362-2369.

Romano, T.A., M.J. Keogh, C. Kelly, P. Feng, L. Berk, C.E. Schlundt, D.A. Carder, and J.J. Finneran. 2004. Anthropogenic sound and marine mammal health: measures of the nervous and immune systems before and after intense sound exposure. *Can. J. Fish. Aquat. Sci.* 61:1124-1134.

Ronconi, R. A., K. A. Allard, and P. D. Taylor. 2015. Bird interactions with offshore oil and gas platforms: Review of impacts and monitoring techniques. *Journal of Environmental Management* 147: 34-45.

Rosenberg, D. H., M. J. Petrula, D. Zwiefelhofer, T. Hollmen, D. D. Hill, and J. L. Schamber. 2016. Seasonal movements and distribution of Pacific Steller’s eiders. Alaska Department of Fish and Game, Final Wildlife Research Report ADF&G/DWC/WRR-2016-7, Juneau.

Rotterman, L. M., and T. Simon-Jackson, 1988. Sea otter. Pp. 237-275 in Selected marine mammals of Alaska: species accounts with research and management recommendations (J. W. Lentfer, ed.). Marine Mammal Commission, Washington, D.C.

Ryan, P.G. 1991. The impact of the commercial lobster fishery on seabirds at the Tristan da Cunha Islands, South Atlantic Ocean. *Biol. Conserv.* 57:339-350.

Sand, O., H.E. Karlsen, and F.R. Knudsen. 2008. Comment on “Silent research vessels are not quiet”. *J. Acoust. Soc. Am.* 123: 1831-1833.

Sarà, G., J.M. Dean, D. D’Amato, G. Buscaino, A. Oliveri, S. Genovese, S. Ferro, G. Buffa, M.Lo Martire, and S. Mazzola. 2007. Effect of boat noise on the behaviour of bluefin tuna *Thunnus thynnus* in the Mediterranean Sea. *Mar. Ecol. Prog. Ser.* 331: 243-253.

Schwemmer, P., B. Mendel, N. Sonntag, V. Dierschke, and S. Garthe. 2011. Effects of ship traffic on seabirds in offshore waters: implications for marine conservation and spatial planning. *Ecol. Appl.* 21:1851-1860.

Simpson S.D., A.N. Radford, S.L. Nedelec, M.C.O. Ferrari, D.P. Chivers, M.I. McCormick, and M.G. Meekan. 2016. Anthropogenic noise increases fish mortality by predation. Nat. Commun. 7, 10544

Skaret, G., B.E. Axelsen, L. Nottestad, A. Ferno, and A. Johannessen. 2005. The behaviour of spawning herring in relation to a survey vessel. ICES *J. Mar. Sci.* 62: 1061-1064.

Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. Marine mammal noise expo-sure criteria: initial scientific recommendations. *Aquat. Mamm.* 33(4):411-522.

Southall, B.L., J.J. Finneran, C. Reichmuth, P.E. Nachtigall, D.R. Ketten, A.E. Bowles, and P.L. Tyack. 2019. Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. *Aquatic Mammals*, 45, 125–232. https://doi.org/10.1578/AM.45.2.2019.125.

Speckman, S.G., J.F. Piatt, and A.M. Springer. 2004. Small boats disturb fish-holding marbled murrelets. *Northw. Nat.* 85:32-34.

Stehn, R.A., W.W. Larned, and R.M. Platte. 2013. Analysis of aerial survey indices monitoring waterbird populations of the Arctic Coastal Plain, Alaska, 1986-2012. United States Fish and Wildlife Service. Report. 56 p.

Stemp, R. 1985. Observations on the effects of seismic exploration on seabirds. p. 217-231 In: Greene, G.D., F.R. Engelhardt, and R.J. Paterson (eds.), Proceedings of the Workshop on the Effects of Explosives used in the Marine Environment, 29–31 January 1985. Tech. Rep. 5, Canada Oil and Gas Lands Administration, Environmental Protection Branch, Ottawa, Ont.

Stone, C.J. and M.L. Tasker. 2006. The effects of seismic airguns on cetaceans in UK waters. *J. Cetac. Res. Manage.* 8(3):255-263.

Telfer, T.C., J.L. Sincock, G.V. Byrd, and J.R. Reed. 1987. Attraction of Hawaiian seabirds to lights: Conservation efforts and effects of moon phase. *Wildl. Soc. Bull.* 15:406-413.

Tenessen, J.B. and S.E. Parks. 2016. Acoustic propagation modeling indicates vocal compensation in noise improves communication range for North Atlantic right whales. *Endang. Species Res.* 30:225-237.

TerraSond Limited. 2018. TERRA Aleutian South Submarine Fiber Cable Desktop Study. Submitted to GCI September 4, 2018. 451 p.

Thornburg, D.D. 1973. Diving duck movements on Keokuk Pool, Mississippi River. *J. Wildl. Manage.* 37:382-389.

Tougaard, J., A.J. Wright, and P.T. and Madsen. 2015. Cetacean noise criteria revisited in light of proposed exposure limits for harbour porpoises. *Mar. Poll. Bull.* 90:196-208.

Tougaard, J., A.J. Wright, and P.T. Madsen. 2016. Noise exposure criteria for harbor porpoises. p. 1167-1173 In: A.N. Popper and A. Hawkins (eds.), The Effects of Noise on Aquatic Life II. Springer, New York, NY. 1292 p.

Transportation Research Board. 2008. Risk of Vessel Accidents and Spills in the Aleutian Islands. Special Report 293. Washington, D.C. 245 p.

Tyack, P.L. 2008. Implications for marine mammals of large-scale changes in the marine acoustic environment. *J. Mammal*. 89(3):549-558.

Tyack, P.L. and V.M. Janik. 2013. Effects of noise on acoustic signal production in marine mammals. p. 251 271 In: H. Brumm (ed.), Animal communication and noise. Springer, Berlin, Heidelberg, Germany. 453 p.

Udevitz, M.S., J.L. Bodki, and D.P. Costa. 1995. Detection of sea otters in boat-based surveys of Prince William Sound, Alaska. Mar. Mamm. Sci. 11(1):59-71.

United States Army Corps of Engineers. 2017. “Sand Point Dock Replacement” Operations Branch Public Notice. December 2017.

United States Army Corps of Engineers. 2004. Navigation Improvements, Interim Feasibility Study, and Final Environmental Impact Statement, Akutan Alaska. Pp. FEIS 114.

United States Coast Guard. 2018. Sector Anchorage Waterways Management. https://www.pacificarea.uscg.mil/Our-Organization/District-17/17th-District-Units/Sector-Anchorage/-Waterways-Management/ Accessed November 20, 2018.

USFWS. 1997. Endangered and threatened wildlife and plants; threatened status for the Alaska breeding population of Steller's eider. Fed. Regist. 62 (112, 11 June):31748–31757.

USFWS. 2001a. Endangered and threatened wildlife and plants: final determination of critical habitat for the Alaska-breeding population of Steller's eider. Fed. Regist. 66 (23, 2 February):8850-8884.

USFWS. 2001b. Short-tailed albatross (*Phoebastria albatrus*). . Threatened and Endangered Species, Fact Sheet. . Anchorage Fish and Wildlife Field Office. USFWS. February 2001. 2 p.

USFWS. 2002. Steller's eider recovery plan. Fairbanks, AK. 27 p.

USFWS. 2008. Short-tailed Albatross Recovery Plan. Anchorage, AK, 105 pp.

USFWS. 2009. Endangered and threatened wildlife and plants: designation of critical habitat for the southwest Alaska distinct population segment of the northern sea otter: Final rule. Fed. Regist. 74(194, 8 Oct.):51987-52012.

USFWS. 2010. Southwest Alaska Distinct Population segment of the northern sea otter (*Enhydra lutris kenyoni*) – Draft Recovery Plan. USFWS, Region 7, Alaska. 171 p.

USFWS. 2011. Steller's Eider (*Polysticta stelleri*). Threatened and Endangered Species, Fact Sheet. Anchorage Fish and Wildlife Field Office. USFWS. August 2011. 2 p.

USFWS. 2013. Southwest Alaska Distinct Population segment of the northern sea otter (*Enhydra lutris kenyoni*) – Recovery Plan. USFWS, Region 7, Alaska. 171 p.

USFWS. 2014a. 5-Year Review: Summary and evaluation of the short-tailed albatross (*Phoebastria albatrus*). Anchorage, AK. 43pp.

USFWS. 2014b. Stock Assessment Report – Northern Sea Otter (*Enhydra lutris kenyoni*): Southwest Alaska Stock. https://www.fws.gov/alaska/fisheries/mmm/stock/stock.htm Revised April 2014. 23 p.

USFWS. 2018. Biological opinion for the effects of the Pacific halibut fisheries in waters off Alaska on the endangered short-tailed albatross (*Phoebastria albatrus*). Accessed February 4, 2019.

USFWS. 2020. Short-tailed Albatross (*Phoebastria albatrus*). 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service. Anchorage Fish and Wildlife Conservation Office. June 2020. Anchorage, AK. Available online at: https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3003.pdf.

USFWS. 2023. Northern Sea Otter (*Enhydra lutris kenyoni*): Southwest Alaska Stock. U.S. Fish and Wildlife Service. Available online at: https://www.fws.gov/media/northern-sea-otter-southwest-alaska-stock-assessment-report-0.

Vabo, R., K. Olsen, and I. Huse. 2002. The effect of vessel avoidance of wintering Norwegian spring spawning herring. Fish. Res. 58: 59-77.

Vanderlaan, A.S.M. and C.T. Taggart. 2007. Vessel collisions with whales: the probability of lethal injury based on vessel speed. Mar. Mamm. Sci. 23(1):144-156.

Velando, A and I. Munilla. 2011. Disturbance of a foraging seabird by sea-based tourism: implications for reserve management in marine protected areas. Biological Conservation 144: 1167-1174.

Vermeij, M.J.A., K.L. Marhaver, C.M. Huijbers, I. Nagelkerken, and S. Simpson. 2010. Coral larvae move toward reef sounds. PLoS ONE 5(5):e10660. doi:10.1371/ journal.pone.0010660.

Weilgart, L.S. 2014. Are we mitigating underwater noise-producing activities adequately? A comparison of Level A and Level B cetacean takes. Paper SC/65b/E07 presented to the Scientific Committee of the International Whaling Commission.

Weilgart, L.S. 2007. A brief review of known effects of noise on marine mammals. Intern. J. Comp. Psychol. 20:159-168.

Wiley, D.N., C.A. Mayo, E.M. Maloney, and M.J. Moore. 2016. Vessel strike mitigation lessons from direct observations involving two collisions between noncommercial vessels and North Atlantic right whales (*Eubalaena glacialis*). Mar. Mamm. Sci. 32(4):1501-1509.

Williams, A.R., T.D. Bowman, and B.S. Shults. 2016. Molting Pacific Steller's Eider Survey in Southwest Alaska, 2016. Unpublished. U.S. Fish and Wildlife Service Report, Migratory Bird Management, Anchorage, Alaska.

Witherell, D., M. Fey, and M. Fina. 2012. Fishing fleet profiles. North Pacific Fishery Management Council. 68p.

Wright, A.J. and S. Kuczaj. 2007. Noise-related stress and marine mammals: An Introduction. Intern. J. Comp. Psychol. 20(2-3):iii-viii.

Wright, A.J., N. Aguilar Soto, A.L. Baldwin, M. Bateson, C.M. Beale, C. Clark, T. Deak, E.F. Edwards, A. Fernández, A. Godinho, L.T. Hatch, A. Kakuschke, D. Lusseau, D. Martineau, L.M. Romero, L.S. Weilgart, B.A. Wintle, G. Notarbartolo-di-Sciara, and V. Martin. 2007a. Do marine mammals experience stress related to anthropogenic noise? Intern. J. Comp. Psychol. 20(2-3):274-316.

Wright, A.J., N. Aguilar Soto, A.L. Baldwin, M. Bateson, C.M. Beale, C. Clark, T. Deak, E.F. Edwards, A. Fernández, A. Godinho, L.T. Hatch, A. Kakuschke, D. Lusseau, D. Martineau, L.M. Romero, L.S. Weilgart, B.A. Wintle, G. Notarbartolo-di-Sciara, and V. Martin. 2007b. Anthropogenic noise as a stressor in animals: A multidisciplinary perspective. Intern. J. Comp. Psychol. 20(2-3): 250-273

Wright, A.J., T. Deak, and E.C.M. Parsons. 2009. Concerns related to chronic stress in marine mammals. Intern. Whal. Comm. Working Pap. SC/61/E16. 7 p.

Wright, A.J., T. Deak and E.C.M. Parsons. 2011. Size matters: management of stress responses and chronic stress in beaked whales and other marine mammals may require larger exclusion zones. Mar. Poll. Bull. 63(1-4):5-9.

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

---

WARNING: External Sender - use caution when clicking links and opening attachments.

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***

WESTON SOLUTIONS
Stacey Korsmo
Senior Project Scientist
(907) 301-5815 Stacey.Aughe@WestonSolutions.com
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
Anchorage, AK 99503

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

December 2023

Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

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.

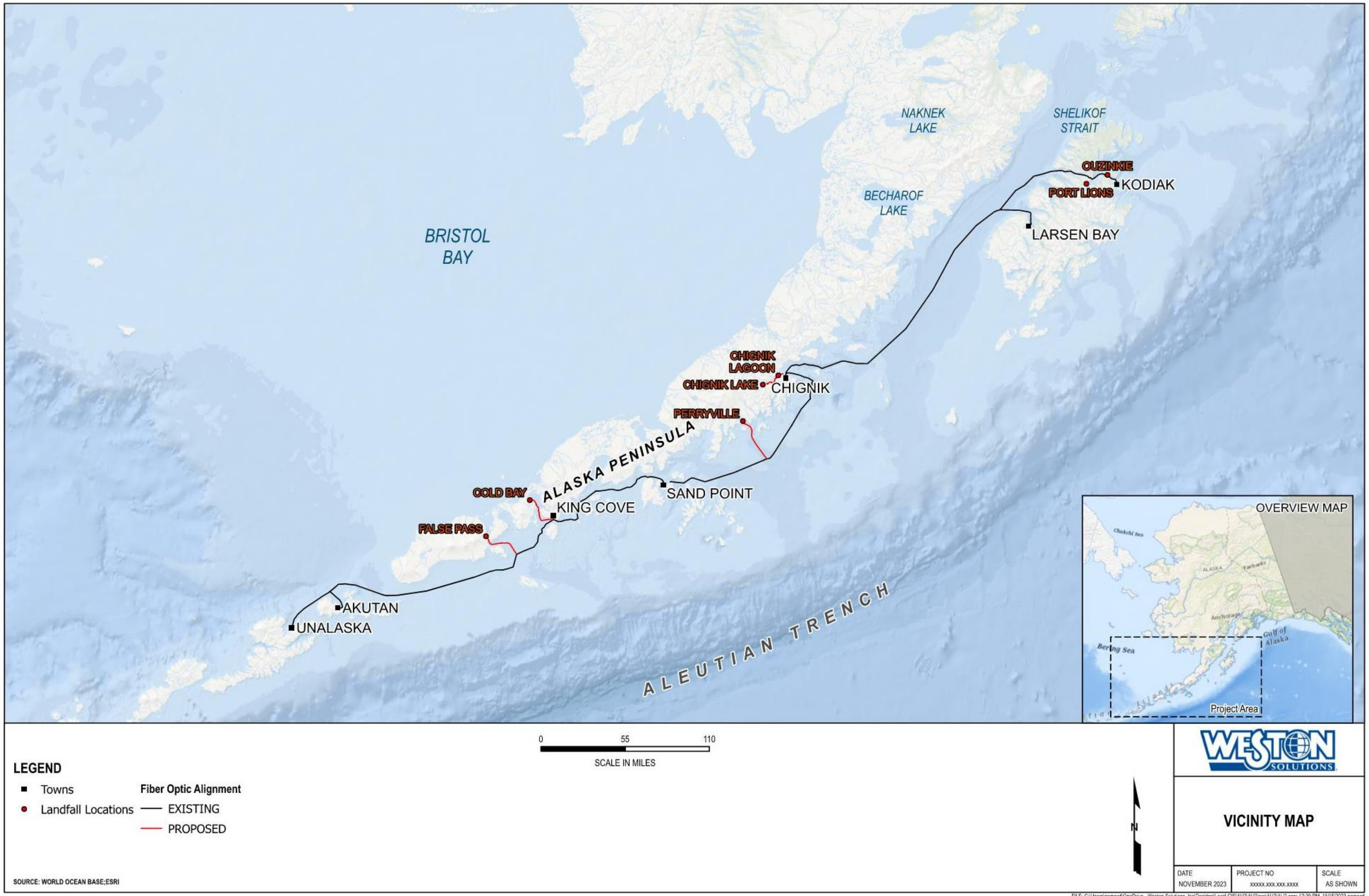


Figure 1. Project Vicinity Map

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.

