Draft Damage Assessment and Restoration Plan and Environmental Assessment for Marine Resources for the M/V *Selendang Ayu* Oil Spill Unalaska, Alaska

Prepared by:

The M/V *Selendang Ayu* Oil Spill Natural Resource Trustees

August 2024

The M/V *Selendang Ayu* Oil Spill Natural Resource Trustees:

U.S. Department of the Interior

U.S. Fish and Wildlife Service

U.S. Department of Commerce

National Oceanic and Atmospheric Administration

State of Alaska

Department of Environmental Conservation
Department of Fish and Game
Department of Natural Resources
Department of Law

The Trustees wish to acknowledge the contributions made to the development of this Damage Assessment and Restoration Plan and Environmental Assessment by Industrial Economics, Incorporated (IEc) and Research Planning, Incorporated (RPI).

CONTENTS

List of Acronyms

ACN	Alaska Chadux Network
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AIRA	Aleutian Islands Risk Assessment
AIS	Automatic Identification System
AIWSC	Aleutian Islands Waterways Safety Committee
CEQ	Council of Environmental Quality
CWA	Clean Water Act
DAP	Damage Assessment Plan
DARP / EA	Damage Assessment and Restoration Plan / Environmental Assessment
DSC	Digital Service Calling
DPS	Distinct Population Segment
DSAY	discounted service acre year
EFH	Essential Fish Habitat
EIS	environmental impact statement
ft	feet
FLAT	Federal Lead Administrative Trustee
FONSI	Finding of No Significant Impact
FWS	United States Fish and Wildlife Service
HEA	Habitat Equivalency Analysis
IMO	International Maritime Organization
M/V	Motor Vessel
MDA	Maritime Domain Awareness
MSS	Marine Safety Sites
MXAK	The Marine Exchange of Alaska
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NFWF	National Fish and Wildlife Foundation
NOI	Notice of Intent
NPFC	National Pollution Funds Center
NRDA	Natural Resource Damage Assessment
OPA	Oil Pollution Act
PAHs	Polycyclic Aromatic Hydrocarbons
RP	Responsible Party
RROs	Risk Reduction Options
SCAT	Shoreline Cleanup Assessment Technique
SOLAS	Safety of Life at Sea
USCG	United States Coast Guard
VRP	Vessel Response Plan
WASP	Waterways Safety Plan

EXECUTIVE SUMMARY

On December 6, 2004, while traveling through the Aleutian Islands, the M/V *Selendang Ayu* experienced engine trouble and encountered adverse weather conditions. The vessel grounded on December 8, 2004 in rough seas off Unalaska Island, Alaska. Upon notification of an oil spill threat, Federal, State, and local agencies responded to the incident to supervise and assist in the cleanup and begin to assess the impact of the oil spill on natural resources. Under the Federal Oil Pollution Act of 1990 (OPA; 33 U.S.C. §§ 2701, et seq.), the National Oceanic and Atmospheric Administration (NOAA), the United States Fish and Wildlife Service (FWS), and four State agencies—State of Alaska Departments of Law, Natural Resources, Environmental Conservation, and Fish and Game—are responsible for restoring natural resources injured by the spill and associated response.

Based on the results of pre-assessment studies, the Trustees conducted a Natural Resource Damage Assessment (NRDA). Due to divergent timelines for the damage assessment for marine resources and the other injury categories, the Trustees will develop phased restoration plans, starting with a plan for marine resources. This Draft Damage Assessment and Restoration Plan / Environmental Assessment (DARP/EA) is for restoration of marine resources only, which, in this case, refers only to shoreline habitats, including gravel beaches, rocky shores, vegetated habitats, and stream channels and flats. Marine mammals, birds, and the human uses of natural resources impacted by the spill will be addressed as part of a separate restoration plan.

Following the spill, the Trustees conducted pre-assessment activities to document injuries to Trust marine resources, henceforth referred to as "shoreline habitats," which are the focus of this document. Habitat equivalency analysis (HEA) was used to quantify injury for impacted shoreline habitats, using the metric of discounted service-acre years (DSAYs). The Trustees documented losses of approximately 855 DSAYs of shoreline habitat resulting from the M/V *Selendang Ayu* oil spill.

Potential restoration projects for shoreline habitats were identified by engaging Federal, State, Tribal, and local natural resource planners and managers. As part of the restoration planning process, the Trustees identified and evaluated the following projects:

- No Action/Natural Recovery;
- Wrapping and removing creosote-treated pilings;
- Distributing bilge socks and sorbent pads;
- Funding for the Aleutian Islands Waterways Safety Committee (AIWSC); and
- Creating an Aleutian Watch Program and communication upgrades.

Creating the Aleutian Watch Program and communication upgrades emerged as the preferred alternative, which would prevent future oil spills and associated impacts to shoreline habitats of the Aleutian Islands primarily via early detection of potential spills and situational awareness for enhanced response.

As shown in Exhibit ES-1, the Aleutian Islands Maritime Area encompasses the full extent of the Aleutian Islands and adjacent areas used by vessels transiting the Aleutian Islands, including substantial commercial shipping traffic using the North Pacific Great Circle Route that connects the west coast of the U.S. with major ports in Asia.

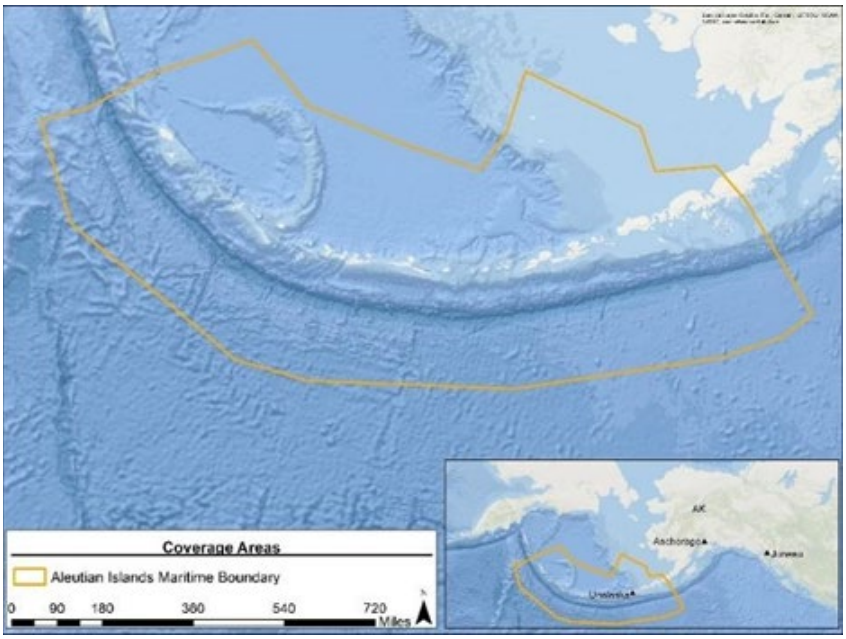

Figure ES-1. Map depicting the Aleutian Islands Maritime Area.

Several efforts have been implemented in the past to enhance safety and prevent oils spills for vessels transiting this area. For example, the International Maritime Organization (IMO) established Areas to be Avoided (ATBA), a network of 25 terrestrial Marine Safety Sites (MSS) and automatic identification system (AIS) receivers were installed, and nine of the 25 AIS receivers have been upgraded to allow two-way communication. Per IMO regulations, vessels of particular specifications are required to be equipped with AIS transceivers, which continuously transmit information on vessel identification and movement to land-based and satellite receivers. While upgrades to the AIS receivers at the terrestrial MSSs have occurred, there are more recent needs for improvements in AIS equipment, which will enhance the communication capabilities within the region.

In addition to improved AIS communication capabilities, increased active monitoring will help prevent oil spills in the region. Currently, approximately 50% of vessels transiting through the Aleutian Islands Maritime Area are required to have a Vessel Response Plan (VRP) and are under active AIS monitoring ("monitored vessels"). However, approximately 50% of vessels transiting through the Aleutian Islands (over 3,000 per year) are not actively monitored, as they are foreign flagged vessels operating in U.S. waters but not coming to or from a U.S. port and not required to have a VRP ("unmonitored vessels"). As a result, these unmonitored vessels are

not actively monitored for potential distress or presence within an ATBA, yet still present a risk of marine casualty and oil spill. The preferred alternative would create a program to track currently unmonitored vessels to ensure safe transit and prevent future oil spills. These efforts will increase communication capabilities with vessel operators and aid in general maritime safety with specific emphasis on preventing large ships from grounding in the Aleutian Islands. Through this project, active observation of unmonitored vessels would occur throughout the Aleutian Island Maritime Area, including for ATBAs, which is currently not occurring. While ATBAs are not mandatory, situational awareness of unmonitored vessels within these sensitive areas is an important aspect of oil spill prevention should a vessel become disabled and adrift.

Specifically, funding would cover three inter-related efforts, together referred to as "Aleutian Watch Program & Communication Upgrades" that provide upgrades to existing infrastructure and establish new programs that are above and beyond what is currently in place, including:

- **Communication upgrades by increasing capabilities** at up to six existing MSSs, by adding AIS transmit capability, VHF-FM and Digital Selective Calling (DSC) capability, and weather reporting stations in appropriate locations. This will provide two-way communication capabilities and the most detailed information possible for all transiting vessels.
- **Administrative staffing to research, develop, and maintain a database** of unmonitored vessels that transit the area because data collection and contact information for these vessels is beneficial to effective sea traffic management and response.
- **Establishing the Aleutian Watch Program**, a 24-hour dedicated watch of unmonitored vessels within the Aleutian Islands Maritime Area with a Watchstander staff program that can identify vessels at risk and notify responders if necessary.

The Trustees scaled the benefits of preventing future oil spills using the same units for injury quantification. The restoration benefits due to the Aleutian Watch Program and AIS communication upgrades will compensate for the loss of shoreline habitat resulting from the M/V *Selendang Ayu* oil spill.

CHAPTER 1 | INTRODUCTION

Summary and Purpose

The purpose of this Draft Damage Assessment and Restoration Plan and Environmental Assessment (DARP/EA) is to address restoration of natural resources injured by the M/V *Selendang Ayu* oil spill on western Unalaska Island, Alaska (the incident). This Draft DARP/EA is for restoration of "marine resources" only, which, in this case, refers only to shoreline habitats, including gravel beaches, rocky shores, vegetated habitats, and stream channels and flats. Marine mammals, birds, and the human uses of natural resources impacted by the spill will be addressed as part of a separate restoration plan.

The Oil Pollution Act of 1990 (OPA; 33 U.S.C. §§ 2701 *et seq.*) assigns certain state and federal government natural resource agencies, known as Natural Resource Trustees (Trustees), the responsibility for restoring natural resources and resource services injured or harmed by an oil spill. As designated Trustees, the National Oceanic and Atmospheric Administration (NOAA), the United States Fish and Wildlife Service (FWS), and four Alaska state agencies (the Alaska Departments of Law, Natural Resources, Environmental Conservation, and Fish and Game) are authorized to act on behalf of the public to assess and recover natural resource damages and to plan and implement actions to restore, rehabilitate, replace, or acquire the equivalent of the natural resources or services injured as a result of an unpermitted discharge of oil. The purpose of shoreline habitat restoration is to make the environment and the public whole for natural resource injuries resulting from an oil spill by implementing restoration actions that offset the harm caused by the oil spill. Marine mammals, birds, and the human uses of natural resources impacted by the spill will be addressed separately.

This document is also intended to address the requirements of the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370d. NEPA requires that federal agencies analyze the potential direct, indirect, and cumulative effects/impacts of proposed major federal actions and alternatives and involve the public in the process. NOAA is the lead federal agency responsible for NEPA compliance for this shoreline habitat Draft DARP/EA. This Draft DARP/EA describes the affected environment and illustrates restoration alternatives, while proposing the preferred project, all for public consideration. The document was developed in accordance with OPA and its implementing regulations, 15 C.F.R. Part 990; as well as NEPA and its implementing regulations, 40 C.F.R. Parts 1500-1508.

Incident and Response Actions Overview

On December 6, 2004, while traveling through the Aleutian Islands, the M/V *Selendang Ayu* experienced engine trouble and encountered adverse weather conditions in rough seas off Unalaska Island (Figure 1-1). Several response actions to rescue the crew and prevent the vessel from grounding were undertaken by the Coast Guard.[1] Following attempted rescue operations,

[1] https://darrp.noaa.gov/oil-spills/mv-selendang-ayu

the M/V *Selendang Ayu* broke in half, resulting in the immediate release of approximately 350,000 gallons of oil.[2] At the time of the release, ongoing rescue efforts and adverse weather conditions prevented oil recovery response activities from occurring immediately. Further, oil sheens originating from the wreck were continually observed through October of 2005, by which time the removal of remaining oil from the ship was completed. Following emergency response efforts, most of the ship was removed but some of the hull remains today.

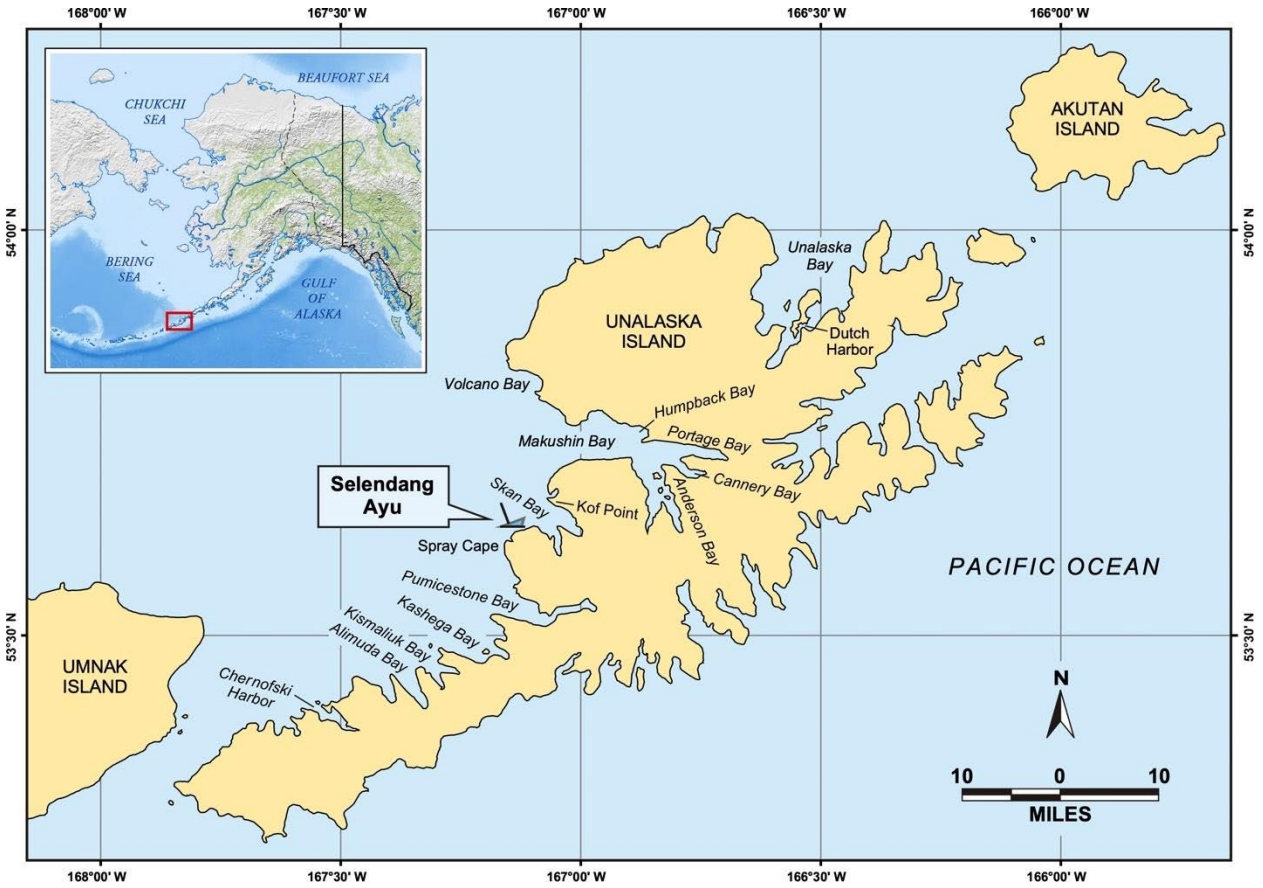

Figure 1-1. Location of the grounding of the M/V *Selendang Ayu*.

Released oil was subsequently transported via winds and currents, resulting in impacts to birds, marine mammals, and approximately 86 miles of shoreline habitats, including supratidal, intertidal, and subtidal habitats and wetland, riparian, and terrestrial vegetation on Unalaska Island. Response efforts included using booms to prevent oil from being transported into anadromous salmon streams, wildlife rescue and rehabilitation (e.g., birds), carcass recovery, shoreline cleanup, and open burning of oily debris. Impacted biota included, but were not necessarily limited to, fish, shellfish, marine mammals, and birds.

[2] Approximately 339,000 gallons of bunker oil and 14,000 gallons of marine diesel and miscellaneous oils.

Federal, State, and local agencies responded to the incident to supervise and assist in the cleanup and begin assessing the impact of the spill on natural resources. The United States Coast Guard (USCG) and the State of Alaska established a Unified Command for directing cleanup efforts. Acting as Natural Resource Trustees on the public's behalf, the two Federal agencies and four State agencies began collecting data in accordance with the pre-assessment phase of the natural resource damage assessment process under the Oil Pollution Act of 1990.

The Unified Command for the M/V *Selendang Ayu* incident divided the shoreline into 797 potentially impacted shoreline segments.[3] To document oiling and provide response decision makers with the best available information, these segments were surveyed by Shoreline Cleanup Assessment Technique (SCAT) teams through June 2005. SCAT teams encountered oil at 519 unique locations within the 797 segments. A unique location is each zone within a segment where oil was observed by the SCAT team. Segments varied in length and included multiple habitats and oiling degrees (i.e., a segment could have multiple unique locations where oil was observed). When SCAT teams encountered oil, if weather conditions and time allowed, they documented the extent and degree of oiling. Some shoreline segments were surveyed multiple times, while others were only surveyed once or were not surveyed due to difficult access or other logistical constraints.

