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OU B-2 Candidate, Threatened, and Endangered Species and Survey of Associated Habitats Report

Former Adak Naval Complex

Adak, Alaska

Department of the Navy
Naval Facilities Engineering Command Northwest
1101 Tautog Circle
Silverdale, WA 98315

FINAL
CANDIDATE, THREATENED, AND ENDANGERED SPECIES AND SURVEY OF ASSOCIATED HABITATS REPORT

FORMER ADAK NAVAL COMPLEX
ADAK ISLAND, ALASKA

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EXECUTIVE SUMMARY

This report details the results of wildlife and habitat field surveys and a literature review conducted in September and October 2011 and June 2012 within Operable Unit (OU) B-2 at the former Adak Naval Complex at Adak Island, Alaska. The U.S. Navy (Navy) proposes to remove munitions and explosives of concern (MEC) from 11 sites in OU B-2. This report is intended to serve as a planning tool for future activities at the former Adak Naval Complex and, therefore, encompasses all habitats and species with potential to occur in the vicinity of the OU B-2 sites.

All 11 sites were visited to observe and record wildlife habitat and species. Focused surveys occurred for three species: Aleutian shield fern (*Polystichum aleuticum*), bald eagle (*Haliaeetus leucocephalus*), and Kittlitz's murrelet (*Brachyramphus brevirostris*). A stream assessment was conducted for Moffett Creek and the lower part of Mitchell Creek to locate and map potential spawning areas for salmon. In addition, a reconnaissance level field survey of existing habitats was conducted on foot in both terrestrial and tidal areas at OU B-2 sites. As part of this report, a literature review of wildlife species for the survey area was performed. The literature review provided supplemental information on species occurrence and life histories on Adak.

Vegetation on Adak Island is classified as maritime tundra. It is typified by low-growing grasses, forbs, and shrubs. Trees and tall shrubs are absent because of strong winds. Ferns are common in some situations, and mosses and lichens are common on the ground surface. The terrestrial vegetation is composed primarily of perennial species that grow close to the ground and form relatively continuous stands. Seven species listed under the Endangered Species Act (ESA) regularly occur on or in the vicinity of Adak Island. They are blue whale, fin whale, humpback whale, northern (Alaska) sea otter, sei whale, northern (Steller) sea lion, and Aleutian shield fern. The northern sea lion rests and spends a portion of its breeding cycle on the marine shoreline. The nearest rookery is on Adak's southwest coast, well away from the OU B-2 sites. The remaining species, with the exception of Aleutian shield fern, are almost entirely confined to the marine environment.

At the present time, the proposed project activities do not include any underwater removal of MEC in Andrew Bay. If that should change in the future, the Navy may be required to initiate formal consultation with National Oceanic and Atmospheric Administration Fisheries under the ESA for the northern sea otter. Consultation can be a lengthy process and will include other effects to the species and to designated critical habitat in Andrew Bay. Northern sea otters are known to occur in Andrew Bay. Kelp beds, which are important habitat for sea otters, also grow in Andrew Bay.

The only site in the study area with potential habitat for Aleutian shield fern was C1-01. However, C1-01 lacks certain preferred habitat elements, including steep ledges and overhangs. No Aleutian shield fern plant was found during the 2011 or 2012 field surveys.

Surveys were conducted for bald eagle nests during June 2012 at C1-01 and SA93-01. No evidence of nesting was observed in or adjacent to C1-01 from the Andrew Bay shoreline. One pair of bald eagles was observed at the southwest corner of the SA93-01 site boundary. One was perched on a rock outcrop area approximately 250 feet above sea level. The location could have been a nest, but this was not confirmed. The second was observed a couple of hundred feet to the north, perched on a steep grassy slope.

Potentially suitable Kittlitz's murrelet habitat was identified in C1-01 during September and October 2011. The following year, breeding season surveys were conducted in C1-01. No Kittlitz's murrelet adult or nest was found during surveys in 2012. Kittlitz's murrelet is known to nest on high elevation rocky slopes in other areas of Adak, and overwinter in marine waters on Adak Island. Habitat in C1-01 lacks the characteristic steep, high elevation talus slopes of nest sites found on Mount Reed. Furthermore, the habitat conditions in C1-01 were reviewed with U.S. Fish and Wildlife Service biologist Robb Kaler, who has observed numerous Kittlitz's murrelet nests on other parts of Adak. Based on the results of the surveys and the discussion with Robb Kaler, it is unlikely they nest within the remedial action area boundary.

Kittlitz's murrelet is currently a candidate for listing under the ESA. By the end of 2013, Kittlitz's murrelet will either be listed under the ESA or removed from the candidate list, depending on the outcome of U.S. Fish and Wildlife Service analyses yet to be completed.

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CONTENTS

ABBREVIATIONS AND ACRONYMS xi

1.0 INTRODUCTION 1-1
1.1 FORMER ADAK NAVAL COMPLEX BACKGROUND 1-1
1.2 PURPOSE AND SCOPE 1-3

2.0 REGULATORY CONTEXT 2-1
2.1 BALD AND GOLDEN EAGLE PROTECTION ACT 2-1
2.2 ENDANGERED SPECIES ACT OF 1973 2-1
2.3 MAGNUSON-STEVENS ACT 2-2
2.4 MARINE MAMMAL PROTECTION ACT 2-2
2.5 MIGRATORY BIRD TREATY ACT 2-3
2.6 FEDERAL EXECUTIVE ORDER 13112 2-3

3.0 SURVEY METHODS 3-1
3.1 LITERATURE SEARCH 3-1
3.2 PERSONAL COMMUNICATIONS 3-2
3.3 HABITAT SURVEY 3-4
3.4 FOCUSED TERRESTRIAL SURVEYS 3-4
3.4.1 Aleutian Shield Fern 3-4
3.4.2 Bald Eagle 3-5
3.4.3 Kittlitz's Murrelet 3-5
3.4.4 Stream Assessment 3-5

4.0 SURVEY RESULTS 4-1
4.1 HABITATS 4-1
4.1.1 Freshwater Wetlands 4-2
4.1.2 Marine Waters 4-7
4.1.3 Ocean Coastline 4-8
4.1.4 Meadows 4-9
4.1.5 Unvegetated and Sparsely Vegetated Highlands 4-10
4.1.6 Artificial 4-11
4.2 FEDERALLY LISTED SPECIES 4-11
4.2.1 ESA-Listed Species 4-12
4.2.2 Candidates for Federal Listing 4-16
4.3 OTHER SPECIAL STATUS SPECIES 4-19

CONTENTS (Continued)

4.4 NONLISTED SPECIES 4-21
4.4.1 Avian Community 4-21
4.4.2 Mammals 4-22
4.4.3 Reptiles and Amphibians 4-23
4.4.4 Freshwater Invertebrates 4-23
4.4.5 Marine Plants and Invertebrates 4-24
4.4.6 Marine and Anadromous Fish 4-24

5.0 CONCLUSIONS 5-1

6.0 QUALIFICATIONS OF THE FIELD TEAM AND AUTHORS 6-1

7.0 REFERENCES 7-1

APPENDICES

A USFWS Threatened and Endangered Species in Alaska
B NOAA Fisheries Endangered, Threatened, Proposed, Candidate and Delisted Species in Alaska
C Birds of Adak Island
D Alaska Maritime National Wildlife Refuge – Native Mammals
E Marine Mammals of the Aleutian Islands
F Plants Observed in the Study Area
G Photographs of Habitat Types
H Photographs of Moffett Creek
I Photographs of Mitchell Creek
J Federally Listed Species Occurring in Alaska and Their Potential to Occur in the Vicinity of Former Adak Naval Complex, Adak, Alaska

CONTENTS (Continued)

FIGURES

1-1 Adak Island Location Map 1-5
1-2 Parcel 4 Boundary 1-7
1-3 Project Sites 1-9
4-1 Fish Passage Barriers 4-27
4-2 Sites MI-01, MI-02, MI-03, OB/OD-01, HG-01 and RR-01 Wetland Locations 4-29
4-3 Sites C1-01 and ALDA-01 Wetland Locations 4-31
4-4 Sites SA93-01 and SA93-03 Wetland Locations 4-33
4-5 Andrew Bay Bathymetry 4-35
4-6 Northern Sea Otter Critical Habitat Map 4-36
4-7 Steller Sea Lion Rookery and Critical Habitat 4-37
4-8 Site C1-01 Potentially Suitable Kittlitz's Murrelet Nesting Habitat 4-39
4-9 Dive Survey Transect Locations 4-41

TABLES

1-1 Descriptions of OU B-2 Sites Included in the Survey 1-11
4-1 Habitats and Vegetation of Adak 4-42
4-2 Terrestrial and Marine Mammals of Adak 4-44
4-3 Reptiles and Amphibians Potentially Found in Adak Marine Waters 4-45
4-4 Marine Plant and Invertebrate Species Found During Dive Surveys at Adak 4-46
4-5 Marine and Anadromous Fish Species Potentially Found in Adak Waters 4-48

ABBREVIATIONS AND ACRONYMS

ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ANHP	Alaska Natural Heritage Program
ARAR	applicable or relevant and appropriate requirement
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DPS	distinct population segment
EFH	essential fish habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FFA	Federal Facilities Agreement
FS	Feasibility Study
IHA	Incidental Harassment Authorization
LOA	Letter of Authorization
LPN	listing priority number
MBTA	Migratory Bird Treaty Act
MEC	munitions and explosives of concern
MMPA	Marine Mammal Protection Act
NAF	Naval Air Facility
NAVFAC	Naval Facilities Engineering Command
Navy	U.S. Navy
NOAA	National Oceanic and Atmospheric Administration
OU	operable unit
RAA	remedial action area
SAERA	State-Adak Environmental Restoration Agreement
TAC	The Aleut Corporation
URS	URS Corporation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey

1.0 INTRODUCTION

The U.S. Navy (Navy) proposes to remove munitions and explosives of concern (MEC) at 11 sites within Operable Unit (OU) B-2 at the former Adak Naval Complex at Adak Island, Alaska (Figure 1-1). A candidate, threatened, and endangered species survey was conducted at the former Adak Naval Complex. The survey scope included identification of habitats that could be occupied by the selected species and of all general wildlife habitats and species occurring at the 11 OU B-2 sites, based on field work and review of existing documents.

This report presents the results of surveys conducted at and in the vicinity of the 11 OU B-2 sites (Figures 1-2 and 1-3). The field survey portion of this work was conducted over an 18-day period from September 19 to October 6, 2011 and a 6-day period from June 11 to June 16, 2012. Visits were made to all 11 sites to observe and record wildlife habitat and species. This report is intended to serve as a planning tool for future activities at the former Adak Naval Complex and, therefore, encompasses all habitats and species with potential to occur in the vicinity of the 11 OU B-2 sites surveyed.

1.1 FORMER ADAK NAVAL COMPLEX BACKGROUND

The former Adak Naval Complex is located on Adak Island, which is approximately 1,300 air miles southwest of Anchorage, Alaska, in the Aleutian chain (Figure 1-1). The 32- by 21-mile island is bordered by the Bering Sea to the north and the Pacific Ocean to the south. Adak Island is volcanic in origin, with a mantle of volcanic ash over most of the island at an approximate depth of 4 to 10 feet below ground surface. The topography is varied and is characterized by four land forms: rugged mountains, rolling lowlands, modified volcanic cones, and narrow beaches backed by sea cliffs. The maximum elevation is 3,924 feet above mean sea level, which is on Mount Moffett, an extinct volcano on the northwest end of the island (USFWS 1995a).

The Navy base, which occupied the northern half of the island, closed operationally on March 31, 1997. The U.S. Fish and Wildlife Service (USFWS) manages the southern portion of the island (117,265 acres) as a designated wilderness within the Alaska Maritime National Wildlife Refuge System. The developed portion of Adak is limited to the northern portion of the island. The former Adak Naval Complex had two main developed areas: Naval Air Facility (NAF) Adak and Naval Security Group Activity. NAF Adak was located in the downtown area of Adak, and Naval Security Group Activity was located approximately 5 miles north of downtown at the northwestern corner of Clam Lagoon.

Military presence on Adak began in 1942 with its occupation as a staging area to mount a counter-offensive to dislodge the Japanese from Attu and Kiska Islands (U.S. Navy, USEPA, and ADEC 2000). The Navy presence at Adak was officially recognized by Public Land Order 1949, dated August 19, 1959, which withdrew the northern portion of Adak Island, approximately 76,800 acres, for use by the Navy for military purposes. The Navy also used the base to conduct a variety of Cold War-era military activities. NAF Adak was on the list of Department of Defense installations recommended for closure in 1995, and that recommendation became final when Congress did not disapprove the list. The active Navy mission ceased, and the base operationally closed on March 31, 1997, through the Base Realignment and Closure (BRAC) process.

In September 2000, the federal government entered into a land transfer agreement with The Aleut Corporation (TAC), a Native corporation, as documented in the Agreement Concerning the Conveyance of Property at the Adak Naval Complex, Adak, Alaska. This agreement set forth the terms and conditions for the conveyance of approximately 47,000 acres of the former Adak Naval Complex property to TAC. The actual conveyance or transfer of property occurred on March 17, 2004. The land transfer included all of the downtown area, housing units, and industrial facilities. Excluded from the transfer were any offshore islands, islets, rocks, reefs, and spires; those fixtures and equipment owned by the United States and associated with the airfield; those improvements owned by the United States and managed by the Federal Aviation Administration; and those improvements owned by the United States and managed by the USFWS. The Navy retained control of 5,600 acres of land, known as Parcel 4 (Figure 1-2).

Investigation and cleanup activities at the former Adak Naval Complex have been ongoing since 1986. Adak was initially proposed for placement on the National Priorities List in 1992 and was officially listed in 1994. The Navy, as lead agency, entered into a three-party Federal Facilities Agreement (FFA) with the U.S. Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation (ADEC), as well as a two-party State-Adak Environmental Restoration Agreement (SAERA) with ADEC to facilitate investigation and cleanup activities. In 1993, the Navy, EPA, and ADEC signed the FFA, which incorporates EPA's cleanup process under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986. The CERCLA exclusion of petroleum as a hazardous substance required that cleanup of petroleum-related chemicals would follow State of Alaska regulations. Therefore, the FFA stated that petroleum-contaminated sites would be evaluated under a separate two-party agreement between the Navy and the State of Alaska. This agreement, the SAERA, was signed in April 1994.