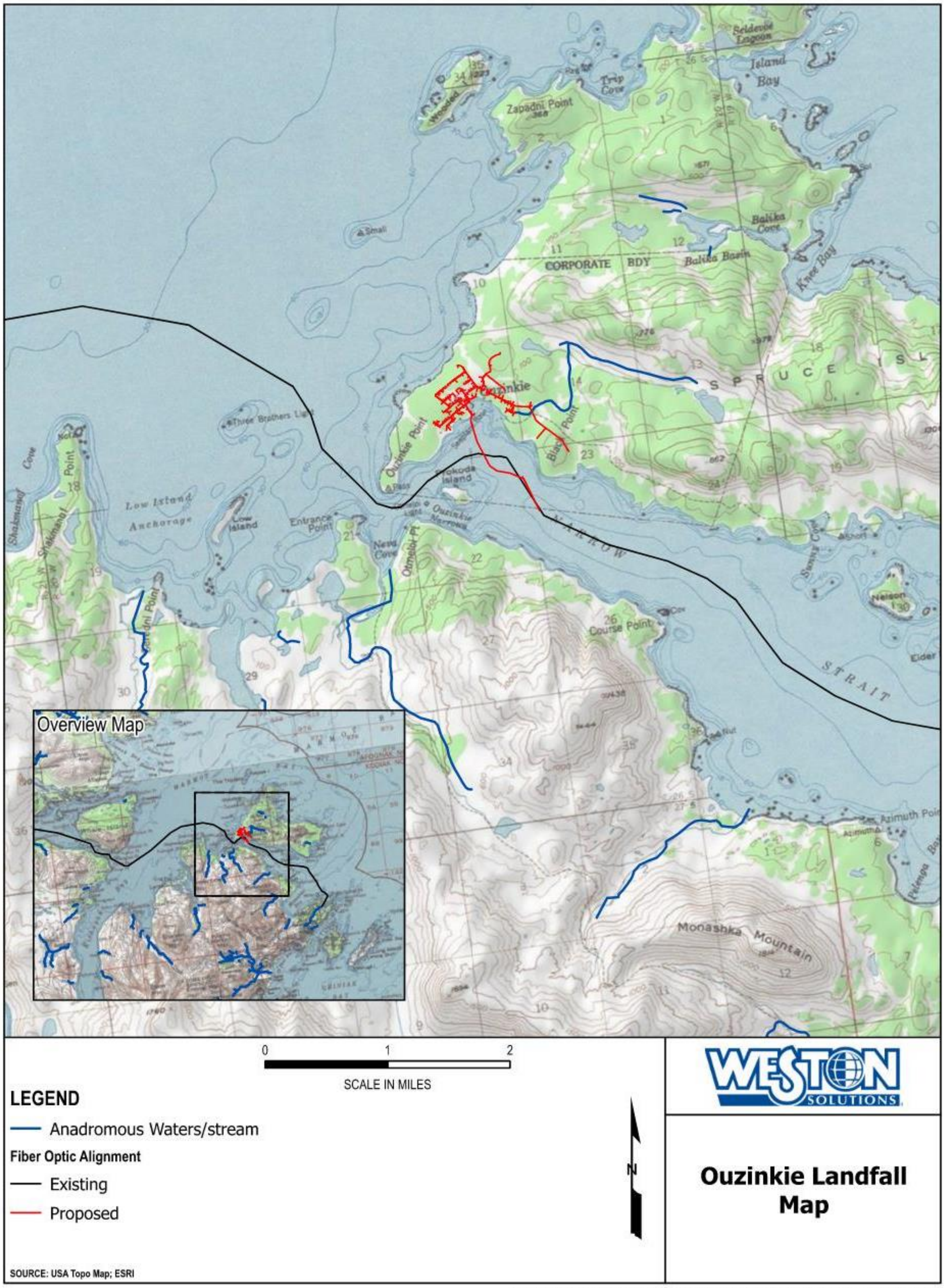


Figure 2. Ouzinkie Landfall Map

Figure 3. Ouzinkie Landing Site

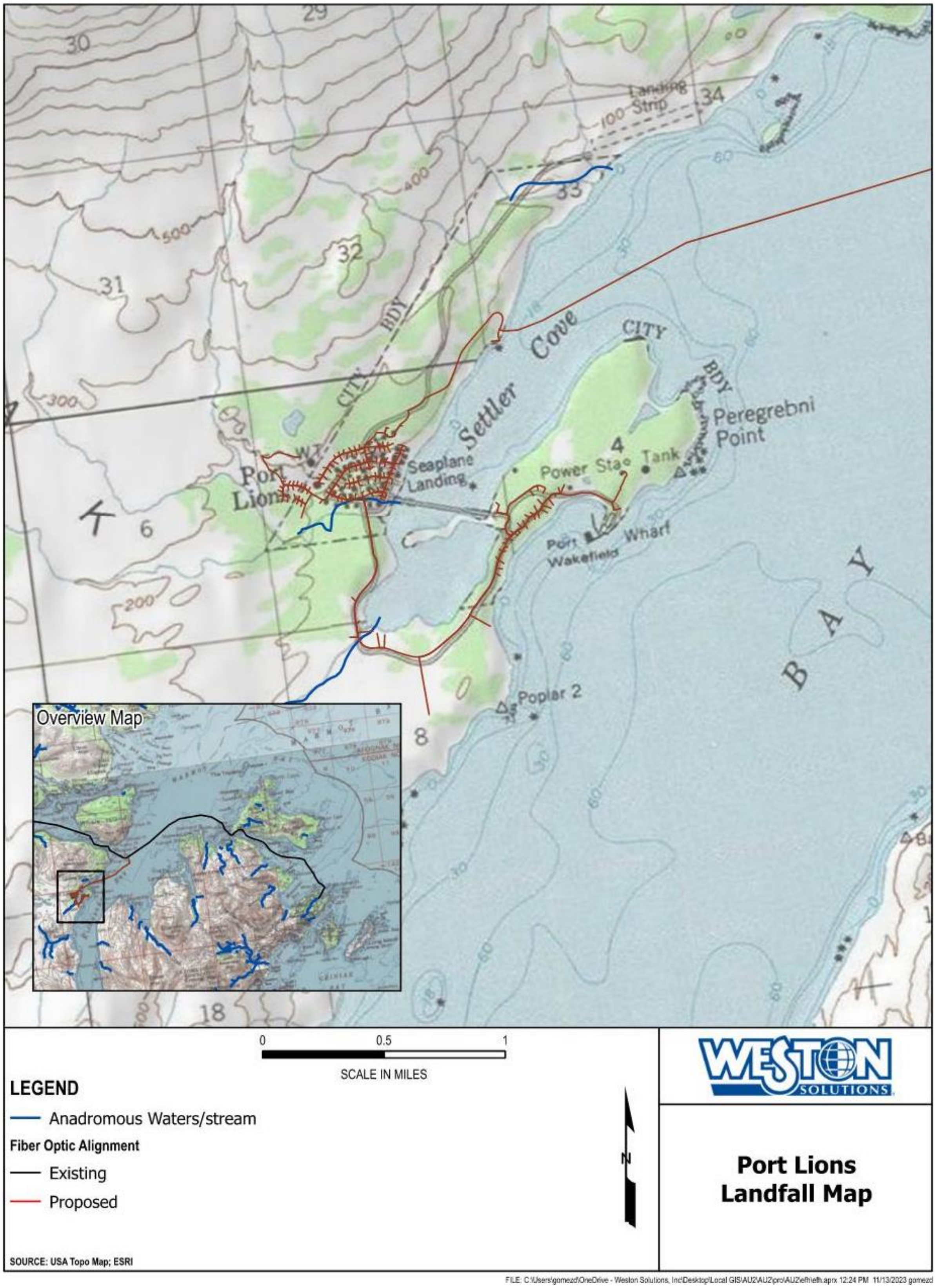


Figure 4. Port Lions Landfall Map

Figure 5. Port Lions Landing Site

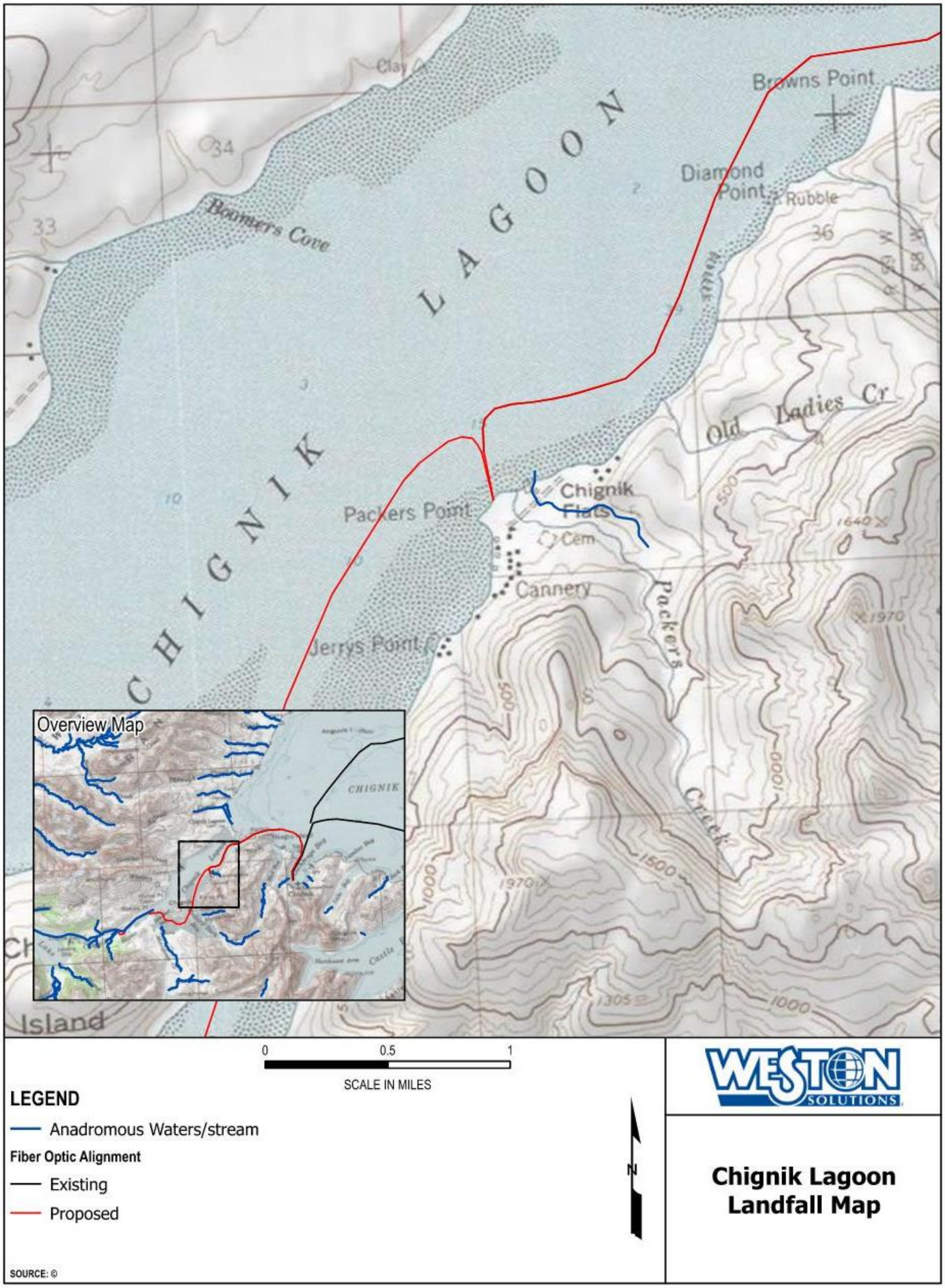
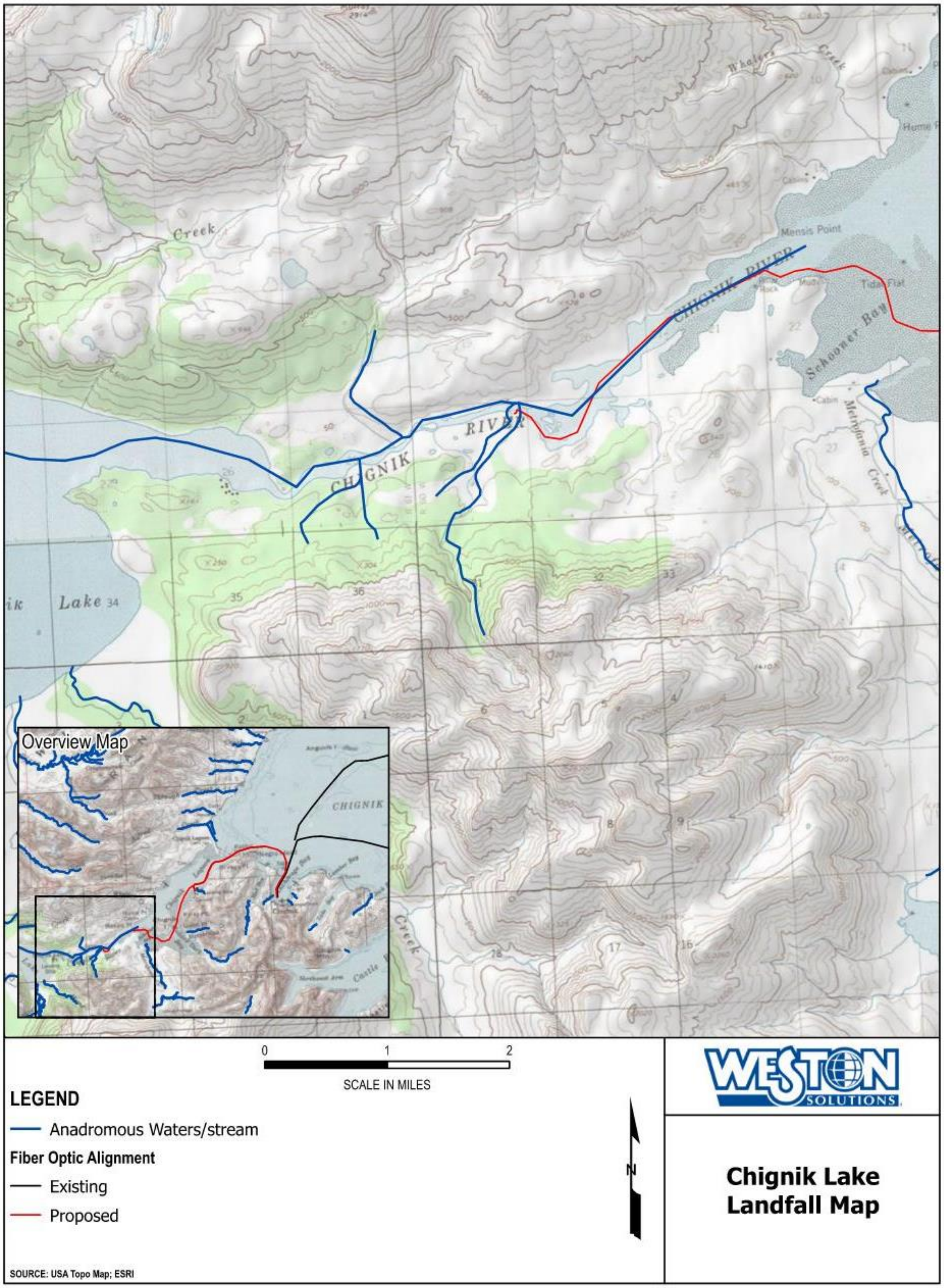


Figure 6. Chignik Lagoon Landfall Map

Figure 7. Chignik Lagoon Landing Site



FILE: C:\Users\gomezd\OneDrive - Weston Solutions, Inc\Desktop\Local GIS\AU2\AU2\pro\AU2\efh\efh.aprx 10:33 AM 11/13/2023 gomezd

Figure 8. Chignik Lake Landfall Map

Figure 9. Chignik Lake Landing Site

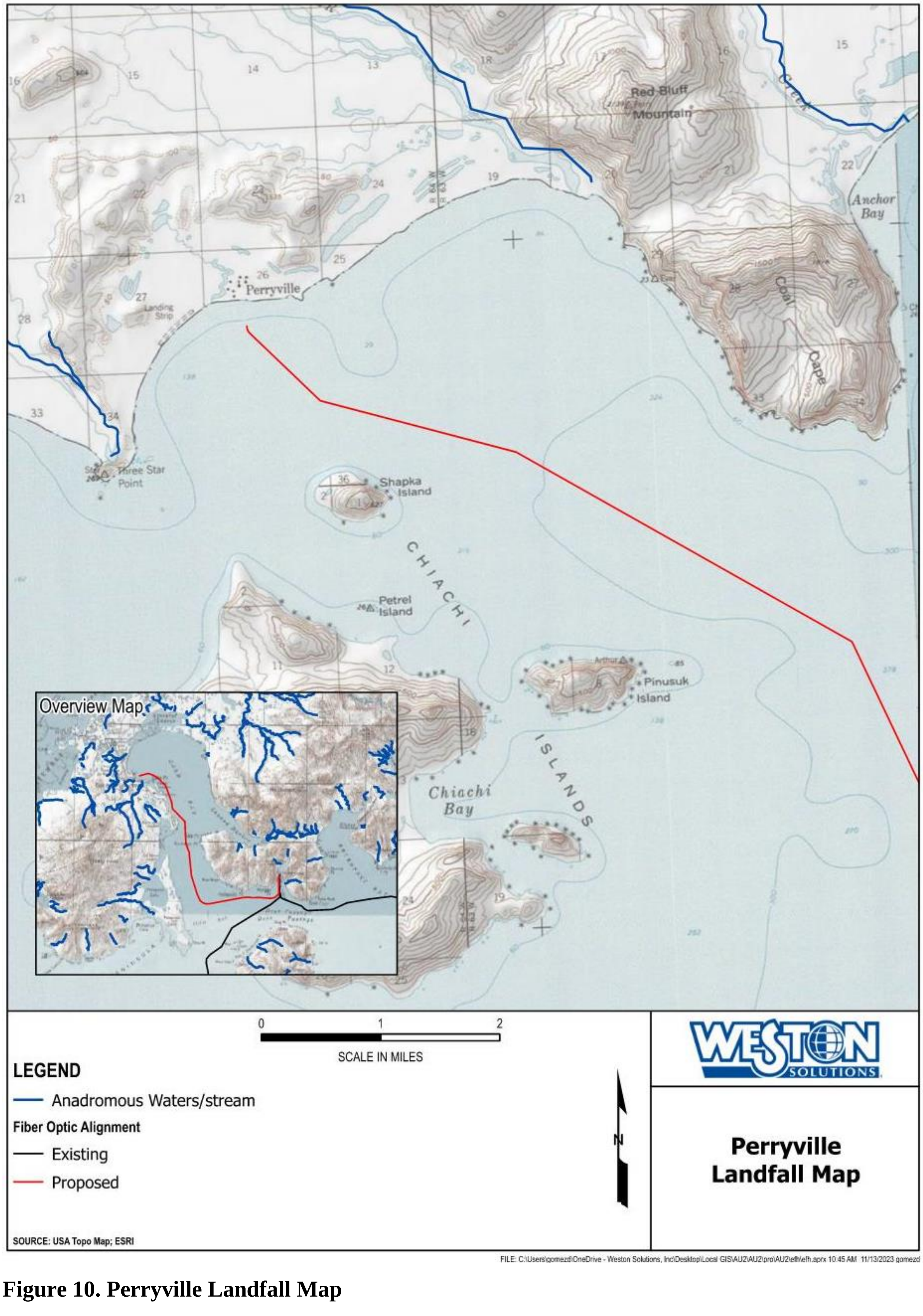


Figure 10. Perryville Landfall Map

Figure 11. Perryville Landing Site

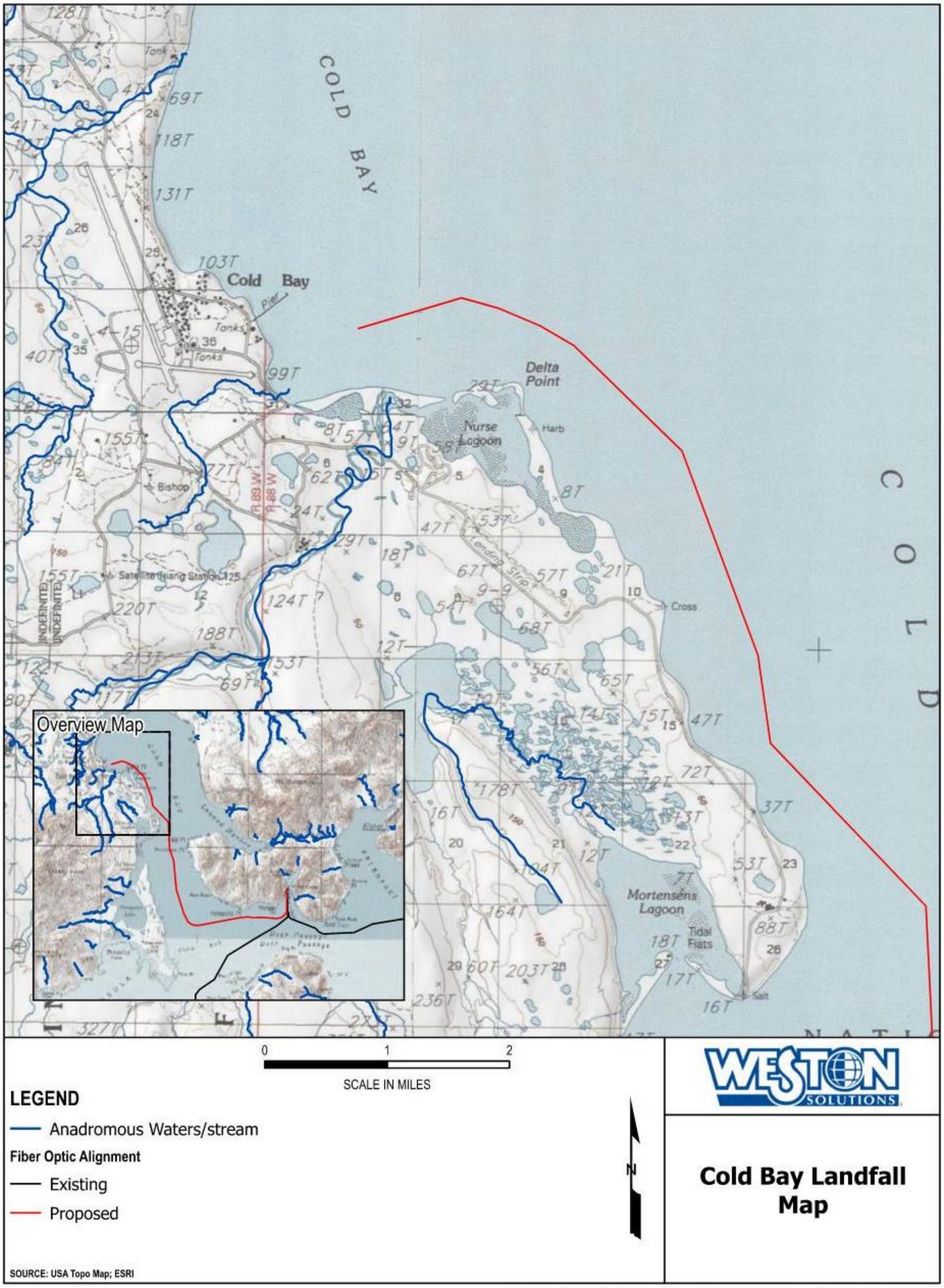


Figure 12. Cold Bay Landfall Map

Figure 13. Cold Bay Landing Site

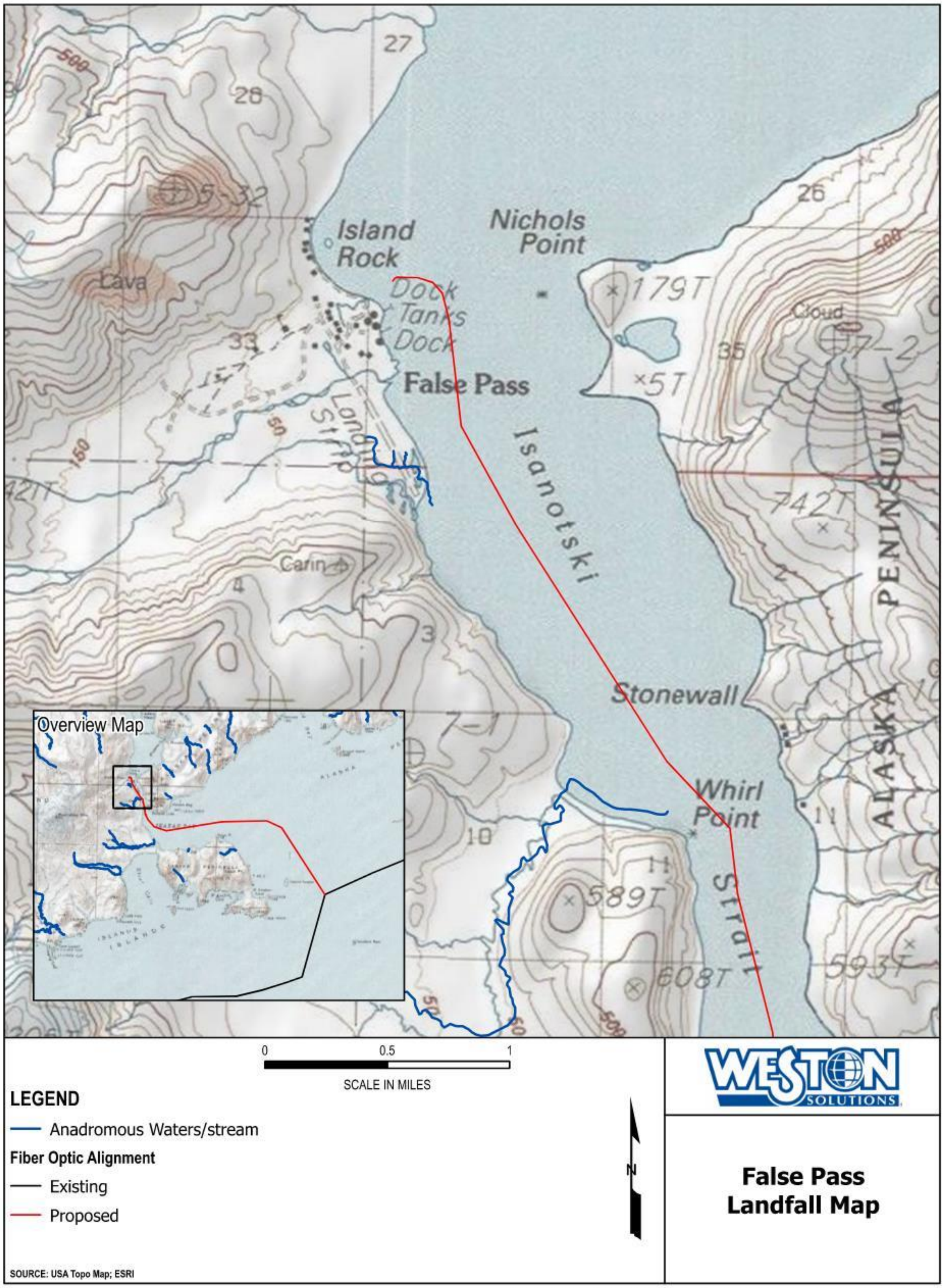


Figure 14. False Pass Landfall Map

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).

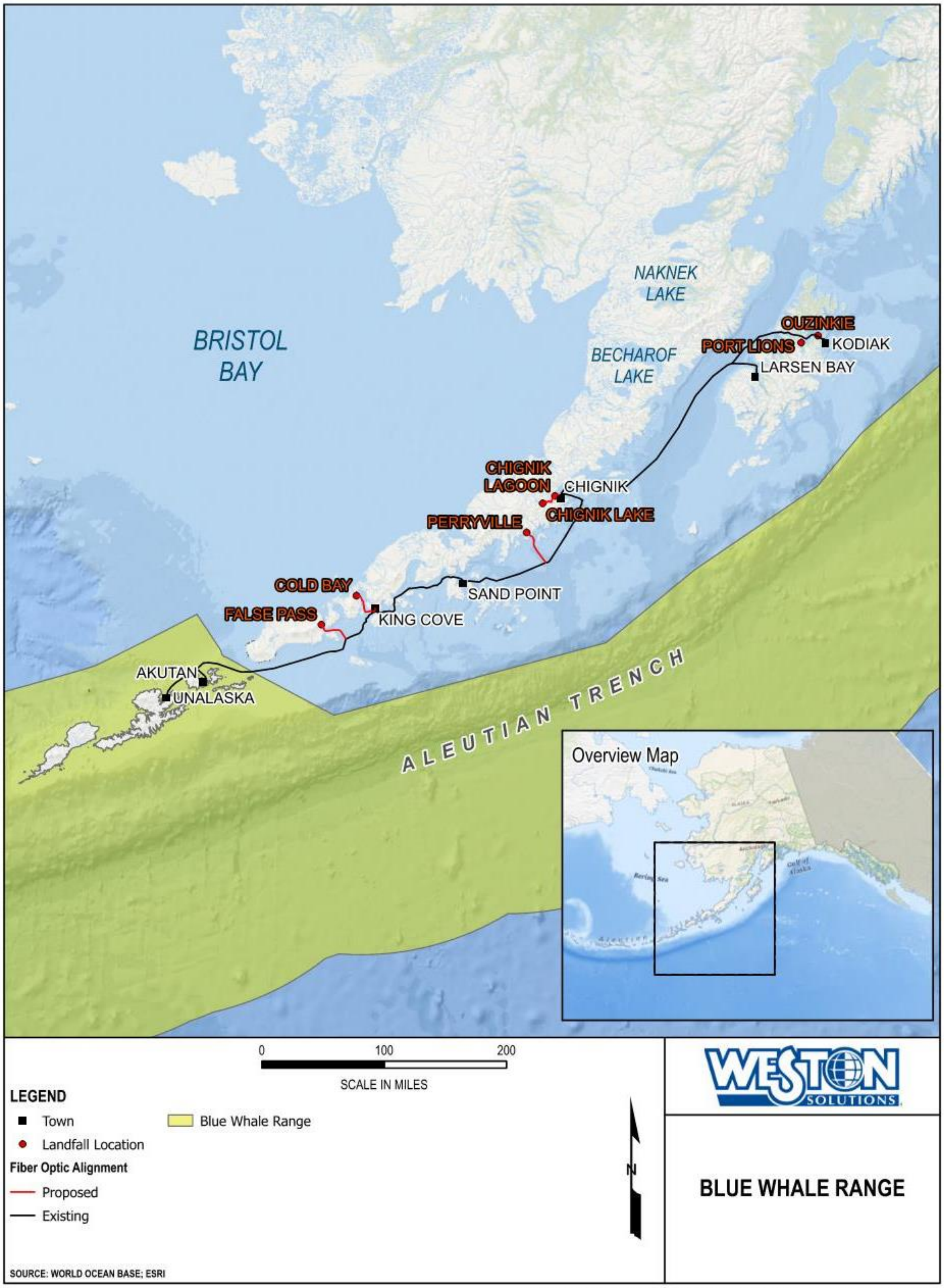
4.1.5 Hearing

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.