Following the completion of SCAT surveys, field notes were entered into a SCAT database. Miles of impacted shoreline were determined by comparing oiled areas from all SCAT surveys within a segment using both the SCAT database and the SCAT field notes. SCAT teams were unable to record the extent of oiling for approximately 17% of the areas identified as being oiled. When oil was encountered, the SCAT teams categorized the degree of oiling (e.g., heavy, light) and the shoreline habitat type (e.g., beach, vegetated). Based on the extent of oiling information, approximately 86 miles of shoreline habitat were documented as being oiled. The final SCAT oiling map represents the maximum degree of oiling observed on the shoreline during any of the surveys (Figure 1-2).

The Unified Command determined that 123 of the 797 segments received enough oil to warrant shoreline cleanup. However, during the winter surveys 21 of the 123 segments were deemed unsafe for cleanup crews to safely land a vessel and deploy equipment for cleanup activities. During the SCAT surveys the following summer, four of the 21 segments were still considered unsafe for cleanup crews. Ultimately, cleanup activities occurred over approximately 20 miles of shoreline. Cleanup methods included, but were not necessarily limited to, manual removal, vegetation cutting, mechanical removal, tilling, berm relocation, and open burning. Specifically, cleanup activities in 2005 included the following:

- Manual removal, which included both wiping oil from surfaces and sediment/oiled debris removal, was performed at numerous locations where oil was encountered;
- Cutting and removal of oiled vegetation occurred at multiple segments;

[3] The Damage Assessment Plan stated that there were 807 SCAT segments; however, 797 unique segments were identified in the SCAT spreadsheets as documented in the Injury Assessment Report.

- Mechanical removal was conducted at four sites in Skan Bay, two sites in Makushin Bay, and three sites in Humpback Bay;
- Mechanical tilling was conducted at six sites in Skan Bay, three sites in Makushin Bay, three sites in Humpback Bay, and one site in Kismaliuk Bay;
- Berm relocation was conducted at three sites in Skan Bay and two sites in Humpback Bay; and
- Open burning of oily debris was conducted at three sites in Skan Bay, one site in Makushin Bay, one site in Humpback Bay, and one site at Kof Point.

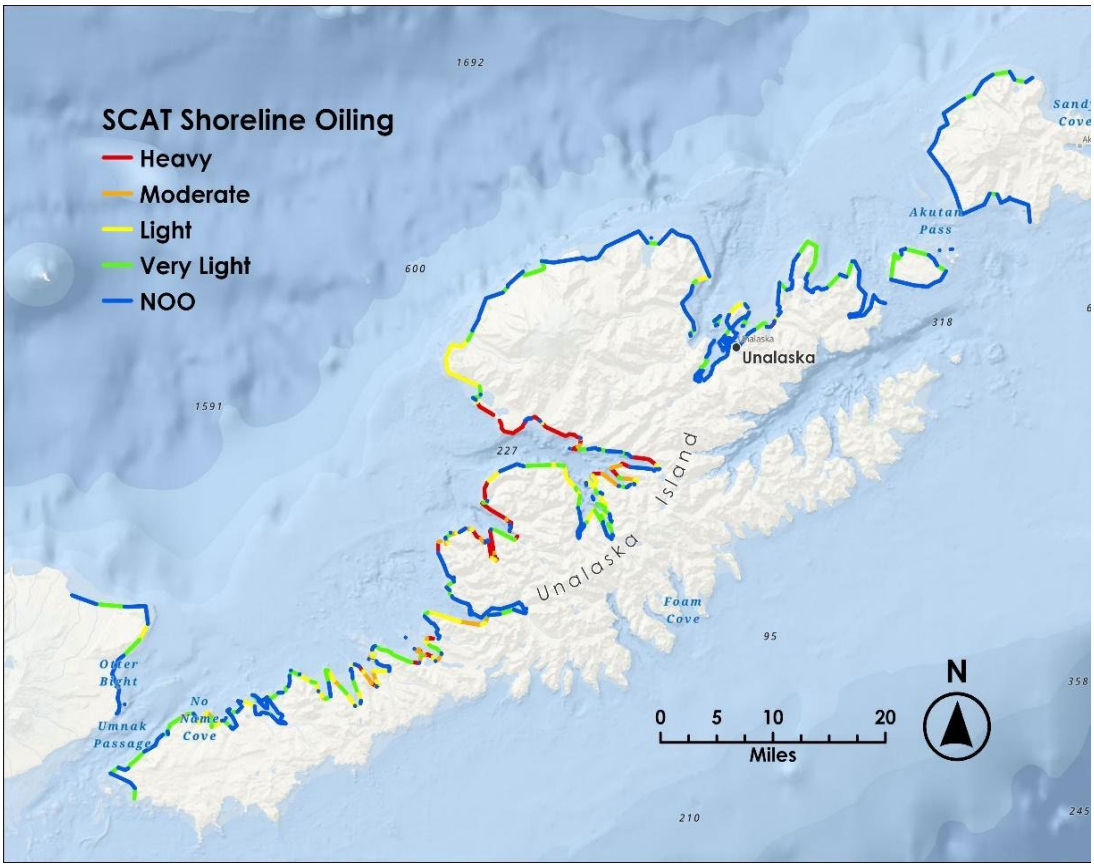

Figure 1-2. The M/V *Selendang Ayu* spill area on Unalaska Island, Alaska. The image shows maximum oil observed from surveys in 2004 and 2005. Assessment was completed with standard Shoreline Cleanup Assessment Technique (SCAT) methods and definitions. "NOO" indicates No Oil Observed.

At the conclusion of shoreline cleanup activities in 2005, cleanup goals were met within 76 of the 102 segments. Because cleanup goals were not met within 26 of the 102 segments, SCAT teams resurveyed those segments in 2006 and additional cleanup activities occurred. However,

cleanup criteria were still not met at seven segments, including four segments deemed unsafe for cleanup, by June 2006. The Trustees are not aware of any additional cleanup activities. On March 30, 2007, based on the available pre-assessment data, the Trustees published a Notice of Intent (NOI) in the Federal Register announcing that they had entered the restoration planning phase of the NRDA (72 Fed. Reg. 15,150 (March 30, 2007)).

Natural Resource Trustees and Authority

Introduction

Federal law establishes liability for natural resource damages to compensate the public for injury, destruction, and loss of such resources and services resulting from oil spills. Trustees for this incident include NOAA of the U.S. Department of Commerce, FWS of the Department of the Interior, and four Alaska state agencies (the Alaska Departments of Law, Natural Resources, Environmental Conservation, and Fish and Game) pursuant to OPA (33 U.S.C. § 2706), and the National Oil and Hazardous Substances Pollution Contingency Plan (40 C.F.R. §§ 300.600 and 300.605). The Trustees are authorized to act on behalf of the public to assess and recover natural resource damages and to develop and implement actions to restore natural resources and resource services injured or lost as the result of a discharge of oil. The Federal Lead Administrative Trustee (FLAT) and the overall NRDA coordinator for this incident is FWS (15 C.F.R. § 990.14(a)(1)).

Overview of the Oil Pollution Act

OPA provides the statutory authority for Trustees to assess and restore injuries resulting from oil spill incidents. OPA regulation defines injury as "*an observable or measurable adverse change in a natural resource or impairment of a natural resource service*." Restoration, under the OPA regulations, means "*restoring, rehabilitating, replacing, or acquiring the equivalent of injured natural resources and services*" and includes both primary restoration and compensatory restoration (15 C.F.R. § 990.30).

A NRDA, as described under Section 1006 of OPA (33 U.S.C. § 2706) and its implementing regulations (15 C.F.R. Part 990), consists of three phases: (1) pre-assessment; (2) restoration planning; and (3) restoration implementation. The Trustees may initiate a damage assessment provided that: an "incident" (as defined in OPA) has occurred; the incident is not from a public vessel or an onshore facility subject to the Trans-Alaska Pipeline Authority Act; the incident is not permitted under federal, state, or local law; and Trustee natural resources may have been injured as a result of the incident (15 C.F.R. § 990.41).

Based on information collected during the pre-assessment phase, Trustees make an initial determination as to whether natural resources or services have been injured, or are likely to be injured, by the release. Through coordination with other responding agencies (e.g., the USCG and the State of Alaska), the Trustees next determine whether oil spill response actions will eliminate the injury or the threat of injury to natural resources. If injuries are expected to continue, and feasible restoration alternatives exist to address such injuries, the Trustees may

proceed with the restoration planning phase. Even if degradation from injuries is not expected to continue, restoration planning may be necessary if injuries resulted in interim losses requiring compensatory restoration.

Restoration Planning

The purpose of the restoration planning phase is to evaluate the potential injuries to natural resources and services, and to use that information to determine the need for, type of, and scale of restoration actions. OPA defines natural resources as: "*land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States, any state or local government or Indian tribe, or any foreign government*" (33 U.S.C. § 2701(20)). Services (or natural resource services) are functions performed by a natural resource for the benefit of another natural resource and/or the public (15 C.F.R § 990.30).

Restoration planning under OPA has two components: injury assessment and restoration selection. The goal of injury assessment is to determine the nature and extent of injuries to natural resources and services, thus providing a factual basis for evaluating the need for, type of, and scale of restoration actions. Restoration selection involves identifying a reasonable range of restoration alternatives; evaluating all alternatives and selecting the preferred alternative(s); developing a Draft DARP/EA that presents the alternatives to the public; soliciting public comment on the Draft DARP/EA; and considering those comments before issuing a Final DARP/EA.

The Trustees prepared this Draft DARP/EA for marine resources (i.e., shoreline habitats) in accordance with OPA requirements and applicable regulations, as well as with guidance concerning restoration planning and implementation (See 33 U.S.C. §§ 2706 *et seq.*; 15 C.F.R. Part 990). This Draft DARP/EA documents the information and analyses that support the Trustees' evaluation of:

- Injuries to shoreline habitat (gravel beaches, vegetated habitats, rocky shores, and stream channels and flats) and their natural resource services caused by the incident;
- Proposed restoration alternatives for shoreline habitats; and
- Rationale for the Trustees' preferred restoration alternative for shoreline habitats, including NEPA compliance.

The Trustees will develop a separate Restoration Plan for other resource categories (i.e., marine mammals, birds, and the human uses).

Summary of Injury Assessment

Data and Information Relied Upon for the Injury Assessment

The Trustees quantified losses for shoreline habitats using Habitat Equivalency Analysis (HEA) and the metric of discounted service-acre years (DSAYs).

Using SCAT data on the shoreline type, extent and degree of oiling, and treatment methods, the Trustees determined that four types of shoreline habitats were injured: gravel beaches, rocky shores, vegetated habitats, and stream channels and flats. In 2008, the Trustees collected data on the location, amount, degradation, and bioavailability of remaining oil from the M/V *Selendang Ayu* incident at 24 gravel beaches with a high likelihood of remaining oil or those with biological concerns evidenced by previous study results. In addition, passive samplers were deployed in the intertidal and nearshore subtidal at selected sites, and mussel samples were collected for analysis of polycyclic aromatic hydrocarbons (PAH) to determine residual oil bioavailability and potential biological effects on shoreline habitats. The results of the 2008 remaining oil studies were published as five chapters that are available in the Administrative Record (Bejarano and Michel, 2010; Carls et al., 2010a,b; Michel and Nixon, 2010; Michel et al., 2010). In brief, M/V *Selendang Ayu* oil that remained on beach segments within the core spill area weathered following the spill. Biologically available oil constituents were detected in mussels and passive samplers. However, the amount of mobile oil was relatively small, yielding uptake concentrations that are likely below known acute toxic effects thresholds for mussels.

Injury Quantification

Using the SCAT data on oil exposure and the results of the 2008 study, the Trustees identified 16 categories of shoreline injury. The length and width of the injured habitat for each category was used to determine the acres of injured habitat. For each habitat type, the Trustees quantified the loss in ecological services incurred from the time the habitat was injured until the services provided by the injured resource returned to their baseline level.[4] The quantity of services lost over time for each of the 16 injury categories were based on field data collected following the spill and on appropriate literature sources. Emphasis was placed on literature derived from field studies that represented the oil type and spill conditions for the M/V *Selendang Ayu*. For this spill, response actions undertaken following the spill along with natural attenuation and natural recovery were expected to have allowed the injured shoreline habitats to return to baseline conditions within approximately 12 years from when the spill occurred. Table 1-1 shows the results of the injury quantification, indicating the loss of 855 DSAYs (2019) of shoreline habitat. For additional details regarding the injury quantification approach see Chapter 4 of this DARP/EA.

[4] Baseline means the condition of the natural resources and services that would have existed had the incident not occurred. Baseline data may be estimated using historical data, reference data, control data, or data on incremental changes (e.g., number of dead animals), alone or in combination, as appropriate. (15 CFR § 990.30).

Table 1-1. Injury to shoreline habitats due to the M/V *Selendang Ayu* oil spill.

Shoreline Habitat Category	Impacted Acres	Injury (2019 DSAYs)
Gravel Beaches	1,072	789
Rocky Shores	296	41
Vegetated Habitats	17	20
Stream Channels and Flats	20	5
Total	**1,406**	**855**

Summary of Restoration Alternative Analysis and Identification of Preferred Restoration Alternatives

To restore lost shoreline habitat and services, the Trustees evaluated four restoration alternatives and identified one preferred restoration project. To identify appropriate restoration projects to restore the lost shoreline habitat and services, the Trustees consulted with local, state, and Federal governmental agencies and local natural resource planners and managers. During this process, the Trustees focused on approaches that would provide natural resources and/or services of the same type and quantity as those lost. Identified projects were subjected to a screening process to narrow the field of potential projects and focus information-gathering efforts on the alternative with the greatest potential to meet the Trustees' restoration goals of returning the injured natural resources and services to baseline and/or compensating for interim losses. As required by OPA and NEPA regulations, a "No Action/Natural Recovery" alternative was included for consideration.

As part of the restoration planning process, the Trustees identified and evaluated the following restoration alternatives:

- No Action/Natural Recovery;
- Wrapping and removing creosote-treated pilings;
- Distributing bilge socks and sorbent pads;
- Funding for the Aleutian Islands Waterways Safety Committee (AIWSC); and
- Creating an Aleutian Watch Program and communication upgrades.

Shoreline habitat restoration projects were evaluated for their potential to result in a quantifiable increase in shoreline habitat services lost due to the M/V *Selendang Ayu* oil spill. The Trustees also evaluated whether sufficient information exists for evaluation under OPA, scaling, implementation within a reasonable timeframe following the receipt of funding, and cost effectiveness. The Aleutian Watch Program and communication upgrades was determined to be the preferred alternative. For additional details regarding the restoration alternatives evaluation see Chapter 5 of this DARP/EA.

Trustee Coordination with the Responsible Party

The OPA regulations require the Trustees to invite the Responsible Party (RP) to participate in the damage assessment process (15 C.F.R. § 990.14(c)). Accordingly, immediately following the spill in December 2004, the Trustees and the RP initiated cooperative assessment activities. In 2007, approximately one month after the Trustees issued the NOI in the Federal Register announcing that they had entered the restoration planning phase of the NRDA, the Trustees and RP finalized a funding and participation agreement. At that time, the RP agreed to reimburse the Trustees for their assessment costs, and both the RP and the Trustees agreed to cooperate and collaborate on studies and activities during the assessment phase. To facilitate assessment activities, the RP chartered vessels and provided aircraft and helicopters for the Trustees to access the spill area and conduct studies. Additionally, the Trustees and RP discussed study plans, study results, data interpretation, and restoration alternatives. The RP also provided comments on Trustee draft pre-assessment reports. However, after the USCG determined that the RP exceeded its limit of liability, the RP terminated the cooperative funding agreement and ceased to participate in assessment activities.

Trustee Oversight of Proposed Restoration

For the purposes of implementing the restoration alternative, the Trustees intend to work collaboratively with a project operator and maintain a supervisory role during project development. The Trustees' objective is to oversee the planning, design, coordination, and implementation of the proposed project in this Restoration Plan that restores, rehabilitates, replaces, and/or acquires equivalent natural resources to those resources injured by the incident. The Trustees will review project progress and require annual progress reports on operations. Annual reports may include, but not be limited to, information on the following:

- Days the upgraded MSS communication systems and Aleutian Watch Program (24-hour watch) are fully functional;
- Number of unmonitored vessels tracked;
- Number of unmonitored vessels identified at risk; and
- Number and/or type of risks communicated (e.g., weather warning, alerting the USCG).

Public Involvement

From the outset of the Incident, the Trustees engaged the public in a variety of assessment and restoration planning activities. For example, in the summer of 2005, the Trustees met with residents of Unalaska Island to ascertain spill-related impacts to their uses of natural resources. Further, on March 30, 2007, based on the available pre-assessment data, the Trustees published a NOI in the Federal Register announcing that they had entered the restoration planning phase of the NRDA (72 Fed. Reg. 15,150 (March 30, 2007)).

The Trustees maintain an Administrative Record, and copies of the Damage Assessment Plan were made available to the public online via a website managed by the U.S. Fish and Wildlife Service. In addition, when the draft Damage Assessment Plan was released for public notice and

comment, the Trustees publicized the opportunity through websites and emails and reached out directly to communities and Tribes on Unalaska Island as well as other key stakeholders. The public was invited to comment on the Damage Assessment Plan by submitting comments to the FLAT.

Public review of this Draft DARP/EA is an integral component to the restoration planning process. The OPA implementing regulations (15 C.F.R. Part 990), as well as NEPA and its implementing regulations (40 C.F.R. Parts 1500-1508), require that the public be provided an opportunity to review and comment on oil spill restoration plans. Through this review process, the Trustees seek public comment on the project being proposed to restore shoreline habitat injured as a result of the incident, as well as the alternatives developed and analyzed by the Trustees. An electronic copy of the Draft DARP/EA was published on the FLAT's website (https://www.fws.gov/project/mv-selendang-ayu-oil-spill-natural-resource-damage-assessment-and-restoration). Additionally, copies of this Draft DARP/EA were available at the following locations:

Unalaska Public Library
64 Eleanor St.
Unalaska, AK 99685

Alaska Resources Library & Information Services
University of Alaska Anchorage Campus
3211 Providence Dr.
Anchorage, AK 99508

Comments regarding this plan may be submitted in writing up to 30 days after the release of this Draft DARP/EA to:

Sarah Allan, Alaska Regional Resource Coordinator
NOAA Office of Response and Restoration
sarah.allan@noaa.gov

95 Sterling Hwy, Suite 2
Homer, AK 99603

Administrative Record

FWS has maintained records to document the information considered by the Trustees as it developed this Draft DARP/EA. These records are compiled in an Administrative Record, which is available to the public online (https://www.fws.gov/library/collections/administrative-record-mv-selendang-ayu-oil-spill-nrdar). Additional information and documents, including public comments received on this Draft DARP/EA, and other related restoration planning documents will become a part of the Administrative Record.