In May 1997, the Navy and ADEC agreed to integrate the cleanup-decision process for petroleum with the cleanup-decision process being conducted for hazardous-substance-release sites under CERCLA. Adak was divided into OU A and OU B in 1998 for technical and administrative purposes through an amendment to the FFA. OU A includes CERCLA and petroleum sites, and OU B includes MEC sites. The final Record of Decision for OU A was signed in April 2000. In 2001, OU B was further divided into OU B-1 and OU B-2 to accommodate land transfer under the BRAC program. The OU B-1 Record of Decision was signed in December 2001. Thirty-nine MEC sites currently comprise OU B-2, and all of the OU B-2 sites are located within the boundaries of Parcel 4. Of the 39 sites, 15 met the requirements for no further action in the preliminary assessment (U.S. Navy 2000a) and did not require further evaluation in the Feasibility Study (FS). The remaining 24 sites were evaluated further in the FS (U.S. Navy 2012a).

The 24 sites were divided into four distinct categories of sites in the FS. Three of the categories consist of those OU B-2 sites that require either additional investigation or limited actions only (institutional controls). The fourth category consists of 11 OU B-2 sites that require active remedies to address explosive hazards incompatible with the designated future land use. Table 1-1 contains a description of the 11 OU B-2 sites, and Figure 1-3 shows the relative locations of these 11 sites.

The Navy is planning removal/remedial actions at these 11 OU B-2 sites in the near future. The areas where active remedies are planned are designated as remedial action areas (RAAs). Five RAAs were created and the 11 sites have been grouped into these RAAs based on the expected types and depths of MEC. The five RAAs and the 11 OU B-2 sites are as follows:

- RAA-01: OB/OD-01
- RAA-02: C1-01
- RAA-03 West: MI-01, MI-02, and MI-03
- RAA-03 East: HG-01 and RR-01
- RAA-04: SA93-01 and SA93-03
- RAA-05: ALDA-01 and ALSW-01

Note that in most cases, the entire site is not included within the boundaries of the RAA, because only the areas of a site where active remedies are planned are included within the RAA.

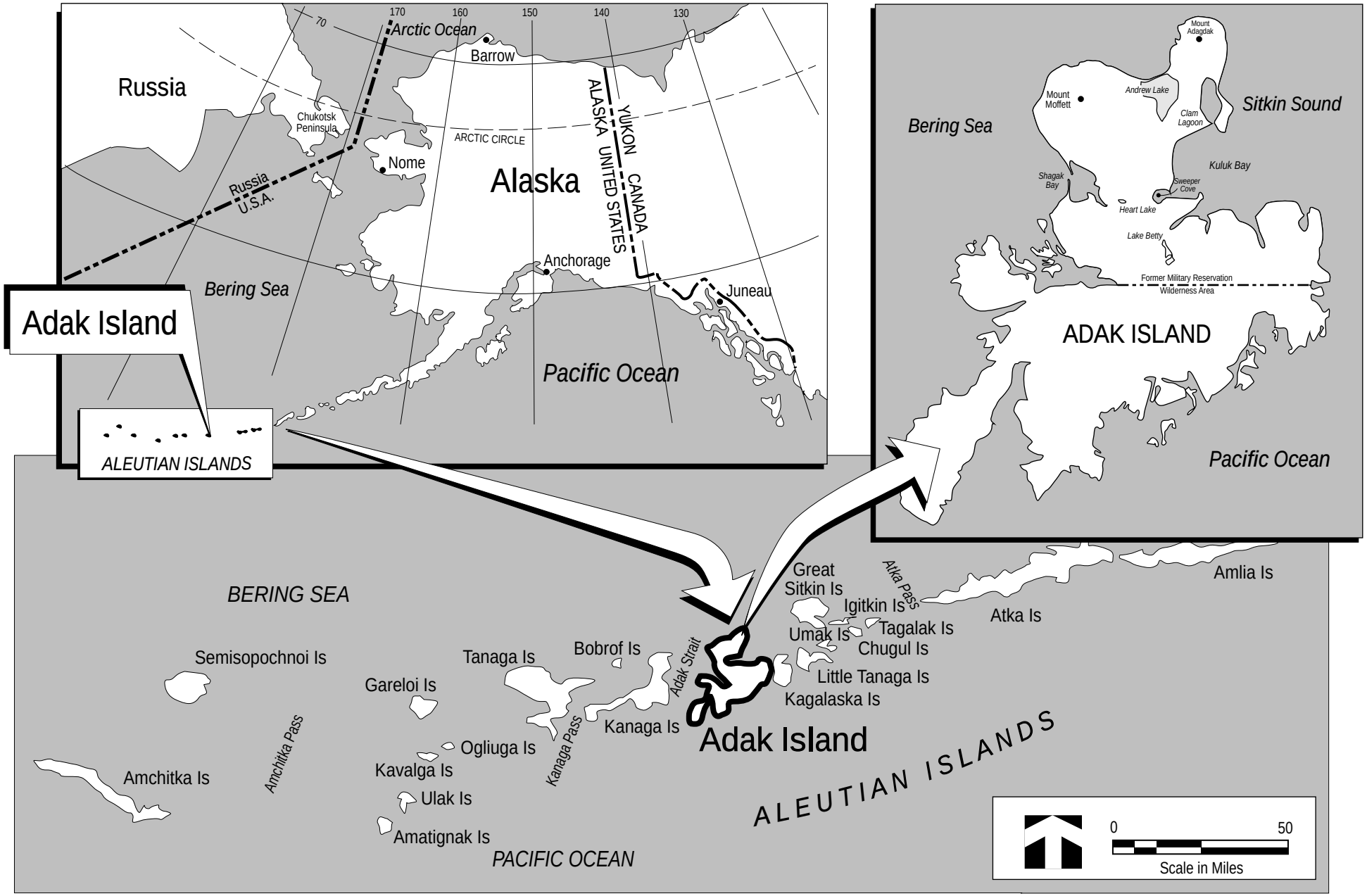
1.2 PURPOSE AND SCOPE

The purpose of the survey documented in this report is to identify federal candidate, threatened, and endangered species that may occur at selected survey areas at the former Adak Naval

Complex and vicinity, as well as potentially suitable habitat for those species. A general inventory of terrestrial and aquatic habitats and species found at the former Adak Naval Complex was also conducted. In addition, regulations pertaining to migratory birds, eagles, marine mammals, and invasive species are identified.

The survey was conducted during two visits to the former Adak Naval Complex in the fall of 2011 and the summer of 2012. The 2011 field work was conducted over an 18-day period by four biologists and the 2012 field work was conducted over a 6-day period by two biologists. Qualifications of the field team are provided in Section 6. The survey was performed at the 11 OU B-2 sites and the adjacent marine environment. Note that the marine environment was observed from land, and no boat or dive survey was conducted. The areas surveyed covered approximately 600 acres, and were based on the RAA boundaries as defined at the time of the fall 2011 field work. These boundaries were included in the February 2011 draft final FS (U.S. Navy 2011a). Following the completion of the fall field work, the boundaries of the remedial action areas were refined, as included in the May 2012 final FS (U.S. Navy 2012a). The summer 2012 field work was focused on survey areas within the refined RAA boundaries.

Literature research was also conducted to identify potential wildlife species that could be present on Adak or the surrounding Aleutian Islands/Bering Sea ecosystem. It is assumed that information used in this report that was gathered from published literature, unpublished reports, and personal communication is still true and accurate.



U.S. NAVY	Figure 1-1 Adak Island Location Map	Delivery Order 0041 Adak Island, AK OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

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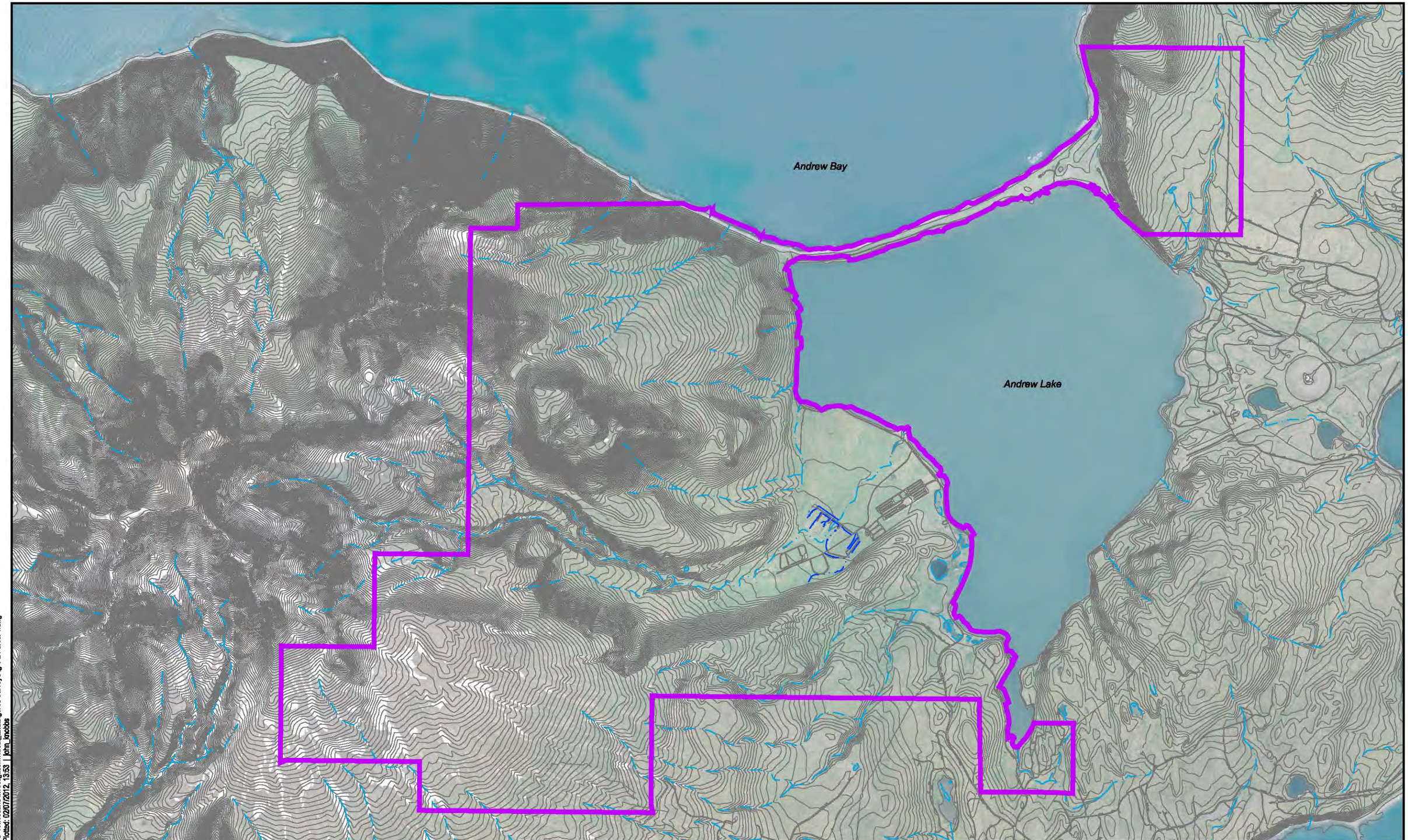

Legend:
Parcel 4 Boundary
Stream (Existing Data)

U.S. NAVY

Delivery Order 0041
Adak Island, AK
OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

0 1250 2500
SCALE IN FEET

Figure 1-2
Parcel 4 Boundary

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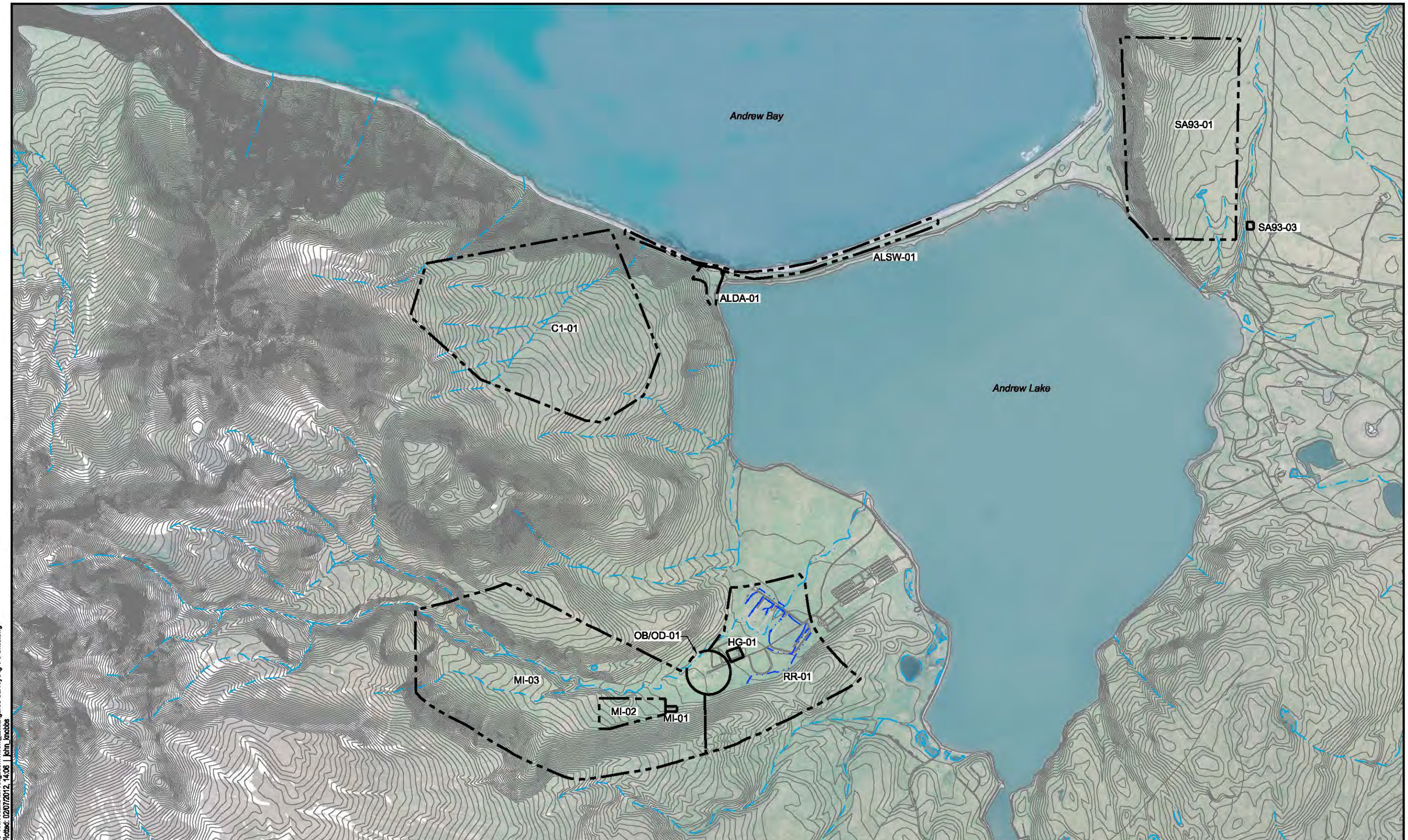