FILE: C:\Users\gomezd\OneDrive - Weston Solutions, Inc\Desktop\Local GIS\AU2\AU2\pro\AU2\AU2.aprx 10:57 AM 11/13/2023 gomezd

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.

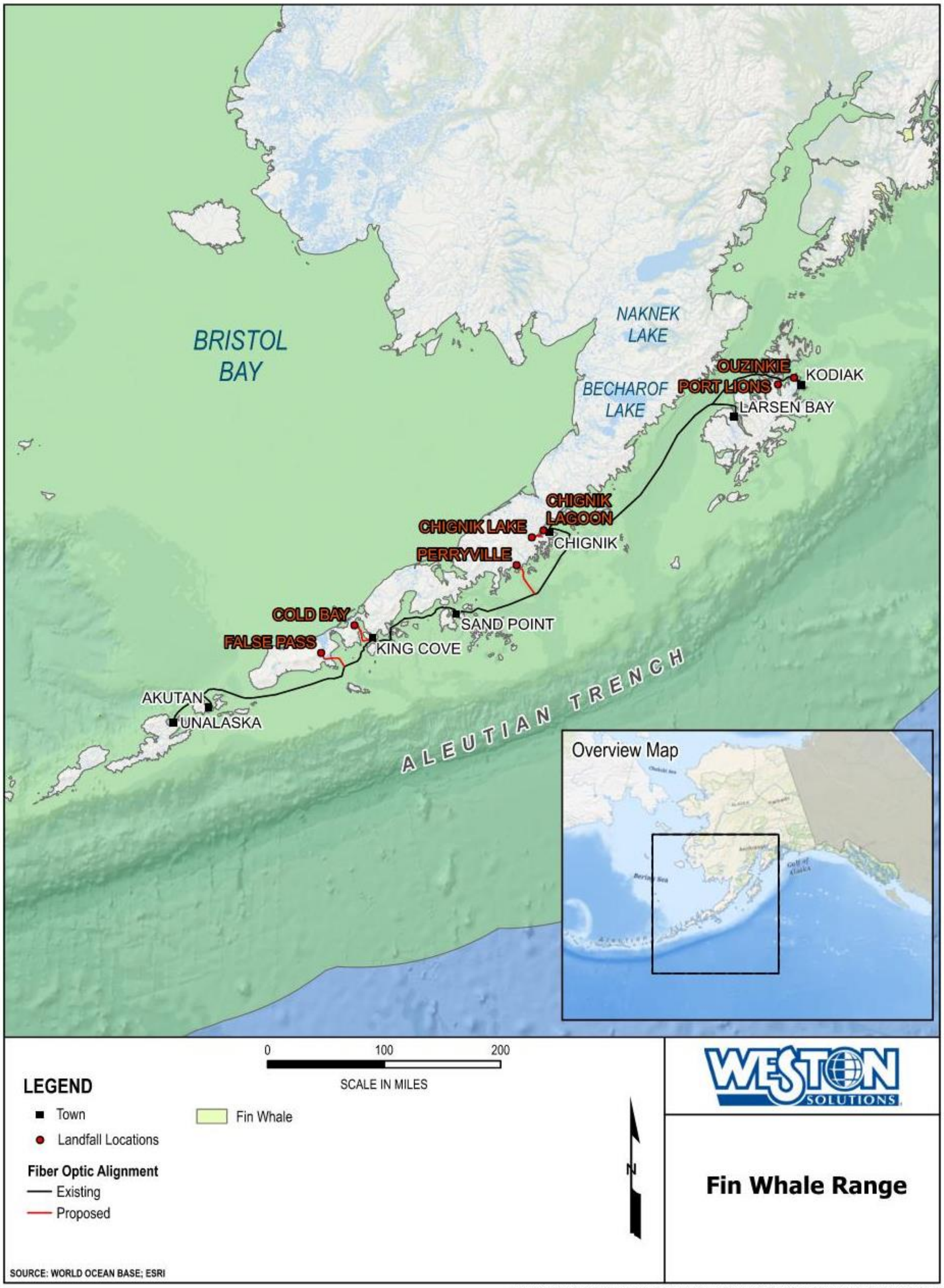


Figure 18. Fin Whale Distribution in the Action Area

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).

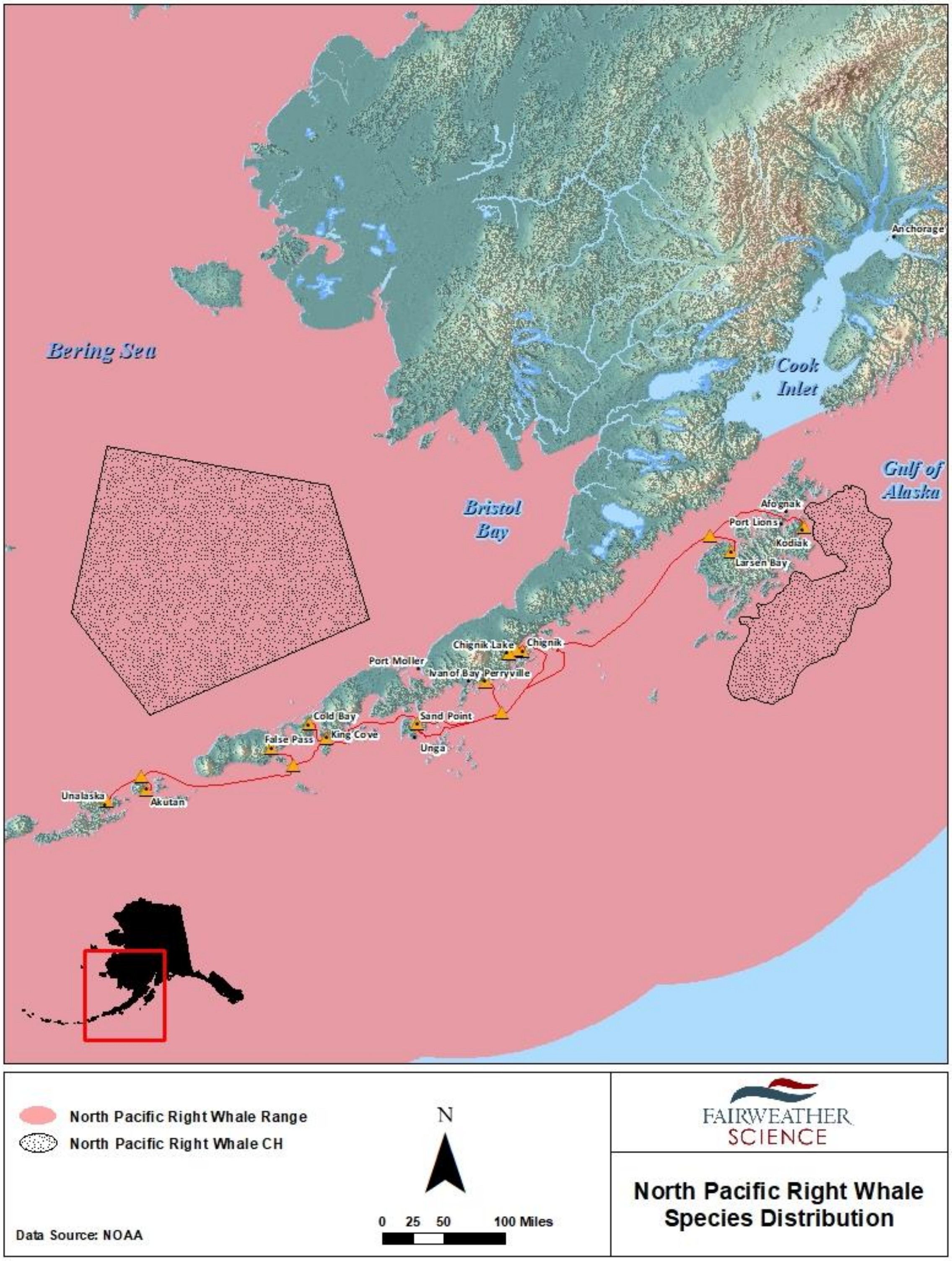


Figure 19. North Pacific Right Whale Distribution in the Action Area

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.

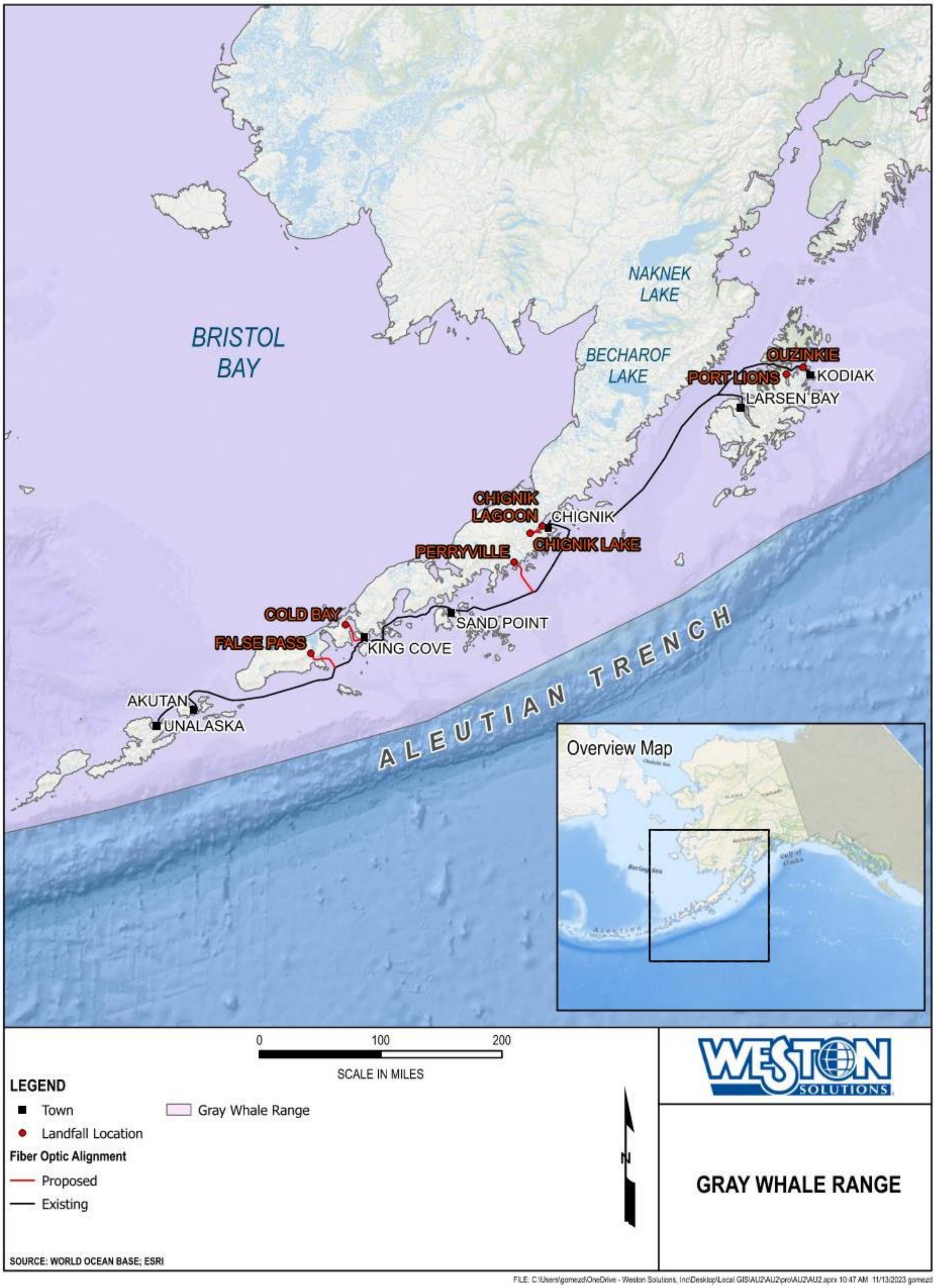


Figure 20. Western North Pacific Gray Whale Distribution in the Project Area

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.

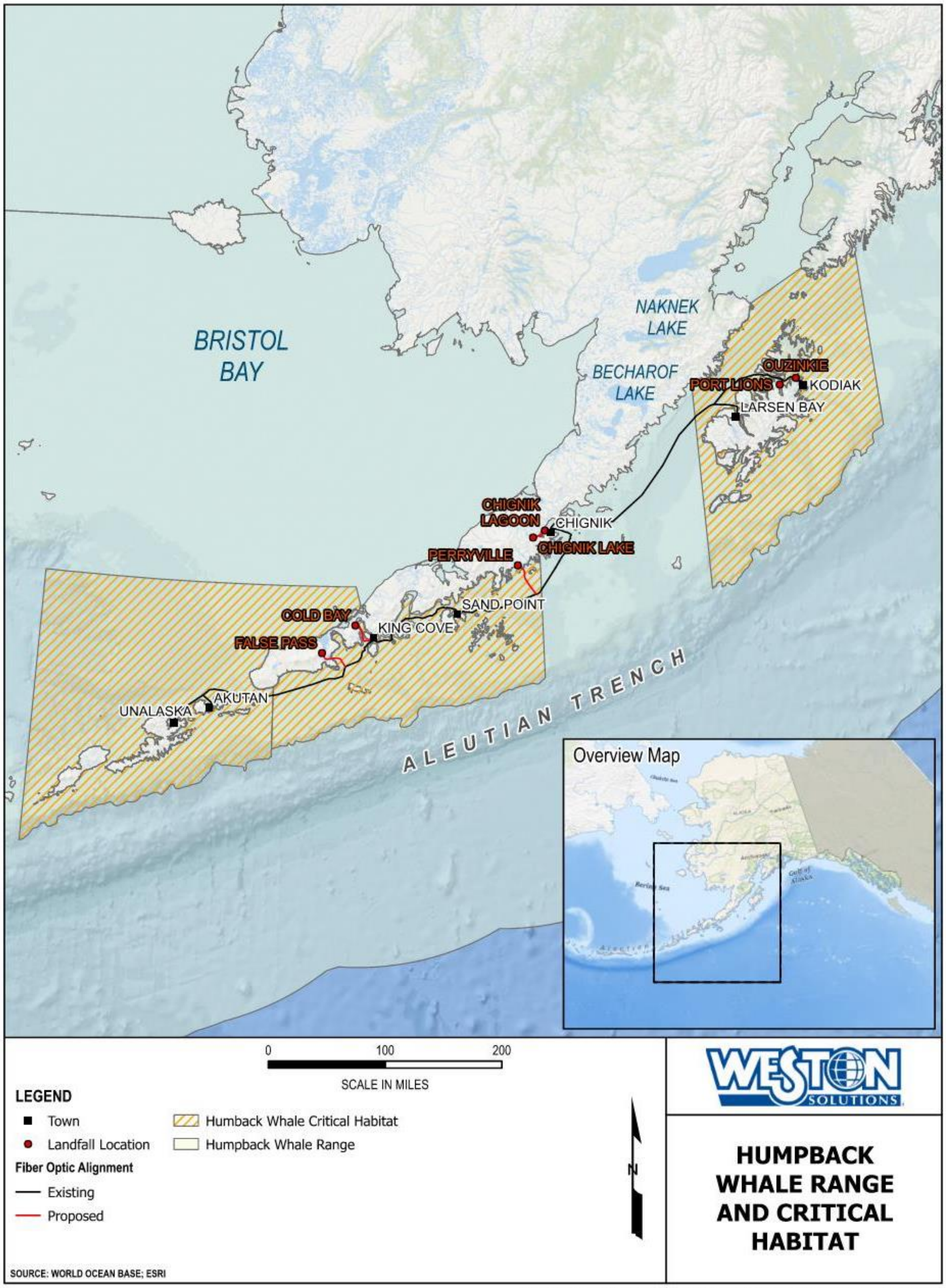


Figure 21. Humpback Whale Distribution in the Action Area

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.

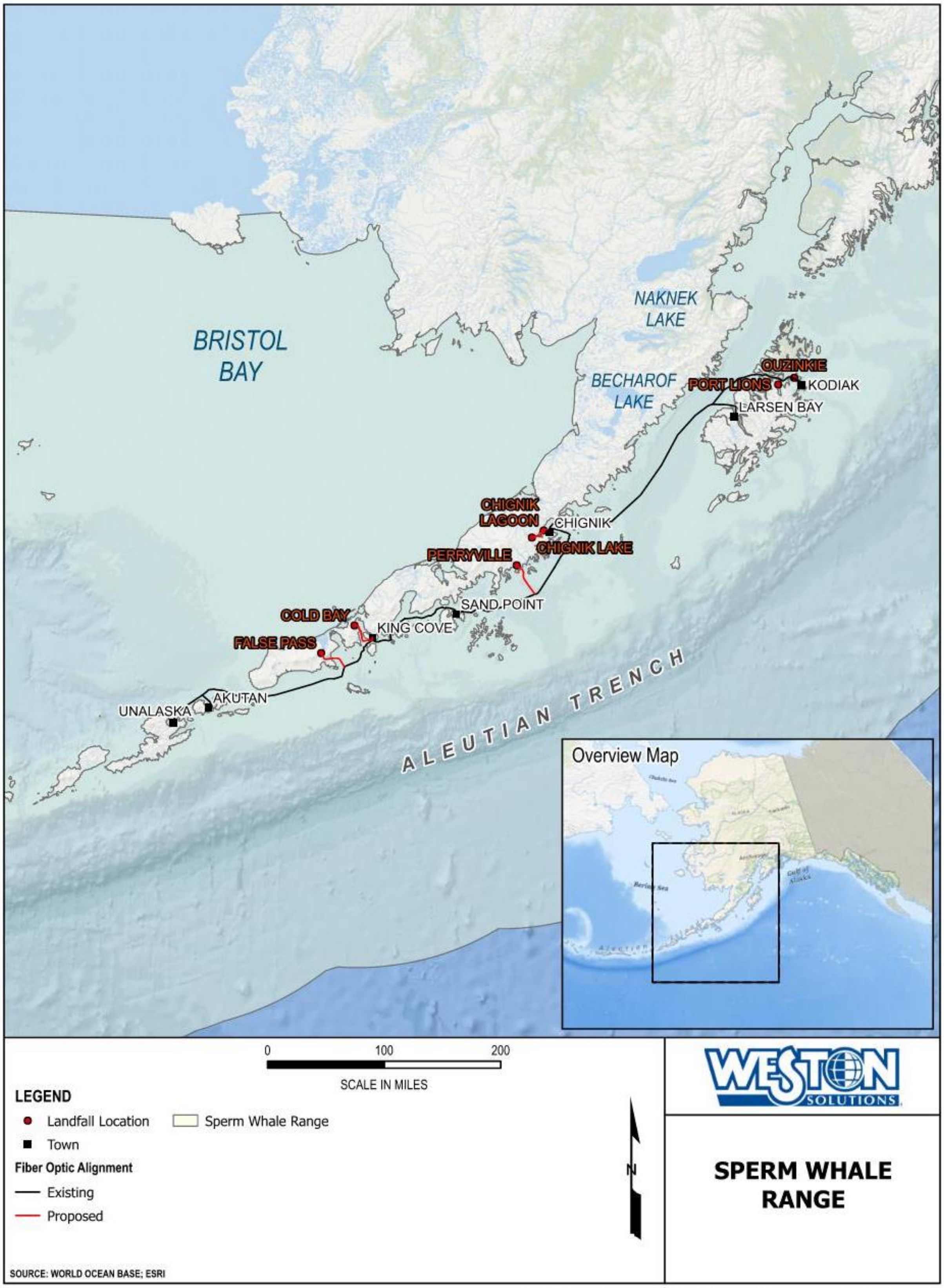
4.6.5 Hearing

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.



FILE: C:\Users\gomezd\OneDrive - Weston Solutions, Inc\Desktop\Local GIS\AU2\AU2\pro\AU2\AU2.aprx 11:46 AM 11/13/2023 gomezd

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).