Organization of the DARP/EA

The remainder of this Draft DARP/EA contains the following chapters:

Affected Environment and Natural Resources of Concern (Chapter 2): This chapter describes the environment affected by the incident and proposed for restoration.

Summary of Pre-Assessment Activities (Chapter 3): This chapter describes the Trustees' pre-assessment activities and efforts to collect ephemeral data during and immediately following the release.

Injured Shoreline Habitats (Chapter 4): This chapter provides the Trustees' assessment of injury to shoreline habitat services.

Restoration Planning (Chapter 5): This chapter describes the process used to evaluate restoration alternatives, then describes and scales the potential restoration actions.

Environmental Impact of Restoration Alternatives (Chapter 6): This chapter describes the impacts the proposed restoration projects will have on the environment, in accordance with NEPA regulations.

Coordination with Applicable Regulations and Authorities (Chapter 7): This chapter discusses federal, state, and local laws and regulations potentially affecting the proposed preferred restoration alternatives.

Preparers, Agencies, and Persons Consulted (Chapter 8): This chapter lists the agencies and personnel involved in developing this Draft DARP/EA.

CHAPTER 2 | AFFECTED ENVIRONMENT AND NATURAL RESOURCES OF CONCERN

Introduction

Although numerous resources have been potentially impacted by the release, as part of the restoration planning processes, the Trustees must determine which natural resource injuries can be effectively studied under the given circumstances and with reasonable costs. Based on the available information and the results of pre-assessment studies, the Trustees have focused assessment and restoration planning efforts on shoreline habitats (also referred to as "marine resources"), marine birds, marine mammals, and the human uses of those natural resources impacted as a result of the release. Due to divergent timelines for the damage assessment for shoreline habitats and the remaining natural resource injury categories, the Trustees will develop two restoration plans, starting with this plan for marine resources (i.e., shoreline habitats). This Draft DARP/EA is for restoration of marine resources only, which, in this case, refers only to shoreline habitats, including gravel beaches, rocky shores, vegetated habitats, and stream channels and flats. Restoration for injuries to marine mammals, birds, and the human uses of natural resources will be addressed as part of a separate restoration plan. This DARP/EA briefly describes the physical and biological environments as they relate to shoreline habitat restoration addressed in this Draft DARP/EA.[5]

The affected environment for injury assessment activities was fully described in the Trustees' Final Natural Resource Damage Assessment Plan for the M/V *Selendang Ayu* Oil Spill and includes all areas in the vicinity of Unalaska Island, Alaska where oil from the M/V *Selendang Ayu* came to be located. That discussion remains relevant to this DARP/EA, and is incorporated by reference and summarized below. In addition, for context and evaluating restoration options, this Draft DARP/EA discusses the surrounding marine environment and the Alaskan Peninsula.

The area affected by the oil spill is the original homeland of Alaska Native peoples, including the Unangax̂ (Aleut) and Alutiiq/Sugpiaq.

Physical Environment

The Aleutian Islands, a remote archipelago with limited development and accessibility, consists of fourteen large islands and fifty-five smaller islands, extends for more than 1,100 miles westward of the Alaska Peninsula, forming the world's longest archipelago and the southern border of the Bering Sea. The islands are the peaks of submarine volcanoes that form a mountain range that separates the Bering Sea from the North Pacific Ocean. These mostly treeless islands

[5] Much of the information in this chapter was derived from the 2001 Environmental Sensitivity Index (ESI) atlas for the Aleutian Islands (NOAA, 2001) and the Environmental Response Management Application (ERMA) maintained by the NOAA Office of Response and Restoration. ERMA includes spatial and tabular data on protected species and critical habitat, Essential Fish Habitat, management areas, and cultural resources. NOAA and FWS websites were also used to determine the status of listed species.

experience strong winds and frequent intense cyclonic storms. Storm systems typically originate east of Japan and move northeastward along the Aleutian Chain. These storms result in high winds, often in excess of 50 miles per hour, causing large and intensive shoreline wave action (Rodionov et al., 2005). These turbulent waters mean that sea ice is rare in the waters surrounding the islands.

The Aleutians are affected by the Aleutian North Slope Current in the Bering Sea, and the Alaska Coastal Current and Alaskan Stream in the North Pacific (Favorite et al., 1976; Stabeno et al., 1999). The overall climate in the vicinity of the spill is maritime. Associated currents and weather patterns continuously transport nutrients within the marine environment and shape the physical environment resulting in productive and diverse shoreline and marine ecosystems that support numerous species of biota. Shorelines are highly irregular, with massive headlands that border numerous embayments. Figure 2-1 shows representative photographs of shoreline habitats.

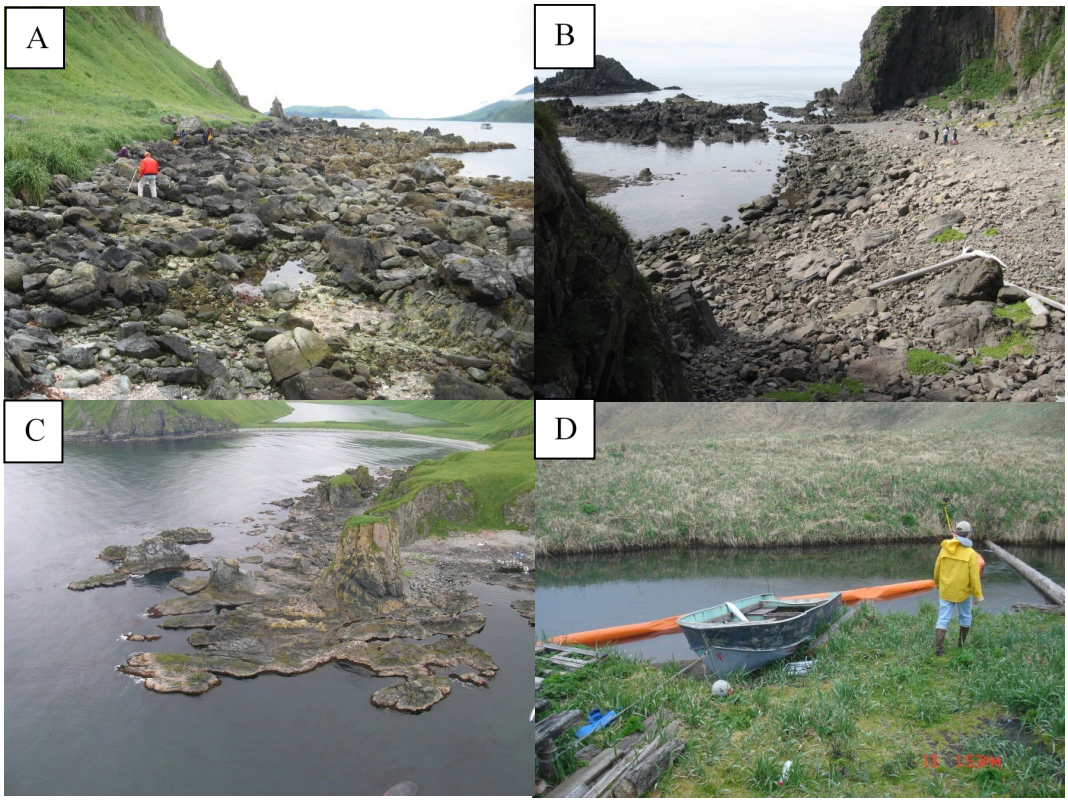

Figure 2-1. Examples of shoreline habitats along the western shore of Unalaska Island. A. Angular bounders on a rocky platform in Humpback Bay. B. Steep gravel storm berm in between rocky shores at the entrance to Makushin Bay C. Wave-cut rocky platforms with a gravel spit at the head of Humpback Bay in the background. D. Vegetated shoreline along a tidal creek in Volcano Bay.

The shorelines are dominated by steep rocky cliffs, extensive wave-cut platforms, and gravel beaches that range in size from pebbles to boulders. The steep cliffs of the headlands are fronted often by wide wave-cut platforms. Rocky shores make up 25 percent of the shoreline in the Aleutian Islands, the rest being beaches, vegetated shorelines, and sheltered tidal flats. Gravel storm berms often form when there is space behind the intertidal zone, which overtime can form more stable gravel beaches. Most bays have one or more streams entering at the head of the bay. Most of the bays are wide enough at their mouth to allow large waves to enter and travel all the way to the bay head, where steep gravel beaches occur at the stream mouth. There are few sheltered rocky shores near the bay heads, as indicated by large, angular boulders that have fallen from the adjacent steep cliffs. The rocky intertidal zone supports a rich community of perennial marine algae and marine invertebrates, whereas an abundant and diverse assemblage of cryptic beach invertebrates occur on beaches beneath cobble, drift seaweeds and other beach wrack (Cubit et al., 2008). There are few intertidal wetlands, which occur primarily at stream mouths, where they are protected from wave action. However, extensive intertidal flats and salt marshes are associated with Izembek Lagoon on the Alaska Peninsula.

Biological Resources

This section describes the biological resources of the Aleutian Islands, including threatened and endangered species listed under the Endangered Species Act and Essential Fish Habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 *et seq.*) as amended and reauthorized by the Sustainable Fisheries Act (Public Law 104-297).

Plants

Terrestrial vegetation in the supratidal zone along beaches affected by the spill is dominated by tall (4-5 feet [ft] high), dense stands of Aleutian ryegrass (Rocque and Erickson, 2008). Several passerines, such as the Sanak song sparrow (*Melospiza melodia sanaka*), a regional endemic, utilize the upland vegetation for nesting habitat and substrate and waterfowl nest near and forage in streams (Gibson and Byrd, 2007). Native vegetation is also important for erosion control and bank stabilization. This area of Unalaska Island is also a refuge for numerous species of rare plants (Dickson, 1956). In addition, the Aleutian Islands support an endangered terrestrial plant, the Aleutian shield fern (*Polystichum aleuticum)*[6].

Birds

The Aleutian Islands support a large and diverse avian community, many species of which use shoreline habitat. The spill occurred in winter and the highest densities of marine birds in the Unimak and Akutan Passes are found in winter, dominated by crested auklets (*Aethia cristatella*; LGL, 1991). Studies have shown that most marine birds in the Unimak Pass area feed on euphausiids (small shrimp-like crustaceans); only tufted puffins (*Fratercula cirrhata*) were found to feed on forage fish and squid (LGL, 1991). There are also twenty-five species of

[6] https://www.fws.gov/species/aleutian-shield-fern-polystichum-aleuticum

waterfowl in the region, often year-round but with higher concentrations of seaducks (such as scoters (*Melanitta* sp.*)*, eiders (*Somateria* sp.), scaup (*Aythya* sp.), and long-tailed duck (*Clangula hyemalis*)), geese (family *Anatidae*), and brant (*Branta bernicla*) in winter. Further, the islands have numerous seabird nesting colonies with 1,000s to 100,000s of birds in each colony (e.g., tufted puffins and ancient murrelets (*Synthliboramphus antiquus*)). Additional details regarding the avian communities impacted by the spill in the affected environment will be discussed in a separate avian DARP/EA.

Marine Mammals

Marine mammals in the Aleutian Islands consist of cetaceans (whales, dolphins, and porpoises); pinnipeds including phocids (earless seals), otariids (eared seals, generally grouped as sea lions or fur seals), and marine fissipeds (sea otters).

Unimak Pass is used by many whale species migrating north to feeding areas in the Arctic Ocean, especially gray (*Eschrichtius robustus*), fin (*Balaenoptera physalus*), and humpback whales (*Megaptera novaeangliae*). The eastern Aleutians are included in the critical habitat for the endangered Western North Pacific humpback whale Distinct Population Segment (DPS) that went into effect in May 2021 (86 Fed. Reg. 21,082 (April 21, 2021)). Critical habitat for the endangered North Pacific right whale (*Eubalaena japonica*) includes an area north of the Aleutian Islands in the Bering Sea (73 Fed. Reg. 19,000 (April 8, 2008)). Recent research has documented that the endangered eastern population of North Pacific right whale uses Unimak Pass both during and outside of the assumed migratory period (Wright et al., 2018).

There are high concentrations of harbor seals (*Phoca vitulina*) throughout the Aleutian Islands, with hundreds of shoreline haulout sites. Their population has been variable over the last 40 years; surveys from 1977-1982 counted 8,601 seals, which declined in 1999 to 2,859 (Small et al., 2008). This was followed by a period of population increase and 6,500 seals were observed in 2010 (Young et al., 2023). However, since 2010 there has been a decline (131 seals per year) in seal populations (Young et al., 2023).

For Steller sea lions (*Eumetopias jubatus*), the Western DPS occurs west of Cape Suckling and is listed as endangered. Stellar sea lions are present at haulouts and rookeries in large numbers (highest count in 2014 was 1,875 animals on a site at Atukun Island in the Eastern Aleutians), with nearly 200 sites along the Aleutian Islands and southern Alaska Peninsula, including 50 rookeries (Smith et al., 2017). All the coastal waters around the Aleutian Islands are designated as critical habitat for Stellar sea lion.

The Southwestern DPS of northern sea otters (*Enhydra lutris kenyoni*) in Alaska was listed as threatened in 2005. Once containing more than half of the world's sea otters, this population segment, which ranges from Kodiak Island through the western Aleutian Islands, has undergone an overall population decline of at least 55-67 percent since the mid-1980s (U.S. FWS, 2013). Most of the coastal waters around the Aleutian Islands have been designated as critical habitat for this sea otter DPS (U.S. FWS, 2013).

Fish and Invertebrates

Most streams in the Aleutians support pink salmon (*Oncorhynchus gorbuscha*); some also have runs of sockeye (*Oncorhynchus nerka*), chinook (*Oncorhynchus tshawytscha*), coho salmon (*Oncorhynchus kisutch*), chum salmon (*Oncorhynchus keta*), and Dolly Varden (*Salvelinus malma*). Other important coastal fish include flounder (*Paralichthys dentatus*), halibut (*Hippoglossus stenolepis*), Pacific cod (*Gadus macrocephalus),* mackerel (*Scomber scombrus*), and sablefish (*Anoplopoma fimbria*). The coastal waters of the Aleutian Islands are designated as EFH for Pacific cod, Pacific ocean perch (*Sebastes alutus*), walleye pollock (*Gadus chalcogrammus*), frog sculpin (*Myoxocephalus stelleri*), bigmouth sculpin (*Hemitripterus bolini*), great sculpin (*Myoxocephalus* sp.), Dover sole (*Solea solea*), southern rock sole (*Lepidopsetta bilineata*), flathead sole (*Hippoglossoides elassodon*), rex sole (*Glyptocephalus zachirus*), yellowfin sole (*Limanda aspera*), blackspotted rockfish (*Sebastes melanostictus*), dusky rockfish (*Sebastes ciliates*), northern rockfish (*Sebastes polyspinis*), rougheye rockfish (*Sebastes aleutianus*), shortraker rockfish (*Sebastes borealis*), shortspine thornyhead rockfish (*Sebastolobus alascanus*), sablefish (*Anoplopoma fimbria*), arrowtooth flounder *(Atheresthes stomias*), Kamchatka flounder (*Atheresthes evermanni*), Alaska skate (*Bathyraja parmifera*), Aleutian skate (*Bathyraja aleutica*), mud skate (*Rhina ancylostoma*), Atka mackerel (*Pleurogrammus monopterygius*), Greenland turbot (*Reinhardtius hippoglossoides*), yellow Irish lord (*Hemilepidotus jordani*), Pacific sand lance (*Ammodytes personatus*), Pacific sandfish (*Trichodon trichodon*), sturgeon poacher (*Podothecus accipenserinus*), and chinook, chum, coho, pink, and sockeye salmon.

Tanner crab (*Chionoecetes bairdi*) inhabits offshore benthic habitats, though it has a pelagic larval stage that occurs in the bays. Parts of the Aleutians are designated as EFH for Tanner crab, golden king crab (*Lithodes aequispinus*), red king crab (*Paralithodes camtschaticus*), octopus (*Octopus* sp), and scallops (*Pectinidae*).

Human Use

The plentiful and diverse resources along the Aleutian Islands support numerous human-use activities, including recreation, commercial fishing, and non-commercial harvest.

There is limited development and infrastructure over the entire area of the Aleutian Islands. Thus, Dutch Harbor, on the northern side of Unalaska Island, is both the primary port in Unalaska and the largest U.S. commercial fishing port in the northern Pacific Ocean. Major commercial fisheries in Unalaska include a number of groundfish species, as well as several major crab fisheries and a few smaller food and bait fisheries. Additionally, the bays and inshore waters of Unalaska Island support a number of commercially significant groundfish species. Many vessels that fish in the Bering Sea land their catch at Unalaska or Dutch Harbor processors (Nuka Research and Planning, 2005).

The Aleutian Islands sit along the North Pacific Great Circle Route, a maritime transit route that connects the west coast of the U.S. with major ports in Asia. Because the Great Circle Route is the most economical route of passage between these two areas, thousands of vessels utilize this

route every year (Burn and Poe, 2014; Aleutian Islands Waterways Safety Committee, 2019). The more northern route goes through Unimak Pass at the eastern end of the Aleutians and splits into one of several routes westward.

Recreation

Though difficult to access, the natural resources of the Aleutian Islands attract visitors to enjoy fishing, hunting, sightseeing, visiting historical and cultural sites, and birdwatching. Most of the islands comprise the Aleutian Islands Unit, a portion of the 4.8-million-acre Alaska Maritime National Wildlife Refuge. The Marine Highway System departs from Homer, with stops in Kodiak Island and along the Southern Alaska Peninsula, and at Sand Point, Cold Bay, False Pass, Akutan, and Dutch Harbor. Visitors can fly into Sand Point, Cold Bay, Dutch Harbor, or Adak; flights are often cancelled due to weather.

Kohout and Meade (2008) noted that, "in addition to conveying cultural value, natural resources on Unalaska provide abundant recreational opportunities. Fishing, hunting, and gathering are integral to life on the Island." Residents and visitors also enjoy wildlife viewing and sightseeing. Skan and Makushin Bays are sites for recreational kayaking tours and wildlife viewing of sea lions at haulouts.

Commercial Fishing

The Aleutian Islands support a very large commercial fishing and seafood processing industry that employs a majority of residents and seasonal visitors. Dutch Harbor has led the nation in seafood landings for the last 22 years, with 763 million pounds crossing the docks in 2018 valued at $182 million; Aleutian Island (Other) was third with 539 million pounds valued at $116 million (NMFS, 2020). The primary species are pollock and crab.