Legend:

Site Boundary

Stream (Existing Data)

U.S. NAVY

Delivery Order 0041
Adak Island, AK
OU B-2 THREATENED &
ENDANGERED SPECIES
& HABITATS SURVEY

0 1000 2000
SCALE IN FEET

Figure 1-3
Project Sites

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Table 1-1
Descriptions of OU B-2 Sites Included in the Survey

RAA	Site Designation	Site Name	Site Description
RAA-01	OB/OD-01	Andrew Lake Open Burn/ Open Detonation Disposal Range	OB/OD-01 is a circular area with a radius of 182 meters (600 feet) that covers 18 acres. The boundary encompasses visible historical demolition craters and an ample buffer zone around the craters to account for kick-outs during disposal operations. It is bordered by RR-02 to the northwest; RR-01 to the northeast, east, and southeast; and MI-03 to the south and west. The elevation at this site ranges from about 33 to 40 meters (110 to 130 feet) asl. There is direct access to this site via the gravel range entry road, which branches from the main access road along the west side of Andrew Lake. This main road is gated (locked steel gate) near the south end of the lake to deter general access. A locked cable barrier also deters access to the range entry road. The terrain is relatively flat, but hummocky in some locations and marshy in others. There are several craters in this area resulting from previous disposal events. The site is generally covered in knee-high, grassy tundra; however, there are relatively barren areas surrounding some of the disposal craters. Moffett Creek runs from west to northeast through the northwestern portion of the site. In addition, standing water has been observed in the disposal craters. The valley floor is composed of a silty, gravelly, sandy, alluvial/colluvial, and/or outwash material overlying andesitic basalt bedrock or consolidated ash tuff. The groundwater is shallow, as evidenced by standing water in the disposal craters. Groundwater is in hydraulic communication with the creek (i.e., there is interconnection between the creek and the groundwater aquifer in this area).
RAA-02	C1-01	Combat Range #1 – Mortar Target Area	C1-01 is a target/impact area that covers 387 acres. C1-01 is located north of the former Range Complex at Andrew Lake. It is roughly oval in shape. C1-01 is situated on a sloping plateau above and west of ALDA-01 on the flanks of Mount Moffett. Elevations range from about 152 to 396 meters (500 to 1,300 feet) asl. It is bordered on all sides by C1-03. ALDA-01 and ALDA-02 are located northeast of this site, and Andrew Lake lies to the east. There is indirect access to this site via a moderate hike from the Andrew Lake range area. Access to the range area is via a locked steel gate near the south end of Andrew Lake. The terrain is moderately steep and rocky in most areas, and the site is inaccessible along the northern boundary. Vegetation consists primarily of sparse short grasses, lichens, and small alpine flowers ranging in height from 1 to 4 inches. An ephemeral drainage channel cuts across C1-01, outfalling north over a steep cliff to a rocky shelf beside Andrew Bay. The geology of the site is characterized by shallow soils with rock outcrops. According to observations made during the preparation of the groundwater study report (U.S. Navy 1995), the occurrence

Table 1-1 (Continued)
Descriptions of OU B-2 Sites Included in the Survey

RAA	Site Designation	Site Name	Site Description
			of groundwater outside of the downtown area is limited by the absence of significant accumulations of permeable materials and the presence of a blanket of low-permeability tephra deposits that inhibit infiltration. As a result, most of the precipitation falling in the remote areas discharges as surface water runoff. Therefore, much of the surface of these remote areas is covered by a maze of stream channels, small impoundments, bogs, and lakes perched over the tephra layer.
RAA-03 East	HG-01	Andrew Lake Hand Grenade Range	HG-01 is a target/impact area. It is a small, square area of about 2 acres located within the former Range Complex at Andrew Lake. Remnants of a berm with incorporated throwing pits are located near the east side of the range. The pits are reinforced with heavy timbers and, at one time, offered protection from exploding grenades during training exercises. The elevation in this site is approximately 33.5 meters (110 feet) asl. This site is located wholly within RR-01. There is direct access to this site via the gravel range entry road, which branches from the main access road along the western side of Andrew Lake. This main road is gated (locked steel gate) near the south end of the lake to deter general access. A locked cable barrier also deters access to the range entry road. The terrain is relatively flat. There are steep slopes on the berm protecting the throwing pits. Vegetation consists of tall tundra grasses up to 18 inches tall interspersed with wildflowers. The valley floor is composed of a silty, gravelly, sandy, alluvial/colluvial, and/or outwash material overlying andesitic basalt bedrock or consolidated ash tuff. Groundwater is anticipated to be shallow, and there may be intermittent standing water at certain times of the year.
RAA-03 East	RR-01	Andrew Lake Range Remainder – Hand Grenade/ 40-mm Area	RR-01 is a target/impact area that covers 182 acres. It is located in the south-central portion of the Range Complex at Andrew Lake. RR-01 is bordered by RR-02 to the north; OU B-1 to the south; RR-04 to the east; and OB/OD-01, RG-01, and MI-03 to the west. HG-01 is located wholly within this site. The elevation in this site ranges from about 15 to 152 meters (50 to 500 feet) asl. There is direct access to this site via the range entry road, which branches from the main access road along the west side of Andrew Lake. This main road is gated (locked steel gate) near the south end of the lake to deter general access. A locked cable barrier also deters access to the range entry road. The terrain is generally flat in the northern portion, but can be uneven and marshy. The steep slopes to the south make the southern third of the site largely inaccessible. The vegetation is predominantly dense, lush tundra grass in accessible lowland portions. Moffett Creek flows

Table 1-1 (Continued)
Descriptions of OU B-2 Sites Included in the Survey

RAA	Site Designation	Site Name	Site Description
			from west to northeast through the northern portion of this site. Lowland areas bordering this creek are often saturated with pooled water at certain times of the year. Groundwater is in hydraulic communication with the creek. The valley floor is composed of a silty, gravelly, sandy, alluvial/colluvial, and/or outwash material overlying andesitic basalt bedrock or consolidated ash tuff. The groundwater is anticipated to be shallow in lowland areas.
RAA-03 West	MI-01	Andrew Lake Mortar Impact Area – Rocket Disposal Area	MI-01 is a target/impact area that covers 0.7 acre. It is located along the southern side of the mortar impact valley in the Range Complex at Andrew Lake (west of Andrew Lake). It is bordered by MI-02 immediately to the west and is otherwise surrounded by MI-03. Elevation in the site ranges from 48 to 55 meters (160 to 180 feet) asl. There is indirect access to this site via the gravel range entry road that terminates at OB/OD-01, which branches from the main access road along the western side of Andrew Lake. This main road is gated (locked steel gate) near the south end of the lake to deter general access. A locked cable barrier also deters access to the range entry road. The terrain at the site slopes gently to the north toward the floor of the mortar impact valley. Dominant vegetation is a mixture of grasses and lowland tundra species ranging in height from 12 to 24 inches. The valley floor is composed of a silty, gravelly, sandy, alluvial/colluvial, and/or outwash material overlying andesitic basalt bedrock or consolidated ash tuff. Based on the elevation and proximity to stream channels, groundwater is anticipated to be shallow in lowland areas.
RAA-03 West	MI-02	Andrew Lake Mortar Impact Area – 40-mm Projectile Impact Area	MI-02 is a target/impact area that covers 19 acres. It is located along the southern side of the mortar impact valley in the Range Complex at Andrew Lake (west of Andrew Lake). It is bordered by MI-01 to the east and is otherwise surrounded by MI-03. The elevation at this site ranges from about 49 to 104 meters (160 to 340 feet) asl. There is indirect access to this site via a gravel range entry road that terminates at OB/OD-01, which branches from the main access road along the western side of Andrew Lake. This main road is gated (locked steel gate) near the south end of the lake to deter general access. A locked cable barrier also deters access to the range entry road. The terrain is relatively flat, rising moderately to the west toward Mount Moffett. The area is somewhat flatter in the eastern portion closer to Andrew Lake. The area is bordered on the south by steep terrain that becomes inaccessible near the top of the ridge delineating the southern boundary of MI-02 and the Range Complex at Andrew Lake. Steep terrain also forms the northern boundary of this site

Table 1-1 (Continued)
Descriptions of OU B-2 Sites Included in the Survey

RAA	Site Designation	Site Name	Site Description
			to the west. Vegetation is grassy with lowland tundra species ranging in height from 12 to 24 inches. Intermittent standing water in the eastern portion of the site (i.e., lowland area) may possibly be present because of shallow groundwater. The valley floor is composed of a silty, gravelly, sandy, alluvial/colluvial, and/or outwash material overlying andesitic basalt bedrock or consolidated ash tuff. Based on the elevation and proximity to stream channels, groundwater is anticipated to be shallow in lowland areas.
RAA-03 West	MI-03	Andrew Lake Mortar Impact Area – Mortar Impact Area	MI-03 is a target/impact area that covers 425 acres. It consists of a steep valley draining west to east from the flanks of Mount Moffett toward Andrew Lake. MI-03 is bordered by OU B-1 (MM-11 and various components of MM-10) to the west, south, and north. Three OU B-2 sites border MI-03 to the east: OB/OD-01, RR-01, and RR-02. MI-01and MI-02 are located wholly within this site. The elevation in MI-03 ranges from about 40 meters (130 feet) asl at the eastern edge to about 280 meters (920 feet) asl along the western edge on the flanks of Mount Moffett. There is indirect access to this site via a gravel range entry road that terminates at OB/OD-01, which branches from the main access road along the western side of Andrew Lake. This main road is gated (locked steel gate) near the south end of the lake to deter general access. A locked cable barrier also deters access to the range entry road. The terrain ranges from relatively low and flat in the eastern portion nearest the OB/OD area to steep and inaccessible at the western end and along the southern border. There is a steep ridgeline near the northern side of the site with a relatively flat top. The top of this ridge is shared with RR-02. Vegetation is grassy in the east with lowland tundra species ranging in height from 12 to 24 inches. The vegetation transitions to upland species (mixed grasses, heaths, and mosses) of shorter stature in the west. Runoff channels or streams within the site run easterly toward Moffett Creek, which is partially located within this site. Groundwater is anticipated to be shallow in the lowland areas, which provides the potential for groundwater seeps. Small ponds or lakes are present at two locations. The valley floor is composed of a silty, gravelly, sandy, alluvial/colluvial, and/or outwash material overlying andesitic basalt bedrock or consolidated ash tuff.

Table 1-1 (Continued)
Descriptions of OU B-2 Sites Included in the Survey

RAA	Site Designation	Site Name	Site Description
RAA-04	SA93-01	Source Area #93 – Multiple Ordnance Impact Area	SA93-01 is a target/impact area that covers 263 acres. It is located to the northeast of Andrew Lake. Most of the site is on a plateau some 91 to 122 meters (300 to 400 feet) above the lake, but a small strip of this site along the southwestern corner abuts the shoreline of the lake. This site is bordered by SA93-02 to the east, areas lying outside Parcel 4 to the north and south, and Andrew Lake to the southwest. It is also bordered by MAG-01 to the west, but the two areas are not physically contiguous because of a steep cliff (i.e., MAG-01 is at the base of the cliff). Elevations in the central portion of this site range from about 67 to 98 meters (220 to 320 feet) asl. Along the western edge of this site, a steep ridge rises to just over 152 meters (500 feet) and then falls very rapidly (cliff) to elevations below 100 feet asl. To the north, a steep ridge rises to over 213 meters (700 feet) on the flanks of a small mountain peak. There is indirect access to this site from the gravel road originating from the east side of Andrew Lake near the Recreation Center. The entire historical impact area in which this site resides is currently fenced (4-strand barbed wire), with posted signage to deter public access. On the west side of this site, a steep ridge forms a cliff above Andrew Lake. To the east of this ridge, the terrain falls gently toward a deep drainage ravine near the east side of this site. Vegetation is generally a mixture of grasses, sedges, mosses, and heaths ranging in height from 18 to 30 inches. A deep ravine at the eastern edge of the site carries runoff southward toward Andrew Lake. Also, there are areas of standing water or streams in the south-central portion of the site. According to observations made during the preparation of the groundwater study report (U.S. Navy 1995), the occurrence of groundwater outside of the downtown area is limited by the absence of significant accumulations of permeable materials and the presence of a blanket of low-permeability tephra deposits that inhibit infiltration. As a result, most of the precipitation falling in the remote areas discharges as surface water runoff. Therefore, much of the surface of these remote areas is covered by a maze of stream channels, small impoundments, bogs, and lakes perched over the tephra layer.
RAA-04	SA93-03	Source Area #93 – Firing Point	SA93-03 is a target/impact area that covers 0.6 acre. This small, rectangular site is located wholly within SA93-02 near the southern boundary of that site. This area was initially believed to be the principal firing point for 2.36-inch rockets found within SA93-01 (located across the ravine to the west). On the basis of items found during the 1999 site inspection, however, this site is now thought to be a rocket impact area. Nevertheless, the original name of this site has been retained to prevent confusion. The elevation of this site is