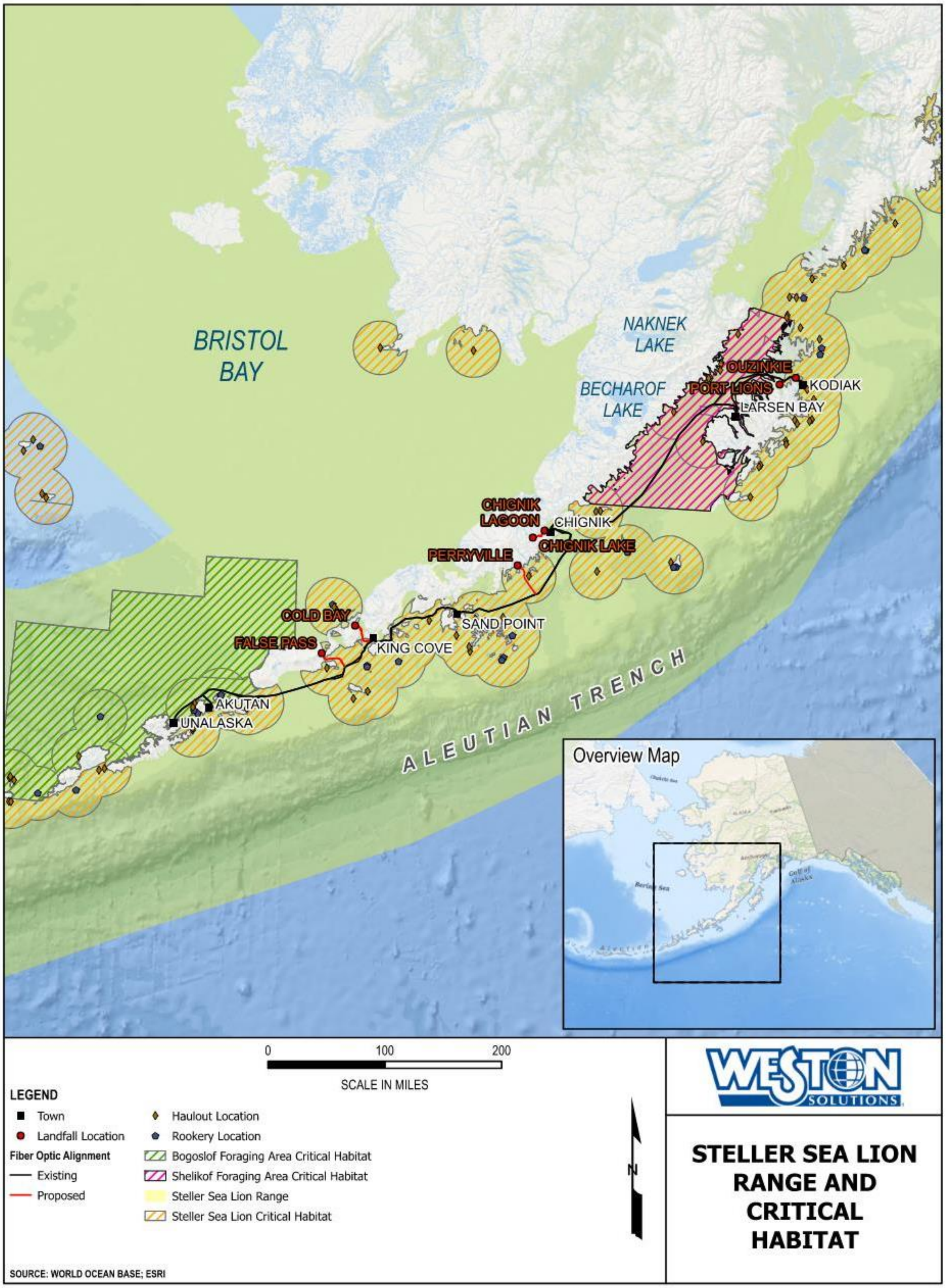


Figure 23. Steller Sea Lion (Western DPS) Distribution in the Action Area

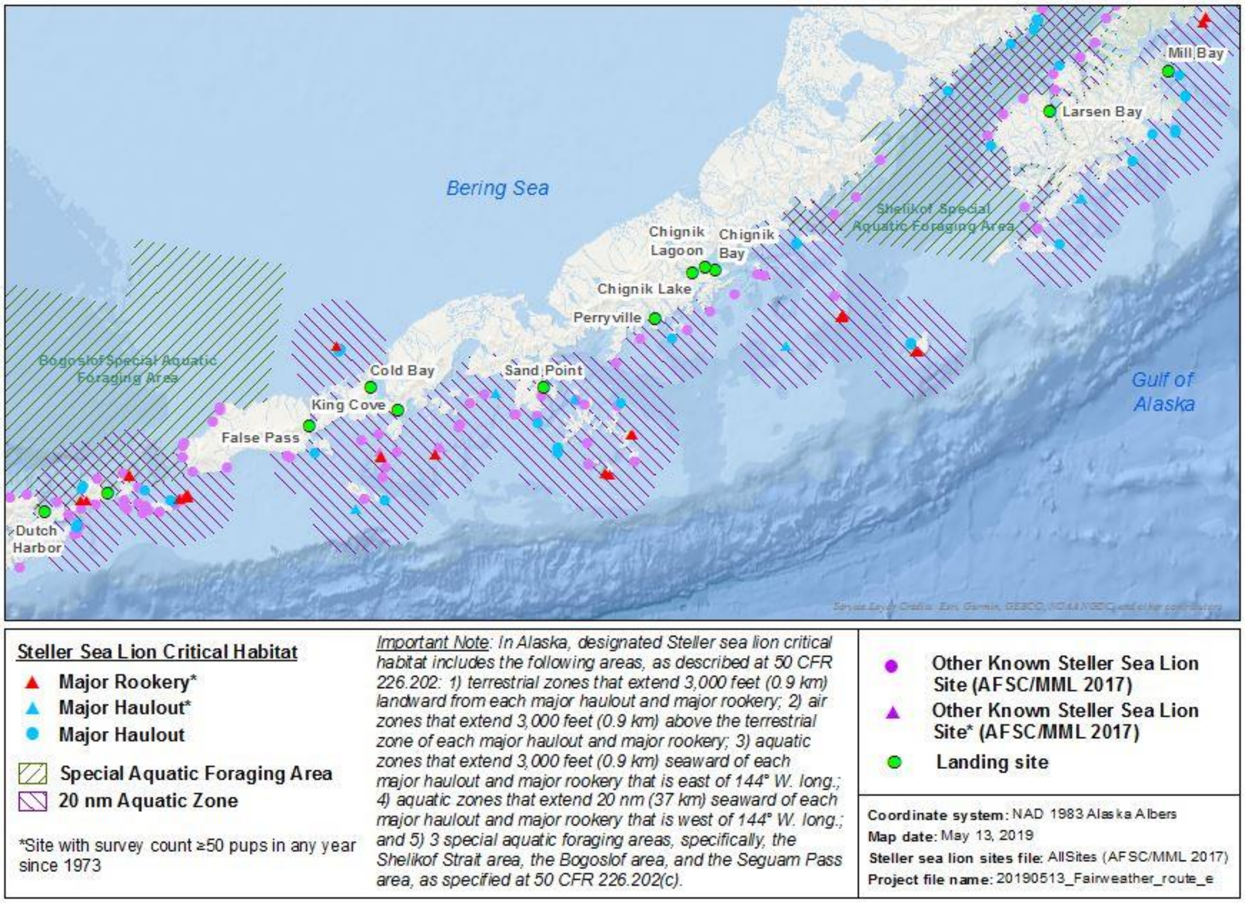
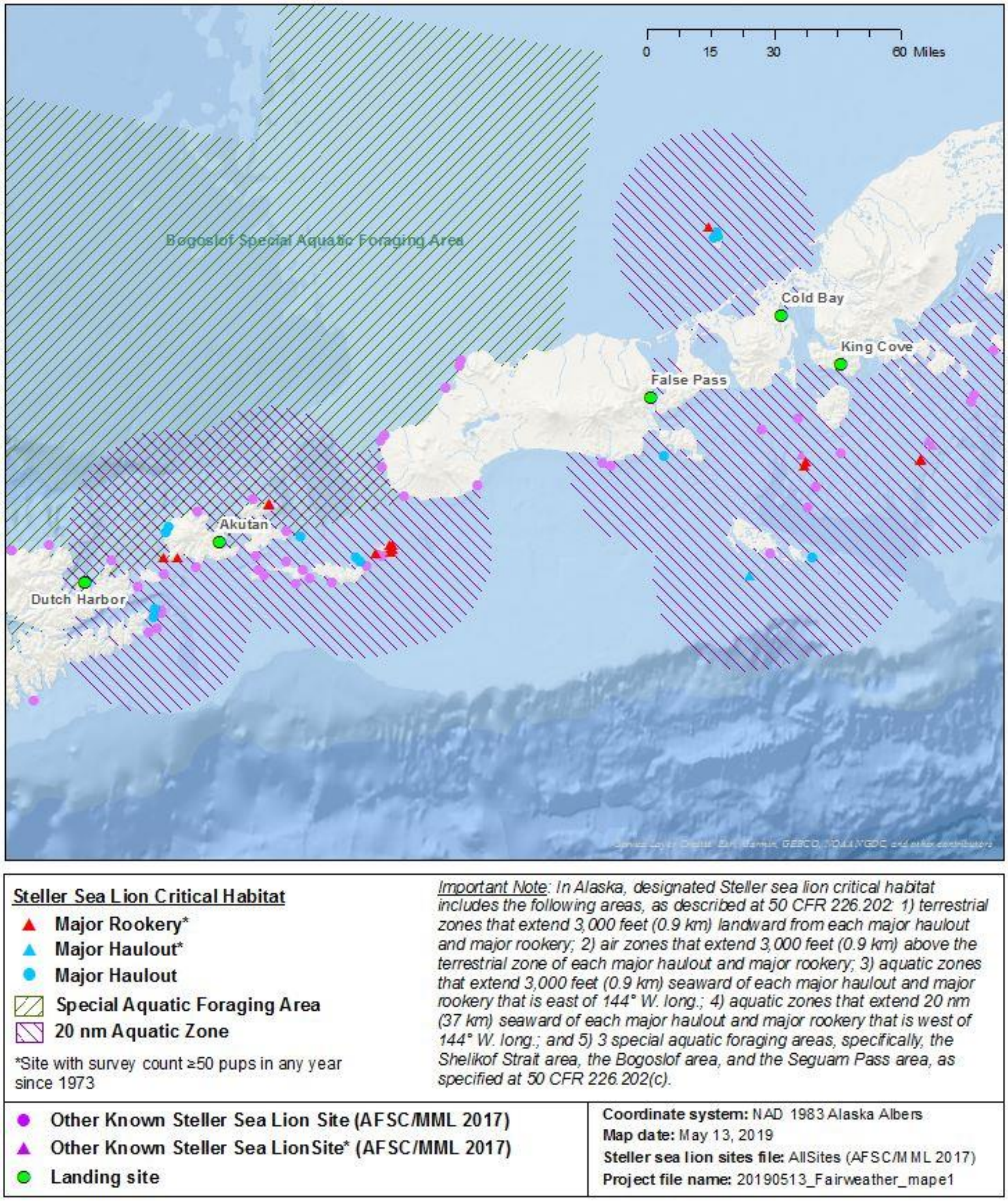
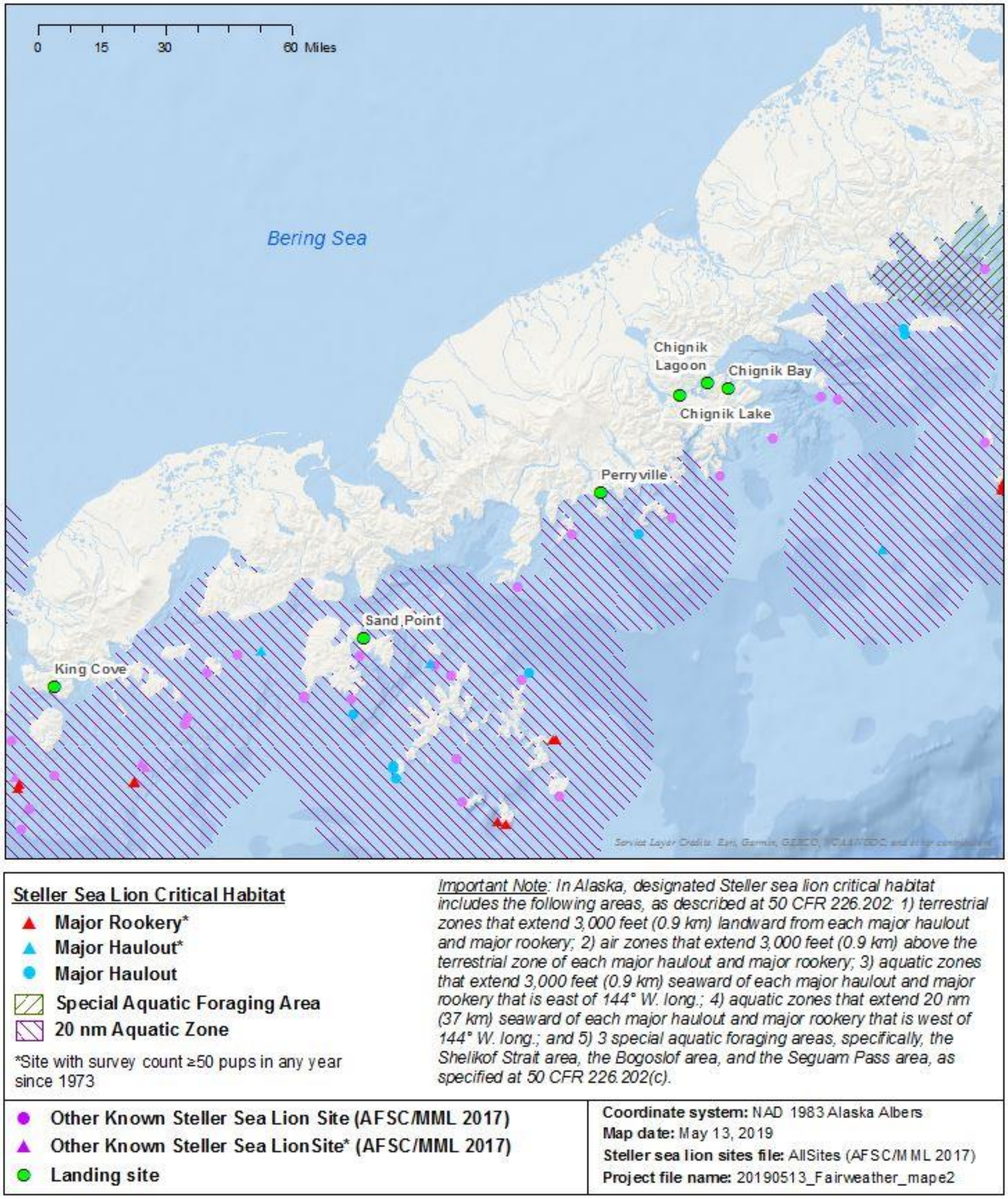


Figure 24. Steller Sea Lion (Western DPS) Haul Out Sites in Action Area



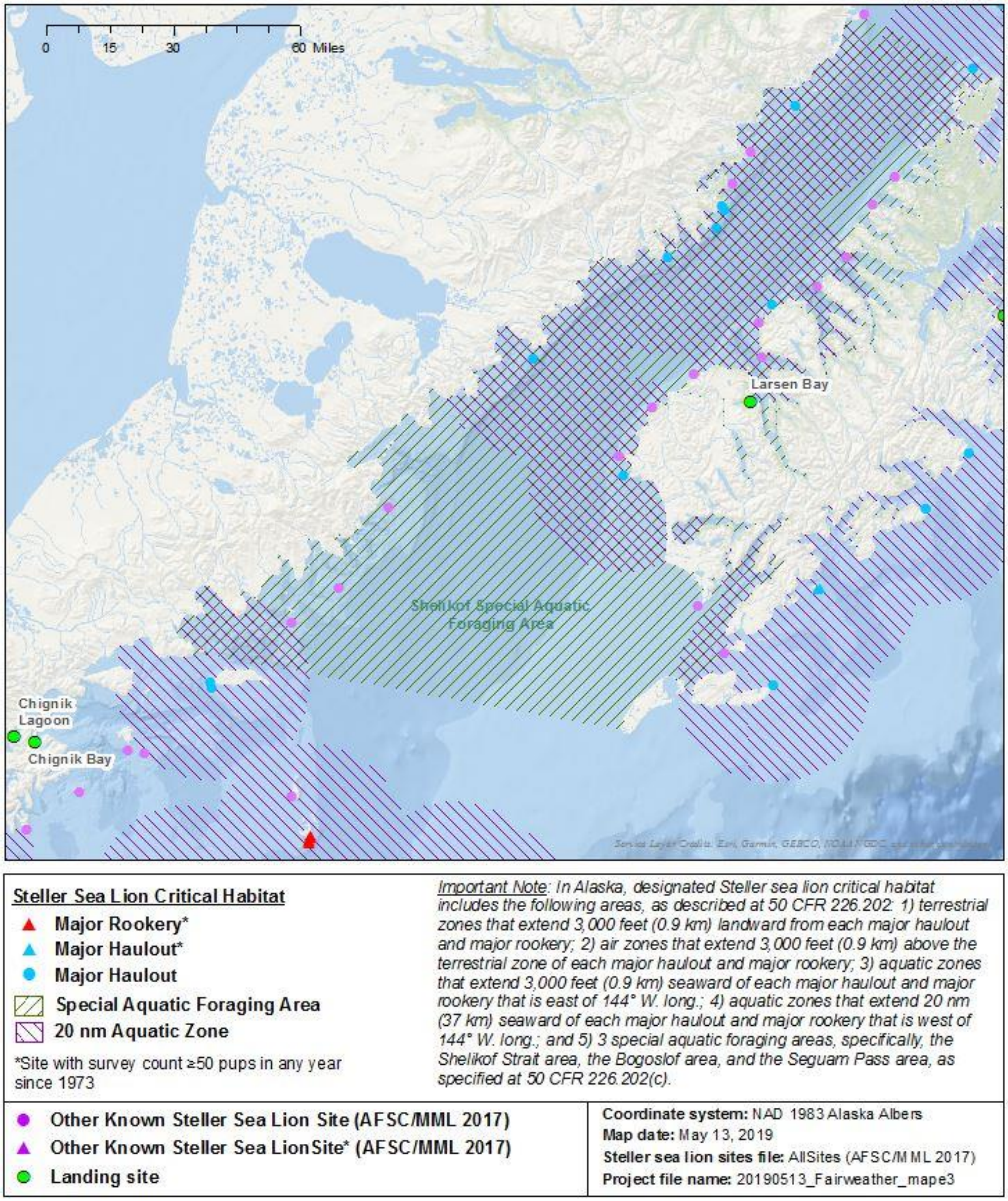
Source: NMFS 2019

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



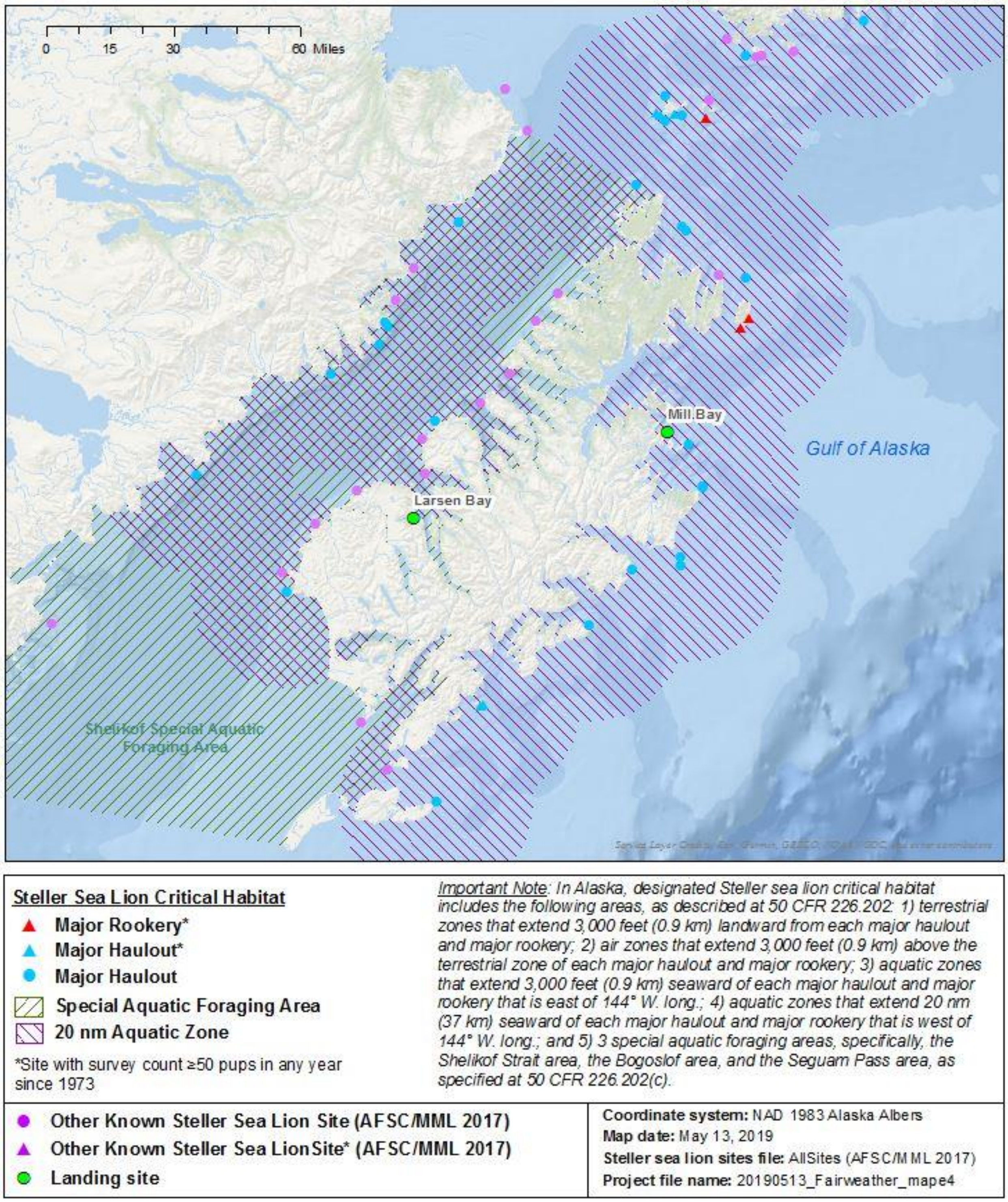
Source: NMFS 2019

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.