Non-Commercial Harvest

Subsistence culture and traditions of the Unangax̂ residents of the Aleutian Islands are well established in the literature (Veltre and Veltre, 1982; Hamrick and Smith, 2003). A 1994 survey found that nearly 97% of Unalaska households participate in using wild resources, and a 2003 survey revealed that salmon species and halibut comprised the top five most commonly used subsistence foods (Scarbrough and Fall, 1997; Hamrick and Smith, 2003). Residents also harvest marine mammals (seals and sea lions), seabirds and seabird eggs, cod, crab, clams, cottonwood driftwood, and wild plants (Hamrick and Smith, 2003).

CHAPTER 3 | SUMMARY OF PRE-ASSESSMENT ACTIVITIES

Introduction

The Trustees initiated the pre-assessment phase on December 7, 2004, immediately after receiving notification of the threat of an oil release due to the M/V *Selendang Ayu* losing power and drifting towards Unalaska Island.

Response and pre-assessment activities, as defined by OPA, focus on collecting ephemeral data essential to determine whether:

- Natural resource injuries have resulted, or are likely to result from, the incident;
- Response actions have adequately addressed, or are expected to address, the injuries resulting from the incident; and
- Feasible restoration actions exist to address the potential injuries.

The Trustees conducted some pre-assessment efforts in coordination with the RP. Specifically, cooperative and Trustee-led pre-assessment efforts included conducting shore- and boat-based surveys, aerial surveys, surveys of subtidal habitats, surveys of anadromous fish streams, collecting and cataloging marine bird and mammal carcasses, and evaluating human use services associated with affected natural resources.

The Trustees summarized the results of the pre-assessment activities in twelve reports, which were organized by resource and can be found in the Administrative Record. Three of the twelve reports focused on marine resources addressed as part of this DARP/EA: 1) surveys of intertidal, subtidal, and anadromous stream habitats; 2) oil risk to early life stage salmon; and 3) assessment of potential injuries to nearshore vegetation communities on Unalaska Island. The remainder of this chapter briefly summarizes the three marine resource-focused pre-assessment reports. Additional details and the other nine reports can be found in the Administrative Record.

Intertidal, Subtidal, and Anadromous Stream Habitat Surveys

In their intertidal surveys, Cubit et al. (2008) reported no visible acute mortality or other adverse effects on the perennial biota (algae and invertebrates) on rocky shores except at Spray Cape and a site in Humpback Bay where mechanical treatment of the adjacent beach had caused some minor oiling of the rocky shore. On beaches in June 2005, they documented burning of woody debris, intensive mechanical treatment operations, and remobilization of oil during these operations. However, the subsurface beach fauna was observed living in close association with deposits of oil without any visible oiling on the animals or causing any readily observable effect. Dive surveys were conducted at four subtidal sites, and they did not observe any definite indications of adverse impacts of oil in subtidal habitats. They documented mortality of the smelt eulachon in Humpback Bay on June 20, 2005 in areas where oil was being remobilized by beach-cleaning operations.

Oil Risk to Early Life Stage Salmon

In their assessment of oil risk to early life stage salmon, Carls et al. (2008) deployed passive samplers along the oiled sections of fourteen streams starting in March 2005. They determined that PAHs from the M/V *Selendang Ayu* oil spill were biologically available at detrimental concentrations three months after the spill in one stream in Skan Bay, but not in the other streams. During field surveys in summer 2005, Carls et al. (2008) found no evidence of intertidal spawning activity, likely due to the paucity of suitable gravels for spawning. Thus, they concluded that, overall, the M/V *Selendang Ayu* spill placed a relatively small number of pink salmon embryos and fry at lethal and sublethal risk in stream habitats.

Nearshore Vegetation Communities

Rocque and Erickson (2008) surveyed vegetation landward of the shoreline at eight oiled locations and one unoiled reference location in July 2005. Although the results showed significant differences in species diversity and plant abundance between oiled (oiled and cleaned) and reference plots, the authors concluded that microhabitat differences, rather than oiling, appeared to be the most likely explanation of the statistical differences.

CHAPTER 4 | INJURED SHORELINE HABITATS

Introduction

This chapter provides a summary of the injury assessment of marine resources, herein referred to as "shoreline habitats". A more detailed description of the injury assessment is available in a report, "Injury Assessment: Marine Resources M/V *Selendang Ayu* Oil Spill" (2019). Four shoreline habitat types were assessed for the extent and duration of injury: gravel beaches, rocky shores, vegetated habitats, and stream channels and flats. Injury to these habitats was quantified using oil contamination and treatment levels as indicators of decreases in habitat quality and function. Habitat oiling degree and extent were primarily determined from the SCAT data. Additional data from post-spill surveys in 2004, 2005, and 2008 were also considered. Subcategories for each habitat were developed based on the degree of oiling (heavier and lighter), type of treatment conducted (manual, mechanical, vegetation cutting), and oil persistence as documented by field surveys in 2008. The Trustees used all the available data from the SCAT program during the response and in subsequent studies to identify the marine habitat injury categories listed in Table 4-1. The length and width of the injured habitat for each category, based on SCAT data, was used to determine the acres of injury.

Table 4-1. Shoreline habitat categories for injury quantification from the M/V *Selendang Ayu* oil spill.

Shoreline Habitat Injury Category	Acres
Gravel Beaches	
Heavier Oiled + Manual	97.47
Heavier Oiled + Mechanical	84.30
Heavier Oiled + Heavier Residual oil in 2008	0.54
Heavier Oiled Middle/Lower Intertidal Zone	168.39
Lighter Oiled	721.63
Rocky Shores	
Heavier Oiled - Spray Cape	1.38
Heavier Oiled - Supra/Upper Intertidal Zone	22.61
Heavier Oiled Middle/Lower Intertidal Zone	74.30
Lighter Oiled	197.82
Vegetated Habitats	
Heavier Oiled Terrestrial Vegetation - No Cut	2.10
Heavier Oiled Terrestrial Vegetation - Summer Cut	2.10
Lighter Oiled Terrestrial Vegetation	4.08
Terrestrial Vegetation - Trampled along SKN-14	3.01
Heavier Oiled Intertidal Vegetation	4.62
Lighter Oiled Intertidal Vegetation	1.58
Stream Channels and Flats	
SKN-14 anadromous stream	20.34

Gravel Beach Injury Assessment

Gravel beaches support distinct biological communities, including rich infaunal communities with numerous species of clams, polychaete worms, amphipods, and other invertebrates, as well as shorebirds and fish (ADFG, 2015a; NOAA, 2012). Gravel beaches also provide physical structure and protection for other shoreline habitats. The Trustees developed a gravel beach HEA with different inputs for each of the five categories of oiled gravel beaches to quantify impacts (Table 4-1). The first four categories represent subsets of gravel beaches that were heavily or moderately oiled, while the fifth represents other areas. These categories are:

1. **Heavier Oiled + Manual Treatment**: Gravel beaches that were classified by SCAT as heavy or moderate in oiling degree and were subject to manual treatment;
2. **Heavier Oiled + Mechanical Treatment:** Gravel beaches that were classified by SCAT as heavy or moderate in oiling degree and were subject to mechanical treatment;
3. **Heavier Oiled + Heavier Residual Oil in 2008**: Gravel beaches that were classified by SCAT as heavy or moderate in oiling degree and where subsurface oil was found in the 2008 lingering oil surveys above a threshold of >5% lightly oiled residue and >50% oil cover;
4. **Heavier Oiled Middle and Lower Intertidal Zone**: The middle and lower intertidal zones of gravel beaches that were classified by SCAT as heavy or moderate in oiling degree but not mechanically treated; and
5. **Lighter Oiled:** Gravel beaches that were classified by SCAT as light, very light, or tarball oiling degree and were subject to manual removal or natural recovery.

The Trustees considered the use of mechanical treatment as a factor in the injury assessment on gravel beaches because extensive mechanical treatment included: 1) in-situ methods such as dry tilling and sediment relocation, and 2) mechanical removal of oiled sediments followed by tilling and sediment relocation. These mechanical methods disturbed the entire beach habitat from the supratidal to the lower intertidal zones. All biota in the mechanically treated areas would be killed, those in placement areas would be smothered, and biota in the lower intertidal zone would be exposed to oil released to the water column during sediment placement and reworking.

The oil that stranded on heavier oiled gravel beaches was a source of exposure to the biological community in the middle and lower intertidal zones, both during the multiple times that oil came ashore during the winter of 2004 through 2005 and as the oil was mobilized during cleanup activities in 2005 and storm events. The Trustees used data on PAH concentrations in mussel tissues to show that the oil on heavier oiled shorelines was bioavailable and at concentrations that would cause sublethal effects in mussels in 2005 and 2006. Mussels are filter feeders and sensitive receptors for oil exposure and uptake. Data from Mauseth et al. (2008) showed that samples of blue mussels, black chitons, and green sea urchin roe collected from more heavily oiled areas, such as Skan Bay, had elevated PAH concentrations compared to samples from

lightly or unoiled areas, such as Cannery Bay. Therefore, the Trustees assessed the injury to these middle and lower intertidal zones as a separate gravel beach category.

To assess injury to these habitats, the Trustees used SCAT oiling data, response and clean-up information, data from preassessment studies, and literature on short- and long-term effects of oiling and response activities on gravel beach communities to estimate the impact and recovery for gravel beaches.

Rocky Shore Injury Assessment

Rocky shores support communities of algae and invertebrates, including mussels and barnacles, and grazers, such as limpets, chitons, and sea urchins (ADFG, 2015a). Shorebirds and marine mammals, including seals and sea lions that haul out on land, inhabit rocky shores. These shoreline habitats also support fish communities that live or feed in nearshore waters (NOAA, 2012).

The Trustees identified four injury categories for oiled rocky shores (Table 4-1):

- Spray Cape (the only rocky shore where pre-assessment surveys observed reduced herbivore populations and physical impacts to kelp that could be attributed to exposure to M/V *Selendang Ayu* oil (Cubit et al., 2008);
- Heavier oiled rocky shore supra and intertidal zones;
- Heavier oiled rocky shore middle and lower intertidal zones; and
- Lighter oiled rocky shores.

It was not often safe for cleanup crews to access rocky shores for oil removal operations. Thus, most of the rocky shores along the open ocean were not treated. The Trustees used data on PAH concentrations in mussel tissue over time to document exposure to rocky shore intertidal communities. PAH levels observed in mussel tissue indicate that amounts of bioavailable oil from the M/V *Selendang Ayu* in mussels were elevated in April 2005 (140 days after the spill) and declined over time (Figure 4-1). Bivalves, such as mussels, are known to depurate PAHs with half-lives of up to several weeks, depending on temperature and the reproductive cycle (Meador et al., 1995). Therefore, it is likely that initial PAH concentrations were much higher, by up to an order of magnitude or more, early in the spill. Bejarano and Michel (2010) determined that the PAH concentrations in 2005 would result in sublethal impacts to mussels. By summer 2008, mean PAH concentrations in mussels (Figure 4-1) at oiled sites approached background levels yet remained marginally elevated. Carls et al. (2010b) concluded that the summer 2008 PAH concentrations in mussels were unlikely to injure mussels.

The Trustees used the thresholds for impacts to mussels and the literature from similar types of spills to estimate the impact and recovery of impacts to rocky shore communities for the four oiling categories.

Vegetated Habitats Injury Assessment

Supratidal vegetation stabilizes shoreline sediments, prevents erosion, and provides habitat for wildlife, including birds and terrestrial mammals. Vegetated habitats are divided into the following injury categories:

- Terrestrial vegetation landward of beaches and rocky shores, which are divided into four subcategories based on oiling and treatment:
  - Heavier oiled;
  - Heavier oiled and cut in summer;
  - Lighter oiled;
  - Trampled along stream in Skan Bay, which was used as a corridor for transport of workers and waste materials and as a staging area for the operations; and
- Heavier oiled intertidal vegetation along stream channels in Skan Bay and Makushin Bay.

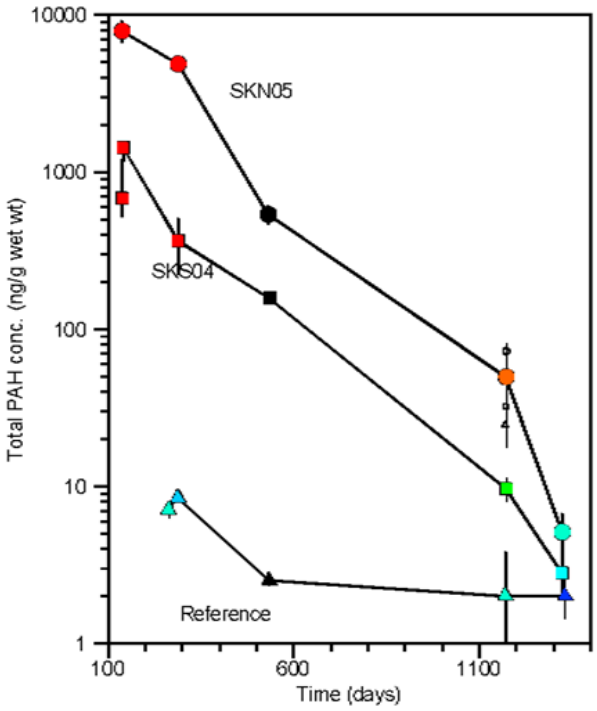

Figure 4-1. Total PAH concentrations in mussel tissue in days after the M/V Selendang Ayu spill. Data in Figure 4-1 from 2005 to 2006 (through 534 d) are from Mauseth et al. (2008). Winter 2008 data (1172 d) are from Flint et al. (2009). Data for August 2008 (1330 d) are from Carls et al. (2010b). Symbols with red/orange colors indicating a strong petroleum source of the PAHs and green/blue colors indicating PAHs were mostly from the combustion of oil. Values are means with bars representing the standard error when multiple samples were collected within the location.

The Trustees used the SCAT oiling database and photographs, and the pre-assessment study of this habitat by Rocque and Erickson (2008), which included information on what areas of vegetation was cut during cleanup operations, to determine the extent of each category of vegetated habitats. The degree of impact and recovery period was determined based on literature studies of heavy fuel oils on vegetation, summarized in Michel and Rutherford (2014).

Stream Channels and Flats Injury Assessment

The lower parts of anadromous streams in the Aleutian Islands are generally low-gradient streams with wide channels, sandy intertidal flats, and vegetated banks. They are important habitats for migration of adult pink salmon, coho salmon, and Dolly Varden to upstream spawning grounds and for rearing juveniles of these species. On Unalaska Island, pink salmon generally do not utilize intertidal habitat for spawning (A. Shaul, ADF&G, personal communication), and Carls et al. (2008) found no evidence of intertidal spawning activity during their field surveys in summer 2005, likely due to the paucity of suitable gravels for spawning. These habitats are also important nursery and rearing habitats for resident fish, including Pacific sand lance, Pacific sandfish, frog sculpin, rock sole, and sturgeon poacher, among others.

Carls et al. (2008) deployed passive samplers, which are plastic membranes designed to accumulate bioavailable oil chemicals from water, along the oiled sections of fourteen streams starting in March 2005, two that were heavily oiled and twelve with no visible oiling. They also deployed passive samplers in the marine areas offshore of the stream mouths. They determined that PAHs from the M/V *Selendang Ayu* oil were biologically available at detrimental concentrations three months after the spill in one stream in Skan Bay. Although bioavailable PAHs in bays were widely distributed, only the waters of Skan Bay posed a potential risk to emigrant juvenile pink salmon during the sampling period. Overall, Carls et al. (2008) concluded that the M/V *Selendang Ayu* spill placed a relatively small number of embryos and fry at lethal and sublethal risk in stream habitat.

To assess injury to these habitats, the Trustees used SCAT oiling data and the results of the study by Carls et al. (2008) to estimate the impact and recovery for stream channels and flats.

Injury Quantification Results

HEA was used to quantify injury for each marine habitat, using the metric of DSAYs. This metric encompasses the value of the ecological services provided by one acre of habitat for a period of one year. The total injury is calculated as the loss in ecological services incurred from the time the habitat is injured until the services provided by the injured resource return to their baseline level. Changes in ecological services are represented as a percentage of baseline services. Percent services over time for each of the sixteen injury categories were based on field data collected following the spill and on appropriate literature sources. Emphasis was placed on literature derived from field studies that represented the oil type and spill conditions for the M/V *Selendang Ayu*. For this spill, response actions undertaken following the spill along with natural attenuation were expected to have allowed the shoreline habitats to return to baseline conditions within approximately ten years from when the spill occurred. Table 4-2 shows the results of the

injury quantification, indicating the loss of 855 DSAYs of shoreline habitat. Additional details regarding the Trustee's injury assessment for shoreline habitats can be found in the administrative record (see the Injury Assessment Report).

Table 4-2. Injury to shoreline habitat due to the M/V *Selendang Ayu* oil spill.

Shoreline Habitat Category	Impacted Acres	Injury (2019 DSAYs)
Gravel Beaches	1,072	789
Rocky Shores	296	41
Vegetated Habitats	17	20
Stream Channels and Flats	20	5
Total	**1,406**	**855**

CHAPTER 5 | RESTORATION PLANNING

The Goals of Restoration Planning

The goals of restoration planning under OPA are to quantify the natural resource injuries, identify actions appropriate to restore natural resources or services to the condition that would have existed if the incident had not occurred, and compensate for interim service losses. The latter goal is achieved through the restoration, rehabilitation, replacement, or acquisition of equivalent natural resources and/or services. Further, the development and consideration of restoration alternatives is required to fulfill the intent of NEPA. For shoreline habitat only, this chapter focuses on restoration evaluation criteria, the development and evaluation of restoration alternatives, the scaling of the alternatives, the justification of preferred restoration alternatives, performance measures and monitoring, and Trustee oversight.

Restoration Strategy

The restoration planning process may involve two components: primary restoration and compensatory restoration. Primary restoration is any action that returns a resource, including its services, to baseline conditions (i.e., the condition that would have existed if the incident had not occurred). In contrast, compensatory restoration actions serve to compensate for the interim loss of resources and their services incurred from the date of incident until recovery (15 C.F.R. § 990.30). The scale of a compensatory restoration project depends on the nature, extent, severity, and duration of the resource injury. Primary restoration actions that speed resource recovery reduce interim losses, as well as the amount of restoration required to compensate for those losses.

In the case of the M/V *Selendang Ayu* spill, response actions undertaken following the spill removed oil from the environment and sensitive shoreline habitats. Shoreline treatment options sought to remove as much oil as technically feasible without causing additional harm, but were also limited by logistical constraints in this very remote location. Natural removal rates were expected to reduce remaining oil amounts and weather the residual oil to non-toxic levels. Accordingly, the Trustees are not pursuing primary restoration and are focusing on compensatory restoration alternatives capable of restoring lost shoreline habitat services.