Table 1-1 (Continued)
Descriptions of OU B-2 Sites Included in the Survey

RAA	Site Designation	Site Name	Site Description
			about 29 meters (95 feet) asl, but a deep ravine abuts the site, falling to about 12 meters (40 feet) asl. There is indirect access to this site from the gravel road originating from the east side of Andrew Lake near the Recreation Center. The entire historical impact area in which this site resides is currently fenced (4-strand barbed wire), with posted signage to deter public access. The terrain is generally flat. However, a deep ravine abuts the site on the west. Vegetation consists of low-growing upland tundra species ranging in height from 6 to 12 inches. According to observations made during the preparation of the groundwater study report (U.S. Navy 1995), the occurrence of groundwater outside of the downtown area is limited by the absence of significant accumulations of permeable materials and the presence of a blanket of low-permeability tephra deposits that inhibit infiltration. As a result, most of the precipitation falling in the remote areas discharges as surface water runoff. Therefore, much of the surface of these remote areas is covered by a maze of stream channels, small impoundments, bogs, and lakes perched over the tephra layer.
RAA-05	ALDA-01	Andrew Lake Disposal Area – Landfill Area	ALDA-01 is a former garbage dump where munitions have been found with wash-up of DMM from the offshore area of ALSW-01. ALDA-01 is located at the northwest corner of Andrew Lake and covers 6.7 acres. The site boundary is dog-legged and wider at the north end of the site near Andrew Bay. Most of this site lies at elevations ranging from about 6.1 to 12.2 meters (20 to 40 feet) asl; however, a cliff on the west side of this site rises to heights of more than 200 feet asl. There is a distinct elevation break running across the site from northwest to southeast that separates the low-lying portion of the site into higher and lower elevation areas. The elevation difference of this feature is about 8 feet. The lower elevation area is a depositional environment from Andrew Bay, with this portion of the site experiencing wash-up of DMM from offshore (see ALSW-01 description below). This site is bordered by ALDA-02 to the west, Andrew Lake to the east, ALSW-01 to the northeast, and a thin strip of ALSW-01 to the north. Parcel 4 areas outside of OU B-2 border this site to the southwest. There is direct access to this site via the main access road running along the western shore of Andrew Lake. This road is gated with a locking steel gate near the south end of the lake to deter general access. The terrain is generally flat, except for steep slopes along the western edge. A line of craters trends northwest to southeast across the site. Vegetation is predominantly grass ranging in height from 12 to 18 inches, which is sparser toward the beach area, but still thick enough to hide the underlying cobbled

Table 1-1 (Continued)
Descriptions of OU B-2 Sites Included in the Survey

RAA	Site Designation	Site Name	Site Description
			surface. The geology of the site is characterized by shallow bedrock with a thin layer of soil. The soil is dominated by cobbles and boulders. There should be no groundwater because of the shallow bedrock.
RAA-05	ALSW-01	SWMU 8, Andrew Lake Seawall	ALSW-01 is a wash-up area for potential disposal at sea or along the shoreline. ALSW-01 consists of the western portion of the seawall located along the north shoreline of Andrew Lake and covers 10 acres. The seawall is narrow and elongated, similar to a dike with a narrow flat top and steep sides. The seawall separates the freshwater lake from Andrew Bay to the north, which is an embayment of the Bering Sea. A munitions dump may be located offshore of the seawall. The location and amount of munitions offshore are unknown. Elevations in the upland portion of the site range from about 3 to 9.1 meters (10 to 30 feet) asl. This site is bordered by ALDA-01 to the west, Andrew Lake to the south, the Andrew Bay beach area to the north, and non-OU B-2 areas to the east. The Navy periodically performs sweeps on the Andrew Bay beach, within the tidal zone, to remove MEC items that have washed up from offshore dump sites. The area below the mean higher high water mark on the Andrew Bay side of the seawall is owned by other agencies. There is direct access to this site via an unimproved road originating on the east side of Andrew Lake near the Recreation Center. There is a locked steel gate and rock barrier on this roadway just north of the Recreation Center to deter public access. There is also indirect access via a walk from the main access road running along the western shore of Andrew Lake. This road is gated (locked steel gate) near the south end of the lake to deter general access. The terrain transitions from generally flat atop the seawall to very steep along the sides (north and south). Vegetation consists of short, relatively sparse grass atop the wall and tussocks of taller grass along the sides where adequate soil is present. A spillway at the northwest corner of Andrew Lake allows some flow of freshwater into Andrew Bay. At times, the spillway is obstructed and discharge is limited to water flowing through the cobble substrate of the seawall to Andrew Bay. The seawall is a man-made feature composed of boulders, cobbles, gravel, large metal debris, and wood.

Notes:
asl - above sea level
DMM - discarded military munitions
MEC - munitions and explosives of concern
mm - millimeter
OU - operable unit

2.0 REGULATORY CONTEXT

Under CERCLA, applicable or relevant and appropriate requirements (ARARs) must be met during the remedial action. ARARs include any federal environmental laws, or any more stringent state requirement (U.S. Navy 2012a). The 2012 FS for OU B-2 sites identifies the ARARs that apply to the OU B-2 remedial action. The following six federal laws apply to the protection of fish, wildlife, and plants.

2.1 BALD AND GOLDEN EAGLE PROTECTION ACT

The bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The Eagle Act makes it illegal to take (kill, wound, pursue, shoot, shoot at, poison, capture, trap, collect, molest or disturb) bald or golden eagles (*Aquila chrysaetos*). Disturb is defined in the Eagle Act as "to agitate or bother a bald or golden eagle to a degree that caused, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." The Eagle Act prohibits unregulated take.

Bald eagles are common residents of Adak and are known to nest there. The most likely nest location nearest to an RAA is the sea stacks just offshore (west) of SA93-01 (Williams 2012b). Additional discussion of bald eagles can be found in Section 4.3. The USFWS maintains a web site describing step-by-step guidance to avoid disturbing bald eagles. It can be accessed at http://www.fws.gov/pacific/eagle/guidelines/disturbnestingbaea1.html. In general, USFWS recommends a buffer of at least 660 feet (200 meters) between project activities and an active nest. All clearing, construction, and other disturbing activities within 660 feet of the nest should be restricted to outside the nesting season.

2.2 ENDANGERED SPECIES ACT OF 1973

The Endangered Species Act of 1973 (ESA) was passed with the goal of preventing the extinction of critically imperiled species. Under the ESA, USFWS and National Oceanic and Atmospheric Administration (NOAA) Fisheries have the responsibility to identify and “list” which species need protection and to designate habitat critical to their protection. Critical habitat is defined as the geographical area containing physical or biological features essential to the

conservation of a listed species and/or areas that may require special management considerations or protection (Rohlf 1989).

Under the ESA, federal agencies must review actions they undertake or support to determine whether they may affect endangered species or their habitats. If such review reveals the potential for effects, the federal agency must consult with the USFWS or NOAA Fisheries to identify whether a federal action is likely to jeopardize the continued existence of the endangered or threatened species, or adversely affect its critical habitat.

The law also prohibits any action that causes a "taking" of any listed species of endangered fish or wildlife. Likewise, import, export, interstate, and foreign commerce of listed species are all generally prohibited.

2.3 MAGNUSON-STEVENS ACT

The Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996, requires federal agencies to consult with NOAA Fisheries on activities that may adversely affect essential fish habitat (EFH). In addition, the law requires fishery management councils to include descriptions of EFH and potential threats to EFH in all federal fishery management plans. EFH is defined in the Magnuson-Stevens Act as those waters and substrate necessary to fish (federally managed species) for spawning, breeding, feeding, or growth to maturity. Federal agencies must consult with NOAA Fisheries regarding any action they authorize, fund, or undertake that may adversely affect EFH, and NOAA Fisheries must provide conservation recommendations to federal and state agencies regarding any action that would adversely affect EFH.

2.4 MARINE MAMMAL PROTECTION ACT

The Marine Mammal Protection Act (MMPA) was enacted on October 21, 1972 and amended in 1994. All marine mammals are protected under the MMPA. The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas and the importation of marine mammals and marine mammal products into the U.S.

The U.S. Congress defines "take" as “the act of hunting, killing, capture, and/or harassment of any marine mammal; or, the attempt at such.” The MMPA defines harassment as any act of pursuit, torment, or annoyance that has the potential to either injure a marine mammal in the wild, or disturb a marine mammal by causing disruption of behavioral patterns, which includes, but is not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

For projects that may unintentionally take marine mammals, two different types of permits are possible. An Incidental Harassment Authorization (IHA) can be issued for activities that constitute "harassment." For activities that may rise to the level of injury or death, a Letter of Authorization (LOA) may be required instead.

2.5 MIGRATORY BIRD TREATY ACT

The MBTA, originally passed in 1918, makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter any migratory bird, or the parts, nests, or eggs of such a bird, except under the terms of a valid federal permit. The term "take" is not defined in the MBTA, but the USFWS has defined it by regulation to mean to "pursue, hunt, shoot, wound, kill, trap, capture, or collect," or to attempt these activities. Under the provisions of the MBTA, the unauthorized take of migratory birds is a criminal offense, even if it is unintentional.

The USFWS maintains a list of birds protected under the MBTA. It includes essentially all species that occur in North America, excluding non-native species that have been introduced (e.g., European starling and house sparrow).

2.6 FEDERAL EXECUTIVE ORDER 13112

Federal Executive Order 13112 was issued on February 3, 1999, to prevent the introduction of invasive species; provide for their control; and minimize the economic, ecological, and human health impacts that invasive species cause. It defines invasive species, requires federal agencies to address invasive species concerns and to not authorize or carry out new actions that would cause or promote the introduction of invasive species, and establishes the Invasive Species Council.

3.0 SURVEY METHODS

A range of methods were used to gather information presented in this report, including a literature search, personal communications with scientists and Adak residents, a habitat survey, and focused terrestrial surveys. A literature search was conducted prior to field activities and is discussed in Section 3.1. Scientists and Adak residents familiar with Adak were contacted, as described in Section 3.2. The habitat survey was performed during the fall of 2011, as discussed in Section 3.3, and the focused terrestrial surveys were performed during the fall of 2011 and summer of 2012, as discussed in Section 3.4.

Field surveys were conducted from September 19 to October 6, 2011 and June 11 to June 16, 2012. Reconnaissance-level pedestrian surveys were performed. Specific transects or sampling locations were not established. Although listed species were the focus of this study, all species encountered during site visits were identified and recorded for context.

A wetland delineation was also conducted as part of the field activities. Methods and results of the wetland delineation are provided in a separate report (U.S. Navy 2012c). Much of the habitat and plant species identification performed during the wetland delineation is incorporated into this report.

3.1 LITERATURE SEARCH

A literature search was performed by URS Corporation (URS) biologists to gather background information on habitats and species, including but not limited to threatened and endangered species, that may occur in the vicinity of Adak. Furthermore, the information gathered aided in the identification of habitat suitable for federally listed and/or candidate species. The literature search included the review of published and unpublished field studies and reports, databases, and aerial photography. Many of the studies on Adak have been conducted over periods of more than one year, and the published reports and background information provided additional context for field observations. The background information was gathered from the following references during the literature search:

- USFWS list of threatened or endangered species that occur in Alaska (USFWS 2011a; see Appendix A)
- National Marine Fisheries Service list of threatened or endangered species that occur in Alaska (NOAA Fisheries 2011a; see Appendix B)

- Alaska Natural Heritage Program (ANHP) rare plant and animal data (ANHP 2011)
- *Monitoring of Breeding Passerines and Other Birds on the Adak Naval Reservation, 1993–1995* (Scharf et al. 1996)
- Adak bird list (USFWS 2010; see Appendix C)
- *Seasonal Abundance of Waterbirds at Adak Naval Reservation, Alaska, 1992–1995* (Rojek et al. 1995)
- *Status of Marbled and Kittlitz's Murrelets at Adak Naval Reservation* (Meehan 1996)
- Alaska Maritime National Wildlife Refuge Native Mammal List (USFWS 2011b; see Appendix D)
- Marine Mammals of the Aleutian Islands (USFWS 2011c; see Appendix E)
- *Ecological Survey of Potentially Contaminated Sites Identified in the Federal Facility Agreement, Naval Air Facility, Adak Island, Alaska* (USFWS 1995a)
- *Survey of the Fishery Resources on Adak Island, Alaska Maritime National Wildlife Refuge, 1993 and 1994* (USFWS 1995b)
- *Natural Resources Management Plan, Naval Complex, Adak, Alaska* (USDA 1990)
- *Management Plan for Aleutian Shield Fern (*Polystichum aleuticum*): An Endangered Species* (Byrd and Williams 2007)

3.2 PERSONAL COMMUNICATIONS

Communications with scientists and local residents knowledgeable about Adak Island were used to supplement information gathered during the literature search and the field surveys. These communications facilitated field work on Adak by providing supplemental information on biological resources, including federally listed and/or candidate species, and their preferred habitats. Following is a list of people contacted by the authors of this report to gather and verify information about biological resources on Adak:

- Brad Benter – Wildlife Biologist, USFWS, Marine Mammals Management, Anchorage, Alaska (field lead for 1993–1994 fisheries surveys on Adak)
- Mark H. Clark – U.S. Department of Agriculture Natural Resources Conservation Service State Soil Scientist/Alaska Soil Survey Region Office Leader, Palmer, Alaska (soil information for Adak)
- James Estes – Adjunct Professor, Biological Sciences and Research Biologist, Institute for Marine Sciences, University of California, Santa Cruz (sea otter surveys and publications about Adak)
- Monte Garroutte – Botanist, University of Alaska, Fairbanks, Alaska (plant identification on Adak)
- Robb Kaler – Biological Science Technician, USFWS, Non-game Migratory Bird Office, Anchorage, Alaska (Kittlitz's murrelet nest survey on Adak and the Aleutian Islands)
- Ellen Lance – Branch Chief, USFWS, Endangered Species Division, Anchorage, Alaska (Aleutian shield fern and migratory birds on Adak)
- Merry Maxwell – Aleutian-Bering Sea Unit Manager, USFWS, Alaska Maritime National Wildlife Refuge, Homer, Alaska (facilitated contacts throughout USFWS)
- Jordan Metzgar – Herbarium Collections Manager, University of Alaska, Fairbanks, Alaska (plant identification)
- Marilyn Meyers – Biologist, USFWS, Endangered Species Listing Office, Anchorage, Alaska (Kittlitz's murrelet ESA listing status)
- Douglas Palmer – Field Supervisor, USFWS, Kenai Fish and Wildlife Field Office, Soldotna, Alaska (lead author of 1993–1994 fisheries study on Adak)
- K.C. Santosh – Data Manager, ANHP, Anchorage, Alaska (plant information for Adak)
- Lisa Spitler – Biological Science Technician on Adak, USFWS, Alaska Maritime National Wildlife Refuge, Adak, Alaska (general Adak information on many topics)

- Thomas Spitler – Resident, Adak, Alaska, and UXO Technician (general Adak information on many topics)
- Jeff Williams – Wildlife Biologist, Aleutians Island Unit, USFSW, Alaska Maritime National Wildlife Refuge, Homer, Alaska (bald eagle and general bird information on Adak)
- Sadie Wright – Section 7 ESA, NOAA Fisheries, Alaska Region National Marine Fisheries Service, Juneau, Alaska (marine mammal information)

3.3 HABITAT SURVEY

A reconnaissance-level field survey of existing habitats was conducted on foot in both terrestrial and tidal areas at 11 OU B-2 sites. The overall objective was to characterize terrestrial habitats, wetlands, streams, and tidal habitats found at Adak and to identify which plant species typically occurred in each habitat and their position in the greater landscape (elevation, topography, hydrological association, substrate, etc.). Efforts were primarily focused on identifying habitat types that may support federally listed and/or candidate species during any time of the year.