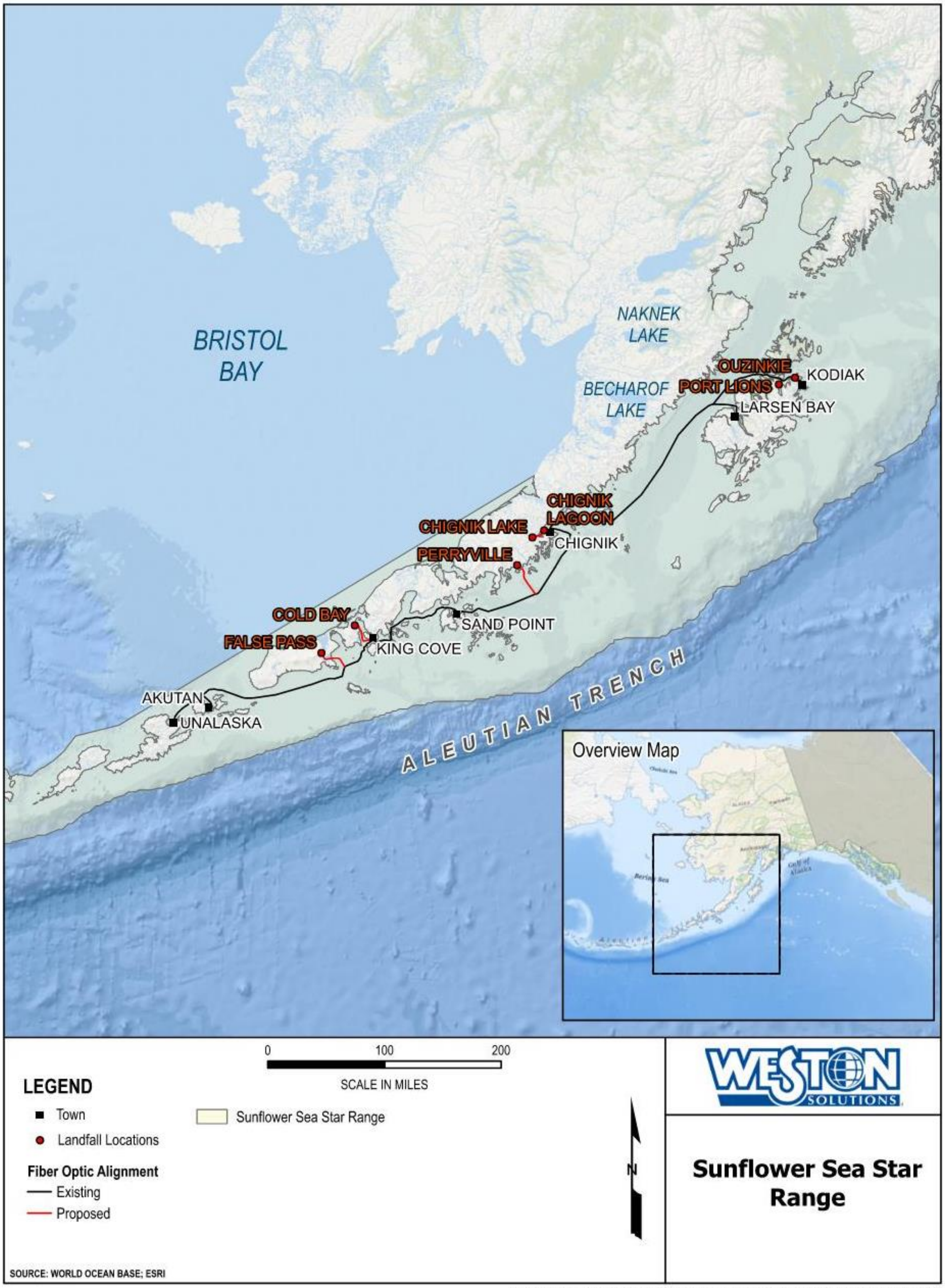


Figure 29. Sunflower Sea Star Distribution in the Action Area

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).

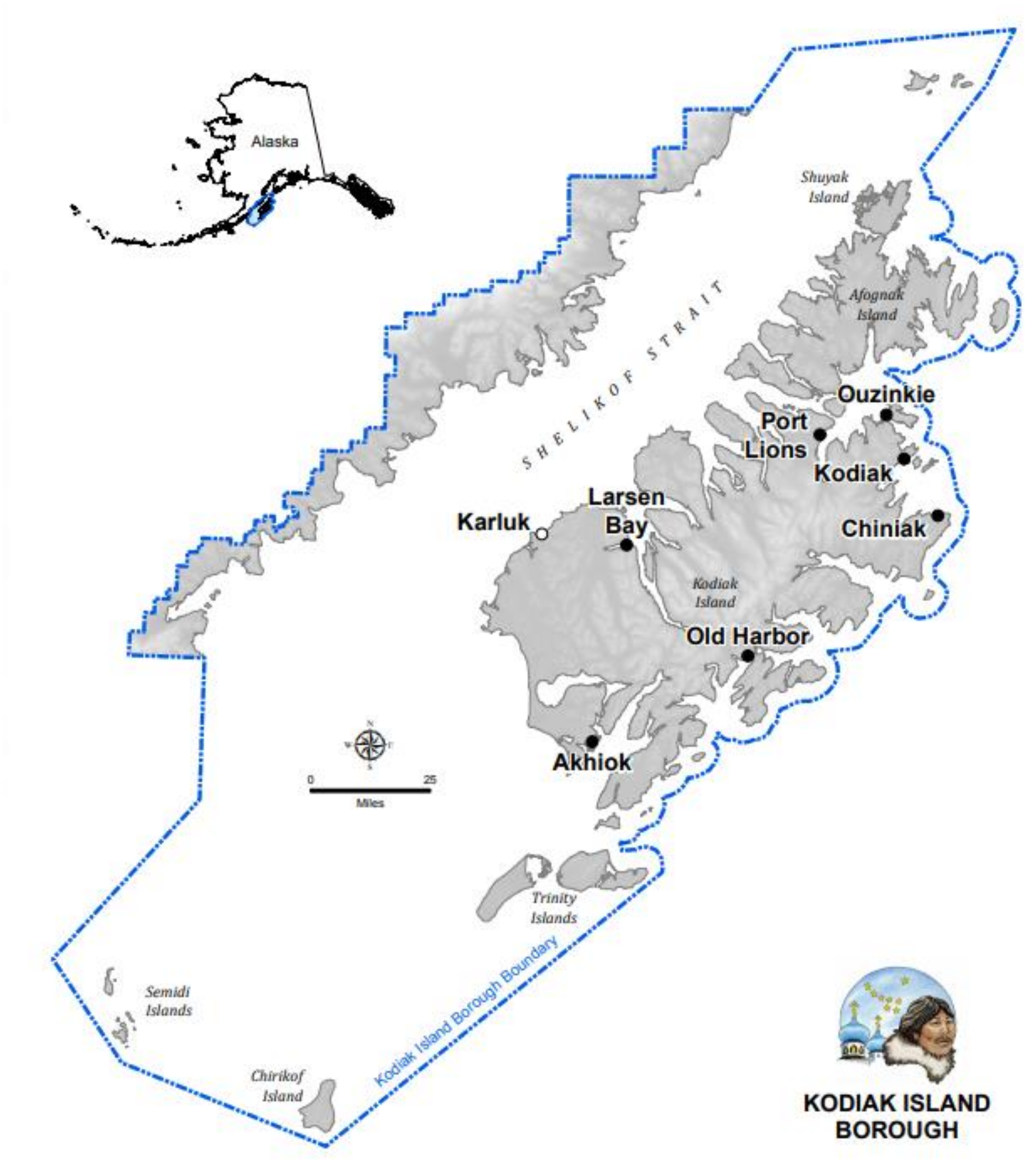
Ocean basin topography, currents, water temperature, and other environmental characteristics influence the high productivity of the region’s saltwater environments, which support many species of fish, marine mammals, crustaceans, and birds. A pre-history of glaciation throughout the region has also significantly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



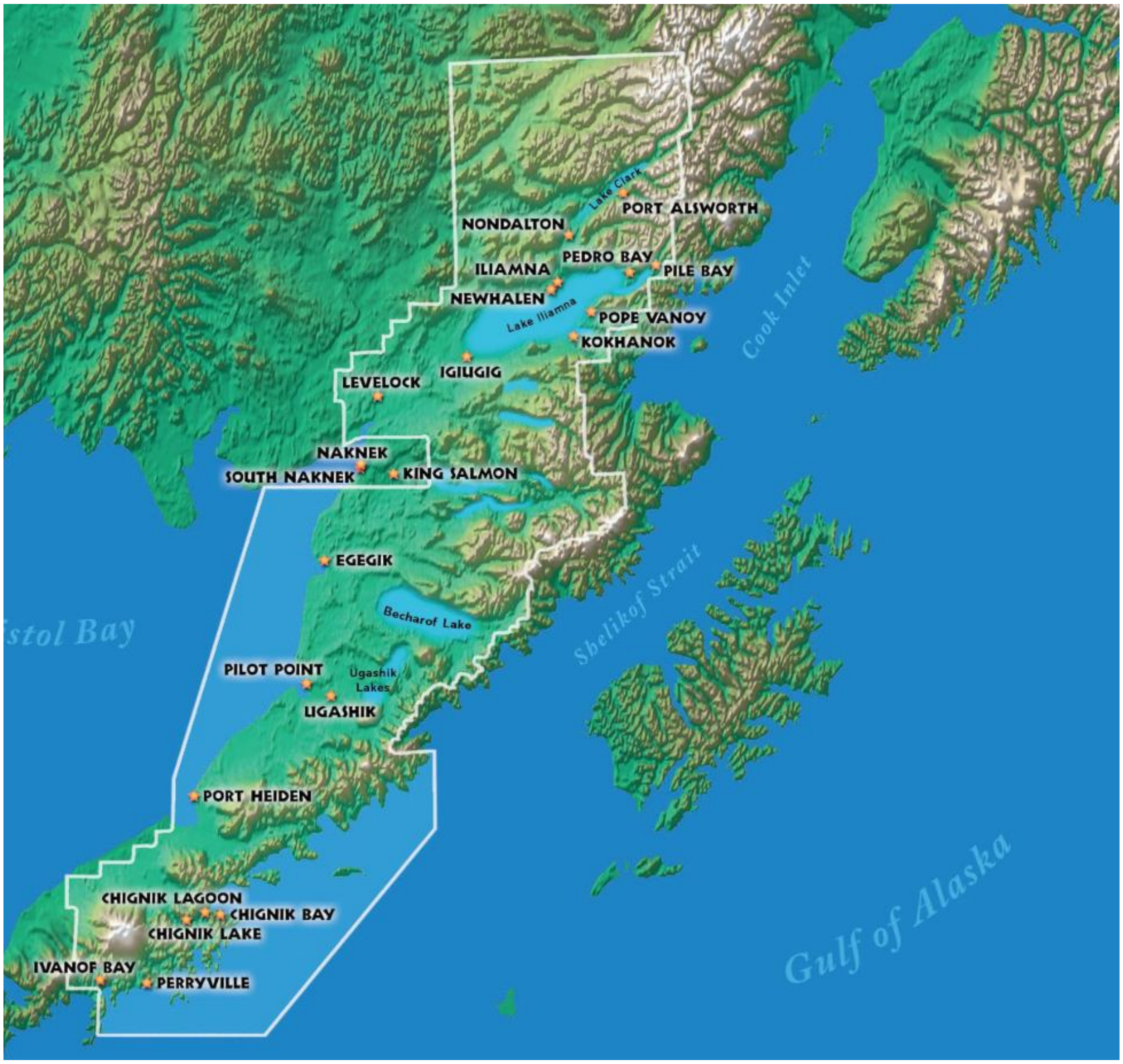
Source: Kodiak Island Borough 2018

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.

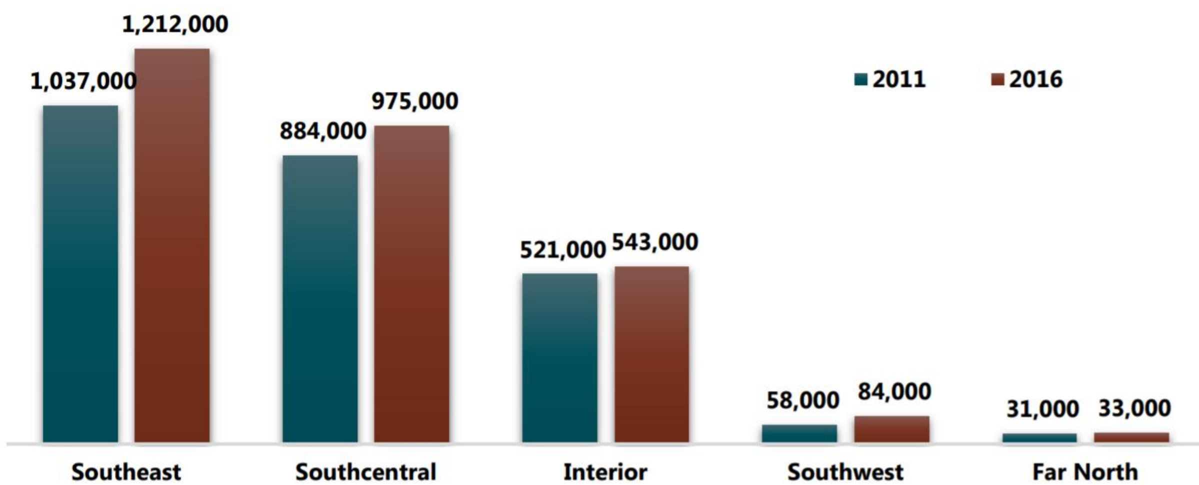
Fishing and commercial seafood processing has occurred on Kodiak Island since the late 1800s (ADF&G 2018a), and today Kodiak is home to Alaska's largest fishing port. The KMA includes the marine waters surrounding the Kodiak Archipelago, as well as drainage from the southeastern portion of the Alaska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

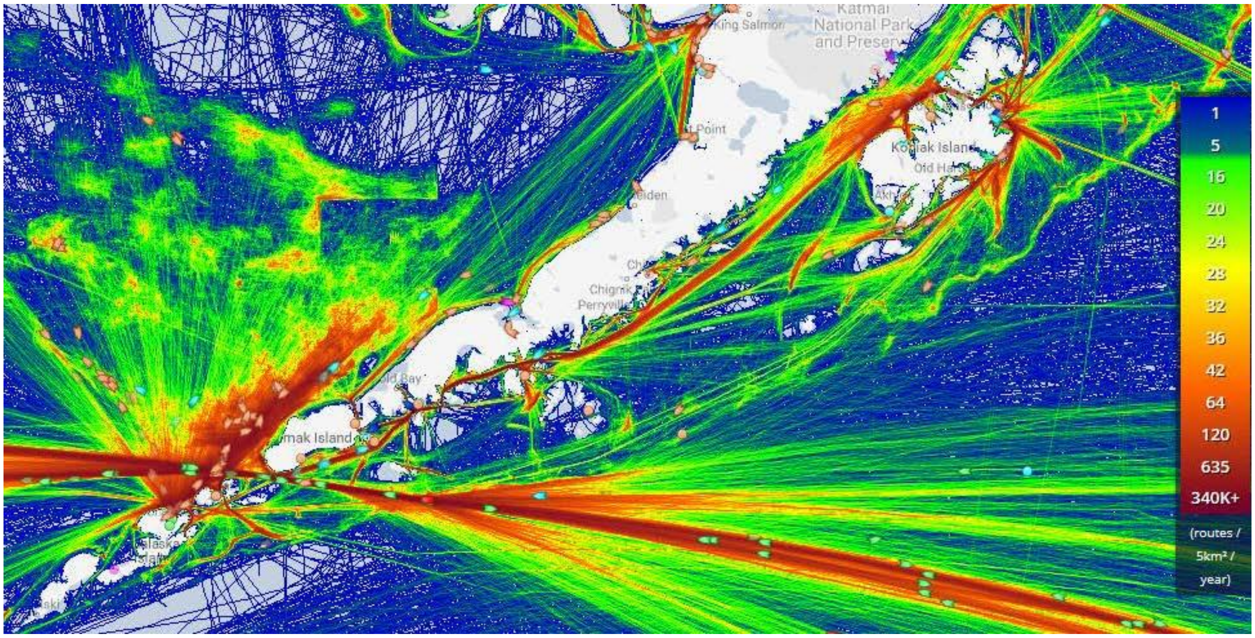
Figure 34. Estimated Visitor Volume to Alaska Regions, Summer 2011 and 2016

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.

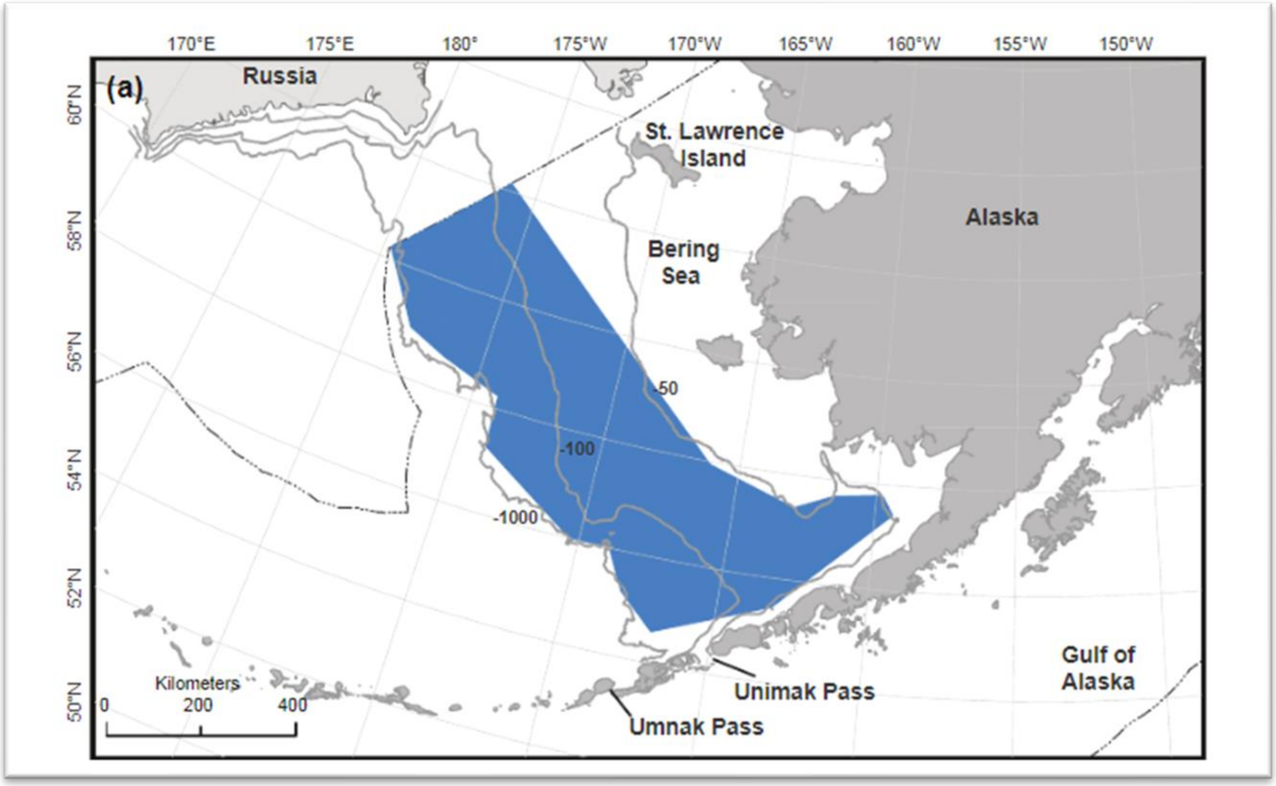
Blue whales are more likely to be encountered further offshore in the deeper waters of the Gulf of Alaska. The slow but continual movement of project vessels along with the rare occurrence of this species in nearshore waters means that any potential encounters are likely to be brief and inconsequential.

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.

8.0 REFERENCES

Alaska Department of Commerce, Community, & Economic Development. 2017. Alaska Visitor Statistics Program 7. Prepared by Alaska Travel Industry Association. May 2017. https://www.alaskatia.org/marketing/AVSP%20VII/Full%20AVSP%20VII%20Report.pdf. Accessed October 29, 2018.

Alaska Department of Fish and Game. 2018a. Subsistence Fishing Information by Area: Kodiak Island Area. http://www.adfg.alaska.gov/index.cfm?adfg=ByAreaSubsistenceKodiakIS.main. Accessed September 17, 2018.

Alaska Department of Fish and Game. 2018b. Commercial Fisheries Overview: Alaska Peninsula Management Area. http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareaakpeninsula.main. Accessed October 29, 2018.

Alaska Department of Fish and Game. 2018c. Commercial Fisheries Overview: Chignik Management Area. http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareachignik.main. Accessed October 29, 2018.

Alaska Department of Labor. 2017. 2017 Population Estimates by Borough, Census Area, Economic Region. http://live.laborstats.alaska.gov/pop/. Accessed November 16, 2018.

ADNR-DOG. 2023. Notice of Sale. Alaska Peninsula Areawide 2023, North Slope Areawide 2023W, and North Slope Foothills Areawide 2023 Competitive Oil and Gas Lease Sales. Available online at: Microsoft Word - 2023-10-13_Sale Notice__Notice of Sale.docx (alaska.gov) .

Alaska Department of Transportation and Public Facilities. 2017. Alaska Airports and Aviation. 2017 Annual Report. http://dot.alaska.gov/documents/aviation/2017Annual_Report.pdf. Accessed November 4, 2018.

Alaska Marine Highway System. 2016. 2015 Annual Traffic Volume Report. Published by the Alaska Marine Highway System for the State of Alaska Department of Transportation.

Aleutians East Borough. 2018. The Communities of the Aleutians East Borough. https://www.aleutianseast.org/vertical/sites/%7BEBDABE05-9D39-4ED4-98D4-908383A7714A%7D/uploads/%7BDE883074-5FBA-46DE-BE62-AD3EDE80E864%7D.jpg. Accessed November 16, 2018.

Aleutians East Borough. 2017. Strategic Initiatives. Completed Projects with Ongoing Components. December 14, 2017.

Allen, B.M., and R.P. Angliss. 2015. Alaska marine mammal stock assessments, 2014. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-301. 304 p. doi:10.7289/V5NS0RTS.

Anderwald, P., A. Brandecker, M. Coleman, C. Collins, H. Denniston, M.D. Haberlin, M. O'Donovan, R. Pinfield, F. Visser, and L. Walshe. 2013. Displacement responses of a mysticete, an odontocete, and a phocid seal to construction-related vessel traffic. Endang. Species Res. 21(3):231-240.

Arctic Council. 2009. Arctic Marine Shipping Assessment 2009 Report. Report. 194 p.

Arimitsu, M. L., J. F. Piatt, S. Hatch, R. M. Suryan, S. Batten, M. A. Bishop, R. W. Campbell, H. Coletti, D. Cushing, K. Gorman, R. R. Hopcroft, K. J. Kuletz, C. Marsteller, C. McKinstry, D.McGowan, J. Moran, S. Pegau, A. Schaefer, S. Schoen, J. Straley, and V. R. von Biela. 2021. Heatwave-induced synchrony within forage fish portfolio disrupts energy flow to top pelagic predators. Glob. Change Biol. 27:1859-1878.

Au, W.W.L. and M. Green. 2000. Acoustic interaction of humpack whales and whale-watching boats. Marine Environmental Research. 40(2000):469-481.

Au, W.W.L., A.N. Popper, and R.R. Fay. 2000. Hearing by Whales and Dolphins. Springer Handbook of Auditory Res. Vol. 12. Springer-Verlag, New York, NY. 458 p.

Au, W.W.L., A.A. Pack, M.O. Lammers, L.M. Herman, M.H. Deakos, and K. Andrews. 2006. Acoustic properties of humpback whale songs. J. Acoust. Soc. Am. 120(2):1103-1110.

Azzara, A.J., W.M. von Zharen, and J.J. Newcomb. 2013. Mixed-methods analytic approach for determining potential impacts of vessel noise on sperm whale click behavior. J. Acoust. Soc. Am. 134(6):4566-4574.

Bailey, H., B.R. Mate, D.M. Palacios, L. Irvine, S.J. Bograd, and D.P. Costa. 2009. "Behavioural estimation of blue whale movements in the Northeast Pacific from state-space model analysis of satellite tracks." Endangered Species Research 10(1): 93-106.

Baker, C.S., L.M. Herman, B.G. Bays, and W.F. Stifel. 1982. The impact of vessel traffic on the behavior of humpback whales in southeast Alaska. Rep. from Kewalo Basin Mar. Mamm. Lab., Honolulu, HI, for U.S. Natl. Mar. Fish. Serv., Seattle, WA. 78 p.