In accordance with the OPA NRDA regulations, the Trustees considered and evaluated a range of project alternatives capable of restoring lost shoreline habitat resources and the services they provide. Consideration of an appropriate range of alternatives also addressed NEPA requirements. To identify restoration projects capable of restoring marine shoreline services, the Trustees consulted with local, state, and federal governmental agencies, Tribal organizations, non-profit organizations, and stakeholders. Projects included in this evaluation include those that were evaluated in the Aleutian Islands Risk Assessment (AIRA). The AIRA is comprised of members from the National Fish and Wildlife Foundation, ADEC, and the USCG. The purpose of the AIRA was to develop a risk report that analyzed the likelihood of spills based on Aleutian Islands vessel traffic, establish a risk matrix to analyze potential consequences of vessel-related

spills, and conduct a qualitative assessment and prioritization of risk-reduction options (Wolniakowski et al., 2011). During the project evaluation process, the Trustees focused on approaches that would provide natural resources and/or services of the same type and quantity as those lost. Identified projects were then subjected to a screening process to narrow the field of potential projects and focus information-gathering efforts on the alternatives with the greatest potential to meet the Trustees' restoration goals. Additionally, as required by OPA and NEPA regulations, a "No Action/Natural Recovery" alternative was included for consideration.

Project Evaluation Criteria Development

The Trustees used a two-tiered process to evaluate restoration alternatives for shoreline habitats. Tier One criteria narrowed the field of potential projects so that the Trustees could focus information gathering efforts on the alternatives with the greatest potential to meet the Trustees' restoration goals. Tier Two criteria included those criteria presented in the OPA regulations and other case-specific criteria adopted by the Trustees. Tier One and Tier Two evaluation criteria are listed below.

Under Tier One, the Trustees evaluated the following:

- Potential of the project to produce a quantifiable increase in services provided by one or more of the injured resources;
- Whether sufficient information exists for the project for evaluation under OPA and NEPA;
- Whether sufficient information exists for the project to enable scaling of the restoration project to the level of injuries; and
- Likelihood the project could be implemented within a reasonable timeframe following receipt of funding.

If a restoration alternative met the Tier One criteria, the Trustees evaluated the alternative using the Tier Two criteria:

- Whether the project would be technically feasible and in accordance with applicable laws, regulations, or permits (15 C.F.R. § 990.53(a)(2));
- Evaluation standards from the OPA regulations (15 C.F.R. § 990.54(a)):
  - Cost to carry out the alternative;
  - Extent to which each alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses;
  - Likelihood of success of each alternative;
  - Extent to which each alternative will prevent future injury as a result of the incident and avoid collateral injury as a result of implementing the alternative;
  - Extent to which each alternative benefits more than one natural resource and/or service, and;
  - Effect of each alternative on public health and safety.
- Consistency with local, regional, and national goals and initiatives;

- Feasibility in light of restrictions or requirements of the project site's ownership;
- Logistical considerations for project implementation, monitoring, and maintenance;
- Requirements for long-term operation and/or maintenance; and
- Opportunities to collaborate with local entities during implementation of the project.

Project Identification and Alternative Evaluation

Proposed projects were reviewed by the Trustees and information was gathered to determine if they met the screening criteria described above. In addition, the Trustees released the draft Damage Assessment Plan (DAP) to the public, which presented potential restoration alternatives. Following the release of the draft DAP, in October 2015, the Trustees invited the public to provide comments and propose additional projects. However, the public proposed no additional restoration projects during the public comment period. In October 2020, the Trustees received one unsolicited project proposal from the Aleutian Islands Waterways Safety Committee, which is evaluated below. As part of the restoration planning process, the Trustees identified the following five proposed project alternatives:

1. No Action/Natural Recovery;
2. Wrapping and removing creosote-treated pilings;
3. Distributing bilge socks and sorbent pads;
4. Funding for the Aleutian Islands Waterways Safety Committee (AIWSC); and
5. Creating an Aleutian Watch Program and communication upgrades.

Table 5-1 summarizes how each proposed restoration alternative was evaluated based on the Tier One criteria described above. Each alternative is evaluated in further detail below. Those alternatives that met all the Tier One criteria were evaluated further using the Tier Two criteria.

Table 5-1. Tier One Evaluation of proposed shoreline habitat restoration projects.

Criteria	No Action/Natural Recovery	Wrapping and/or removing creosote-treated pilings	Distributing bilge socks and sorbent pads	Funding for AIWSC	Creating an Aleutian Watch Program & Communication Upgrades
1. Quantifiable increase in services provided by injured shoreline habitats	No	No	No	No	Yes
2. Sufficient information for evaluation under OPA and NEPA	Yes	Yes	Yes	Yes	Yes
3. Sufficient information for scaling to injury	N/A	Possibly	No	No	Yes
4. Confidence in timely project implementation	N/A	Low	High	Uncertain	High

Alternative 1: No Action/Natural Recovery

Under the No Action/Natural Recovery alternative, no restoration, rehabilitation, replacement, or acquisition actions would occur. If selected, there would be no restoration or replacement of the lost resources and the services they provided, and the public would not be made whole for losses to natural resources or services due to the incident.

Tier One Criteria Evaluation

The following evaluates each of the Tier One criteria for this restoration alternative:

- **Criteria 1**: **Quantifiable increase in services provided by injured shoreline habitats.** No. Under the No Action/Natural Recovery alternative, no restoration, rehabilitation, replacement, or acquisition actions would occur to restore the lost interim services.
- **Criteria 2**: **Sufficient information for evaluation under OPA and NEPA.** Yes. The Trustees can potentially evaluate this alternative under OPA and NEPA because there is sufficient information about the extent of benefits and impacts, but additional information may be required.
- **Criteria 3**: **Sufficient information for scaling to injury.** N/A. Natural Recovery cannot be scaled – it characterizes anticipated changes in natural resources/services that will occur absent Trustee intervention(s) to restore or replace natural resources/resource services.
- **Criteria 4**: **Confidence in timely project implementation.** N/A. By definition, No Action/Natural Recovery occurs without Trustee intervention.

Tier Two Criteria Evaluation

As described in the following sections of this document, the Trustees have identified restoration alternatives capable of restoring injured resources/resource services more completely than the No Action/Natural Recovery alternative. Therefore, this alternative is not evaluated further.

Alternative 2: Wrapping and/or Removing Creosote-Treated Pilings

As described in the DAP, the RP hired Oasis Environmental to study the feasibility of an oil abatement program to restore injuries from the M/V *Selendang Ayu* spill. Part of this study was an evaluation of the toxicity of creosote-treated pilings, which contain high concentrations of PAHs, and options for their removal in the Unalaska Bay area. There is some precedent for creosote piling mitigation efforts, including the removal of creosote pilings from freshwater streams as part of the Adak Island NRDA restoration.[7]

Current Conditions/Status

As of 2012, there was estimated to be more than 1,000 pilings that are potentially creosote-treated located in Unalaska Bay and nearby areas and these pilings are likely a localized source of PAHs to the environment.

[7] https://response.restoration.noaa.gov/about/media/see-what-restoration-looks-oiled-stream-isolated-alaskan-island.html

Proposed Project

This proposed alternative would incorporate wrapping, removing, and/or replacing creosote-treated pilings to prevent any future creosote releases into the surrounding water and sediments. Oasis Environmental (2012) performed toxicity calculations and concluded that the harm caused by approximately 21 to 52 pilings is equivalent to that caused by the oil released by the M/V *Selendang Ayu* spill, however, the Trustees did not agree with this equivalence analysis.

Tier One Criteria Evaluation

The following evaluates each of the Tier One criteria for this restoration alternative:

- **Criteria 1: Quantifiable increase in services provided by injured shoreline habitats.** No. While wrapping or removing creosote pilings could benefit multiple shoreline habitats, benefits would be localized to the immediate vicinity of the pilings (<20 m) (Duncan et al 2017, West et al, 2019) in intertidal and subtidal environments and would likely not extend to the shoreline habitats that were injured by the spill (e.g., supratidal, rocky shoreline, and stream channel and flats habitats). Furthermore, the Trustees determined that the oil equivalency calculations completed by Oasis Environmental did not account for all the harms to the marine environment caused by the oil spilled by the M/V *Selendang Ayu*. Also, the Trustees determined that Oasis did not consider: 1) that PAHs from creosote-treated pilings are released at a different rate compared to oil released from the M/V *Selendang Ayu* and 2) the M/V *Selendang Ayu* oil was significantly more harmful than what was presented in Oasis's calculations. Additional concerns include:
    - Removal efforts can result in the release of contaminants from piling material and sediments, potentially negating any benefits of removal and potentially causing more injury than benefits (West et al, 2019).
    - Removal of pilings may also impact marine organisms that use the piling structure as preferred habitat (Stevens et al, 2002), also potentially negating some benefits.
    - Wrappings on pilings can tear if not constantly monitored and benefits may be limited to the time period immediately following wrapping.

  As such, the Trustees determined that such restoration efforts, while potentially beneficial, will not result in quantifiable in-kind benefits to the shoreline resources injured by the M/V *Selendang Ayu* spill.
- **Criteria 2: Sufficient information for evaluation under OPA and NEPA.** Yes. Oasis Environmental (2012) and other publicly available information, including from the implementation of similar creosote piling removal efforts on the West coast and elsewhere, provide sufficient information for OPA and NEPA evaluation.
- **Criteria 3: Sufficient information for scaling to injury.** Possibly. Although the Oasis Environmental (2012) analysis did not incorporate all assumptions and adjustment factors necessary to scale this restoration project to injury, additional analyses and assumptions could allow for this alternative to be scaled to injury. More specifically, the Trustees determined that PAH mass-to-mass scaling is not appropriate as it does not adequately

reflect injuries caused by the oil spill. Scaling using a HEA approach is possible, however, the habitat benefits would primarily occur in intertidal and subtidal shoreline habitats, with minimal or no benefits in supratidal habitats, rocky shorelines, or stream channels and flats, which were impacted by the *Selendang Ayu* spill. This would mean that the benefits of the project would not be in-kind to the injured shoreline habitats, therefore requiring estimation of relative habitat values or a similar scaling approach. While such approaches have been used elsewhere, the applicability of values used elsewhere to this environment and/or the feasibility of developing 'custom' values for this location is uncertain.

- **Criteria 4: Confidence in timely project implementation.** Low. The Trustees have concerns with the implementation, timing, and likely benefits of this restoration alternative, including:
    - Issues with site ownership, as many of the creosote pilings in Unalaska Bay are privately owned and in current use. Obtaining permission of site owners to remove, replace, or wrap pilings could take years and may never be achieved. Further, implementation could impact private and public operations and the use of critical infrastructure.
    - PAHs from creosote-treated pilings are released slowly, meaning that the impacts being prevented are small on an annual basis.

Tier Two Criteria Evaluation

Because this restoration alternative did not meet the Tier One criteria, the Trustees did not evaluate Tier Two criteria.

Alternative 3: Distributing Bilge Socks and Sorbent Pads

Bilge oil pollution prevention was another potential oil abatement project that was evaluated by Oasis Environmental (2012). Specifically, they evaluated the potential use of bilge socks and sorbent pads in smaller vessels that do not have built in oil-water separators in the Unalaska Bay area. There is some precedent for distributing bilge socks to small vessel owners to prevent small oil spills.

Current Conditions/Status

Currently, while larger vessels have oil-water separators that prevent the release of oil into marine waters from oily bilge water, smaller vessels often do not and are, therefore, likely to have oily bilge water discharges. Oasis Environmental (2012) estimated the total annual discharge of oil from vessel bilge (i.e., the sum from all vessels without oil-water separators) in the Greater Unalaska Bay area to be between 329 and 1,971 gallons per year.

Proposed Project

To combat a preventable future release of oily bilge water discharge, this restoration alternative would distribute free bilge socks and sorbent pads to harbors hosting smaller vessels in the Unalaska Bay area for vessel operators to use.

Tier One Criteria Evaluation

The following evaluates each of the Tier One criteria for this restoration alternative:

- **Criteria 1: Quantifiable increase in services provided by injured shoreline habitats.** No. The scope of oil prevention for this proposed project would be limited to small vessel discharges. As such, the Trustees determined bilge socks and sorbent pads have the potential to collect only a limited amount of oil. Furthermore, small amounts of oil released via oily bilge water are unlikely to come ashore in large quantities. As such, removing these small volumes would not avoid harm to shoreline habitats that is comparable to the harm caused by a large oil spill, such as from the M/V *Selendang Ayu*, which leads to much higher volumes and concentrations of oil in shoreline habitats for much longer periods of time. The benefits of such a bilge sock program would also likely not extend to supratidal beach and vegetated shoreline habitats that were injured by the spill (i.e., weathering and dissolution would occur prior to oil coming ashore). As a result, the Trustees determined that such restoration efforts, while potentially beneficial, will not result in quantifiable benefits to injured shoreline habitats.
- **Criteria 2: Sufficient information for evaluation under OPA and NEPA.** Yes. Oasis Environmental (2012) and other publicly available information provide sufficient information for OPA and NEPA evaluation.
- **Criteria 3: Sufficient information for scaling to injury.** No. The Trustees determined that oil volume-to-volume scaling, as proposed in the Oasis Environmental report (2012), is not appropriate for this project as it does not adequately equate injuries caused by the oil spill to the benefits provided by the project. The benefits of the project would not be in-kind to the injured shoreline habitats, therefore requiring estimation of relative habitat values or a similar scaling approach. Further, adoption rates or rates of effective utilization of the products are unknown given the voluntary nature of the program and lack of this type of information from other comparable programs. Such limitations preclude defensible benefits scaling of this restoration alternative to the injury using a HEA or a similar method.
- **Criteria 4: Confidence in timely project implementation.** High. Distribution of bilge socks could occur via marinas and other maritime infrastructure. Similar programs have been implemented successfully in Alaska. While the Trustees have high confidence in the timely distribution of the materials, product use rates are unknown and there are limited options for ensuring any used products are disposed of correctly considering the voluntary nature of the program and logistical considerations for removing hazardous materials from remote locations in Alaska.

Tier Two Criteria Evaluation

Because this restoration alternative did not meet the Tier One criteria, the Trustees did not evaluate Tier Two criteria.

Alternative 4: Funding for Aleutian Islands Waterways Safety Committee

The Aleutian Islands Waterways Safety Committee (AIWSC), established in 2017, operates a multi-stakeholder forum on maritime safety, including maintaining the Aleutian Islands Waterways Safety Plan (WSP). The stated mission of the AIWSC is to "*enhance safe, efficient and environmentally sound maritime operations in the Aleutian Islands region by fostering a productive exchange of information among mariners and other stakeholders and establishing and promoting best practices and standards of care*."[8] Establishing and maintaining the AIWSC was one of the recommendations in the AIRA. The AIWSC is a valuable forum and enhances marine safety in the Aleutian Islands Maritime Area.

Current Conditions/Status

The AIWC brings together State and Federal agencies with representatives of marine industries, fishing and fish processors, communities, ports, marine pilots, local and international shipping, Alaska Natives, and non-governmental organizations with a stake in marine issues in the region. These representatives meet regularly to share information and promote best practices. AIWSC is not a regulatory group; rather it is a forum for identifying, assessing, planning, communicating, and implementing regionally specific operational and environmental measures that complement statutory and regulatory requirements. The best practices and standards of care are captured in the WSP.[9] The WSP was adopted in 2019 to convey marine safety practices and enhance environmental stewardship. It was funded by a grant from the National Fish and Wildlife Foundation (NFWF) and facilitated by Nuka Research Planning Group, LLC.

Proposed Project

This restoration alternative would provide funding for the AIWSC to operate as a forum on maritime safety and to maintain the Aleutian Islands WSP. The AIWSC activities, including travel for committee members to attend meetings, meeting facilitation, and product development, are currently funded by a grant from NFWF. However, the AIWSC has indicated that a lack of long-term funding threatens the viability of the AIWSC. This restoration alternative would ensure that the AIWSC could continue to operate as a forum and develop and maintain products that enhance maritime safety and reduce the risk of an oil spill, for the period of time that funding is provided, irrespective of future funding uncertainty from other sources.

Tier One Criteria Evaluation

The following evaluates each of the Tier One criteria for this restoration alternative:

- **Criteria 1: Quantifiable increase in services provided by injured shoreline habitats.** No. While enhanced maritime safety is likely to reduce oil spills and the AIWSC is a valuable program, the Trustees are unable to reasonably quantify reductions in spill

[8] https://www.aleutianislandswsc.org/

[9] https://www.aleutianislandswsc.org/waterways-safety-plan

frequency, magnitude, location and/or similar measures attributable to the AIWSC's wide variety of potential beneficial activities. Thus, the contributions of the AIWC to oil spill prevention and resulting quantifiable benefits to shoreline habitats are not quantifiable with a reasonable level of certainty.

- **Criteria 2: Sufficient information for evaluation under OPA and NEPA.** Yes. Based on available information from AIWSC or public sources, the Trustees believe there is sufficient information available to evaluate this alternative under OPA and NEPA.
- **Criteria 3: Sufficient information for scaling to injury.** No. While enhanced maritime safety is likely to reduce oil spills, the contributions of the AIWSC to oil spill prevention specifically, and thus shoreline habitat restoration, could not be quantified in a way that would allow for scaling. Current AIWSC products, such as the WSP, primarily compile existing information from other sources, thus making it impossible to discern the impact of the AIWSC from other ongoing efforts to enhance maritime safety and prevent oil spills in the Aleutians, including the work that the member groups are doing independent of the AIWSC. The Trustees also considered that a forum like the AIWSC is recommended in the AIRA. However, the AIWSC was not evaluated as a Risk Reduction Option (RRO) in the risk assessment, which may have provided additional information potentially relevant to scaling.
- **Criteria 4: Confidence in timely project implementation.** Uncertain. Because funding for this effort has historically existed, it is likely that implementation could occur in a reasonable timeframe and the AIWSC could continue its functions should funding not be available in the future. However, if funding is available from other sources, it is unclear how or when additional funding would be applied to enhance spill prevention.

The Trustees consider the AIWSC to be a valuable organization with local, regional, and national support that is working to enhance maritime safety. However, it does not meet the established Tier One criteria for a shoreline habitat restoration project for this NRDA case.

Tier Two Criteria Evaluation

Because this restoration alternative did not meet the Tier One criteria, the Trustees did not evaluate Tier Two criteria.