3.4 FOCUSED TERRESTRIAL SURVEYS

Focused surveys were conducted for three species: the Aleutian shield fern *(Polystichum aleuticum*), bald eagle (*Haliaeetus leucocephalus*), and Kittlitz's murrelet (*Brachyramphus brevirostris*). These three species were chosen for focused surveys because they are known to occur in the terrestrial environment on Adak and are protected by federal law (see more information in the following three subsections). In addition, incidental wildlife observations of individuals, vocalization, tracks, and bones were recorded during the course of field work. A stream assessment was conducted inside RAA boundaries. Although no marine-based boat or dive surveys were conducted, tidal areas adjacent to the seawall at Sites ALDA-01 and ALSW-01 (Figure 1-3) were scanned with binoculars to identify birds and marine mammals occurring there during the course of land-based field work.

3.4.1 Aleutian Shield Fern

Aleutian shield fern is the only ESA-listed plant species in Alaska. It is presently only known to occur on Adak Island. Geographic Information System data received from ANHP and location information from USFWS were consulted for known Aleutian shield fern locations (all south of the study area).

Aleutian shield fern field surveys were planned and executed using the "intuitive controlled method." This method consists of checking representative sites within a study area with more intensive focus on areas with known rare plant populations and/or appropriate habitat.

Prefield selection of representative target survey areas consisted of plotting known locations on maps and identifying locations with habitat parameters comparable to known suitable Aleutian shield fern habitat, based on the literature review and knowledge of project biologists. Currently, the known locations on Adak Island occur on east-facing slopes having steep cliffs, rock outcrops, and vegetated gullies and ledges. Site C1-01 is the only site with potentially suitable habitat elements, such as rock outcrops and vegetated gullies, for the Aleutian shield fern.

3.4.2 Bald Eagle

The bald eagle is protected under the Bald and Golden Eagle Protection Act, and is found commonly on Adak. Prior to field work, bald eagle nest surveys conducted during 1991-1994 by the USFWS were reviewed. These surveys showed most nests occurring around the perimeter of the island, on cliffs or sea stacks. Two sites, C1-01 and SA93-01 were considered to have potentially suitable nesting sites within their boundaries or nearby. In the field, steep slopes and cliffs were surveyed on a portion of one day at each site. At C1-01, the cliffs above Andrew Bay on the northeast side of the RAA were surveyed from the shoreline. At SA-93-01, the steep slopes and cliffs on the southwest corner of the RAA were surveyed from below.

3.4.3 Kittlitz's Murrelet

Kittlitz's murrelet is a candidate for listing under the ESA. Prior to field work, aerial photographs of the OU B-2 sites were used to identify potentially suitable habitat for Kittlitz's murrelet. This included unvegetated areas dominated by bare rock and/or exposed soil, free of snow, sloped, and located above approximately 600 feet elevation. Two sites, C1-01 and SA93-01, were considered to have potentially suitable habitat based on aerial photography. In the field, both sites were visited on multiple days and pedestrian surveys conducted by two biologists. The biologists walked in parallel lines up to 100 feet apart through habitat mapped as potentially suitable.

3.4.4 Stream Assessment

A stream assessment was conducted to locate and map potential spawning areas for salmon. The stream assessment was conducted for the entire length of Moffett Creek within the RAA boundaries, as well as the stream segment downstream of the RAA boundary to Andrew Lake. The entire length of Moffett Creek from Site OB/OD-01 to Andrew Lake was walked along the stream bank. Upstream from Site OB/OD-01, a cross section of Moffett Creek and the

surrounding area was periodically characterized from elevated viewpoints. Mitchell Creek (known as Park Creek in USFWS 1995b) was surveyed below the first fish passage barrier, approximately 0.6 mile from where it drains to Andrew Lake. Evidence of spawning adults would include presence of redds (fish nests), salmon carcasses (in the stream or on shore), and live fish. Fish passage barriers were identified and mapped.

4.0 SURVEY RESULTS

This section presents the results of the field surveys, personal communications, and literature search. The vegetation on Adak is characterized by plant species and classified into broad avian habitat types. This habitat classification is from Gibson and Byrd (2007) based on Kessel (1979). The OU B-2 sites where each habitat type predominantly occurs is also identified. Stream assessments for Moffett Creek and Mitchell Creek are described. A brief species account is given for each federally listed species (and candidates for listing) with the potential to occur on Adak. Typical fish and wildlife species found on Adak, but not listed under the ESA, are also described. No Aleutian shield fern or Kittlitz's murrelet adult or nest was documented during focused terrestrial surveys within the RAAs. One pair of bald eagles was observed at the southwest corner of the SA93-01 site boundary in 2012, although it is unknown if they nested in the vicinity.

4.1 HABITATS

Vegetation on Adak Island is classified as maritime tundra. It is typified by low-growing grasses, forbs, and shrubs. Trees and tall shrubs are absent because of strong winds. Ferns are common in some situations, and mosses and lichens are common on the ground surface. The terrestrial vegetation is composed primarily of perennial species that grow close to the ground and form relatively continuous stands. Most species die back to ground level following the brief growing season (early May through mid-October) and overwinter as bulbs, corms, tubers, and rhizomes. However, a few plants, such as crowberry (*Empetrum nigrum*) and alpine azalea (*Loiseleuria procumbens*), are evergreen and provide food for animals throughout the year. All plant species observed during the 2011 and 2012 field work are listed in Appendix F by both common and scientific names. Habitat types are summarized in Table 4-1, and photographs of each habitat type are provided in Appendix G. These habitats were recorded at various OU B-2 sites, as summarized in Table 4-1. Marine habitats and stream assessment results are included here to correspond with the Gibson and Byrd (2007) classification system.

Plant species diversity is lower on Adak than for other areas at similar latitudes. One-hundred and four species were observed in the study areas, including 11 shrubs, 59 herbs, 24 graminoids (grasses, sedges, and rushes), 3 ferns, 2 horsetails, and 5 clubmosses. Mosses and lichens are common in some settings, but were not identified. The vegetation is almost entirely composed of native species. Only two non-native species were observed: mouse-ear chickweed (*Cerastium fontanum* ssp. *triviale*) and sheep sorrel (*Rumex acetosella*). Both of these species were observed on roadsides.

4.1.1 Freshwater Wetlands

Lacustrine Waters and Shorelines

This habitat type includes large and small ponds and lakes (Appendix G, Photo 1). Topography varies considerably among the Aleutians Islands, and the density of small ponds is highest on islands and areas of islands that are not mountainous. The largest lakes in the Aleutian chain are on Adak Island, with Andrew Lake the largest of all (Gibson and Byrd 2007). Pond habitat is present at Sites SA93-01 and MI-03.

Photo: Pond in SA-93-01. Jennifer Pretare/URS

Fluviate Waters and Shorelines

Fluviate waters and shorelines include creeks and streams, which are numerous throughout the Aleutian chain (Appendix G, Photo 2). However, watercourses large enough to be called rivers are

almost absent (Gibson and Byrd 2007). Adak Island has no rivers. The watercourses in the vicinity of the OU B-2 sites are characterized by several short, steep-gradient streams draining radially from Mount Moffett and Mount Adagdak.

Two perennial streams and one ephemeral stream occur within the project sites. The largest stream is Moffett Creek, located within the Moffett Valley and flowing through portions of Sites MI-03, OB/OD-01, and RR-01(in order from upstream to downstream). The second stream is Mitchell (also known as Park) Creek, which runs through a small portion of the study area between Sites SA93-01 and SA93-03. Another stream appears at Site SA93-01 on some maps of Adak Island. However, in the field, this feature appears to be only a grassy swale, which is not identified as a fish-bearing stream by the USFWS (1995b). The ephemeral stream is associated with Site C1-01, but is unnamed. These stream surveys were conducted during low-flow conditions in a dry time of year for Adak (late summer to early fall). Very little precipitation was recorded during the 18-day survey period. Each of these three creeks has a fish passage barrier at or near the mouth. The locations and photographs of the barriers to fish passage are shown on Figure 4-1. Each creek is discussed further below.

Moffett Creek. Moffett Creek drains the eastern slopes of Mount Moffett with numerous small tributaries, which eventually consolidate into one main channel in the valley within Site MI-03. Moffett Creek drains into Andrew Lake, which is connected to Andrew Bay through a man-made channel (spillway) cut into the seawall. The Andrew Lake spillway was originally constructed in the late 1940s. Under natural conditions Andrew Lake is not connected to Andrew Bay. During the 1980s and 1990s, the Navy did not consistently clear the spillway on an annual basis. Since 2006 or 2007, the Navy has cleared the spillway annually, around late August or early September. The Navy intends to clear the spillway annually for the foreseeable future in order to maintain access to ALDA-01 and prevent erosion of a landfill located on the southeast side of Andrew Lake. The spillway obstruction is typically caused by winter storms that mobilize gravel and rock.

The length of Moffett Valley was traversed on foot (as described in Section 3.3). A series of photographs of Moffett Creek, from upstream to downstream, are shown in Appendix H. At the west end of Site MI-03 are three branches to Moffett Creek. Located at the bottom of steeply sloped ravines (approximately 50 feet deep), these tributaries were mostly viewed from above because of the lack of safe access points. At the west end of Site MI-03, the creek bed was typically 5 to 8 feet wide, with 1 foot or less depth of flowing water. Large boulders approximately 2 to 3 feet in diameter occupied the creek bed, and steep drops of 1 to 2 feet in elevation were common along these upper reaches. Because of the steep gradient and lack of suitable spawning substrate, it is unlikely that spawning salmonids utilize this step-pool section of upper Moffett Creek. This habitat is likely suitable for Dolly Varden (*Salvelinus malma*). The three forks consolidate into one main channel at approximately the middle of Site MI-03. Two small check

dams are located in the creek in the vicinity Site MI-03, one on the main stem of Moffett Creek and the other approximately 75 yards downstream at the mouth of a side channel. These dams are considered historic structures and are identified in the cultural resources survey report for Adak (U.S. Navy 2012b).

Photo: Moffett Creek Valley. URS/Jan Novak

The floodplain widens downstream of the forks' confluence, and the topography becomes flatter. In the eastern half of Site MI-03, Moffett Creek is typically 6 to 8 feet wide, but reaches 15 feet in some places. Boulders up to 6 feet in diameter occur in places. There is some gravel in the streambed, but few erosional features appear evident that would be feeder sources of gravel for the stream.

Within Site OB/OD-01, Moffett Creek widens to an average of 12 feet, and the water remains approximately 1 foot deep. Downstream from this location, the entire creek edge was walked as part of the stream assessment. There were abundant cobbles up to 12 inches in diameter and some sand in the streambed. Moffett Creek continues to meander through Site RR-01, where the drainage has been modified by previous construction of roads and berms associated with the rifle range. Moffett Creek flows through two culverts as it passes under a road leading to the rifle range target area. These two culverts appear to be fish passable.

Downstream of Site RR-01, the Moffett Creek floodplain widens and the stream sinuosity increases. This section contains suitable spawning and rearing habitat. There are several meanders in the stream where small side pockets of still water exist. The stream widens to 15 to 18 feet and decreases to 4 to 6 inches deep. The substrate consists of cobbles 8 to 12 inches in diameter, gravel, and some sand. A resident of Adak reported that in the spring when snow melt from Mount Moffett is high, Moffett Creek will frequently overtop the streambank in this lower floodplain (Spitler 2011).

Moffett Creek passes through five large culverts under the main access road just before it empties into Andrew Lake. There is approximately 1.5 feet between the bottom of the culvert and the surface of Moffett Creek on the outfall side (Figure 4-1). The series of five culverts at the mouth of Moffett Creek may be a partial fish passage barrier to migrating salmonids during low-flow conditions. In some years, when debris blocked the Andrew Lake spillway, lake levels may have risen and, therefore, created a shorter distance between the bottom of the culverts and the lake elevation. However, the same spillway debris obstruction may prevent salmon from entering Andrew Lake from the ocean.

In 1993 and 1994, pink salmon and kokanee were recorded in Moffett Creek (USFWS 1995b). At that time, surveys were limited by restricted entry because of MEC, so it is not clear how much of the stream was surveyed. No systematic survey of Adak Creeks has been conducted since that time (L. Spitler 2012 and Williams 2012a). Conditions of the Moffett Creek culverts and surrounding outfall also could have changed since the 1993 and 1994 fish surveys were conducted. Several small fish (2 to 3 inches) were observed in Moffett Creek between Site OB/OD-01 and Andrew Lake, but not identified. No adult salmon spawners or redds were observed during field work in 2011 or 2012.