Baker, C.S., L.M. Herman, B.G. Bays, and G.B. Bauer. 1983. The impact of vessel traffic on the behavior of humpback whales in southeast Alaska: 1982 season. Rep. from Kewalo Basin Mar. Mamm. Lab., Honolulu, HI, for U.S. Nat. Mar. Mamm. Lab., Seattle, WA. 30 p. + fig., tables.

Baker, S. 1988. Behavioural responses of humpback whales to vessels in Glacier Bay. Proceedings of the Workshop to Review and Evaluate Whale Watching Programs and Management Needs, November 1988. Center for Marine Conservation, Washington DC. 16 pp.

Baker, C.S. and L.M. Herman. 1989. Behavioral responses of summering humpback whales to vessel traffic: experimental and opportunistic observations. NPS-NR-TRS-89-01. Rep. from Kewalo Basin Mar. Mamm. Lab., Univ. Hawaii, Honolulu, HI, for U.S. Natl. Park Serv., Anchorage, AK. 50 p. NTIS PB90-198409.

Baker, C.S., J.M. Straley, and A. Perry. 1992. Population characteristics of individually identified humpback whales in southeastern Alaska: Summer and fall 1986. Fishery Bulletin, U.S. 90:429-437.

Baker, C. S., D. Steel, J. Calambokidis, E. Falcone, U. González-Peral, J. Barlow, A. M. Burdin, P. J. Clapham, J. K. Ford, C. M. Gabriele, and D. Mattila. 2013. Strong maternal fidelity and natal philopatry shape genetic structure in North Pacific humpback whales. Mar. Ecol. Prog. Ser. 494:291-306.

Barlow, J., J. Calambokidis, E. A. Falcone, C. S. Baker, A. M. Burdin, P. J. Clapham, J. K. B. Ford, C. M. Gabriele, R. LeDuc, D. K. Mattila, T. J. Quinn II, L. Rojas-Bracho, J. M. Straley, B. L.

Taylor, J. Urbán R., P. Wade, D. Weller, B. H. Witteveen, and M. Yamaguchi. 2011. Humpback whale abundance in the North Pacific estimated by photographic capture-recapture with bias correction from simulation studies. Mar. Mammal Sci. 27:793-818.

Berta, A., R. Racicot and T. Deméré. 2009. The comparative anatomy and evolution of the ear in Balaenoptera mysticetes. p. 33 In: Abstr. 18th Bienn. Conf. Biol. Mar. Mamm., Québec, Oct. 2009. 306 p.

Bittencourt, L., I.M.S. Lima, L.G. Andrade, R.R. Carvalho, T.L. Bisi, J. Lailson-Brito, Jr., and A.F. Azevedo. 2016. Underwater noise in an impacted environment can affect Guiana dolphin communication. Mar. Poll. Bull. http://dx.doi.org/doi: 10.1016/j.marpolbul.2016.10.037.

Blackwell, S.B. and C.R. Greene, Jr. 2003. Acoustic measurements in Cook Inlet, Alaska, during August 2001. Greeneridge Rep. 271-2. Rep. from Greeneridge Sciences, Inc., Santa Barbara, CA, for NMFS, Anchorage, AK. Revised 14 June 2003. 43 p.

Blair, H.B., N.D. Merchant, A.S. Friedlaender, D.N. Wiley, and S.E. Parks. 2016. Evidence for ship noise impacts on humpback whale foraging behaivour. Biol. Lett. 12:20160005. http://dx.doi.org/ doi:10.1098/rsbl.2016.0005.

Bradford, A.L., K.A. Forney, J. E.M. Oleson, J. Barlow. 2017. Abundance estimates of cetaceans from a line-transect survey within the U.S Hawaiian Islands Exclusive Economic Zone. Fishery Bulletin 115: 129-142.

Branstetter, B.K., J.S. Trickey, H. Aihara, J.J. Finneran, and T.R. Liberman. 2013. Time and frequency metrics related to auditory masking of a 10 kHz tone in bottlenose dolphins (Tursiops truncatus). J. Acoust. Soc. Am. 134(6):4556-4565.

Branstetter, B.K., K.L. Bakhtiari, J.S. Trickey, and J.J. Finneran. 2016. Hearing mechanisms and noise metrics related to auditory masking in bottlenose dolphins (Tursiops truncatus). p. 109-116 In: A.N. Popper and A. Hawkins (eds.), The Effects of Noise on Aquatic Life II. Springer, New York, NY. 1292 p.

Breithaupt, T. 2002. Sound perception in aquatic crustaceans. p. 548-558 In: K. Wiese (ed.). The crustacean nervous system. Springer-Verlag, Berlin-Heidelberg, Germany. 623 p.

Bröker, K., G. Gailey, J. Muir, and R. Racca. 2015. Monitoring and impact mitigation during a 4D seismic survey near a population of gray whales off Sakhalin Island, Russia. Endang. Species Res. 28:187-208.

Budelmann, B.U. 1992. Hearing in crustacea. p. 131-139 In: D.B. Webster, R.R. Fay, and A.N. Popper (eds.). Evolutionary biology of hearing. Springer-Verlag, New York, NY.

Calambokidis, J., G. H. Steiger, J. M. Straley, L. M. Herman, S. Cerchio, D. R. Salden, J. Urbán R., J. K. Jacobsen, O. von Ziegesar, K. C. Balcomb, C. M. Gabriele, M. E. Dahlheim, S. Uchida, G. Ellis, Y. Miyamura, P. Ladrón de Guevara P., M. Yamaguchi, F. Sato, S. A. Mizroch, L. Schlender, K. Rasmussen, J. Barlow, and T. J. Quinn II. 2001. Movements and population structure of humpback whales in the North Pacific. Mar. Mammal Sci. 17(4):769-794.

Calambokidis, J., E.A. Falcone, T.J. Quinn, A.M. Burdin, P.J. Clapham, J.K.B. Ford, C.M. Gabriele, R. LeDuc, D. Mattila, L. Rojas-Bracho, J.M. Straley, B.L. Taylor, J. Urbán R., D. Weller, B.H.

Witteveen, M. Yamaguchi, A. Bendlin, D. Camacho, K. Flynn, A. Havron, J. Huggins, and N. Maloney. 2008. SPLASH: Structure of Populations, Levels of Abundance and Status of Humpback Whales in the North Pacific. Final Report for Contract AB133F-03-RP-00078, U.S. Dep. Commer., Western Administrative Center, Seattle, WA. Available online: http://www.cascadiaresearch.org/publications/splash-structure-populations-levels-abundance-and-status-humpback-whales-north-pacific. Accessed November 2017.

Calambokidis, J. and J. Barlow. 2020. Updated abundance estimates for blue and humpback whales along the U.S. West Coast using data through 2018, U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-634.

Calkins, D.G., Mallister, D.C., Pitcher, K.W. and G.W. Pendleton. 1999. Steller sea lion status and trend in Southeast Alaska: 1979–1997. Marine Mammal Science, 15(2), pp.462-477.

Campana, I., R. Crosti, D. Angeletti, L. Carosso, L. Davis, N. Di-Méglio, A. Moulins, M. Rosso, P. Tepsich, and A. Arcangeli. 2015. Cetacean response to summer maritime traffic in the western MediAUnean Sea. Mar. Environ. Res. 109:1-8.

Carretta, J.V., E.M. Oleson, K.A. Forney, D.W. Weller, A.R. Lang, J. Baker, A.J. Orr, B. Hanson, J. Barlow, J.E. Moore, M. Wallen, and R.L. Brownell Jr. 2023. U.S. Pacific marine mammal stock assessments: 2022. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-684. https://doi.org/10.25923/5ysf-gt95.

Carretta, J.V., K.A. Forney, E.M. Oleson, D.W. Weller, A.R. Lang, J. Baker, M.M. Muto, B. Hanson, A.J. Orr, H. Huber, M.S. Lowry, J. Barlow, J.E. Moore, D. Lynch, L. Carswell, and R.L. Brownell Jr. 2017. U.S. Pacific Marine Mammal Stock Assessments: 2016. US Department of Commerce. NOAA Technical Memorandum NMFS-SWFSC-577. https://repository.library.noaa.gov/view/noaa/14915

Carretta, J.V., K.A. Forney, E.M. Oleson, D.W. Weller, A.R. Lang, J. Baker, M.M. Muto, B. Hanson, A.J. Orr, H. Huber, M.S. Lowry, J. Barlow, J.E. Moore, D. Lynch, L. Carswell, and R.L. Brownell Jr. 2018. U.S. Pacific Marine Mammal Stock Assessments: 2017. US Department of Commerce. NOAA Technical Memorandum NMFS-SWFSC-602. https:// doi.org/10.7289/V5/TM-SWFSC-602Casper, B.M. and D.A. Mann. 2006. Evoked potential audiograms of the nurse shark (Ginglymostoma cirratum) and the yellow stingray (Urobatis jamaicensis). Environ. Biol. Fishes 76: 101-108.

Castellote, M., C.W. Clark, and M.O. Lammers. 2012. Acoustic and behavioural changes by fin whales (Balaenoptera physalus) in response to shipping and airgun noise. Biol. Conserv. 147(1):115-122.

Cholewiak, D., C.W. Clark, D. Ponirakis, A. Frankel, L.T. Hatch, D. Risch, J.E. Stanistreet, M. Thompson, E. Vu, and S.M. Van Parijs. 2018. Communicating amidst the noise: modeling the aggregate influence of ambient and vessel noise on baleen whale communication space in a national marine sanctuary. Endang Species Res. 36: 59-75.

City of Kodiak Alaska. 2018. Upcoming Kodiak Projects. https://www.city.kodiak.ak.us/engineering/page/upcoming-kodiak-projects. Accessed November 26, 2018.

Clapham, P.J., C. Good, S.E. Quinn, R.R. Reeves, J.E. Scarff, and R.L. Brownell, Jr. 2004. Distribution of North Pacific right whales (Eubalaena japonica) as shown by 19th and 20th century whaling catch and sighting records. J. Cetacean Res. Manage. 6(1):1-6.

Clapham, P.J., K.E.W. Shelden, and P.R. Wade. 2006. Review of information relating to possible critical habitat for Eastern North Pacific right whales, p. 1-27. In P.J. Clapham, K.E.W. Shelden, and P.R. Wade (eds.), Habitat requirements and extinction risks of Eastern North Pacific right whales. AFSC Processed Report 2006-06, Alaska Fisheries Science Center, National Marine Fisheries Service, Seattle, WA.

Clark, C.W. and W.T. Ellison. 2004. Potential use of low-frequency sounds by baleen whales for probing the environment: Evidence from models and empirical measurements. p. 564-589 In: J.A. Thomas, C.F. Moss and M. Vater (eds.), Echolocation in Bats and Dolphins. Univ. Chicago Press, Chicago, IL. 604 p.

Clark, C.W., W.T. Ellison, B.L. Southall, L. Hatch, S.M. Van Parijs, A. Frankel, and D. Ponirakis. 2009. Acoustic masking in marine ecosystems: intuitions, analysis, and implication. Mar. Ecol. Prog. Cooke, J.G., Taylor, B.L. Reeves, R. and Brownell Jr., R.L. 2018. Eschrichtius robustus (western subpopulation). The IUCN Red List of Threatened Species 2018. Ser. 395:201-222.

Cooke, J.G., Weller, D.W., Bradford, A.L., Sychenko, O.A., Burdin, A.M., Lang, A.R. and Brownell, R.L. Jr. 2017. Population assessment update for Sakhalin gray whales, with reference to stock identity. Paper SC/67a/NH/11 presented to the International Whaling Commission.

Cooke, J.G., Taylor, B.L. Reeves, R. and Brownell Jr., R.L. 2018. Eschrichtius robustus (western subpopulation). The IUCN Red List of Threatened Species 2018.

Culloch, R.M., P. Anderwald, A. Brandecker, D. Haberlin, B. McGovern, R. Pinfield, F. Visser, M. Jessopp, and M. Cronin. 2016. Effect of construction-related activities and vessel traffic on marine mammals. Mar Ecol Prog Ser 549:231-242.

Cunningham, K.A. and C. Reichmuth. 2016. High-frequency hearing in seals and sea lions. Hearing Res. 331:83-91.

Cunningham, K.A., B.L. Southall, and C. Reichmuth. 2014. Auditory sensitivity of seals and sea lions in complex listening scenarios. J. Acoust. Soc. Am. 136(6):3410-3421.

Currie, J.J., S.H. Stack, and G.D. Kaufman. 2017 Modelling whale-vessel encounters: the role of speed in mitigating collisions with humpback whales (Megaptera novaeangliae). J. Cetacean Res. Manage. 17 (1):57-63.

Curtis, K. Alexandra, J. Calambokidis, K. Audley, M.G. Castaneda, J. De Weerdt, A.J. García Chávez, F. Garita, P. Martínez-Loustalot, J.D. Palacios-Alfaro, B. Pérez, E. Quintana-Rizzo, R Ramírez Barragan, N. Ransome, K. Rasmussen, J. Urbán R., F. Villegas Zurita, K. Flynn, T. Cheeseman, J. Barlow, D. Steel, and J. Moore. 2022. Abundance of humpback whales (Megaptera novaeangliae) wintering in Central America and southern Mexico from a one-dimensional spatial capture-recapture model. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-661. https://doi.org/10.25923/9cq1-rx80

Dahlheim, M. and M. Castellote. 2016. Changes in the acoustic behavior of gray whales Eschrichtius robustus in response to noise. Endang. Species Res. 31:227-242.

Darlings, J. D., J. Calambokidis, K. C. Balcomb, P. Bloedel, K. Flynn, A. Mochizuki, K. Mori, F. Sato, H. Suganuma, and M. Yamaguchi. 1996. Movement of a humpback whale (Megaptera novaeangliae) from Japan to British Columbia and return. Mar. Mammal Sci. 12(2):281-287.

DataUSA. 2018. Locations search. https://datausa.io/search/?kind=geo. Accessed November 16, 2018.

Dehnhardt, G., B. Mauck, W. Hanke, and H. Bleckmann. 2001. Hydrodynamic trail-following in harbor seals (Phoca vitulina). Science, 293: 102–104.

De Robertis, A., V. Hjellvik, N.J. Williamson, and C.D. Wilson. 2008. Silent ships do not always encounter more fish: Comparison of acoustic backscatter recorded by a noise-reduced and a conventional research vessel. ICES J. Mar. Sci. 65: 623-635.

Dunlop, R.A., M.J. Noad, D.H. Cato, and D. Stokes. 2013. The social vocalization repertoire of east Australian migrating humpback whales (Megaptera novaeangliae). The Journal of the Acoustical Society of America 122(5).

Dunlop, R.A. 2015. The effect of vessel noise on humpback whale, Megaptera novaeangliae, communication behaviour. Animal Behav. 111:13-21.

Dunlop, R.A. 2016. The effect of vessel noise on humpback whale, Megaptera novaeangliae, communication behavior. Animal behaviour. 111(2016):13-21.

Dunlop, R.A., M.J. Noad, R.D. McCauley, E. Kniest, R. Slade, D. Paton, and D.H. Cato. 2016. Response of humpback whales to ramp up of a small experimental air gun array. Mar Pol Bul. 103:72-83.

Engås, A., E.K. Haugland, and J.T. Ovredal. 1998. Reactions of cod (Gadus morhua L.) in the pre-vessel zone to an approaching trawler under different light conditions. Hydrobiologica 371-372: 199-206.

Erbe, C. 2002. Hearing Abilities of Baleen Whales. Report CR 2002. Ottawa, Ont., Canada: Defense Research and Development Canada.

Erbe, C., C. Reichmuth, K. Cunningham, K. Lucke, and R. Dooling. 2016. Communication masking in marine mammals: a review and research strategy. Mar. Poll. Bull. 103(1-2):15-38.

Ferguson, M. C., C. Curtice, and J. Harrison. 2015a. Biologically important areas for cetaceans within U.S. waters – Gulf of Alaska region. Aquatic Mammals 41: 65-78.

Ferguson, M. C., J. M. Waite, C. Curtice, J. T. Clarke, and J. Harrison. 2015b. Biologically important areas for cetaceans within U.S. waters – Aleutian Islands and Bering Sea region. Aquatic Mammals 41: 79-93.

Fey, M. and R. Ames. 2013. Fishing fleet profiles 2012 Addendum. North Pacific Fishery Management Council. 41p.

Finneran, J.J., D.A. Carder, C.E. Schlundt and R.L. Dear. 2010. Growth and recovery of temporary threshold shift (TTS) at 3 kHz in bottlenose dolphins (Tursiops truncatus). J. Acoust. Soc. Am. 127(5):3256-3266.

Finneran, J.J. and B.K. Branstetter. 2013. Effects of noise on sound perception in marine mammals. p. 273-308 In: H. Brumm (ed.), Animal communication and noise. Springer Berlin, Heidelberg, Germany. 453 p.

Fournet, Michelle, L. Matthews, C. Gabriele, D. Mellinger, and H. Klinck. 2018. Source levels of foraging humpback whale calls. The Journal of the Acoustical Society of America. 143. EL105-EL111. 10.1121/1.5023599.

Frankel, A. 2005. Gray whales hear and respond to a 21-25 kHz high-frequency whale-finding sonar. p. 97 In: Abstr. 16th Bienn. Conf. Biol. Mar. Mamm., San Diego, CA, Dec. 2005. 306 p.

Frankel, A.S., and C.W. Clark. 1998. Results of low-frequency playback of M-sequence noise to humpback whales, Megaptera novaeangliae, in Hawai'i. Canadian Journal of Zoology, 76, 521-535.

Friday, N.A., A.N. Zerbini, J.M. Waite, and S.E. Moore. 2012. Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf: 1999-2004. Deep-Sea Res. II (65-70):260-272.

Friday, N.A., A.N. Zerbini, J.M. Waite, S.E. Moore, and P.J. Clapham. 2013. Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf in June and July of 2002, 2008, and 2010. Deep-Sea Res. II 94:244-256.

Gailey, G., O. Sychenko, T. McDonald, R. Racca, A. Rutenko, and K. Bröker. 2016. Behavioural responses of western gray whales to a 4-D seismic survey off northeastern Sakhalin Island, Russia. Endang. Species Res. 30:53-71.

Gervaise, C., N. Roy, Y. Simard, B. Kinda, and N. Menard. 2012. Shipping noise in whale habitat: Characteristics, sources, budget, and impact on belugas in Saguenay-St. Lawrence Marine Park hub. J. Acoust. Soc. Am. 132(1):76-89.

Goldbogen, J.A., Southall, B.L., DeRuiter, S.L., Calambokidis, J., Friedlaender, A.S., Hazen, E.L., Falcone, E.A., Schorr, G.S., Douglas, A., Moretti, D.J. and C. Kyburg. 2013. Blue whales respond to simulated mid-frequency military sonar. In Proc. R. Soc. B (Vol. 280, No. 1765, p. 20130657). The Royal Society.

Goold, J.C. and S.E. Jones. 1995. Time and Frequency-Domain Characteristics of Sperm Whale Clicks, J. Acoust. Soc. Am. 98(3):1279-1291.

Gordon, J., D. Gillespie, J. Potter, A. Frantzis, M.P. Simmonds, R. Swift, and D. Thompson. 2004. A review of the effects of seismic surveys on marine mammals. Mar. Technol. Soc. J. 37(4):16-34.

Gospić, N.R. and M. Picciulin. 2016. Changes in whistle structure of resident bottlenose dolphins in relation to underwater noise and boat traffic. Mar. Poll. Bull. 105:193-198.

Gravem SA, Heady WN, Saccomanno VR, Alvstad KF, Gehman ALM, Frierson TN, Hamilton SL. 2021. Pycnopodia helianthoides. IUCN Red List of Threatened Species 2021.43.

Gridley, T., S.H. Elwen, G. Rashley, A.B. Krakauer, and J. Heiler. 2016. Bottlenose dolphins change their whistling characteristics in relation to vessel presence, surface behavior and group composition.

Proceedings of Meetings on Acoustics 4ENAL 27(1):010030. http://dx.doi.org/doi:10.1121/2.0000312.

Halliday, W.D., S.J. Insley, R.C. Hilliard, T. de Jong, and M.K. Pine. 2017. Potential impacts of shipping noise on marine mammals in the western Canadian Arctic. Mar. Poll. Bull. 123:73-82.

Hamilton SL, Saccomanno VR, Heady WN, Gehman AL, Lonhart SI, Beas-Luna R, Francis FT, Lee L, Rogers-Bennett L, Salomon AK, Gravem SA. 2021. Disease-driven mass mortality event leads to widespread extirpation and variable recovery potential of a marine predator across the eastern Pacific. Proceedings of the Royal Society B. 288(1957):20211195.

Handegard, N.O., K. Michalsen, and D. Tjostheim. 2003. Avoidance behaviour in cod (Gadus morhua) to a bottom-trawling vessel. Aquat. Living. Resour. 16: 265-270.

Harris, R.E., G.W. Miller and W.J. Richardson. 2001. Seal responses to airgun sounds during summer seismic surveys in the Alaskan Beaufort Sea. Mar. Mamm. Sci. 17(4):795-812.

Hartin, K.G., C.M. Reiser, D.S. Ireland, R. Rodrigues, D.M.S. Dickson, J. Beland, and M. Bourdon. 2013. Chukchi Sea vessel-based monitoring program. (Chapter 3) In: Funk, D.W., C.M. Reiser, D.S. Ireland, R. Rodrigues, and W.R. Koski (eds.). 2013. Joint Monitoring Program in the Chukchi and Beaufort seas, 2006–2010. LGL Alaska Report P1213-2, Report from LGL Alaska Research Associates, Inc., LGL Ltd., Greeneridge Sciences, Inc., and JASCO Research, Ltd., for Shell Offshore, Inc. and Other Industry Contributors, and National Marine Fisheries Service, U.S. Fish and Wildlife Service. 592 p. plus Appendices.

Hastings, M.C. and A.N. Popper. 2005. Effects of sound on fish. Prepared for Jones & Stokes, Sacramento, CA, for California Dept. Transportation, Sacramento, CA.

Hatch, L.T., C.W. Clark, S.M. Van Parijs, A.S. Frankel, and D.W. Ponirakis. 2012. Quantifying loss of acoustic communication space for right whales in and around a U.S. National Marine Sanctuary. Conserv. Biol. 26(6):983-994.

Hawkins, A.D., A.E. Pembroke, and A.N. Popper. 2015. Information gaps in understanding the effects of noise on fishes and invertebrates. Rev. Fish. Biol. Fisheries 25: 39-64.

Heezen, B.C. 1957. Whales entangled in deep sea cables. Deep-Sea Research 4: 105-115.

Heiler, J., S.H. Elwen, H.J. Kriesell, and T. Gridley. 2016. Changes in bottlenose dolphin whistle parameters related to vessel presence, surface behaviour and group composition. Animal Behav. 117:167-177.

Hermannsen, L., J. Tougaard, K. Beedholm, J. Nabe-Nielsen, and P.T. Madsen. 2014. High frequency components of ship noise in shallow water with a discussion of implications for harbor porpoises (Phocoena phocoena). J. Acoust. Soc. Am. 136(4):1640-1653.

Heuch P.A, and H.E. Karlsen. 1997. Detection of infrasonic water oscillations by copepodids of Lepeophtheirus salmonis (Copepoda: Caligida). J. Plankton. Res. 19: 735–747.