Alternative 5: Aleutian Watch Program & Communication Upgrades (Preferred Alternative)

The Aleutian Islands sit along the North Pacific Great Circle Route, a maritime transit route that connects the west coast of the U.S. with major ports in Asia. Because the Great Circle Route is the most economical route of passage between these two areas, thousands of vessels utilize this route every year (Burn and Poe, 2014; Aleutian Islands Waterways Safety Committee, 2019). The sheer number of vessels transiting this route, as well as past oil spills and near misses in this region, indicates the importance of a robust and comprehensive ship tracking and response system.

Current Conditions/Status

The International Maritime Organization's (IMO) Safety of Life at Sea (SOLAS) is an international maritime treaty that established minimum safety standards for merchant ships. Since 2004, SOLAS regulations require that ships carry automatic identification system (AIS) technology capable of providing information about the ship to other ships and coastal authorities automatically. The regulation requires that AIS be carried and maintained operational on all ships of 300 gross tons or greater that are on international voyages, 500 gross tons or greater that are not engaged on international voyages, and all passenger ships.[10] AIS systems consist of a VHF transmitter, VHF receiver(s), and marine electronic communications links to a shipboard display. Though some vessels operating in the Aleutian Islands Maritime area are not equipped with AIS transceivers (e.g., personal fishing boats), the majority of the vessels transiting through the area are automatically transmitting basic vessel information, such as identification, position, course, and speed data via AIS. These signals are received by shipboard, land-based, or satellite receivers and can be used for a variety of navigation, monitoring, and marine safety applications. Shipboard AIS systems can receive information about other vessels, as well as other types of broadcasts, in the form of text-only messages or displayed on AIS-enabled chartplotters.[11]

For the purposes of restoration planning for the M/V *Selendang Ayu* NRDA, the Trustees consider the area presented in Figure 5-1 (hereinafter the "Aleutian Islands Maritime Area") as the restoration area, consistent with the focus area of the AIRA. The more northern Great Circle route goes through Unimak Pass at the eastern end of the Aleutians and splits into one of several routes westward. The density of maritime traffic activity in the Aleutian Islands region in 2017, captured by AIS, illustrates the scope and importance of this route.

While the number of vessels transiting the Aleutian Islands Maritime Area since 2004 has varied, the AIRA surmised that vessel traffic in the Aleutian Islands would increase from 2010 to 2035. As such, despite some historical variation, the Trustees expect vessel traffic to continue to increase over the coming decade.

[10] https://www.imo.org/en/OurWork/Safety/Pages/AIS.aspx

[11] Additional information about AIS is available from the U.S. Coast Guard Navigation Center: https://www.navcen.uscg.gov/automatic-identification-system-overview

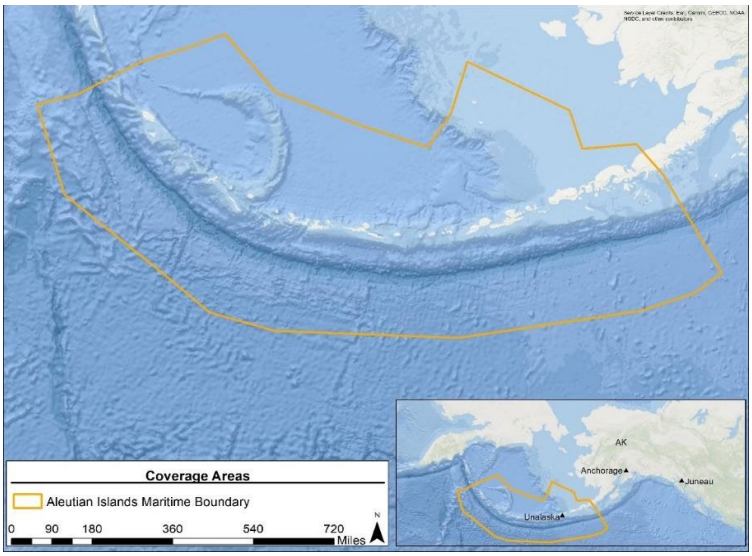

Figure 5-1. Map depicting the Aleutian Islands Maritime Area.

Several efforts have been implemented since the AIRA was written to enhance safety and prevent oils spills for vessels transiting this area, including:

- At the request of the U.S., the IMO designated five Areas to be Avoided (ATBAs), which are 50 nautical mile buffers around five Aleutian Island groups categorized as "no-transit" zones, which went into effect in 2016. ATBAs reduce the risk of vessel groundings and protect sensitive habitats and resources in the Aleutian Islands. The ATBAs are shown in Figure 5-2. Vessel tracking in years after the implementation of the ATBAs shows 88% overall compliance (Sullender, 2021).
- A vessel tracking system that includes a network of AIS transceivers installed at approximately 25 Marine Safety Sites (MSSs) throughout the Aleutian Islands as well as through a satellite AIS provider (Exhibit 5-3). Satellite AIS coverage, though not as precise as ground-based AIS coverage, allows vessels to be tracked beyond the range of terrestrial-based units.
- Currently, nine AIS receiver sites are operational throughout the Aleutian Islands, placed in strategic locations in which to provide the greatest coverage. Exhibit 5-4 shows the locations (in red) of AIS stations in Alaska. Combined, these stations receive millions of vessel position reports every day.
- Electronic navigation (eNAV or Aid to Navigation) services provided by MSSs include weather collection and broadcast services, Digital Selective Calling (DSC) capability, as well as VHF-FM Voice Over Internet Protocol capability in some areas where Coast Guard VHF coverage is challenged.
- Enrolled monitored vessels are part of the Alaska Chadux Network (ACN). The ACN is a non-profit company providing the response capability consistent with a vessel's VRP (https://alaskaosro.org/). The Marine Exchange of Alaska (MXAK) has been providing vessel monitoring services of vessels with a VRP for the ACN since 2004.

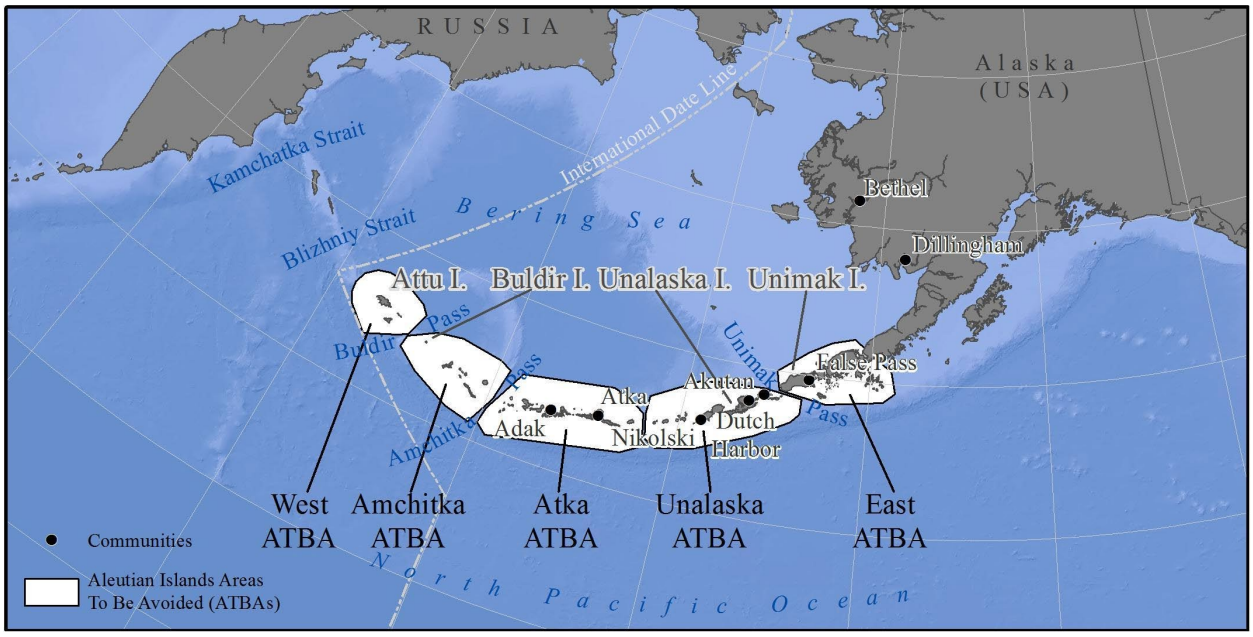

Figure 5-2. Aleutian Islands Areas To Be Avoided (ATBAs), as implemented by the International Maritime Organization in 2016. The IMO designated these five ATBAs (white polygons) after the U.S. proposed them to reduce the risk of marine casualty and impacts to wildlife on the Aleutian Islands and recommend routes through certain passes in the Aleutian Archipelago. Adapted from Sullender, et al. 2021.

For U.S. flagged vessels with a VRP, the information obtained via the existing monitoring network described above must be processed and acted upon should a vessel be at risk. As such, a 24-hour watchstanding service based in Juneau, Alaska provides watch services to those enrolled vessels. The AIS data are channeled to the operations center in Juneau, Alaska, where Maritime Information Specialists (a.k.a. “Watchstanders”) provide live monitoring and initiate response actions when necessary. Responses may include contacting vessels if they enter an ATBA or otherwise require course correction, alerting response organizations if a vessel appears to be compromised, identifying potential good Samaritan vessels to provide assistance, and identifying safe harbors, among other functions.

A vessel tracking system, currently operated by the MXAK, began operating in 2004 and approximately 50% of the vessels transiting the Aleutian Islands Maritime Area are required to have a VRP and are under active AIS monitoring (“monitored vessels”). However, approximately 50% of vessels transiting through the Aleutian Islands (over 3,000 per year) are not actively monitored, as they are foreign flagged vessels operating in U.S. waters but not coming to or from a U.S. port and not required to have a VRP (“unmonitored vessels”). As a result, these unmonitored vessels are not actively observed for potential distress or presence within an ATBA, yet still present a risk of marine casualty and oil spill.

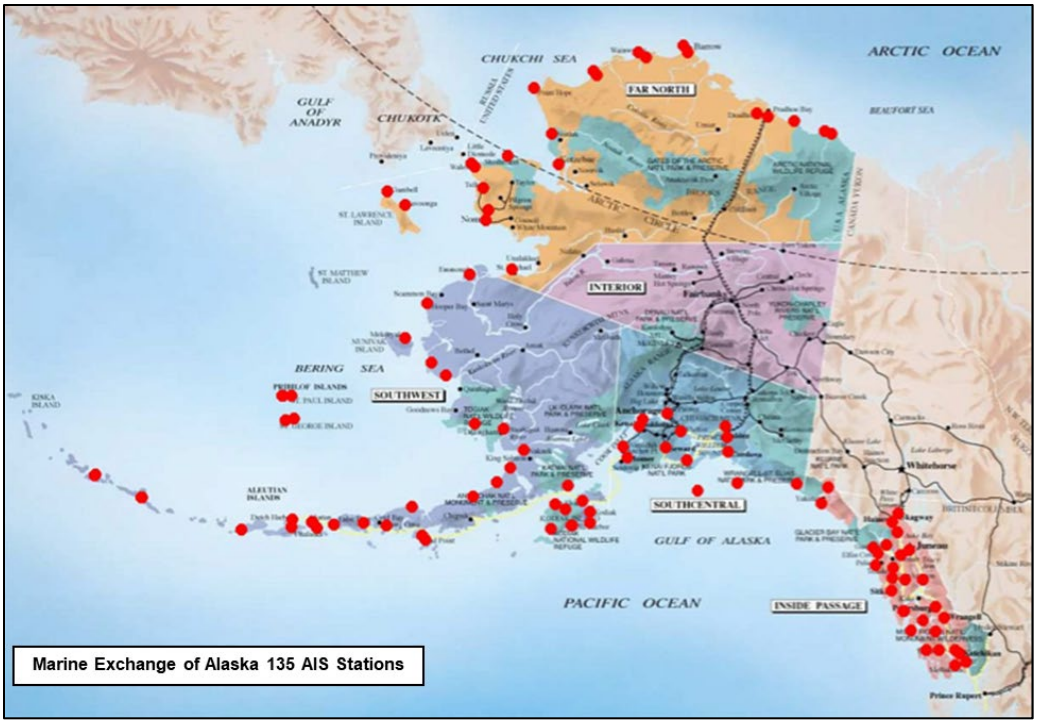

Figure 5-3. Current AIS Stations in Alaska.

Proposed Project

As described above, several actions have been taken to implement safety measures in this Aleutian Islands Maritime Area. However, unmonitored vessels continue to pose a risk of future oil spills, there is no existing program that provides real-time AIS monitoring of such vessels. Enhanced AIS-based vessel monitoring was the highest-ranked RRO in the AIRA. This restoration project was originally envisioned with a focus on expanding the MSS station network by building new land-based AIS stations to provide additional coverage, as outlined in the Damage Assessment Plan. Through the restoration planning process, the Trustees shifted the focus of the project to providing expanded vessel monitoring over a larger area, with more minor infrastructure upgrades, based on input from the maritime community and changes in spill risk and prevention needs in the area. This proposed restoration project would create a watch program and upgrade communications infrastructure to track the unmonitored vessels, currently conducting 3,000 transits per year, to enhance the safety and security of transit, and prevent future oil spills.

The geographic scope of this restoration alternative will include the entire Aleutian Islands Maritime Area, encompassing the four major passes, ATBAs, and portions of the US EEZ. It will include all AIS-equipped unmonitored vessels transiting the Aleutian Islands. Specifically, funding would cover three inter-related efforts, together referred to as "Aleutian Watch Program & Communication Upgrades" that provide upgrades to existing infrastructure and establish new programs that are above and beyond what is currently in place, including:

- **Communication upgrades by increasing capabilities** at up to six existing MSSs, by adding AIS transmit capability, VHF-FM and Digital Selective Calling (DSC) capability, and weather reporting stations in appropriate locations. This will provide two-way communication capabilities and the most detailed information possible for all transiting vessels.
- **Administrative staffing to research, develop, and maintain a database** of unmonitored vessels that transit the area because data collection and contact information for these vessels is beneficial to effective sea traffic management and response.
- **Establishing the Aleutian Watch Program**, a 24-hour dedicated watch of unmonitored vessels within the Aleutian Island Maritime Area with a Watchstander staff program that can identify vessels at risk, and notify responders if necessary.

Combined, these three efforts will increase monitoring, communication, prevention, and response capabilities with vessel operators and aid in general maritime safety with specific emphasis on preventing large ships from grounding on the Aleutian Islands. Through this restoration alternative, unmonitored vessels would be tracked throughout the Aleutian Islands Maritime Area, both inside and outside the ATBAs, which is currently not occurring. This will not affect or overlap with current monitoring or services for monitored vessels with VRPs. Monitoring provided by this project may not meet the more stringent requirements of VRPs for U.S. flagged vessels.

The following describes the need and benefits of each of the three proposed efforts in more detail.

Communication upgrades by increasing capabilities at up to six existing MSSs – While AIS data can be received everywhere in the Aleutians (via vessel, terrestrial, or satellite units), publicly broadcast data and messages (warnings, broadcasts to mariners, etc.) can only be transmitted from terrestrial MSS sites equipped with two-way communications capabilities to vessels within their line of sight (25 to 100 Nautical Miles depending on the height of the transmitter). It is not possible to transmit messages to AIS-equipped vessels via satellite AIS receivers. The addition of transmitting AIS units on land would enhance marine safety and spill prevention capabilities for any vessel transiting the Aleutian Islands Maritime Area. Vessels that receive timely notifications about hazards, weather, and other aids to navigation (i.e., buoys and markers) can take precautionary measures and make routing decisions that reduce the risks of incidents that lead to groundings and oil spills. The U.S. Coast Guard has indicated that these upgrades are a priority and repeatedly requested funding to implement upgrades, but critical gaps in two-way communications capabilities remain with no dedicated funding reasonably anticipated. Such additional transmitting units would be added to existing MSS locations and no new construction would be required. The proposed effort anticipates additional capabilities being added at up to six existing locations.

Creating a new database of unmonitored vessels, including contact information – Administrative staff will build and maintain a communications database that includes relevant

contact information for unmonitored vessels that transit the Aleutian Islands Maritime Area. Information will be compiled from public information sources. Such a database is needed because unmonitored vessels are not required to, nor do they regularly, provide contact information. AIS transmits a unique vessel identifier, but not the information necessary to establish communications with a vessel. An Aleutian Watch database of readily available and up-to-date contact information will allow responders to reach out to a vessel that has triggered an alert and determine the status of a vessel and potential need for response actions. For example, a vessel may reduce its speed for weather safety or other reasons, which would not require the launch of scarce response resources. However, sudden changes in speed or heading may be indicative of a compromised vessel and communications are important to ascertain the status and any response needs. Timely detection of vessels in distress and an ability to rapidly establish communications for situational awareness and response coordination is a critical need for spill prevention, as detailed in the AIRA. Most of the Aleutian Islands Maritime Area is outside of standard VHF communications areas, so having vessel-specific contact information will be beneficial for establishing communications. Building and maintaining a communications database is beneficial for optimizing response capabilities and requires a dedicated funding source for administrative staff.

Establishing an Aleutian Watch Program – Through a new Aleutian Watch Program, tracking of unmonitored vessels will occur 24 hours a day, seven days a week, from a centralized location staffed by a dedicated team of Watchstanders. The focus would be to identify vessels of concern by monitoring vessel movements and initiating timely communications with the USCG or other response organizations if needed. Based on live AIS monitoring, the Watchstander will notify the USCG or other response organizations if a potentially compromised vessel or other situation that presents a spill risk is detected. Timely detection and notification are critical to successful response operations, especially in remote areas with limited response infrastructure, and will reduce the risk of a close call becoming an oil spill. The program will be maintained for 30 years (see scaling information below).

Tier One Criteria Evaluation

The following evaluates each of the Tier One criteria for this restoration alternative:

- **Criteria 1: Quantifiable increase in services provided by injured shoreline habitats.** Yes. Currently unmonitored vessels transiting through the Aleutian Islands present an ongoing and future oil spill risk. Oil released from an incident involving these vessels would be likely to come ashore and impact shoreline habitats similar to those injured by the M/V *Selendang Ayu* oil spill. The three components of this project reduce the risk of future incidents and resulting oil spills from currently unmonitored vessels through active monitoring and enhanced communications capabilities, as described above. By reducing the risk of future oil spills, this project would prevent future injuries to shoreline habitats, thereby providing a quantifiable increase in the services provided by the shoreline habitats that were injured following the M/V *Selendang Ayu* spill.