Mitchell (Park) Creek. Mitchell (Park) Creek flows between Sites SA93-01 and SA93-03, but was included within the survey area for 2011 and 2012 field work. Mitchell Creek drains portions of SA93-01 and SA93-03 and most of the surrounding landscape. Mitchell Creek was surveyed on foot from Andrew Lake upstream to the small dam historically used as a power generating facility for the Adak Recreation Building. This dam and a small waterfall directly downstream are considered fish passage barriers (Figure 4-1). The short length of Mitchell Creek downstream of the barrier that is accessible to fish from Andrew Lake is approximately 4 feet wide and 12 inches deep, with cobble substrate up to 2 feet in diameter in places. A series of photographs of this 0.6 mile length of Mitchell Creek is located in Appendix I. Grasses and herbaceous vegetation are abundant and grow directly to the edge of the creek. No fish were observed during this survey.

Site C1-01 Unnamed Drainage. One mapped (ephemeral stream) drainage feature at Site C1-01 connects to Andrew Bay northeast of the site. This unnamed feature is entirely blocked to fish because of the steepness of the terrain between Andrew Bay and Site C1-01 (Figure 4-1).

Seasonal Drainages. Numerous small, seasonal drainages are present in the study area. These drainages are unmapped and sometimes disappear subsurface. Most of the drainages empty into wetlands or named watercourses.

Wet Meadows

Wet meadows often occur at the edges of ponds and streams (Appendix G, Photo 3). Wet meadows are also created temporarily in the spring by snowmelt and in the fall by prolonged precipitation (Gibson and Byrd 2007). Wet meadows are very common at the OU B-2 sites surveyed. Some wet meadows in the study area are dominated by tall sedges, while other wet meadows are dominated by broad-leaved herbaceous species. There are also large areas that are dominated by Bering's hairgrass (*Deschampsia beringensis*).

Photo: Russet cottongrass. URS/Jennifer Pretare.

As previously stated, some wet meadows are dominated by coarse, relatively tall sedges, including water sedge (*Carex aquatilis*) and rock sedge (*Carex saxatilis*). Common associates include many-flowered sedge (*Carex pluriflora*), large-awned sedge (*Carex macrochaeta*), tufted spikerush (*Trichophorum caespitosum*), russet cottongrass (*Eriophorum russeolum*), marsh marigold (*Caltha palustris*), common horsetail (*Equisetum arvense*), and variegated scouring-rush (*Equisetum variegatum*). These areas are found on floodplains, near pond margins, and in upland depressions. They are also found in organic soils on slope seepage zones, pond margins, and depressions, where russet cottongrass and tufted spikerush are more common.

Other wet meadows in the study area are dominated by herbs other than grasses or sedges, including common horsetail, variegated scouring-rush, marsh marigold, Arctic rush (*Juncus arcticus*), bog orchid (*Platanthera convallariaefolia*), white bog orchid (*Platanthera dilatata*), and Siberian springbeauty (*Claytonia sibirica*). These herb-dominated meadows are found in seepage areas, pools, pond margins, and marsh edges.

In some wet meadow areas, Bering's hairgrass is the dominant species. Arctic rush, bluejoint (*Calamagrostis canadensis*), Pacific reedgrass (*Calamagrostis nutkaensis*), red fescue (*Festuca rubra*), and yarrow (*Achillea borealis*) are common associates. This community type also occurs in moist uplands.

Wetlands, which are primarily comprised of the wet meadow habitat, were delineated as part of a separate task for the Navy. Full details of that report can be found in the wetland delineation report (U.S. Navy 2012c). Locations of delineated wetlands are shown on Figures 4-2, 4-3, and 4-4. Wetlands were located within every OU B-2 site, except ALSW-01, which was not delineated and does not appear to be conducive to wetland occurrence.

4.1.2 Marine Waters

Inshore Marine Waters

Photo: Andrew Bay (right) and Andrew Lake (left) from SA93-01. URS/Jennifer Pretare.

These relatively shallow marine waters provide habitat for kelp forests (Appendix G, Photo 4). In the Aleutians, shallow marine waters form fairly narrow bands around islands. They are much more extensive in the eastern and western Aleutians than in the central Aleutians. Because of the different characteristics of the two major inshore marine currents, properties of inshore waters vary from one end of the archipelago to the other. The Alaska Coast Current, which is relatively warm and fresh, influences inshore waters in the eastern Aleutians, whereas the Alaska Stream, which is colder and saltier, is the major influence in the central and western Aleutians (Gibson and Byrd 2007).

Andrew Bay is a marine environment with a high-energy beach susceptible to heavy surf. An explosive ordnance disposal report (U.S. Navy 2000b) noted that the rocky conditions along the shoreline persist well offshore. Information on seabed composition is limited. The composition of the bottom through the tidelands and into submerged lands was reported as a solid layer of boulders out to a water depth of approximately 50 feet. Mixed sand and rock were noted at depths of 50 to 100 feet. Depth soundings made along about 2.5 miles of the seawall indicated that the 100-foot contour was approximately 1,000 yards from the shore, consistent with information from available nautical charts (Figure 4-5). The presence of kelp was observed as minimal at approximately 15- to 20-foot water depths off the Andrew Lake Spillway by Navy

personnel in August 2000 (U.S. Navy 2000b). A separate report indicated that kelp beds extend out hundreds of meters from the beach (WHG 2002). The presence of kelp beds typically varies throughout the year, with kelp thickest in the late summer and early fall and much reduced during the winter, as large winter storms tend to tear kelp from the seabed. Kelp species in the vicinity of Adak include *Agarum cribrosum*, *Alaria fistulosa*, *Cymathera triplicate*, *Laminaria* spp., and *Thalassiophyllum clathrus*. *A. fistulosa* is the most common of these in the Andrew Bay area (Estes and Duggins 1995).

4.1.3 Ocean Coastline

Rocky Shores and Reefs

Rocky shores and reefs constitute the primary intertidal habitat through the Aleutians, where tidal ranges are narrow and boulder beaches and broad intertidal reefs are exposed at low tide (Appendix G, Photo 5). Boulder beaches without intertidal reefs are typical of areas in the vicinity of contemporary volcanic activity (Gibson and Byrd 2007).

Photo: URS/Jennifer Pretare.

The surface geology of the Andrew Lake seawall area reflects the high-energy nature of the Andrew Bay coastline, with large rocks and cobbles making up the steeply sloped beach and nearby areas (U.S. Navy 2011b). The beach in the central portion of Andrew Bay is composed primarily of cobble-sized material, with an estimated average size of 3.9 to 9.8 inches, and large boulders (WHG 2002). Vegetation in this area is limited to rockweed and kelp along the rocky segments of the beach (USFWS 1995a).

4.1.4 Meadows

Dwarf Shrub Meadow

Photo: URS/Jennifer Pretare

Dwarf shrub meadows are widespread at lower elevations away from the beach fringe (Gibson and Byrd 2007) (Appendix G, Photo 6). In this habitat type, crowberry and bog blueberry (*Vaccinium uliginosum*) are the common species, with lesser amounts of Arctic willow (*Salix arctica*). The herb layer is variable and may include clubmoss (*Lycopodium* spp.), avens (*Geum calthifolium*), Unalaska arnica (*Arnica unalaschcensis*), leatherleaf saxifrage (*Leptarrhena pyrolifolia*), horsetail, and large-awned sedge. In wetland areas, the herbaceous layer includes tufted spike rush and many-flowered sedge. Peat moss (*Sphagnum* sp.) can also be present.

Dwarf shrub meadows are present at Sites C1-01, MI-01, MI-02, MI-03, and SA93-01.

Grass Meadow

Although frequently patchy, grass meadow is a habitat type found on nearly every Aleutian island, usually below 300 meters elevation (Gibson and Byrd 2007) (Appendix G, Photo 7). This upland community type is dominated by two or more species of grasses, as well as forbs. Common grasses include red fescue, Bering's hairgrass, Pacific reedgrass, and bluejoint. Common herbs include white anemone (*Anemone narcissiflora*), Nootka lupine (*Lupinus nootkatensis*), northern monkshood (*Aconitum maximum*), wormwood (*Artemisia unalaskensis*), clubmosses, dwarf dogwood (*Cornus suecica*), wild geranium (*Geranium erianthum*), coastal angelica (*Angelica lucida*), and yarrow.

Grass meadows are present at Sites ALDA-01, OB/OD-01, HG-01, MI-01, MI-02, MI-03, RR-01, and SA93-01.

Tall Forb Meadow

This is a prominent community just inland from beaches and in the lower reaches of protected coastal stream canyons (Gibson and Byrd 2007) (Appendix G, Photo 8). In the study area, this community type is very similar to "grass meadow," but includes tall broad-leaved herbaceous species such as fireweed (*Chamerion angustifolium*), coastal angelica, and cow parsnip (*Heracleum lanatum*).

Tall forb meadows are present at Sites ALDA-01, OB/OD-01, HG-01, MI-01, MI-02, MI-03, RR-01, and SA93-01.

4.1.5 Unvegetated and Sparsely Vegetated Highlands

Dwarf Shrub Mat

Occurring primarily at higher elevations, dwarf shrub mat is composed of very short vegetation (including lichens and mosses) mixed with bare soil (Gibson and Byrd 2007) (Appendix G, Photo 9). Crowberry is dominant, with lesser amounts of bog blueberry, Arctic willow, Aleutian mountain heather (*Phyllodoce aleutica*), and Alaska cassiope (*Cassiope lycopodioides*). The herb layer is variable and may include Unalaska arnica, mountain harebell (*Campanula lasiocarpa*), coiled sedge (*Carex circinata*), alpine clubmoss (*Lycopodium alpinum*), and yarrow. Within the study area, dwarf shrub mat habitat was only observed at Site C1-01.

Photo: URS/Jennifer Pretare.

Scree

Scree is loose rock debris or gravel at higher elevations, sometimes interspersed with dwarf shrub mat (Appendix G, Photo 10). This type of habitat is confined to Site C1-01 and one ridge at the edge of Site SA93-01, where several exposed ridge tops have no vegetation and are dominated by loose rocks and boulders.

4.1.6 Artificial

Distributed locally throughout the Aleutians, artificial habitat includes planted trees, buildings, piers and docks, refuse dumps, outfalls, and abandoned equipment (Appendix G, Photo 11). It is most extensive near villages and military bases (Gibson and Byrd 2007). Artificial habitat was observed at Sites HG-01, OB/OD-01 and RR-01 within the study area.

4.2 FEDERALLY LISTED SPECIES

There are 25 federally listed or candidate species that occur in Alaska or the marine waters off Alaska's coast (NOAA Fisheries 2011a and USFWS 2011a). This includes 6 birds, 14 mammals, 4 reptiles, and 1 plant. A list of these species, their preferred habitat, and potential to occur on or near Adak is provided in Appendix J.

Of the 25 species listed in Appendix J, 5 have no potential to occur on Adak. They are Eskimo curlew **(***Numenius borealis*), Steller's eider (*Polysticta stelleri*) breeding population, Cook Inlet beluga whales (*Delphinapterus leucas*), bearded seal (*Erignathus barbatus* ssp. *nauticus*), and polar bear (*Ursus maritimus).* These five species are eliminated from further discussion in this report for the following reasons: The Eskimo curlew is generally considered extinct, Steller's eider breeding population is entirely confined to the central arctic coastal plain, Cook Inlet beluga whale is only known from Cook Inlet near Homer, Alaska, the bearded seal is closely associated with sea ice, and polar bears occur on the sea ice of the Chuckchi and Beaufort Seas.

Of the remaining 20 species, 10 are considered very unlikely to occur based on their known distribution, habitat preferences, and/or rarity. They are short-tailed albatross (*Phoebastria albatrus*), spectacled eider (*Somateria fischeri*), bowhead whale (*Balaena mysticetus*), North Pacific right whale (*Eubalaena japonica*), ringed seal (*Pusa hispida*), sperm whale (*Physeter macrocephalus*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), and Olive Ridley sea turtle (*Lepidochelys olivacea*). The albatross would be considered a vagrant or stray during migration. The spectacled eider is known to breed in the Arctic and has not been recorded on Adak (Appendix C). The whales and seals typically occur north of Adak in the Arctic Ocean, sea ice regions, and/or in deep water habitats. The four turtle species would be wandering far from their normal migration or foraging areas in the temperate or tropical latitudes. Because these 10 species are considered very unlikely to occur at Adak, they are also eliminated from further discussion in this report.

Seven listed and three candidate species have some potential to occur in the vicinity of Adak. They are Kittlitz's murrelet, yellow-billed loon (*Gavia adamsii*), blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), Northern (Alaskan) sea otter (*Enhydra lutris* ssp. *kenyoni*), Pacific walrus (*Odobenus rosmarus* ssp. *divirgens*), sei whale (*Balaenoptera borealis*), northern (Steller) sea lion (western distinct population segment [DPS]; *Eumetopias jubatus*), and Aleutian shield fern. These 10 species are discussed in greater detail below. Formally listed species (threatened or endangered) are discussed in Section 4.2.1 and candidate species in Section 4.2.2.

4.2.1 ESA-Listed Species

The following seven species are listed as threatened or endangered under the ESA and have the potential to occur on or near Adak.

Blue Whale

Blue whales are the largest animal in the world. They are listed as endangered and have no designated critical habitat. The seasonal movement of this species is not well understood. They tend to prefer waters of the Continental Slope or Slope Break (NRC 1996).

Photo: NOAA Fisheries.

In the North Pacific Ocean, the blue whale's range is known from Kamchatka, Russia, to southern Japan in the west and from the Gulf of Alaska and California south to at least Costa Rica in the east. The species is found primarily south of the Aleutian Islands and the Bering Sea (NOAA Fisheries 2011b). Although their distribution is considered variable and not well known, it is assumed they have the potential to occur in the marine waters near Adak, based on known distribution maps.

Fin Whale

Exceeded in size only by the blue whale, the fin whale is a relatively sleek and fast species (Folkens 2002). They are listed as endangered and have no designated critical habitat. They occur worldwide, but tend to occupy Continental Slope or Slope Break habitats (NRC 1996)

and/or deep offshore waters (NOAA Fisheries 2011b). There is likely a separate population of fin whales occurring in the North Pacific Ocean (NOAA Fisheries 2011b). They are migratory and move seasonally into and out of high-latitude feeding areas. However, specific routes have not been documented (NOAA Fisheries 2011b). It is assumed that marine waters near Adak are suitable migratory or foraging habitat for fin whales.