Hill, A.N., C. Karniski, J. Robbins, T. Pitchford, S. Todd, R. Asmutis-Silvia. 2017. Vessel collision injuries on live humpback whales, Megaptera novaeangliae, in the southern Gulf of Maine. Mar. Mamm. Sci. 33(2):558-573.

Hodin J, Pearson-Lund A, Anteau FP, Kitaeff P, Cefalu S. 2021. Progress toward complete lifecycle culturing of the endangered sunflower star, Pycnopodia helianthoides. Biological Bulletin. 241(3):243-258.

Houghton, J., M.M. Holt, D.A. Giles, M.B. Hanson, C.K. Emmons, J.T. Hogan, T.A. Branch, and G.R. VanBlaricom. 2015. The relationship between vessel traffic and noise levels received by killer whales (Orcinus orca). PLoS ONE 10(12): e0140119. http://dx.doi.org/doi:10.1371/journal.pone.0140119.

Houser, D.S., D.A. Helweg and P.W.B. Moore. 2001. A bandpass filter-bank model of auditory sensitivity in the humpback whale. Aquatic Mammals 27:82–91.

Illingworth & Rodkin. 2016. Quintillion subsea operations fiber optic cable-laying project sound source verification. Prepared for Owl Ridge Natural Resource Consultants, Inc. by Illingworth & Rodkin, Inc. 15 Pp.

Isojunno, S., K. Aoki, C. Cure, P.H. Kvadshein, and P.J.O. Miller. 2018. Breathing Patterns Indicate Cost of Exercise During Diving and Response to Experimental Sound Exposures in Long-Finned Pilot Whales. Frontiers in Physiology. 9(1462):1-17.

Ivashchenko, Y. V., R. L. Brownell, Jr., and P. J. Clapham. 2014. Distribution of Soviet catches of sperm whales Physeter macrocephalus in the North Pacific. Endang. Species Res. 25:249-263.

Jensen, F.H., L. Bejder, M. Wahlberg, N. Aguilar Soto, M. Johnson, and P.T. Madsen. 2009. Vessel noise effects on delphinid communication. Mar. Ecol. Prog. Ser. 395:161-175.

Jefferson, T.A., M.A. Webber, and R.L. Pitman. 2008. Marine Mammals of the World: a Comprehensive Guide to their Identification. Academic Press, Elsevier, UK.

Johnson, J.H. and A.A. Wolman. 1984. The Humpback Whale, Megaptera novaeangliae. Marine Fisheries Review 46(4):300–337.

Johnson, S.R., W.J. Richardson, S.B. Yazvenko, S.A. Blokhin, G. Gailey, M.R. Jenkerson, S.K. Meier, H.R. Melton, M.W. Newcomer, A.S. Perlov, S.A. Rutenko, B. Würsig, C.R. Martin, and D.E. Egging. 2007. A western gray whale mitigation and monitoring program for a 3-D seismic survey, Sakhalin Island, Russia. Environ. Monit. Assess. 134(1-3):1-19.

Jones, E.L., G.D. Hastie, S. Smout, J. Onoufriou, N.D. Merchant, K.L. Brookes, and D. Thompson. 2017. Seals and shipping: quantifying population risk and individual exposure to vessel noise. J. Appl. Ecol. dx.doi.org/doi:10.1111/1365-2664.12911.

Jørgensen, R., N.O. Handegard, H. Gjøsæter, and A. Slotte. 2004. Possible vessel avoidance behaviour of capelin in a feeding area and on a spawning ground. Fish. Res. 69: 251-261.

Kastak, D. and R.J. Schusterman. 1998. Low-frequency amphibious hearing in pinnipeds: methods, measurements, noise, and ecology. J. Acoust. Soc. Am. 103(4):2216-2228.

Kastak, D. and R.J. Schusterman. 1999. In-air and underwater hearing sensitivity of a northern elephant seal (Mir-ounga angustirostris). Can. J. Zool. 77(11):1751-1758.

Kastak, D., B.L. Southall, R.J. Schusterman, and C. Reichmuth. 2005. Underwater temporary threshold shift in pinnipeds: effects of noise level and duration. J. Acoust. Soc. Am. 118(5):3154-3163.

Kastak, D., J. Mulsow, A. Ghoul, and C. Reichmuth. 2008. Noise-induced permanent threshold shift in a harbor seal. J. Acoust. Soc. Am. 123(5):2986.

Kastelein, R.A., P.J. Wensveen, L. Hoek, W.C. Verboom and J.M. Terhune. 2009. Underwater detection of tonal signals between 0.125 and 100 kHz by harbor seals (Phoca vitulina). J. Acoust. Soc. Am. 125(2):1222-1229.

Kastelein, R.A., P. Mosterd, B. van Santen, M. Hagedoorn, and D. de Haan. 2002. Underwater audiogram of a Pacific walrus (Odobenus rosmarus divergens) measured with narrow-band frequency-modulated signals. J. Acoust. Soc. Am. 112(5):2173-2182.

Kastelein, R.A., R. van Schie, W.C. Verboom, D. de Haan. 2005. Underwater hearing sensitivity of a male and a female Steller sea lion (Eumetopias jubatus). J. Acoust. Soc. Am. 118(3, Pt. 1):1820-1829.

Kato, H., and T. Miyashita. 1998. Current status of North Pacific sperm whales and its preliminary abundance estimates. Unpubl. doc. submitted to Int. Whal. Comm. Scientific Committee (SC/50/CAWS/52). 6 p.

Ketten, D.R. 1991. The marine mammal ear: specializations for aquatic audition and echolocation. p. 717-750 In: D. Webster, R. Fay and A. Popper (eds.), The Biology of Hearing. Springer-Verlag, Berlin.

Ketten, D.R. 1992. The cetacean ear: form, frequency, and evolution. p. 53-75 In: J.A. Thomas, R.A. Kastelein, and A. Ya Supin (eds.), Marine Mammal Sensory Systems. Plenum, New York, NY.

Ketten, D.R. 1994. Functional analysis of whale ears: adaptations for underwater hearing. IEEE Proc. Under-water Acoust. 1:264-270.

Ketten, D.R. 2000. Cetacean ears. p. 43-108 In: W.W.L. Au, A.N. Popper, and R.R. Fay (eds.), Hearing by Whales and Dolphins. Springer-Verlag, New York, NY. 485 p.

Ketten, D.R., J. O'Malley, P.W.B. Moore, S. Ridgway, and C. Merigo. 2001. Aging, injury, disease, and noise in marine mammal ears. J. Acoust. Soc. Am. 110(5, Pt. 2):2721 (Abstract).

Knowlton, A. R. & Kraus, S. D. 2001 Mortality and serious injury of northern right whales (Eubalaena glacialis) in the western North Atlantic Ocean. J. Cetacean Res. Management (Special Issue) 2, 193-208.

Kodiak Island Borough. 2018. About Our Community. https://www.kodiakak.us/621/About-Our-Community. Accessed October 15, 2018.

Konar B, Mitchell TJ, Iken K, Coletti H, Dean T, Esler D, Lindeberg M, Pister B, Weitzman B. 2019. Wasting disease and static environmental variables drive sea star assemblages in the northern Gulf of Alaska. Journal of Experimental Marine Biology and Ecology. 520:151209.

Krieger, K.J. and B.L. Wing. 1984. Hydroacoustic surveys and identification of humpback whale forage in Glacier Bay, Stephens Passage, and Frederick Sound, southeastern Alaska, summer 1983.

NOAA Tech. Memo. NMFS F/NWC-66. U.S. Natl. Mar. Fish. Serv., Auke Bay, AK. 60 p. NTIS PB85-183887.

Krieger, K.J. and B.L. Wing. 1986. Hydroacoustic monitoring of prey to determine humpback whale movements. NOAA Tech. Memo. NMFS F/NWC-98. U.S. Natl. Mar. Fish. Serv., Auke Bay, AK. 63 p. NTIS PB86-204054.

Kryter, K.D. 1985. The Effects of Noise on Man. 2nd ed. Academic Press, Orlando, FL. 688 p.

Kuhn C. E., K. Chumbley, D. Johnson, and L. Fritz. 2017. A re-examination of the timing of pupping for Steller sea lions Eumetopias jubatus breeding on two islands in Alaska. Endang Species Res 32:213-222. https://doi.org/10.3354/esr00796

Kujawa, S.G. and M.C. Liberman. 2009. Adding insult to injury: cochlear nerve degeneration after “temporary” noise-induced hearing loss. J. Neurosci. 29(45):14077-14085.

Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet, M. Podesta. 2001. Collisions between ships and whales. Mar. Mamm. Sci. 17(1):35-75.

Laist, D.W., A.R. Knowlton, D. Pendleton. 2014. Effectiveness of mandatory vessel speed limits for protecting North Atlantic right whales. Endang. Species. Res. 23:133-147.

Lake and Peninsula Borough. 2018. Villages. http://www.lakeandpen.com/residents/about_l_p_b/villages. Accessed November 16, 2018.

Lammers, M.O., A.A. Pack, E.G. Lyman, L. Espiritu. 2013. Trends in collisions between vessels and North Pacific humpback whales (Megaptera novaeangliae) in Hawaiian waters (1975-2011).

LeDuc, R. 2004. Report of the results of the 2002 survey for North Pacific right whales. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWFSC-357, 58 p.

Le Prell, C.G. 2012. Noise-induced hearing loss: from animal models to human trials. p. 191-195 In: A.N. Popper and A. Hawkins (eds.), The effects of noise on aquatic life. Springer, New York, NY. 695 p.

LGL Alaska Research Associates, Inc., JASCO Applied Sciences, Inc., and Greeneridge Sciences, Inc. 2014. Joint Monitoring Program in the Chukchi and Beaufort Seas, 2012. LGL Alaska Final Report P1272-2 for Shell Offshore, Inc. ION Geophysical, Inc., and Other Industry Contributors, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. 320 p. plus Appendices.

Liberman, C. 2016. Noise-induced hearing loss: permanent versus temporary threshold shifts and the effects of hair cell versus neuronal degeneration. p. 1-7 In: A.N. Popper and A. Hawkins (eds.), The Effects of Noise on Aquatic Life II. Springer, New York, NY. 1292 p.

Loughlin, T.R. 1997. Using the phylogeographic method to identify Steller sea lion stocks, p. 329-341. In A. Dizon, S. J. Chivers, and W. Perrin (eds.), Molecular genetics of marine mammals, incorporating the proceedings of a workshop on the analysis of genetic data to address problems of stock identity as related to management of marine mammals. Soc. Mar. Mammal., Spec. Rep. No. 3.

Lowry, D, Wright, S, Neuman, M, Stevenson, D, Hyde, J, Lindeberg, M, Tolimieri, N, Lonhart, S, Traiger, S, and R Gustafson. 2022. Endangered Species Act Status Review Report: Sunflower Sea Star (Pycnopodia helianthoides). Final Report to the National Marine Fisheries Service, Office of Protected Resources. October 2022. 89 pp. + App.

Luís, A.R., M.N. Couchinho, and M.E. Dos Santos. 2014. Changes in the acoustic behavior of resident bottlenose dolphins near operating vessels. Mar. Mamm. Sci. 30(4):1417-1426.

MacGillivray, A.O., R. Racca, and Z. Li. 2014. Marine mammal audibility of selected shallow-water survey sources. J. Acoust. Soc. Am. 135(1):EL35-EL40.

MacLean, S.A. and B. Haley. 2004. Marine mammal monitoring during Lamont-Doherty Earth Observatory's seismic study in the Støregga Slide area of the Norwegian Sea, August–September 2003. LGL Rep. TA2822-20. Rep. from LGL Ltd., King City, Ont., for Lamont-Doherty Earth Observatory of Columbia Univ., Palisades, NY, and Nat. Mar. Fish. Serv., Silver Spring, MD. 59 p.

Malme, C.I., B. Würsig, J.E. Bird, and P.L. Tyack. 1986. Behavioral responses of gray whales to industrial noise: Feeding observations and predictive modeling (BBN Report No. 6265, OCS Study MMS 88-0048; NTIS PB88-249008). NOAA Outer Continental Shelf Environmental Assessment Program, Final Reports of Principal Investigators, 56, 393-600.

Malme, C.I., P.R. Miles, C.W. Clark, P. Tyack, and J.E. Bird. 1984. Investigations of the potential effects of underwater noise from petroleum industry activities on migrating gray whale behavior. Phase II: January 1984 migration (BBN Report No. 5586; NTIS PB86-218377). Report from Bolt Beranek and Newman Inc. for U.S. Minerals Management Service, Anchorage, AK.

Mann, D.A., Z. Lu, and A.N. Popper. 1997. A clupeid fish can detect ultrasound. Nature 389(6649): 341.

Mann, D.A., Z. Lu, M.C. Hastings, and A.N. Popper. 1998. Detection of ultrasonic tones and simulated dolphin echolocation clicks by a teleost fish, the American shad (Alosa sapidissima). J. Acoust. Soc. Am. 104(1): 562-568.

Mann, D.A., D.M. Higgs, W.N. Tavolga, M.J. Souza, and A.N. Popper. 2001. Ultrasound detection by clupeiform fishes. J. Acoust. Soc. Am. 109(6): 3048-3054.

Martins, D.T.L., M.R. Rossi-Santos, and F.J.D.L. Silva. 2016. Effects of anthropogenic noise on the acoustic behaviour of Sotalia guianensis (Van Bénéden, 1864) in Pipa, North-eastern Brazil. J. Mar. Biol. Assoc. U.K. doi:10.1017/S0025315416001338.

Mate, B.R., Lagerquist, B.A. and J. Calambokidis. 1999. Movements of North Pacific blue whales during the feeding season off southern California and their southern fall migration. Marine Mammal Science, 15(4), pp.1246-1257.

Mauzey KP, Birkeland C, Dayton PK. 1968. Feeding behavior of asteroids and escape responses of their prey in the Puget Sound region. Ecology. 49(4):603-619.

McCauley, R.D., D.H. Cato, and A.F. Jeffery. 1996. A study of the impacts of vessel noise on humpback whales in Herve Bay, Queensland, Australia. Report for the queensland Department of Environment and Heritage, Maryborough Office, from the Department of Marine Biology, James Cook University, Townsville. 137 pp.

McConnell, B.J., Fedak, M.A., Lovell, P., and P.S. Hammond. 1999. Movements and foraging areas of grey seals in the North Sea. Journal of Applied Ecology, 36: 573–590.

McDonald, M.A., and S.E. Moore. 2002. Calls recorded from North Pacific right whales (Eubalaena japonica) in the eastern Bering Sea. Journal of Cetacean Research and Management 4:261–266.

McKenna, M.F. 2011. Blue whale response to underwater noise from commercial ships. In: PhD Thesis in Oceanography at the University of California San Diego. 218 p.

McKenna, M.F., S.L. Katz, C. Condit, and S. Walbridge. 2012. Response of commercial ships to a voluntary speed reduction measure: Are voluntary strategies adequate for mitigating ship-strike risk? Coast. Manage. 40:634-650.

McKenna, M.F., J. Calambokidis, E.M. Oleson, D.W. Laist, J.A. Goldbogen. 2015. Simultaneous tracking of blue whales and large ships demonstrate limited behavioral responses for avoiding collision. Endang. Species. Res. 27:219-232.

Meier, S.K., Yazvenko, S.B., Blokhin, S.A., Wainwright, P., Maminov, M.K., Yakovlev, Y.M. et al. 2007. Distribution and abundance of western gray whales off northeast Sakhalin Island, Russia, 2001’003. Environmental Monitoring and Assessment, in press.

Melcón, M.L., A.J. Cummins, S.M. Kerosky, L.K. Roche, S.M. Wiggins, and J.A. Hildebrand. 2012. Blue whales respond to anthropogenic noise. PLoS ONE 7(2):e32681. http://dx.doi.org/doi:10.1371/ journal.pone.0032681.

Miles, P.R., and C.I. Malme. 1983. The acoustic environment and noise exposure of humpback whales in Glacier Bay, Alaska (BBN Technical Memorandum 734). Report from Bolt Beranek & Newman Inc. for National Marine Mammal Laboratory, Seattle, WA. 81 pp.

Misund, O.A., J.T. Ovredal, and M.T. Hafsteinsson. 1996. Reactions of herring schools to the sound field of a survey vessel. Aquat. Living Resour. 9: 5-11.

Mizroch, S.A., and D.W. Rice. 2006. Have North Pacific killer whales switched prey species in response to depletion of the great whale populations? Mar. Ecol. Prog. Ser. 310:235-246.

Mizroch, S.A., and D.W. Rice. 2013. Ocean nomads: distribution and movements of sperm whales in the North Pacific shown by whaling data and Discovery marks. Mar. Mammal Sci. 29(2):E136-E165. DOI: 10.1111/j.1748-7692.2012.00601.x.

Mizroch, S.A., D. Rice, D. Zwiefelhofer, J. Waite, and W. Perryman. 2009. Distribution and movements of fin whales in the North Pacific Ocean. Mammal Rev. 39(3):193-227.

Mooney, T.A., P.E. Nachtigall, M. Breese, S. Vlachos, and W.W.L. Au. 2009a. Predicting temporary threshold shifts in a bottlenose dolphin (Tursiops truncatus): the effects of noise level and duration. J. Acoust. Soc. Am. 125(3):1816-1826.

Mooney, T.A., P.E. Nachtigall and S. Vlachos. 2009b. Sonar-induced temporary hearing loss in dolphins. Biol. Lett. 4(4):565-567.

Moulton, V.D., and M. Holst. 2010. Effects of Seismic Survey Sound on Cetaceans in the Northwest Atlantic. Environmental Studies Research Funds Report No. 182. St. John’s. 28p.

Moulton, V.D., W.J. Richardson, M.T. Williams, R.T. Elliot, T.L. McDonald, C. Nations, and M.T. Williams. 2005. Effects of an offshore oil development on local abundance and distribution of ringed seals (Phoca hispida) of the Alaskan Beaufort Sea. Mar. Mamm. Sci. 21(2):217-242.

Munger, L. M., and J. A. Hildebrand. 2004. Final Report: Bering Sea right whales: acoustic recordings and public outreach. North Pacific Research Board Grant Report T-2100.

Muslow, J. and C. Reichmuth. 2010. Psychophysical and electrophysiological aerial audiograms of Steller sea lion (Eumetopias jubatus). J. Acoust. Soc. Am. 127(4):2692-2701.

Muto, M.M., V.T. Helker, R.P. Angliss, B.A. Allen, P.L. Boveng, J.M. Breiwick, M.F. Cameron, P.J. Clapham, S.P. Dahle, M.E. Dahlheim, B.S. Fadely, M.C. Ferguson, L.W. Fritz, R.C. Hobbs, Y.V. Ivashchenko, A.S. Kennedy, J.M. London, S.A. Mizroch, R.R. Ream, E.L. Richmond, K.E.W. Shelden, R.G. Towell, P.R. Wade, J.M. Waite, and A.N. Zerbini. 2017. Alaska marine mammal stock assessments, 2016. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-355, 366 p. doi:10.7289/V5/TM-AFSC-355.

Muto, M.M., V.T. Helker, R.P. Angliss, B.A. Allen, P.L. Boveng, J.M. Breiwick, M.F. Cameron, P.J. Clapham, S.P. Dahle, M.E. Dahlheim, B.S. Fadely, M.C. Ferguson, L.W. Fritz, R.C. Hobbs, Y.V. Ivashchenko, A.S. Kennedy, J.M. London, S.A. Mizroch, R.R. Ream, E.L. Richmond, K.E.W. Shelden, R.G. Towell, P.R. Wade, J.M. Waite, and A.N. Zerbini. 2018. Alaska marine mammal stock assessments, 2017. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-378, 382 p.

Muto, M. M., V. T. Helker, B. J. Delean, N. C. Young, J. C. Freed, R. P. Angliss, N. A. Friday, P. L. Boveng, J. M. Breiwick, B. M. Brost, M. F. Cameron, P. J. Clapham, J. L. Crance, S. P. Dahle, M. E. Dahlheim, B. S. Fadely, M. C. Ferguson, L. W. Fritz, K. T. Goetz, R. C. Hobbs, Y. V. Ivashchenko, A. S. Kennedy, J. M. London, S. A. Mizroch, R. R. Ream, E. L. Richmond, K. E. W. Shelden, K. L. Sweeney, R. G. Towell, P. R. Wade, J. M. Waite, and A. N. Zerbini. 2021. Alaska marine mammal stock assessments, 2020. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-421, 398 p.

Newby, T.C., F.M Hart, and R.A. Arnold. 1970. Weight and blindness of harbor seals. Journal of Mammalogy, 51: 152.

Neilson, J.L., C.M. Gabriele, A.S. Jensen, K. Jackson, and J.M. Straley. 2012. Summary of reported whale-vessel collisions in Alaskan waters. Journal of Marine Biology. doi: 10.1155/2012/106282

Nichol, L.M., B.M. Wright, P. O'Hara, and J.K.B. Ford. 2017. Risk of lethal vessel strikes to humpback and fin whales off the west coast of Vancouver Island, Canada. Endang. Species. Res. 32:373-390.

NMFS [National Marine Fisheries Service]. 2008. Recovery Plan for the Steller sea lion (Eumetopias jubatus). Revision. National Marine Fisheries Service, Silver Spring, MD. 325 p.

NMFS. 2018. 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.

NMFS. 2019. Steller sea lion haul outs and critical habitat relative to project landing locations. Prepared by Tammy Olson of NMFS, transmitted by Judy Jacobs, NMFS AKR to Sheyna Wisdom, Fairweather Science on May 15, 2019 via email.

NMFS. 2021. Occurrence of Endangered Species Act (ESA) Listed Humpback Whales off Alaska. NMFS Alaska Region. Revised August 6, 2021.

NOAA [National Oceanic and Atmospheric Administration]. 2017. Alaska Regional Office – Marine Mammal Viewing Guidelines and Regulations. https://alaskafisheries.noaa.gov/pr/mm-viewing-guide Website accessed November 14, 2017.

Nowacek, D.P., M. Johnson, and P. Tyack. 2004. North Atlantic right whales (Eubalaena glacialis) ignore ships but respond to alerting stimuli. Proceedings of the Royal Society of London Series B: Biological Sciences, 271, 227-231.

Nowacek, D.P., L.H. Thorne, D.W. Johnston, and P.L. Tyack. 2007. Responses of cetaceans to anthropogenic noise. Mammal Rev. 37(2):81-115.

Nuka Research and Planning Group. 2014. Aleutian Island Risk Assessment 2012 Transits of Umiak Pass. Brief to the Aleutian Islands Risk Assessment Advisory Panel and Management Team. September 2014. 13 p.

Oakley, J.A., A.T. Williams, and T. Thomas. 2017. Reactions of harbour porpoise (Phocoena phocoena) to vessel traffic in the coastal waters of Wouth Wales, UK. Ocean & Coastal Manage. 138:158-169.

O'Brien, J.M., S. Beck, S.D. Berrow, M. Andre, M. vand er Schaar, I. O'Connor, and E.P. McKeown. 2016. The use of deep water berths and the effects of noise on bottlenose dolphins in the Shannon Estuary cSAC. p. 775-783 In: A.N. Popper and A. Hawkins (eds.), The effects of noise on aquatic life II. Springer, New York, NY. 1292 p.