- **Criteria 2: Sufficient information for evaluation under OPA and NEPA.** Yes. Substantial information is available to evaluate the proposed project under OPA and NEPA, including information about existing infrastructure and comparable services for US-flagged vessels.
- **Criteria 3: Sufficient information for scaling to injury.** Yes. Information about current vessel tracking and monitoring operations in the Aleutian Islands, as well as vessel transit and oil spill data and analysis of the RROs summarized in the AIRA, provide information for estimating the restoration benefits from the proposed project (summarized further below).
- **Criteria 4: Confidence in timely project implementation.** Yes. Based on information available regarding vessel tracking and response services for monitored vessels, the Trustees are confident that this restoration alternative could be implemented in a reasonable timeframe (less than two years) following receipt of restoration funds and continue for 30 years.

Tier Two Criteria Evaluation

The following evaluates each of the Tier Two criteria for this restoration alternative:

- **Whether the project would be technically feasible and in accordance with applicable laws, regulations, or permits (15 C.F.R. § 990.53(a)(2))**: Existing AIS infrastructure in the Aleutian Islands and ongoing vessel tracking and monitoring services provided for monitored vessels demonstrates that this restoration alternative is technically feasible. Per the Trustees' review, this project is consistent with existing laws.
- **Evaluation standards from OPA Regulations (15 C.F.R. § 990.54(a))**:
    - *Cost* – AIS-based vessel monitoring was the most cost effective RRO evaluated in the AIRA. Although the cost to implement the Aleutian Watch Program & Communication Upgrades is potentially greater than other restoration alternatives, it is the only project for which the Trustees have high confidence in the likelihood of timely, successful restoration.
    - *Extent to which the alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses* – By preventing future oil spills within the Aleutian Island Maritime Area, this project will provide a quantifiable increase in the services provided by the shoreline habitats, compensating for the injuries to those resources and services caused by the M/V *Selendang Ayu* spill, which is the Trustees' primary restoration goal.
    - *Likelihood of success* – The project has a high likelihood of successfully implementing and maintaining continuous active monitoring (Aleutian Watch) of currently unmonitored vessels and enhanced communications capabilities that reduce the risk of vessel incidents and resulting oil spills over the course of the project. Existing AIS infrastructure in the Aleutian Islands Maritime Area and ongoing vessel tracking and monitoring services provided for U.S.-flagged

vessels demonstrate that the proposed project has a high likelihood of success and is technically feasible.
    - *Extent to which the alternative will prevent future injury as a result of the incident and avoid collateral injury as a result of implementing the alternative* – Besides the yet-uncompensated interim losses, the M/V *Selendang Ayu* incident is no longer generating new injuries; thus, there are no future injuries to prevent related to the incident. No physical impacts to the environment are anticipated because all Watchstander efforts will occur in an office space and all equipment upgrades will occur where equipment already exists, requiring no 'earth moving' activities.
    - *Extent to which the alternative benefits more than one natural resource and/or service* – Spill prevention resulting from this alternative would benefit a wide range of natural resources and services, including, for example, shoreline habitats injured by the M/V *Selendang Ayu* spill and other resources that utilize adjacent habitats or rely on shoreline biota for prey.
    - *Effect of the alternative on public health and safety* – The enhanced marine safety provided by the potential project would have a positive effect on public health and safety for local communities in the Aleutians and broader public involved in commercial fishing, shipping, and other activities in the area.
- ***Consistency with local, regional, and national goals and initiatives***: Creating the Aleutian Watch Program & Communication Upgrades is consistent with the local, regional, and national goals, as described in the AIRA (e.g., monitor vessel traffic in real time to quickly identify problems).
- ***Feasibility in light of restrictions or requirements of the project site's ownership***: The communications upgrades require site access to modify existing infrastructure. Land-based AIS stations are owned and operated by different entities and hosted at a range of different facilities and sites. The Trustees do not anticipate restrictions or requirements related to site ownership to impact the feasibility of the project.
- ***Logistical considerations for project implementation, monitoring, and maintenance*** –
    - Upgrading communication equipment will require access to and work in remote parts of Alaska, however the upgrades are improvements to this existing infrastructure, which has been installed already and has been maintained successfully to date.
    - Logistical considerations for creating the database and the 24-hour Watchstanders are primarily related to staffing and technical support. Because monitoring efforts are in place for U.S. flagged vessels, the Trustees believe similar efforts for unmonitored vessels are logistically reasonable.
- ***Requirements for long-term operation and/or maintenance*** – This project requires long-term operation and maintenance to ensure project benefits accrue. The upgraded equipment may require periodic inspection and maintenance. The vessel contact database will require updating and ongoing review and maintenance. Watchstanders will continuously be required to staff the operations center where incoming data are reviewed.
- ***Opportunities to collaborate with local entities during implementation of the project –*** Given the remote location where equipment upgrades will occur and the subject matter

expertise to serve as a Watchstander, there will be limited opportunities for community involvement.

Preferred Restoration Alternative Scaling

The preferred restoration project is scaled to compensate for injuries to shoreline habitats resulting from the spill as described and quantified as 855 DSAYs (2019) of shoreline habitat. To compensate for these losses, the preferred restoration project creates an Aleutian Watch Program and communications upgrades to prevent future oil spills that would result in impacts to shoreline habitats of the Aleutian Islands. The prevention of such shoreline oiling in the Aleutian Islands would result in DSAYs not lost of the same shoreline habitats impacted by the M/V *Selendang Ayu* spill. Thus, the Trustees can scale the restoration benefits to compensate for the losses in the same units (i.e., DSAYs of shoreline habitat).

The Trustees reviewed available information to assist in estimating the number of DSAYs of shoreline not injured due to prevention of oil spills as a result of the preferred project. In particular, the Trustees reviewed documents from the AIRA project for data and trends concerning vessel traffic, oil spills, and spill modeling (Wolniakowski et al., 2011; DNV and ERM, 2010a, b). The AIRA consists of several different reports. For the purposes of quantifying benefits of the Aleutian Watch Program and communication upgrades, the most relevant AIRA reports include the Phase A Summary Report (Wolniakowski et al., 2011), the Marine Spill Frequency and Size Report (DNV and ERM, 2010a), the Baseline Spill Study Report (DNV and ERM, 2010b), and the Risk Reduction Options Evaluation Report (DNV and ERM, 2011).

To estimate the benefits of the preferred restoration project, for the purposes of this assessment only, the Trustees developed the quantification approach shown in Figure 5-4. The total number of DSAYs not lost because of the Aleutian Watch Program and communication upgrades are based on information and analyses presented in the AIRA reports, discussion with the U.S. Coast Guard, Marine Exchange of Alaska, and other subject matter experts, and the Trustees' best professional judgment. Specific inputs to the Trustees' benefits quantification included, but were not limited to, the following:

- Estimated volume of oil released under the baseline (no-restoration scenario);
- Proportion of the released oil that would be prevented from release due to RROs implemented between 2008 and 2022;
- Proportion of the released oil that would be prevented from release due to implementation of the preferred restoration project;
- Average length of shoreline oiled per volume of oil released in the spill scenarios presented in DNV and ERM (2010a, b); and
- Proportion of shoreline habitat services lost each year after oiling, as per the Injury Assessment Report.

The methods used to scale restoration are summarized below.

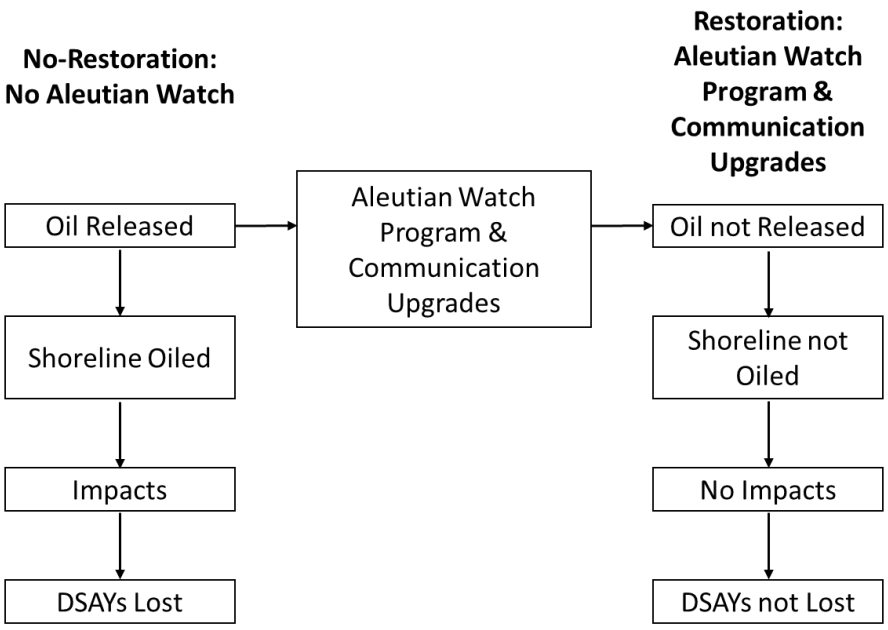

Figure 5-4. Restoration scaling conceptual approach for quantification of restoration benefits.

The Amount of Oil Released Annually Under the no-Restoration Scenario

To scale restoration, the first step was to estimate the amount of oil that would be released (in tons) annually under the no-restoration scenario, beginning in 2027. The year 2027 was chosen as the expected start of restoration, based on the anticipated timeline for funding and project planning. The volume of oil released without restoration was quantified using the estimated total annual volume of oil released throughout the entire Aleutian Islands region provided in Wolniakowski et al. (2011), who projected that the volume of oil released would increase in the future and provided a point estimate for spilled oil in 2034. Using an annual estimate of oil released does not account for unevenly distributed spills over time and/or a single large event, both of which could affect the long-term average volume of oil. However, for the purposes of scaling this project, an annual estimate of oil released is an appropriate metric. Following Wolniakowski et al. (2011), certain RROs were implemented in the Aleutian Islands Maritime Area and the Trustees considered these RROs when estimating future release volumes. A suite of RROs were evaluated by an expert panel, as part of the AIRA development process, to create effectiveness scores, where the lower the rank the more effective the RRO (Table 5-2). The Trustees estimated the proportion of oil release prevented by RROs implemented since the AIRA (Table 5-2; see Figure 5-5 below for the predicted volume of oil spilled based on the RROs). To do so, the Trustees relied on the best available information and best professional judgment related to future spill likelihood and volumes, but acknowledge uncertainty about some assumptions, which increases as the projection gets further away from present day. For example, the oil spill model assumes that petroleum products will continue to be transported as both vessel fuel and cargo for the duration of the restoration project.

Table 5-2. Past and potential future Risk Reduction Options considered. The RROs, effectiveness scores and ranks are from the AIRA, with adjustments for partial implementation as noted.

RRO #	RRO Name	Year Implemented	Effectiveness Score	Rank
1a	Satellite tracking + AIS (Aleutian Watch)	2027	39.24	1
2a	Manned VTS/Direct Comm w Vessels	2027 (partial)*	16.56	11
2b	Traffic Separation Scheme in U. Pass	N/A	0.56	17
3a	Dedicated rescue tug(s)	N/A	25.58	6
3b	Non-dedicated rescue tug	N/A	17.05	9
3c	Seasonal, dedicated tug	N/A	17.05	9
3d	Tugs of opportunity program	N/A	17.17	8
4a	Expand shore-based ETS	2010	31.50	3
4b	Require emergency towing arrangements on deep draft vessels	N/A	36.92	2
5a	Enhance towing cap on Cutters	N/A	11.45	14
5b	Increase number of cutters	N/A	7.63	16
6a	IMO PSSA and associated measures (e.g., ATBA)	2016	31.38	4
7a	Ocean rated OSRO/PRAC - Open Ocean	2011	8.90	15
7b	Nearshore rated OSRO/PRAC	2011	23.50	7
7c	Increase Salvage & Firefighting Cap thru Regs	N/A	27.11	5
8c	Develop more geographic response strategies (GRS)	2015 (partial)**	11.75	13
9b	Increase State civil penalties	N/A	12.95	12

Table notes:
*Aleutian Watch and communications upgrades, as proposed, includes information for responders to communicate directly with the vessels. Thus, this RRO provides a portion of effectiveness.
**Although this RRO was implemented, it is unlikely to prevent oil spills. It may decrease the severity of impacts.
VTS = Vessel traffic service
ETS = Emergency Towing System
ATBA = Areas to be avoided

The Trustees applied a stepwise adjustment to the baseline volume of oil released from Wolniakowski et al. (2011). Adjusting baseline oil spill risk with the RROs already implemented in a stepwise manner assumes that RRO effectiveness is maintained relative to a dynamic baseline of oil release, not just the static baseline conditions at the time the AIRA was written. A stepwise application of RROs sees diminishing returns from each new RRO implementation because the baseline spill risk decreases with each previous implementation. It also assumes a one-time, independent benefit of the RROs on the baseline volume. Because annualized spill rates are required for the scaling calculations, the Trustees assumed the increase is linear from 2027-2034, consistent with predictions in Wolniakowski et al. (2011) and the AIRA, and remains constant in the years after 2034. The results of this step of the Trustees' benefits quantification, incorporating the RROs implemented since the AIRA was written, determined an approximate two-thirds reduction in the predicted future volume released (Figure 5-5).

The Amount of Oil Prevented from Release

The restoration project is not expected to eliminate all oil spills. Thus, the next step was to quantify the amount of oil prevented from release due to the preferred restoration alternative (creating Aleutian Watch Program and communication upgrades). To estimate the amount of oil prevented from release, the Trustees considered all project components.

Due to a myriad of possible vessel in distress scenarios, it is not possible to consider all possible risk and response scenarios or the volume of oil prevented from release. Based on a review of available information, discussion with subject matter experts, and best professional judgment, the Trustees estimate that implementation of the Aleutian Watch program and communications upgrades would prevent 48 percent of the volume of oil predicted to be spilled in the absence of those projects. This includes an estimated 40 percent reduction in the volume of spilled oil from the satellite and AIS tracking components of the project and an 8 percent reduction associated with the direct communications with vessels provided by AIS upgrades and the vessel contact database (Figure 5-5), consistent with the RRO effectiveness evaluation from the AIRA (table 5-2) and baseline spill risk adjustments described above.

The total volume of oil prevented from release due to the Aleutian Watch Program and communication upgrades was estimated to be 5171 tons over the 30-year lifespan of the project.

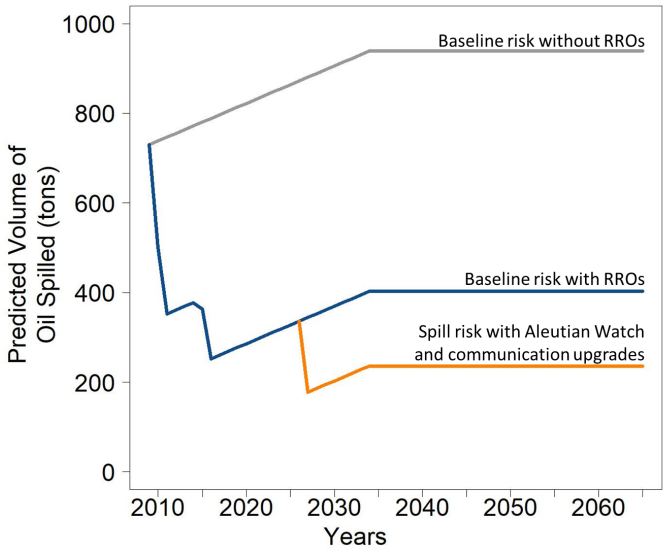

Figure 5-5. Predicted volume of oil spilled in the absence of any new RROs (gray) after 2008, adjusted with RROs implemented between 2008-2023 (blue), and with the preferred alternative, the Aleutian Watch Program and communication upgrades implemented in 2027 (orange).

The Amount of Shoreline not Oiled

The third step was to quantify the amount of shoreline prevented from being oiled due to the preferred restoration alternative. To do this, the Trustees relied upon results of spill scenario modeling developed as part of the AIRA (DNV and ERM, 2010a, b) to determine how much

shoreline is expected be oiled by a certain volume of oil. For this analysis, the Trustees used the AIRA model estimation of 50 percent probability of oiling for three oil spill scenarios (bunker fuel spill of 440 tons, diesel spill of 3,750 tons, and a crude oil spill of 52,450 tons[12]). The Trustees then used the average of these scenarios to determine the average length of shoreline oiled per ton of oil released. That is, the length of shoreline that was prevented from oiling due to the volume of oil prevented from release as a result of creating the Aleutian Watch Program and communication upgrades.

The Length and Width of Shoreline Habitats

The fourth step was to estimate the length and width (in order to calculate acreage) of shoreline habitats that would be prevented from oiling. The Environmental Sensitivity Index (ESI) data on shoreline habitats for the Aleutian Island chain indicated that beach and rocky shore habitats account for more than 90 percent of all habitats. This distribution is consistent with the Injury Assessment Report, in which greater than 90 percent of the lost DSAYs of shoreline habitat were associated with impacts to beach habitats and rocky shore habitats. Considering these distributions, the Trustees assume that, on average, releases of oil impact shoreline habitats in the same proportion as those habitats exist within the Aleutians.

The width of oiling prevented was assumed to be the same as was observed in the M/V *Selendang Ayu* spill. This is a reasonable assumption given that the shorelines oiled during the M/V *Selendang Ayu* are representative of shorelines in the Aleutian Islands and spills often occur during extreme weather such as the storm when the M/V *Selendang Ayu* spill occurred. Thus, the average length-weighted shoreline widths presented in the Injury Assessment Report were applied for the purposes of scaling restoration, allowing for the quantification of area not oiled.

Quantifying the area (in acres) prevented from oiling due to proposed upgrades annually from 2027 to 2057 results in values ranging from 0.16 to 27 acres for different habitats and a total area of shoreline prevented from oiling for the whole time period for each habitat type as presented in Table 5-4.

Table 5-4. Total acres of shoreline prevented from oiling over 30 years (2027-2057) due to the Aleutian Watch Program and communication upgrades.

Shoreline Habitat	Area Prevented from Oiling (acres; sum of 2027-2057)
Beach	530
Vegetated	11
Rocky Shore	875
Stream Channel/Flat	5
Other	1
Total	**1422**

Note: total may not compute exactly due to rounding

[12] The 52,450 tons of crude oil that were spilled did not produce any shoreline oiling. As such, the estimate of shoreline prevented from being oiled is based on bunker fuel and diesel spills.