Photo: NOAA Fisheries

Humpback Whale

One of the more familiar species, humpback whales are listed as endangered. They have no designated critical habitat. Humpback whales are more inclined to occupy coastal waters and the Continental Shelf (NRC 1996). They tend to stay near the surface of the water during migration and prefer shallow water during calving (NOAA Fisheries 2011b). There are at least three subpopulations in the North Pacific Ocean. The "western" North Pacific stock winters near Japan and probably migrate to waters west of the Kodiak Archipelago in summer/fall (NOAA Fisheries 2011b). This subpopulation includes the Bering Sea and Aleutian Islands. Waters adjacent to Adak are considered suitable for migration and/or summering habitat.

Photo: NOAA Fisheries.

Northern (Alaskan) Sea Otter

The northern sea otter is the smallest marine mammal, and 90 percent of the world's population lives in coastal Alaska. The southwest Alaska population is a threatened species and ranges from Kodiak Island through the western Aleutians (USFWS 2011d). They are present year round at Adak Island, in Clam Lagoon and other surrounding nearshore shallow waters and kelp beds. They are known to occur in Andrew Bay; however, none

Photo: URS/Jan Novak.

were observed during 2011 or 2012 field work.

Critical habitat for northern sea otter does occur at Adak (USFWS 2011e). It is defined as all contiguous water from the mean high tide line to the 20-meter (65.6-foot) depth contour, as well as water within 100 meters (328.1 feet) of the mean high tide line that occurs adjacent to Adak Island (USFWS 2009). This is depicted on Figure 4-6 based on USFWS contour data. Critical habitat occurs immediately adjacent to the Andrew Lake seawall (Site ALSW-01) and also Site ALDA-01.

Northern sea otters have been surveyed and studied at Adak and other Aleutian Islands periodically since about the late 1950s. These surveys highlighted the sharp decline in their population numbers and led to their listing under the ESA. Results of these studies have been published in Doroff et al. (2003) and Estes et al. (2005).

Sei Whale

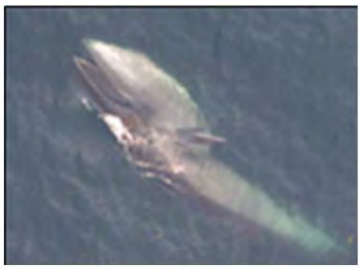


Photo: NOAA Fisheries.

The sei whale (pronounced "sigh") is listed as endangered and has no designated critical habitat. They are inclined towards deeper oceanic waters (NRC 1996) and prefer temperate waters in the midlatitudes. The distribution and movement patterns of sei whale are not well known, but the Aleutian Islands are considered part of their range (NOAA Fisheries 2011b). It is likely they migrate north in the summer and south in the winter. Marine waters adjacent to Adak are considered suitable habitat for sei whales.

Northern (Steller) Sea Lion

Northern (Steller) sea lions can be found in waters of the North Pacific rim from California through the Aleutian Islands to Japan (NRC 1996). They pup and breed in June and July in rookeries on relatively remote islands, rocks, and reefs. The western DPS is listed as endangered. Critical habitat for the northern sea lion includes all major haul-outs, rookeries, and a terrestrial zone that extends 3,000 feet landward from the rookery or haul-out (measured vertically from the sea). Critical habitat also includes an aquatic zone that extends 20 nautical miles seaward from any rookery or haul-out in Alaska that is west of 144° longitude (NMFS 1993).

Photo: NOAA Fisheries.

The nearest known rookery to Adak occurs at the tip of the Yakak Peninsula on the island's southwest side. The rookery location and approximate area of associated critical habitat is shown on Figure 4-7. This area is designated part of the Alaska Maritime National Wildlife Refuge. Parcel 4 does not fall within known northern sea lion critical habitat.

Northern sea lions disperse widely during the nonbreeding season, and marked animals have been seen far from the locations where they were tagged (NRC 1996). It is likely that individuals may use marine waters on the north side of Adak for foraging at times. Individual sea lions were observed in the waters of Andrew Bay during both 2011 and 2012 field work.

Aleutian Shield Fern

Photo: USFWS/Ellen Lance.

The Aleutian shield fern is one of the three species that was targeted during the terrestrial surveys. No Aleutian shield fern was found during the surveys.

Aleutian shield fern is a small, tufted fern that grows to about 6 inches tall. Aleutian shield fern is listed as endangered and is the only ESA-listed plant species in Alaska. It is only known to occur in two locations, Atka and Adak Islands in the Aleutian Islands, Alaska, making it one of the rarest and most restricted plants in North America. The Atka population has not been relocated since its original discovery in 1932, in spite of repeated attempts. In 1975, Aleutian shield ferns were discovered at Adak, and subsequently three additional populations have been found there (Byrd and Williams 2007). Four populations totaling approximately 143 "clumps" are located on Mount Reed on Adak Island, where they occur on east-facing slopes having steep cliffs, rock outcrops, and vegetated gullies and ledges. The fern grows in moderately protected, moist spots in crevices beneath overhangs and at the edge of vegetation mats along rock walls (USFWS 2011f).

After review of existing information prior to the field work, it was determined that the only site in the study area with potential habitat for Aleutian shield fern was C1-01. The rocky areas at Site C1-01 contain the "dwarf shrub mat" habitat type described in Section 4.1.5. No Aleutian shield fern plant was found during a survey of Site C1-01 in September 2011. In addition, Site C1-01 lacks certain preferred habitat elements, including the steep ledges and overhangs.

4.2.2 Candidates for Federal Listing

Candidate species are plants and animals for which the USFWS has enough information on their status and the threats they face to propose them as threatened or endangered, but developing a proposed listing rule is precluded by higher priority listing actions. This is commonly called "warranted but precluded" from listing under ESA. Candidate species do not receive legal protection under the ESA. The USFWS undertakes and publishes an annual Candidate Notice of Review, which is an appraisal of the current status of plants and animals considered candidates for protection under the ESA. The most recent review was released on October 25, 2011 (USFWS 2011g). A "listing priority number" (LPN) is assigned to each candidate species by the USFWS. The LPN ranges from 1 to 12, depending on the magnitude of threats to the species, immediacy of threats to the species, and its taxonomic status. The lower the LPN, the higher the listing priority (that is, a species with an LPN of 1 would have the highest listing priority). In the year following the release of the 2011 review, USFWS is anticipating having only the financial resources to complete listings for those species ranked 1 or 2. Three candidate species have some potential to occur in the vicinity of Adak: Kittlitz's murrelet, yellow-billed loon, and Pacific walrus. Below, each species is discussed in more detail, including the 2011 LPN.

Kittlitz's Murrelet

The Kittlitz's murrelet is one of the three species that was targeted during the terrestrial surveys. No Kittlitz's murrelet adult or nest was found during the terrestrial surveys.

In 2011, USFWS changed the LPN for Kittlitz's murrelet from 2 to 8. The change in the LPN is based on uncertainty of the cause of low reproductive success of the species. It was previously thought there was a crucial association with tidewater glaciers, which are melting at a rapid rate. More recent evidence indicates Kittlitz's murrelet has also poor reproductive success in part of its range where there are no tidewater glaciers (such as the Aleutian Islands). Ongoing research by the USFWS is attempting to gather more information on this topic (USFWS 2011g).

Photo: USFWS/Alyson McNight

Kittlitz's murrelet is known to occur in the marine waters of Adak Island year round and also to nest on the island. It is considered common in spring, uncommon in summer, and rare in the fall and winter (Appendix C). Kittlitz's murrelet does not typically occur in marine waters adjacent to Adak during the winter, and none was recorded during intensive surveys conducted in 1993, 1994, and 1995 (Meehan 1996). The number of murrelets (Kittlitz's and marbled, which are difficult to distinguish) in marine waters peak in early June and then

again in early to mid-September. The June peak is likely associated with preparation for nesting activity. The onset of incubation is likely from early to mid-June; juvenile birds then fledge in mid-August. In September the peak number in marine water marks the shift of juveniles from their land-based nests to foraging sites.

On Adak Island, nests are likely associated with steep, boulder-strewn or scree-covered slopes free of snow (Meehan 1996, Kaler and Kenney 2012). Kittlitz's murrelet is extremely secretive and well camouflaged during nesting, and, as a result, little has been learned about the species until very recently. Kittlitz's murrelet nests known from other locations typically occur in the elevation range of 230 to 1,070 meters, on a mean slope of 40 degrees, in vegetative cover of less than 10 percent, facing a northerly direction, within 600 meters (1,970 feet) of a stream, situated on the downhill side of a rock at least as large as a murrelet, and not far from the top of a mountain or prominent ridgeline (Day et al. 1983). Portions of Mount Moffett (non-Parcel 4 areas) were searched during the fall of 2010 by a USFWS crew. However, Mount Reed is the only location on Adak where nests have been located during searches in 2010, 2011 and 2012 (Kaler 2011, Kaler and Kenney 2012).

Pedestrian surveys were conducted during September and October 2011 field work to identify suitable Kittlitz's murrelet nesting habitat within OU B-2 sites. Pedestrian reconnaissance-level surveys identified some areas of Site C1-01 with potentially suitable Kittlitz's murrelet nesting habitat. The approximate boundaries of suitable habitat are shown on Figure 4-8. However, habitat at C1-01 lacks the characteristic steep, high elevation talus slopes of nest sites found on Mount Reed. A small area in the northwest portion of Site SA93-01 was also searched, but was considered unlikely to be suitable habitat because it was mostly bare ground rather than rock and at the very low end of the known species elevation range.

Pedestrian surveys were conducted during the June 2012 field work within the C1-01 site boundary to search for Kittlitz's murrelet nests. This was considered an appropriate time of year to find active nests if any were present, and some were found on Mount Reed by USFWS biologists during this time (Kaler and Kenney 2012). The area surveyed for nests in 2012 is shown on Figure 4-8. Two biologists traversed the entire survey are by foot at approximately 100 to 150-foot intervals. No Kittlitz's murrelet adults or suspected nests were observed. Furthermore, the habitat conditions in C1-01 were reviewed with USFWS biologist Robb Kaler, who has observed numerous Kittlitz's murrelet nests on other parts of Adak. Based on the results of the surveys and the discussion with Robb Kaler, it is unlikely they nest within the RAA boundary.

As of 2009 only 43 active nest sites had been documented for Kittlitz's murrelet (Kaler et al. 2010). Because this species is not well known, it is possible that the definition of suitable nesting habitat could be expanded in the future. The USFWS is actively researching this species and its habitat each summer. If an expanded definition of Kittlitz's murrelet nesting habitat is identified, additional areas of OU B-2 sites may need to be surveyed.

Photo: C1-01 from Mitchell Creek. URS/Jennifer Pretare

In July 2011 the USFWS and Center for Biological Diversity reached a legal agreement that the USFWS would issue a Proposed Rule (to list Kittlitz's murrelet under the ESA) or a not-warranted finding (not list it under the ESA) to the *Federal Register* for Kittlitz's murrelet no later than the end of the fiscal year 2013. The ESA branch of USFWS in Anchorage, Alaska, has confirmed that they are expecting Kittlitz's murrelet either to be listed as threatened or endangered or removed from the candidate list by the end of 2013 (Lance 2012).

Yellow-Billed loon

The 2011 LPN for yellow-billed loon is 8. The yellow-billed loon is a migratory bird. Solitary pairs breed on lakes in the arctic tundra of the United States, Russia, and Canada from June to September. During the remainder of the year, the species winters in more southern coastal waters of the Pacific Ocean and Norway and the North Sea (USFWS 2011g). On Adak, the yellow-billed loon is considered a casual visitor (not annual; only a few records), which may occur in any of the four seasons (Appendix C). In the Aleutians, they are considered rare in fall, winter, and spring (Gibson and Byrd 2007) and not at all during the summer. They have typically been observed in nearshore and inshore waters (Gibson and Byrd 2007). The species occurs only in the marine environment (or bays and lakes) and not in the terrestrial environment.

Photo: ADF&G

Pacific Walrus

Photo: USFWS/Joel Garlich-Miller

Pacific walrus was added to the list of candidates in early 2011 and has an LPN of 9. The Pacific walrus is found throughout the continental shelf waters of the Bering and Chukchi seas and occasionally in the East Siberian Sea and the Beaufort Sea. During spring, most of the population, including females and calves, migrates from the Bering Sea into the Chukchi Sea, where they form mixed groups along the southern edge of the pack ice. As summer sea ice recedes, walrus may haul out onshore on Wrangel Island in the Russian Federation and other islands and along the Chukchi Sea coast. The Pacific walrus is as an ice-dependent species, because it uses floating sea ice as a substrate for birthing and nursing calves, resting, isolation from predators, and passive transport to new feeding areas. Pacific walrus also use terrestrial haul-outs located in close proximity to areas suitable for feeding. Pacific walrus may occur occasionally in the waters near Adak during migratory phases.

4.3 OTHER SPECIAL STATUS SPECIES

This includes species protected or monitored under other federal and state regulations. In addition, three plants are discussed that have no mandated protection, but are tracked by the ANHP because of their rarity in Alaska.

Bald Eagle

Photo: Adult and juvenile bald eagle on Adak. URS/Jan Novak.

The bald eagle is one of the three species that was targeted during the terrestrial surveys. One pair of bald eagles was observed in the vicinity of SA93-01.

The bald eagle is protected under the Bald and Golden Eagle Protection Act (Section 301). The bald eagle is a common breeding resident on Adak. In the late 1970s and early 1980s, the Aleutian population included at least 360 breeding pairs. On Adak, high concentrations of eagles were greatly reduced when the size of established human communities declined. For example, Christmas bird counts on Adak went from 225 in 1993 to 21 in 1994 and 37 in 1997 (Gibson and Byrd 2007). As recently as 2008, the combined population of bald eagles on Unimak and Adak Islands was thought to be around 17 breeding pairs (Byrd and Williams 2008).