Ona, E., O.R. Godo, N.O. Handegard, V. Hjellvik, R. Patel, and G. Pedersen. 2007. Silent research vessels are not quiet. J. Acoust. Soc. Am. 121: 1-6.

Packard A, H.E. Karlsen HE, and O. Sand. 1990. Low frequency hearing in cephalopods. J Comp Physiol A 166:501–505.

Papale, E., M. Gamba, M. Perez-Gil, V.M. Martin, and C. Giacoma. 2015. Dolphins adjust species-specific frequency parameters to compensate for increasing background noise. PLoS ONE 10(4):e0121711. http://dx.doi.org/doi:10.1371/journal.pone.0121711.

Parks, S.E. M. Johnson, D. Nowacek, and P.L. Tyack. 2011. Individual right whales call louder in increased environ¬mental noise. Biol. Lett. 7(1):33-35.

Parks, S.E., C.W. Clark, and P.L. Tyack. 2007a. Short- and long-term changes in right whale calling behavior: the potential effects of noise on acoustic communication. J Acoust Soc Am 122: 3725−3731.

Parks, S.E., D.R. Ketten, J.T. O'Malley and J. Arruda. 2007b. Anatomical predictions of hearing in the North Atlantic right whale. Anat. Rec. 290(6):734-744.

Parks, S.E., I. Urazghildiiev, and C.W. Clark. 2009. Variability in ambient noise levels and call parameters of North Atlantic right whales in three habitat areas. J Acoust Soc Am. 125: 1230−1239.

Parks, S.E., M.P. Johnson, D.P. Nowacek, and P.L. Tyack. 2012. Changes in vocal behaviour of North Atlantic right whales in increased noise. p. 317-320 In: A.N. Popper and A. Hawkins (eds.), The effects of noise on aquatic life. Springer, New York, NY. 695 p.

Parks, S.E., K. Groch, P. Flores, R. Sousa-Lima, and I.R. Urazghildiiev. 2016a. Humans, fish, and whales: How right whales modify calling behavior in response to shifting background noise conditions. p. 809-813 In: A.N. Popper and A. Hawkins (eds.), The effects of noise on aquatic life II. Springer, New York, NY. 1292 p.

Parks, S.E., D.A. Cusano, A. Bocconcelli, and A.S. Friedlaender. 2016b. Noise impacts on social sound production by foraging humpback whales. Abstr. 4th Int. Conf. Effects of Noise on Aquatic Life, July 2016, Dublin, Ireland.

Payne, R. 1978. Behavior and vocalizations of humpback whales (Megaptera sp.). In: K.S Norris and R.R. Reeves (eds.), Report on a workshop on problems related to humpback whales (Megaptera novaeangliae) in Hawaii. MCC-77/03. Rep. from Sea Life Inc., Makapuu Pt., HI, for U.S. Mar. Mamm. Comm., Washington, DC.

Pitcher, K.W., V.N. Burkanov, D.G. Calkins, B.J. LeBoeuf, E.G. Mamaev, R.L. Merrick, and G.W. Pendleton. 2001. Spatial and temporal variation in the timing of births of Steller sea lions. J. Mammalogy 82(4): 1047-1053

Popper, A.N. 2009. Are we drowning out fish in a sea of noise? Mar. Scientist 27: 18-20.

Popper, A.N., M. Salmon, and K.W. Horch. 2001. Acoustic detection and communication by decapod crustaceans. J. Comp. Physiol. A 187: 83-89.

Popper, A.N. and M.C. Hastings. 2009a. The effects of human-generated sound on fish. Integr. Zool. 4(1): 43-52.

Popper, A.N. and M.C. Hastings. 2009b. The effects of anthropogenic sources of sound on fishes. J. Fish Biol. 75(3): 455 489.

Popper, A.N. and R.R. Fay. 2010. Rethinking sound detection by fishes. Hearing Res. 273(1-2): 25-36. doi:10.1016/j.heares.2009.12.023.

Pye, H.J. and W.H. Watson, III. 2004. Sound detection and production in the American lobster, Homarus americanus: Sensitivity range and behavioural implications. J. Acoust. Soc. Am. 115 (5, Pt. 2): 2486.

Reichmuth, C., M.M. Holt, J. Mulsow, J.M. Sills, and B.L. Southall. 2013. Comparative assessment of amphibious hearing in pinnipeds. J. Comp. Physiol. A: 199:491-507.

Rice, A.N., J.T. Tielens, B.J. Estabrook, C.A. Muirhead, A. Rahaman, M. Guerra, and C.W. Clark. 2014. Variation of ocean acoustic environments along the western North Atlantic coast: A case study in context of the right whale migration route. Ecol. Inform. 21:89-99.

Richardson, W. J., C.R. Greene, Jr., W.R. Koski,, C.I. Malme, G.W. Miller, and M.A. Smultea. 1990. Acoustic effects of oil production activities on bowhead and white whales visible during spring migration near Pt. Barrow, Alaska—1989 phase (OCS Study MMS 90- 0017; NTIS PB91-105486). LGL Ltd. report for U.S. Minerals Management Service, Herndon, VA. 284 pp.

Richardson, W.J., C.R. Greene, Jr., C.I. Malme, and D.H. Thomson. 1995. Marine mammals and noise. Academic Press, San Diego, CA. 576 p.

Rockwood, R.C., J. Calambokidis, and J. Jahncke. 2017. High mortality of blue, humpback and fin whales from modeling of vessel collisions on the U.S. west coast suggests population impacts and insufficient protection. PLoS ONE 12(8):e0183052.

Rolland, R.M., S.E. Parks, K.E. Hunt, M. Castellote, P.J. Corkeron, D.P. Nowacek, S.K. Wasser, and S.D. Kraus. 2012. Evidence that ship noise increases stress in right whales. Proc. Bio Sci. 279(1737):2362-2369.

Rone, B.K., C.L. Berchok, J.L. Crance, and P.J. Clapham. 2012. Using air-deployed passive sonobuoys to detect and locate critically endangered North Pacific right whales. Mar. Mammal Sci. 28:E528-E538.Rone, B. K., A. N. Zerbini, A. B. Douglas, D. W. Weller, and P. J. Clapham. 2017. Abundance and distribution of cetaceans in the Gulf of Alaska. Mar. Biol. 164:23. DOI: dx.doi.org/10.1007/s00227-016-3052-2 .

Sairanen, E.E. 2014. Weather and ship induced sounds and the effect of shipping on harbor porpoise (Phocoena phocoena) activity. M.Sc. Thesis, University of Helsinki. 67 p.

Salden, D.R. 1993. Effects of research boat approaches on humpback whale behavior off Maui, Hawaii, 1989–1993. p. 94 In: Abstr. 10th Bienn. Conf. Biol. Mar. Mamm., Galveston, TX, Nov. 1993. 130 p.

Sand, O., H.E. Karlsen, and F.R. Knudsen. 2008. Comment on “Silent research vessels are not quiet”. J. Acoust. Soc. Am. 123: 1831-1833.

Sarà, G., J.M. Dean, D. D’Amato, G. Buscaino, A. Oliveri, S. Genovese, S. Ferro, G. Buffa, M.Lo Martire, and S. Mazzola. 2007. Effect of boat noise on the behaviour of bluefin tuna Thunnus thynnus in the MediAUnean Sea. Mar. Ecol. Prog. Ser. 331: 243-253.

Savage, K. 2017. Alaska and British Columbia Large Whale Unusual Mortality Event summary report. 2017. NOAANMFS.

Schaffar, A., B. Madon, C. Garrigue, and R. Constantine. 2013. Behavioural effects of whale-watching activities on an Endangered population of humpback whales wintering in New Caledonia. Endangered Species Research. 19:245-254.

Shivji M, Parker D, Hartwick B, Smith MJ, Sloan NA. 1983. Feeding and distribution study of the sunflower sea star Pycnopodia helianthoides (Brandt, 1938). Pacific Science. 37(2):133- 140.

Sills, J.M., B.L. Southall, and C. Reichmuth. 2014. Amphibious hearing in spotted seals (Phoca largha): underwater audiograms, aerial audiograms and critical ratio measurements. J. Exp. Biol. 217:726-734.

Sills, J.M., B.L. Southall, and C. Reichmuth. 2017. The influence of temporally varying noise from seismic air guns on the detection of underwater sounds by seals. J. Acoust. Soc. Am. 141(2):996-1008.

Simpson S.D., Radford AN, Nedelec S.L., Ferrari M.C.O., Chivers D.P., McCormick M.I., and M.G. Meekan. 2016. Anthropogenic noise increases fish mortality by predation. Nat. Commun. 7, 10544

Skaret, G., B.E. Axelsen, L. Nottestad, A. Ferno, and A. Johannessen. 2005. The behaviour of spawning herring in relation to a survey vessel. ICES J. Mar. Sci. 62: 1061-1064.

Southall B.L., R.J. Schusterman, D. Kastak. 2000. Masking in three pinnipeds: Underwater, low-frequency critical ratios. J. Acoust. Soc. Am. 108(3):1322-1326.

Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. Marine mammal noise expo-sure criteria: initial scientific recommendations. Aquat. Mamm. 33(4):411-522.

Springer, A.M., C.P. McRoy, and M.V. Flint. 1996. The Bering Sea green belt: shelf-edge processes and ecosystem production. Fish. Oceanogr. 5:205-223.

Stafford, K.M. 2003. Two types of blue whale calls recorded in the Gulf of Alaska. Marine Mammal Science. 19: 682-693.

Stafford, K.M., S. L. Nieukirk, and G.G. Fox. 2001. Geographic and seasonal variation of blue whale calls in the North Pacific. J. Cetacean Res. Manage. 3(1):65-76.

Stone, C.J. 2003. The effects of seismic activity on marine mammals in UK waters 1998-2000. JNCC Rep. 323. Joint Nature Conserv. Commit., Aberdeen, Scotland. 43 p.

Stone, C.J. 2015. Marine mammal observations during seismic surveys from 1994-2010. JNCC report, No. 463a. 64 p.

Stone, C.J. and M.L. Tasker. 2006. The effects of seismic airguns on cetaceans in UK waters. J. Cetac. Res. Manage. 8(3):255-263.

Sweeney, K., L. Fritz, R. Towell, and T. Gelatt. 2016. Results of Steller sea lion surveys in Alaska, June-July 2016. Memorandum to D. DeMaster, J. Bengtson, J. Balsiger, J. Kurland, and L. Rotterman, December 5, 2016. Available from Marine Mammal Laboratory, AFSC, NMFS, 7600 Sand Point Way NE, Seattle, WA 98115.

Sweeney, K., K. Luxa, B. Birkemeier, and T. Gelatt. 2019. Results of Steller sea lion surveys in Alaska, June-July 2019. Memorandum to the Record, December 6, 2019. Available from Marine Mammal Laboratory, AFSC, NMFS, 7600 Sand Point Way NE, Seattle, WA 98115.

Tenessen, J.B. and S.E. Parks. 2016. Acoustic propagation modeling indicates vocal compensation in noise improves communication range for North Atlantic right whales. Endang. Species Res. 30:225-237.

TerraSond Limited. 2018. TERRA Aleutian South Submarine Fiber Cable Desktop Study. Submitted to GCI September 4, 2018. 451 p.

Thode, A., D.K. Mellinger, S. Stienessen, A. Martinez, and K. Mullin. 2002. Depth-dependent acoustic features of diving sperm whales (Physeter macrocephalus) in the Gulf of Mexico. J. Acoust. Soc. Am. 112:308.

Thompson, P.O., W.C. Cummings, and S.J. Ha. 1986. Sounds, source levels, and associated behavior of humpback whales, Southeast Alaska. Journal of the Acoustic Society of America. 80(3):735-740.

Tougaard, J., A.J. Wright, and P.T. and Madsen. 2015. Cetacean noise criteria revisited in light of proposed exposure limits for harbour porpoises. Mar. Poll. Bull. 90:196-208.

Tougaard, J., A.J. Wright, and P.T. Madsen. 2016. Noise exposure criteria for harbor porpoises. p. 1167-1173 In: A.N. Popper and A. Hawkins (eds.), The Effects of Noise on Aquatic Life II. Springer, New York, NY. 1292 p.

Transportation Research Board. 2008. Risk of Vessel Accidents and Spills in the Aleutian Islands. Special Report 293. Washington, D.C. 245 p.

Tsujii K., T. Akamatsu, R. Okamoto, K. Mori, Y. Mitani, and N. Umeda. 2018. Change in singing behavior of humpback whales caused by shipping noise. PLoS ONE 13(10): e0204112. https://doi.org/10.1371/journal.pone.0204112

Tyack, P.L. 2008. Implications for marine mammals of large-scale changes in the marine acoustic environment. J. Mammal. 89(3):549-558.

Tyack, P.L. and V.M. Janik. 2013. Effects of noise on acoustic signal production in marine mammals. p. 251 271 In: H. Brumm (ed.), Animal communication and noise. Springer, Berlin, Heidelberg, Germany. 453 p.

United States Census Bureau. 2010. Geographic Identifiers: 2010 Demographic Profile Data (DP-1): Chiniak CDP, Alaska. U.S. Census Bureau, American Factfinder. Retrieved November 28, 2018.

United States Coast Guard. 2018. Sector Anchorage Waterways Management. https://www.pacificarea.uscg.mil/Our-Organization/District-17/17th-District-Units/Sector-Anchorage/-Waterways-Management/ Accessed November 20, 2018.

U.S. Department of the Interior (USDOI), Bureau of Ocean Energy Management. 2015. Biological Assessment: Oil and Gas Activities Associated with Lease Sale 193.

Vabo, R., K. Olsen, and I. Huse. 2002. The effect of vessel avoidance of wintering Norwegian spring spawning herring. Fish. Res. 58: 59-77.

van der Hoop, J.M., A.S.M. Vanderlaan, T.V.N. Cole, A.G. Henry, L. hall, B. Mase-Guthrie, T. Wilmmer, and M.J. Moore. 2015. Vessel strikes to large whales before and after the 2008 ship strike rule. Consrv. Let. 8(1):24-32.

Vanderlaan, A.S.M. and C.T. Taggart. 2007. Vessel collisions with whales: the probability of lethal injury based on vessel speed. Mar. Mamm. Sci. 23(1):144-156.

Vermeij, M.J.A., K.L. Marhaver, C.M. Huijbers, I. Nagelkerken, and S. Simpson. 2010. Coral larvae move toward reef sounds. PLoS ONE 5(5):e10660. Doi:10.1371/ journal.pone.0010660.

Wade, P. R., A. Kennedy, R. LeDuc, J. Barlow, J. Carretta, K. Shelden, W. Perryman, R. Pitman, K. Robertson, B. Rone, J. C. Salinas, A. Zerbini, R. L. Brownell, Jr., and P. Clapham. 2011. The world's smallest whale population. Biol. Lett. 7:83-85.

Wade, P.R ., T.J. Quinn, J. Barlow, C.S. Baker, A.M. Burden, J. Calambokidis, P.J. Clapham, E.A. Falcone, J.K.B. Ford, C.M. Gabriele, D.K. Mattila, L. Rojas-Bracho, J.M. Straley, B. Taylor, J. Urban, D. Weller B.H. Witteveen, and M. Yamaguchi. 2016. Estimates of abundance and migratory destination for north Pacific humpback whales in both summer feeding areas and winter mating and calving areas. Paper SC/66b/IN21 presented to the International Whaling Commission Scientific Committee.

Wade, P. R. 2021. Estimates of abundance and migratory destination for North Pacific humpback whales in both summer feeding areas and winter mating and calving areas. International Whaling Commission. SC/68c/IA/03. 32 pp.

Warner, G., and A. McCrodan. 2011. Underwater Sound Measurements. (Chapter 3) In: Hartin K.G., L.N. Bisson, S.A. Case, D.S. Ireland, and D. Hannay. (eds.) 2011. Marine mammal monitoring and mitigation during site clearance and geotechnical surveys by Statoil USA E&P Inc. in the Chukchi Sea, August–October 2011: 90-day report. LGL Rep. P1193. Rep. from LGL Alaska Research Associates Inc., LGL Ltd., and JASCO Research Ltd. For Statoil USA E&P Inc., Nat. Mar. Fish. Serv., and U.S. Fish and Wild. Serv. 202 pp, plus appendices.

Watkins, W.A, K.E. Moore, D. Wartzok, and J.H. Johnson. 1981. Radio tracking of finback (Balaenoptera physalus) and humpback (Megaptera novaeangliae) in Prince William Sound, Alaska. Deep-Sea Res. 28:577-588.

Watkins, W.A. 1986. Whale reactions to human activities in Cape Cod waters. Mar. Mamm. Sci. 2(4):251-262.

Watkins, W.A., M.A. Daher, G.M. Reppucci, J.E. George, D.L. Martin, N.A. DiMarzio, and D.P. Gannon. 2000. Seasonality and distribution of whale calls in the North Pacific. Oceanography 13(1): 62-67.

Weiffen, M., B. Moller, B. Mauk, and G. Dehnhardt. 2006. Effect of water turbidity on the visual acuity of harbor seals (Phoca vitulina). Vision Research. 46:1091-1116.

Weilgart, L.S. 2014. Are we mitigating underwater noise-producing activities adequately? A comparison of Level A and Level B cetacean takes. Paper SC/65b/E07 presented to the Scientific Committee of the International Whaling Commission.

Weilgart, L.S. and H. Whitehead. 1988. Distinctive vocalizations from mature male sperm whales (Physeter microcephalus). Can. J. Zool. 66(9):1931-1937.

Weilgart, L. and H. Whitehead. 1993. Coda communication by sperm whales (Physeter microcephalus) off the Galapagos Islands. Can. J. Zool. 71(4):744-752.

Weilgart, L.S. and H. Whitehead. 1997. Group-specific dialects and geographical variation in coda repertoire in South Pacific sperm whales. Behavioral Ecology and Sociobiology 40:277-285.

Weller, D.W., Y.V. Ivashchenko, G.A. Tsidulko, A.M. Burdin, and R.L. Brownell, Jr. 2002. Influence of seismic surveys on western gray whales off Sakhalin Island, Russia in 2001. Paper SC/54/BRG14, IWC, Western Gray Whale Working Group Meet., 22-25 Oct., Ulsan, South Korea. 12 p.

Weller, D.W., G.A. Tsidulko, Y.V. Ivashchenko, A.M. Burdin and R.L. Brownell Jr. 2006b. A re-evaluation of the influence of 2001 seismic surveys on western gray whales off Sakhalin Island, Russia. Paper SC/58/E5 presented to the IWC Scient. Commit., IWC Annu. Meet., 1-13 June, St. Kitts.

Weller, D.W., Bettridge, S., Brownell, R.L., Jr., Laake, J.L. Moore, J.E., Rosel, P.E., Taylor, B.L. and Wade, P.R. 2013. Report of the National Marine Fisheries Service Gray Whale Stock Identification Workshop. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-507.

Wiley, D.N., C.A. Mayo, E.M. Maloney, and M.J. Moore. 2016. Vessel strike mitigation lessons from direct observations involving two collisions between noncommercial vessels and North Atlantic right whales (Eubalaena glacialis). Mar. Mamm. Sci. 32(4):1501-1509.

Williams, R. and P. O'Hara. 2010. Modelling ship strike risk to fin, humpback and killer whales in British Columbia, Canada. J. Cetacean Res. Mngmt. 11(1):1-8.

Witherell, D., M. Fey, and M. Fina. 2012. Fishing fleet profiles. North Pacific Fishery Management Council. 68p.

Witteveen, B. H., J. M. Straley, O. von Ziegesar, D. Steel, and C. S. Baker. 2004. Abundance and mtDNA differentiation of humpback whales (Megaptera novaeangliae) in the Shumagin Islands, Alaska. Can. J. Zool. 82:1352-1359.

Wood, J., B.L. Southall, and D.J. Tollit. 2012. PG&E offshore 3-D seismic survey project EIR – Marine Mammal Technical Report. SMUR Ltd. 121 p.

Wright, D. L. 2015. Simultaneous identification of four mysticete species in the Bering Sea using passive acoustic monitoring increase confidence in acoustic identification of the critically endangered North Pacific right whale (Eubalaena japonica). Final Report, International Fund for Animal Welfare. 63 p.

Wright D.L., M. Castellote, C.L. Berchok, D. Ponirakis, J.L. Crance, and P.J. Clapham. 2018. Acoustic detection of North Pacific right whales in a high-traffic Aleutian Pass, 2009-2015. Endang Species Res 37:77

Würsig, B.G., D.W. Weller, A.M. Burdin, S.H. Reeve, A.L Bradford, S.A. Blokhin, and R.L Brownell, Jr. 1999. Gray whales summering off Sakhalin Island, Far East Russia: July-October 1997. A joint U.S.-Russian scientific investigation. Final Report. Rep. from Texas A&M Univ., College Station, TX, and Kamchatka Inst. Ecol. & Nature Manage., Russian Acad. Sci., Kamchatka, Russia, for Sakhalin Energy Investment Co. Ltd and Exxon Neftegaz Ltd, Yuzhno-Sakhalinsk, Russia. 101 p.

Yazvenko, S.B., T.L. McDonald, S.A. Blokhin, S.R. Johnson, S.K. Meier, H.R. Melton, M.W. Newcomer, R.M. Nielson, V.L. Vladimirov, and P.W. Wainwright. 2007a. Distribution and abundance of western gray whales during a seismic survey near Sakhalin Island, Russia. Environ. Monit. Assess. 134(1-3):45-73.

Yazvenko, S. B., T.L. McDonald, S.A. Blokhin, S.R. Johnson, H.R. Melton, and M.W. Newcomer. 2007b. Feeding activity of western gray whales during a seismic survey near Sakhalin Island, Russia. Environ. Monit. Assess. 134(1-3):93-106.Young, N. C., Brower, A. A., Muto, M. M., Freed, J. C., Angliss, R. P., Friday, N. A., Boveng, P. L., Brost, B. M., Cameron, M. F., Crance, J. L., Dahle, S. P., Fadely, B. S., Ferguson, M. C., Goetz, K. T., London, J. M., Oleson, E. M., Ream, R. R., Richmond, E. L., Shelden, K. E. W., Sweeney, K. L., Towell, R. G., Wade, P. R., Waite, J. M., and Zerbini, A. N. 2023. Alaska marine mammal stock assessments, 2022. U.S. Department of Commerce, NOAA Technical Memorandum NMFSAFSC-474, 316 p.

Young, N. C., Brower, A. A., Muto, M. M., Freed, J. C., Angliss, R. P., Friday, N. A., Boveng, P. L., Brost, B. M., Cameron, M. F., Crance, J. L., Dahle, S. P., Fadely, B. S., Ferguson, M. C., Goetz, K. T., London, J. M., Oleson, E. M., Ream, R. R., Richmond, E. L., Shelden, K. E. W., Sweeney, K. L., Towell, R. G., Wade, P. R., Waite, J. M., and Zerbini, A. N. 2023. Alaska marine mammal stock assessments, 2022. U.S. Department of Commerce, NOAA Technical Memorandum NMFSAFSC-474, 316 p.

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