Restoration Benefits

The last step was to quantify restoration benefits in DSAYs. To quantify benefits from preventing future oil spills the assumed shoreline habitat percent service losses each year post-release was multiplied by the area of impacted shoreline habitat to estimate annual lost service acres by habitat type. Annual values were then discounted to present value (2019) using a 3 percent discount rate. This quantification was performed for each year, from 2027 to 2057 and summed across the 30-year project period to quantify the total number of DSAYs of shoreline habitat not lost due to implementing the preferred restoration project. The total number of DSAYs of shoreline habitat not lost over the period 2027 to 2057, in present value (2019) terms, is 852 (Table 5-5).

Table 5-5. Present value number of DSAYs not lost due to the Aleutian Watch Program and communication upgrades for each habitat type for the project lifetime (2027-2057).

Shoreline Habitat	Total Present Value (2019) DSAYs Not Lost Due to the Proposed Restoration Project
Beach	406
Vegetated	4
Rocky Shore	441
Stream Channel/Flat	1
Total	**852**

CHAPTER 6 | ENVIRONMENTAL IMPACTS OF RESTORATION ALTERNATIVES

Introduction

This chapter addresses the potential impacts and other factors to be considered under NEPA regulations. NEPA requires that the environmental impacts of a proposed federal action be considered before implementation. Generally, when it is uncertain whether an action would have a significant impact, federal agencies would begin the NEPA planning process by preparing an environmental assessment (EA). Federal agencies may then review public comments prior to making a final determination. Depending on whether an impact is considered significant, an environmental impact statement (EIS) or a final Finding of No Significant Impact (FONSI) would be issued.

Restoration Alternative Evaluation Criteria

In undertaking their NEPA analysis, the Trustees evaluated the potential significance of the impacts anticipated from the proposed actions, considering both the potentially affected environment and the degree of the effects of the action (40 C.F.R. § 1501.3(b)). In considering the potentially affected environment, agencies should consider, as appropriate to the specific action, the affected area (national, regional, or local) and its resources (40 C.F.R. § 1501.3(b)(1)). In considering the degree of the effects, agencies should consider the following, as appropriate to the specific action: (1) both short- and long-term effects; (2) both beneficial and adverse effects; (3) effects on public health and safety; and (4) effects that would violate Federal, State, Tribal, or local law protecting the environment (40 C.F.R. § 1501.3(b)(2)).

This Draft DARP/EA is intended to accomplish NEPA compliance by:

1. Summarizing the current environmental setting of the proposed restoration,
2. Describing the purpose and need for restoration action,
3. Identifying alternative actions, assessing the preferred actions' environmental consequences, and
4. Providing opportunities for public participation in the decision process.

The purpose and need for restorative actions are to compensate the public for injuries to natural resources and services (shoreline habitats) incurred from the time the injury began until the return of the resource to baseline conditions or service levels (described in Chapter 4). The alternative actions are described in Chapter 5, with their environmental consequences described in this chapter for the no action alternative and the preferred alternative. This Draft DARP/EA is designed to allow the Trustees to meet the public involvement requirements of OPA and NEPA concurrently.

NEPA Analysis

This Draft DARP/EA describes and compares the potential impacts of the proposed action (Alternative 4) and the No Action alternative, pursuant to the CEQ NEPA regulations (40 C.F.R. § 1502.14). In particular, this Draft DARP/EA analyzes the potential direct, indirect, and cumulative

impacts to the affected environment (physical environment, biological resources, and human use) associated with the proposed action and No Action alternatives.

The Trustees determined that Alternatives 2 - 4 did not meet the Tier One criteria and therefore were not evaluated further. The CEQ NEPA regulations require a discussion of the reasons for an alternative having been eliminated (40 C.F.R. § 1502.14(a)), and that discussion is provided in Chapter 5. As a result, NEPA analysis does not apply to these alternatives.

The following definitions were generally used to characterize the nature of the various impacts evaluated with this EA:

Short-term or long-term impacts. These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term impacts are those that would occur only with respect to a particular activity or for a finite period. Long-term impacts are those that are more likely to be persistent and chronic over the life of the project, in this case approximately 30 years.

Direct or indirect impacts (effects). Direct effects are caused by the action and occur at the same time and place (40 CFR § 1508.1(g)(1)). Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR § 1508.1(g)(2)).

Minor, moderate, or major impacts. These relative terms are used to characterize the magnitude of an impact. Minor impacts are generally those that might be perceptible but, in their context, are not amenable to measurement because of their relatively minor character. Moderate impacts are those that are more perceptible and, typically, more amenable to quantification. Major impacts are those that, in considering the potentially affected environment and the degree of effects of the proposed action, have the potential to have significant effects (40 CFR § 1501.3(b)) and thus warrant heightened attention and examination for potential means for mitigation to fulfill NEPA requirements.

Adverse or beneficial impacts. An adverse impact is one having unfavorable or undesirable outcomes on the human or natural environment. A beneficial impact is one having positive outcomes on the human or natural environment. A single action might result in adverse impacts on one environmental resource and beneficial impacts on another resource; each type of impact must be identified and evaluated individually even if they might be considered to cancel each other out.

Cumulative impacts (effects). Cumulative effects are defined as “effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR § 1508.1(g)(3)). After considering NEPA requirements, the Trustees believe that the preferred alternative in this Draft DARP/EA would have mainly long-term beneficial impacts and only temporary, minor adverse impacts to the environment, or to natural resources or the services they provide.

Communications upgrades of the existing AIS system, and the implementation of the Aleutian Watch Program, will prevent future spills that result in impacts to shoreline habitats throughout the Aleutian Islands. The Trustees' complete analysis for the preferred No Action/Natural Recovery alternative, is provided below.

Alternative 1: No Action Alternative/Natural Recovery

NEPA requires the Trustees to consider a "No Action" alternative, and the OPA regulations require consideration of the "Natural Recovery" option. These alternative options are equivalent. Under this alternative, the Trustees would take no direct action to restore injured natural resources or compensate for lost services pending natural recovery. Instead, the Trustees would rely on natural processes for recovery of the injured natural resources. While natural recovery would occur over varying time scales for the injured resources, the interim losses suffered would not be compensated under the No Action alternative.

The principal advantages of this approach are the ease of implementation and low cost. This approach relies on the capacity of ecosystems to "self-heal." OPA, however, clearly establishes Trustee responsibility to seek compensation for interim losses pending recovery of the natural resources. This responsibility cannot be addressed through a "no action" alternative. The Trustees have determined that there will be no primary restoration for injuries resulting from this incident and that the No Action alternative is rejected for compensatory restoration, as it does not meet the purpose and need for action. Losses were suffered and impacts continued during the period of recovery from this spill and technically feasible, cost-effective alternatives exist to compensate for these losses.

Although the No Action alternative was rejected, NEPA requires that the direct, indirect, and cumulative impacts be addressed in comparison to the preferred alternatives. This alternative could have direct or indirect adverse impacts to shoreline habitat and services from future oil spills that could have been avoided with the implementation of the Aleutian Watch Program and communications upgrades. There could be cumulative long-term adverse impacts from this alternative from the repeated oiling of shoreline habitat, particularly as vessel traffic in the Aleutian Islands is expected to increase significantly over the next 20 years. As discussed in Chapter 5, there could be hundreds of thousands of gallons of oil from medium and large spills over the coming decades in the Aleutian Islands. Repeated oiling of shorelines could have long-term direct, indirect, and cumulative adverse impacts to shoreline habitat and the biological resources (vegetation, fish and invertebrates and related EFH, marine mammals, birds) and human uses (recreation, commercial and subsistence fishing, non-commercial harvesting of natural resources) that rely on shoreline habitat and the services it provides. None of these cumulative impacts are expected to be significant.

Alternative 5: Aleutian Watch Program & Communication Upgrades (Preferred Alternative)

This alternative includes creating an Aleutian Watch Program and communication upgrades. This alternative would occur in the Aleutian Islands and surrounding waters shown in Figures 5-1 and 5-

2. The footprint of the existing AIS stations will not be altered and no heavy construction (i.e., "earth-moving" activities) will occur; no construction will occur outside of the footprint of existing MSSs. Construction will focus on upgrading communication hardware and repairing/fortifying existing infrastructure.

This alternative could have direct and indirect, short-term, minor adverse effects to some physical and biological resources from increased vessel, vehicle, and/or foot traffic during upgrades to existing infrastructure.[13] Additional short term, minor disturbances may result from decreased air quality and water quality in the vicinity of the vessel or vehicle used to access remote locations, as well as a temporary increase in the presence of people and anthropogenic noise in these areas.

There would be indirect, long-term, minor to moderate beneficial impacts to the physical and biological environment (shoreline habitats; aquatic and terrestrial vegetation; fish and marine invertebrates and related EFH; birds; and marine mammals, including federally listed species and their critical habitat) from preventing future oil spills and the resulting impacts to shoreline habitats. Due to a lack of future oiling, benefits may include, but are not limited to, reduced mortality of biota and increased habitat structure and stabilization (e.g., increased vegetation may result in reduced erosion, improved water quality, etc.). Long-term, indirect, minor beneficial impacts to climate change would occur from the enhanced resilience to extreme storm and sea level rise provided by increased shoreline habitat structure and stability; vegetated shoreline habitat, where occurring, could provide an effective carbon sink. There may be direct and indirect, short and long-term, minor beneficial impacts to socioeconomics from short- and long-term jobs associated with implementing the upgrades and staffing the watch program. There would be indirect, long-term, minor to moderate beneficial impacts to human uses, including recreational opportunities, commercial and subsistence fishing, and non-commercial harvesting of natural resources, with the prevention of future oil spills due to implementation of the Aleutian Watch Program and communications upgrades.

When considered in tandem with other past, present, and reasonably foreseeable future actions within the Aleutian Island area, the preferred alternative is not anticipated to have more than minor, adverse cumulative impacts to the physical, biological, and human use resources in the restoration area. Cumulative impacts would be mainly long-term and beneficial due to a lack of future oiling in the Aleutian Islands Maritime Area and the resulting increased resilience of existing Aleutian Island shoreline habitat. Moreover, future Trustee restoration activities that address marine mammals, birds, and the human uses of natural resources impacted by the M/V *Selendang Ayu* oil

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[13] The Trustees have determined that there would be no adverse impacts to the federally listed (endangered) Aleutian shield fern. The only known populations of the Aleutian shield fern occur on Mount Reed, Adak Island, Alaska (https://www.fws.gov/species/aleutian-shield-fern-polystichum-aleuticum). No project actions are anticipated in known Aleutian shield fern locations. If any Aleutian shield fern is encountered during project implementation, the Trustees will comply with any necessary ESA requirements.

The Trustees have determined that there would be no adverse impacts (e.g., harassment) to Western DPS of Steller sea lions or to Southwestern DPS of Northern sea otters, as these species would be avoided during any vessel or helicopter access to the existing AIS stations. As described in Chapter 7, as the specific MSSs are identified and work plans developed, the Trustees will work with FWS and NOAA Fisheries to comply with any necessary ESA requirements.

spill will likely result in synergistic beneficial cumulative impacts. None of the cumulative adverse impacts are expected to be significant, as defined by NEPA.

CHAPTER 7: COORDINATION WITH APPLICABLE REGULATIONS AND AUTHORITIES

OPA and its regulations provide the basic framework for natural resource damage assessment and restoration for oil discharges. NEPA sets forth a specific process of impact analysis and public review of such. The Trustees must also comply with other applicable laws, regulations, and policies at the federal, state, and local levels. This chapter describes the primary laws, regulations, and policies that the Trustees considered and must comply with at federal, state, and local levels. The Trustees will have complied with all laws, regulations, and policies described below prior to the implementation of the preferred alternative(s).

Key Statutes, Regulations, and Policies

Oil Pollution Act of 1990 (OPA)

OPA (33 U.S.C. §§ 2701 *et seq.*; 15 C.F.R. Part 990) establishes a liability regime for oil spills that injure or are likely to injure natural resources and/or the services that those resources provide to the ecosystem or humans. Federal and state agencies act as Trustees on behalf of the public to assess the injuries, scale restoration to compensate for those injuries, and implement restoration. Section 1006(e)(1) of OPA (33 U.S.C. § 2706(e)(1)) requires the President, acting through the Under Secretary of Commerce for NOAA to promulgate regulations for the assessment of natural resource damages resulting from a discharge or substantial threat of a discharge of oil. Assessments are intended to provide the basis for restoring, replacing, rehabilitating, and/or acquiring the equivalent of injured natural resources and services. This Draft DARP/EA was developed pursuant to those regulations.

National Environmental Policy Act (NEPA)

Congress enacted NEPA (42 U.S.C. §§ 4321 *et seq.*; 40 C.F.R. Parts 1500-1508) in 1969 to establish a national policy for the protection of the environment. NEPA applies to federal agency actions that affect the human environment, which includes the natural environment. If a categorical exclusion is not adopted or another exception not approved, NEPA requires that an EA be prepared in order to determine whether the proposed restoration actions would have a significant effect on the quality of the human environment. Generally, when it is uncertain whether an action would have a significant effect, federal agencies would begin the NEPA planning process by preparing an EA. The EA must undergo a public review and comment period. Federal agencies must then review the comments and may make a determination. Depending on whether an impact is considered significant, an EIS would be produced or a FONSI would be issued.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 *et seq.*) as amended and reauthorized by the Sustainable Fisheries Act (Public Law 104-297) established a program to promote the protection of EFH in the review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. After EFH has been described and identified in fishery management plans by the regional fishery

management councils, federal agencies are obligated to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 U.S.C. §§ 661 *et seq.*) requires that federal agencies consult with the FWS, NOAA's National Marine Fisheries Service, and State wildlife agencies for activities that affect, control, or modify waters of any stream or bodies of water, in order to minimize the adverse impacts of such actions on fish and wildlife resources and habitat. This consultation is generally incorporated into the process of complying with Section 404 of the CWA, NEPA, or other federal permit, license, or review requirements.

Wilderness Act of 1964

The National Wilderness Preservation System, or Wilderness Act, (16 U.S.C. §§ 1311, *et seq.*) authorizes Congress to designate wilderness areas. In 1980, Congress established the Aleutian Island Wilderness area, which encompasses 1,300,000 acres and is managed by the U.S. Fish and Wildlife Service. As specific MSSs are identified for upgrades and workplans are developed, if project implementation actions are within the designated Wilderness area, then the Trustees will work with the FWS to ensure that project implementation would be compliant with any Wilderness Act requirements.

Endangered Species Act (ESA) of 1973

The purpose of the Endangered Species Act (ESA) is to conserve endangered and threatened species and the ecosystems upon which they depend. The ESA directs all federal agencies to utilize their authorities to further these purposes. Pursuant to Section 7 of the ESA, federal agencies shall, in consultation with the Secretary of the Department of the Interior and/or Commerce, ensure that any action that they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat.

Under the ESA, NOAA's National Marine Fisheries Service (NFMS) and the FWS publish lists of endangered and threatened species. Before initiating an action, the federal action agency, or its non-federal permit applicant, must ask the FWS and/or NMFS to provide a list of threatened, endangered, proposed, and candidate species and designated critical habitat that may be present in the project area. If no species or critical habitats are known to occur in the action area, the federal action agency has no further ESA obligations under Section 7. If the federal action agency determines that a project may affect a listed species or designated critical habitat, consultation is required.

If the federal action agency concludes that the project will not adversely affect listed species or critical habitat, the agency submits a "not likely to adversely affect" determination to the FWS and/or NMFS. If the FWS and/or NMFS concur with the federal action agency's determination of "not likely to adversely affect," then the consultation (informal to this point) is completed and the decision is put in writing.

If the federal action agency determines that the project is likely to adversely affect either a listed species or its critical habitat, then more formal consultation procedures are required. There is a designated period in which to consult (90 days), and beyond that, another set period for the FWS and/or NMFS to prepare a biological opinion (45 days). The determination of whether or not the selected action would be likely to jeopardize the species or adversely modify its critical habitat is contained in the biological opinion. If a jeopardy or adverse modification determination is made, the biological opinion must identify any reasonable and prudent alternatives that could allow the project to move forward.

Several federally listed threatened endangered species occur in areas impacted by the M/V *Selendang Ayu* incident. As specific MSSs are identified for upgrades and workplans are developed, the Trustees will work with with the FWS and NMFS to ensure that the selected restoration action would be compliant with the ESA.

Executive Orders 12898 and 14096 – Environmental Justice

The purpose of Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*) is to address environmental justice in minority and low-income populations. This Executive Order requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority and low-income populations. EPA and the Council on Environmental Quality have emphasized the importance of incorporating environmental justice review in the analyses conducted by federal agencies under NEPA and of developing mitigation measures that avoid disproportionate environmental effects on minority and low-income populations. Executive Order 14096 (*Revitalizing Our Nation's Commitment to Environmental Justice for All*) reiterates and strengthens Executive Order 12898 regarding Federal actions and environmental justice. Executive Order 14096 also requires that each agency shall, as appropriate and consistent with applicable laws, carry out environmental reviews under NEPA "in a manner that analyzes direct, indirect, and cumulative effects of Federal actions on communities with environmental justice concerns" (EO 14096, §3(ix)(A)).

The Trustees have not identified any disproportionate adverse impacts on human health or the environment for minority and low-income populations due to the implementation of the selected restoration. Long-term, indirect and cumulative beneficial impacts to minority and low-income populations, Tribes, and other communities with environmental justice concerns are anticipated with the implementation of the preferred alternative.

Executive Order 11514 – Protection and Enhancement of Environmental Quality

The purpose of Executive Order 11514 (35 FR 4247) is to protect and enhance the quality of the Nation's environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans, and programs to meet national environmental goals.

Executive Order 13112 – Invasive Species

The purpose of Executive Order 13112 (64 FR 6183) is to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause.

Marine Mammal Protection Act (MMPA)

The MMPA (16 U.S.C. §§ 1361 *et seq.*) provides for long-term management and research programs for marine mammals. It places a moratorium on the taking and importing of marine mammals and marine mammal products, with limited exceptions. The Department of Commerce is responsible for whales, porpoise, seals, and sea lions. The Department of the Interior is responsible for all other marine mammals.

National Historic Preservation Act

The purpose of the National Historic Preservation Act (54 U.S.C. §§ 300101 *et seq.*) is to protect and preserve historical and archaeological sites in the United States. This act created the National Register of Historic Places and the list of National Historic Landmarks. Through the process, called Section 106 Review, federal agencies are required to evaluate the impact of federally funded or permitted projects on historic property.

CHAPTER 8: AGENCIES AND PERSONS CONSULTED

The following Trustee representatives were involved the preparation of this document and with the selection of the preferred alternative:

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In addition, USCG were consulted and provided technical support in relation to the project alternatives.

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