At the present time, bald eagles can be seen commonly around the refuse station on Adak and also where streams empty into Andrew Lake. In the Aleutians, nest building can occur as early as January, with egg laying from March to May (peak mid-April) and first hatching in early May. Fledging then occurs from early July to late August. Bald eagles occur in all habitat types on Adak, but tend to be more frequent in coastal areas where they also nest (Scharf et al. 1996). There are no nests to the west of Andrew Bay along the marine coastline. The nearest previously recorded nest to OU B-2 sites is on the east side of Andrew Bay, located on a sea stack formation offshore to the north and west of SA93-01 (USFWS 2012). Most of the bald eagle nesting sites on Adak have been established for decades (Williams 2012b).

Surveys were conducted for bald eagle nests during June 2012 at C1-01 and SA93-01. No evidence of nesting was observed in or adjacent to C1-01 from the Andrew Bay shoreline. One pair of bald eagles was observed at the southwest corner of the SA93-01 site boundary. One of the pair was observed perching within a rock outcrop area approximately 250 feet above sea level. This individual was stationary at this location for at least an hour of observation. The location could have been a nest, but this was not confirmed. A second bald eagle was observed a couple of hundred feet to the north, perched on a steep grassy slope. This bird was also stationary during the survey.

Stoloniferous Pussytoes

Stoloniferous pussytoes (*Antennaria dioica*) is a small, tufted perennial plant that is distributed across northern Asia and Europe. In North America, it is only found in the central and east Aleutian Islands (Hulten 1968). The plant was observed in September 2011 at Site C1-01 growing on a rocky slope with Alaska cassiope, coiled sedge, mountain harebell, and alpine azalea. Stoloniferous pussytoes has a global status of G5 and a state status of S2/S3. G5 means that the plant is demonstrably widespread, abundant, and secure globally, though it may be quite rare in parts of its range, especially at the periphery. S2/S3 indicates some uncertainty in the state rank. S2 means that the plant is imperiled in the state because of rarity or other factors making it very vulnerable to extirpation from the state, typically 6 to 20 occurrences. S3 means that the plant is rare or uncommon in the state, typically 21 to 100 occurrences.

Broad-Leaved Twayblade

Photo: Ben Legler/UW

Broad-leaved twayblade (*Listera convallarioides*) is an orchid that occurs in the Pacific Northwest and eastern Canada, but is only known in Alaska from a few isolated spots in the Aleutian Islands (Hulten 1968). The plant was observed once in September 2011 at Site MI-03 growing in an upland at the edge of the Moffett Creek Valley. Associated species include Bering's hairgrass, twinflower (*Linnaea*

borealis), crowberry, clubmoss (*Lycopodium clavatum*), wild geranium, and avens. Broad-leaved twayblade has a global status of G5 and a state status of S2. G5 means that the plant is demonstrably widespread, abundant, and secure globally, though it may be quite rare in parts of its range, especially at the periphery. S2 means that the plant is imperiled in the state because of rarity or other factors making it very vulnerable to extirpation from the state, typically only 6 to 20 occurrences. Broad-leaved twayblade was removed from the ANHP rare species list in 2012. It was determined that the species occurred commonly in Southeast Alaska, which changed its ranking to S4.

Aleutian Avens

Aleutian avens (*Sieversia pentapetala*) is a small, creeping perennial plant that is distributed across northern Asia. In North America, it is only found in the central and east Aleutian Islands (Hulten 1968). The plant was observed in June 2012 at Site SA93-03 growing in a wetland with grassyslope arctic sedge (*Carex anthoxanthea*), avens (*Geum calthifolium*), northern asphodel (*Tolfieldia coccinea*), alpine bistort (*Polygonum viviparum*), and common horsetail (*Equisetum arvense*). Aleutian avens has a global status of G3/G4 and a state status of S2/S3. G3/G4 indicates some uncertainty of global rank. G4 means the plant is apparently secure, but G3 means the plant could be vulnerable. S2/S3 indicates some uncertainty in the state rank. S2 means that the plant is imperiled in the state because of rarity or other factors making it very vulnerable to extirpation from the state, typically 6 to 20 occurrences. S3 means that the plant is rare or uncommon in the state, typically 21 to 100 occurrences.

4.4 NONLISTED SPECIES

The following section describes "typical" fish and wildlife observed on Adak. Because of Adak Island's harsh climate conditions and relative lack of vegetative structure, the diversity of wildlife inhabiting the island is fairly low. However, these species groups together characterize the wildlife assemblage found in and around Adak.

4.4.1 Avian Community

The bird community of Adak Island is large, diverse, and varies greatly by season. At least 195 species have been identified on Adak. A list of species is included in Appendix C (USFWS 2010).

Adak and the Aleutian Islands provide nesting sites for millions of seabirds, and migrant birds occur in different seasons from Asia, the Pacific, and North America (Gibson and Byrd 2007). The timing of the bird breeding season on Adak is variable, but can generally be considered May

through August. During 1993 through 1995, breeding birds were surveyed on Adak (Scharf et al. 1996). Thirty-eight species were recorded, and an additional six species were recorded in previous years. Of these, only 19 species were "regular" breeders, or species that could be seen every year. Lapland longspur (*Calcarius lapponicus*) was the most abundant species in all habitats (except beaches). Also common around developed areas is the snow bunting (*Plectrophenax nivalis*). Song sparrows (*Melospiza melodia*) are the major inhabitants of the dense vegetation lining creek beds, and rock ptarmigan (*Lagopus muta*) inhabit the hillside areas near Mount Moffett. The beach fringes at the mouth of the major creeks provide foraging opportunities for several species of birds, including the bald eagle, common raven (*Corvus corax*), several species of gulls, rock sandpiper (*Calidris ptilocnemis*), gray-crowned rosy-finch (*Leucosticte tephrocotis*), and winter wren (*Troglodytes hiemalis*) (USFWS 1995a, and 2010). In wetlands, green-winged teal (*Anas crecca*) and mallard (*Anas platyrhynchos*) were the most commonly observed species, followed by greater scaup (*Aythya marila*), harlequin duck (*Histrionicus histrionicus*), and red-breasted merganser (*Mergus serrator*). Regularly observed shorebirds included black oystercatcher (*Haematopus bachmani*), semipalmated plover (*Charadrius semipalmatus*), and red-necked phalarope (*Phalaropus lobatus*). Other common species include glaucous-winged gull (*Larus glaucescens*), northern pintail (*Anas acuta*), pelagic cormorant (*Phalacrocorax pelagicus*), and pigeon guillemot (*Cepphus columba*).

4.4.2 Mammals

No terrestrial mammals are endemic to Adak. Caribou (*Rangifer tarandus*) and brown (Norway) rats (*Rattus norvegicus*) are introduced species. Red fox (*Vulpes vulpes*) used to occur as an introduced species on Adak, but have extirpated (Bailey 1993). Table 4-2 has a list of potential mammals (terrestrial and marine) that may occur at Adak. Marine mammal's habitat and abundance is from Appendix E (USFWS 2011c) and may not be consistent with information present in Appendix J in all cases.

Caribou were introduced to Adak in the 1950's (USFWS 2011h). Caribou can travel long distances and range widely during the year. On Adak, a 2005 survey by USFWS counted 2,751 individuals, with the majority occurring in the southern portion of the island (south of town). Only 34 were counted north of town (USFWS 2011i). Caribou bones of an undetermined age were observed on SA93-01 during fall 2011 field work. Caribou scat was observed on C1-01 during 2012. Hunting of caribou on Adak is allowed under Alaska Department of Fish and Game (ADF&G) regulations and occurs regularly.

The distribution of brown rats on Adak is unknown. However, they are presumed to occur primarily in the vicinity of town. Small mammal trapping was conducted by USFWS in 1994, and brown rat was the only species caught. No shrew or other native small mammal was caught (USFWS 1995a). Some Aleutian Islands have native mammals, such as tundra vole (*Microus*

oeconomus) (Appendix D). However, it is thought that the Aleutian Islands west of Amukta Pass are absent of native terrestrial mammals (Bailey 1993). Some species, such as European rabbit (*Oryctolagus cuniculus*), were introduced on nearby Kanaga (9 miles west), but there is no record or observation that indicates that they were introduced on Adak (USFWS 1995a).

Marine mammals found in the bays and harbors of Adak Island, both year round and on a migratory basis, include the harbor seal (*Phoca vitulina*), killer whale (*Orcinus orca*), harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), sperm whale, Baird's beaked whale (*Berardius bairdii*), goose-beaked whale (*Ziphius cavirostris*), gray whale (*Eschrichtius robustus*), minke whale (*Balaenoptera acutorostrata*), fin whale, humpback whale, northern sea otter, and northern sea lion (USFWS 1995a and 2011c) (Appendix E).

Domestic cats and dogs also occur on Adak near residential areas.

4.4.3 Reptiles and Amphibians

No terrestrial reptiles or amphibians are known to occur on Adak. There are four species of marine turtle that range worldwide and may occupy waters off Alaska's coast (Table 4-3). All would be considered very rare in Alaska or the Aleutians. The green sea turtle has been seen 15 times since 1960 in Alaska. Most prior to 1993 were dead turtles (ADF&G 2011). Nineteen leatherback turtles have been reported in Alaska between 1960 and 2007. Prior to 1993, they were the most common sea turtle species in Alaskan waters (ADF&G 2011). Though rare in Alaska, loggerhead sea turtles occasionally visit Gulf of Alaska coastal waters. They have been reported in Alaska only twice between 1960 and 2007 (ADF&G 2011). Olive Ridley sea turtles have been reported in Alaska three times between 1960 and 2007 (ADF&G 2011).

NOAA Fisheries considers Alaska outside of the known distribution for all except the leatherback turtle. The Aleutians, including Adak, would be considered the extreme northern edge of the known leatherback turtle worldwide distribution (NOAA 2011b).

4.4.4 Freshwater Invertebrates

No invertebrate survey was conducted as part of this delivery order. The results discussed here are from freshwater invertebrate sampling done by USFWS in 1994 (USFWS 1995a). Invertebrates were sampled in streams by four methods: a Surber sampler, a kick net, systematic sampling with artificial substrates (rocks), and opportunistic sampling. In general, the surveys showed a large number of organisms from a few species. One hundred and eighteen taxa were identified. However, most are only to the family level (the taxonomic level above genus). Most of the common insect orders were represented in the samples (Diptera—flies; Coleoptera—beetles; Emphemeroptera—mayflies; Hemiptera—true bugs; Homoptera—cicadas, hoppers,

whiteflies and aphids; Hymenoptera – bees and ants; Lepidoptera – moths and butterflies; Orthoptera—grasshoppers, cockroaches, and walkingsticks; Plecoptera—stoneflies; and Tricoptera—caddisflies). There was also a smaller number of Arachnids, such as spiders, ticks, and mites.

4.4.5 Marine Plants and Invertebrates

Land-based marine observation surveys were conducted as part of this delivery order, but not dive or boat surveys. The results presented here are a summary of dive surveys conducted by the USFWS in 1994 (USFWS 1995a). The dive surveys were done across 100-meter transects perpendicular from the shore, with data recorded every 10 meters (USFWS 1995a). The locations of the transects are shown on Figure 4-9 and are as follows: Airport Beach, Sweeper Cove, Sweeper Creek, Palisades, Metals Landfill North, Finger Bay, Andrew Lake, Metals Landfill South, Clam Lagoon West, and Clam Lagoon East. During the surveys, prominent plant and animal species were recorded, and samples of invertebrate species were collected opportunistically for identification.

Excluding fish and marine mammals recorded during the surveys, 11 species of marine plants and 38 species of marine invertebrates were recorded. A list of species is provided in Table 4-4. One transect located in Andrew Lake was the only freshwater transect. The only species recorded along this transect was an unidentified green algae.

4.4.6 Marine and Anadromous Fish

No fish sampling was conducted as part of this delivery order, but visual inspection of streams did occur. The results presented here are a summary of freshwater fish surveys conducted by the USFWS in 1993 and 1994 (USFWS 1995b) and nearshore marine fish surveys conducted by U.S. Geological Survey (USGS) in 2006 (USGS 2011) and NOAA in 2005 (NOAA Fisheries 2011c). A complete list of fish species from these surveys is presented in Table 4-5.

A collaborative forage fish ecological study survey conducted by USGS and USFWS along the Aleutian Archipelago during the summer of 2006 captured at least 32 species of nearshore fishes using a beach seine in the Aleutian Islands (USGS 2011). Pacific sand lance (*Ammodytes hexapterus*) were the most frequently encountered species, followed by pink salmon (*Oncorhynchus gorbuscha*), and northern rock sole (*Lepidopsetta polyxystra*). More than 80 percent of beach seine tows were conducted in the Andreanof Islands, where the nearshore catch was dominated by Gadids (cods, hakes, and pollocks), juvenile pink salmon, and Pacific sand lance. The USGS also collected several other nearshore forage fishes including several species in Salmonidae (salmon), Hexagrammidae (greenlings), Cottidae (sculpins), Pholidae (gunnels), Trichodontidae (sandfish), and Pleuronectidae (flatfishes) families.

The Nearshore Fish Atlas of Alaska (NOAA Fisheries 2011c) contains Aleutian Island sites on Akun and Unalaska Islands with kelp bed and large cobble substrate. The Akun Island site is located on Lost Harbor and has direct exposure to the Bering Sea, similar to Andrew Bay. These are the closest sites to Adak Island that are included the Nearshore Fish Atlas database. Online photos verified that the substrate habitat is also quite similar to Andrew Bay, high energy cobble substrate beach with nearshore kelp zone.

The kelp beds were sampled during June 2005 at Akun and Unalaska Islands. Fish species present at this site included juvenile pink salmon, juvenile chum salmon (*Oncorhynchus keta)*, juvenile flatfish, juvenile cod, juvenile sculpin, Dolly Varden, Pacific sandfish (*Trichodon trichodon*), Pacific sand lance, rock sole (*Lepidopsetta* spp.), silverspotted sculpin (*Blepsias cirrhosus*), frog sculpin (*Myoxocephalus stelleri*), armored sculpin (*Leptocattus armatus*), red Irish lord (*Hemilepidotus hemilepidotus),* rock greenling (*Hexagrammos lagocephalus*), masked greenling (*Hexagrammos octogrammus*), starry flounder (*Platichthys stellatus*), snake prickleback (*Lumpenus sagitta*), and crescent gunnel (*Pholis laeta*). Many additional pelagic fish species are likely to occur in the waters near Adak Island that have not yet been identified.

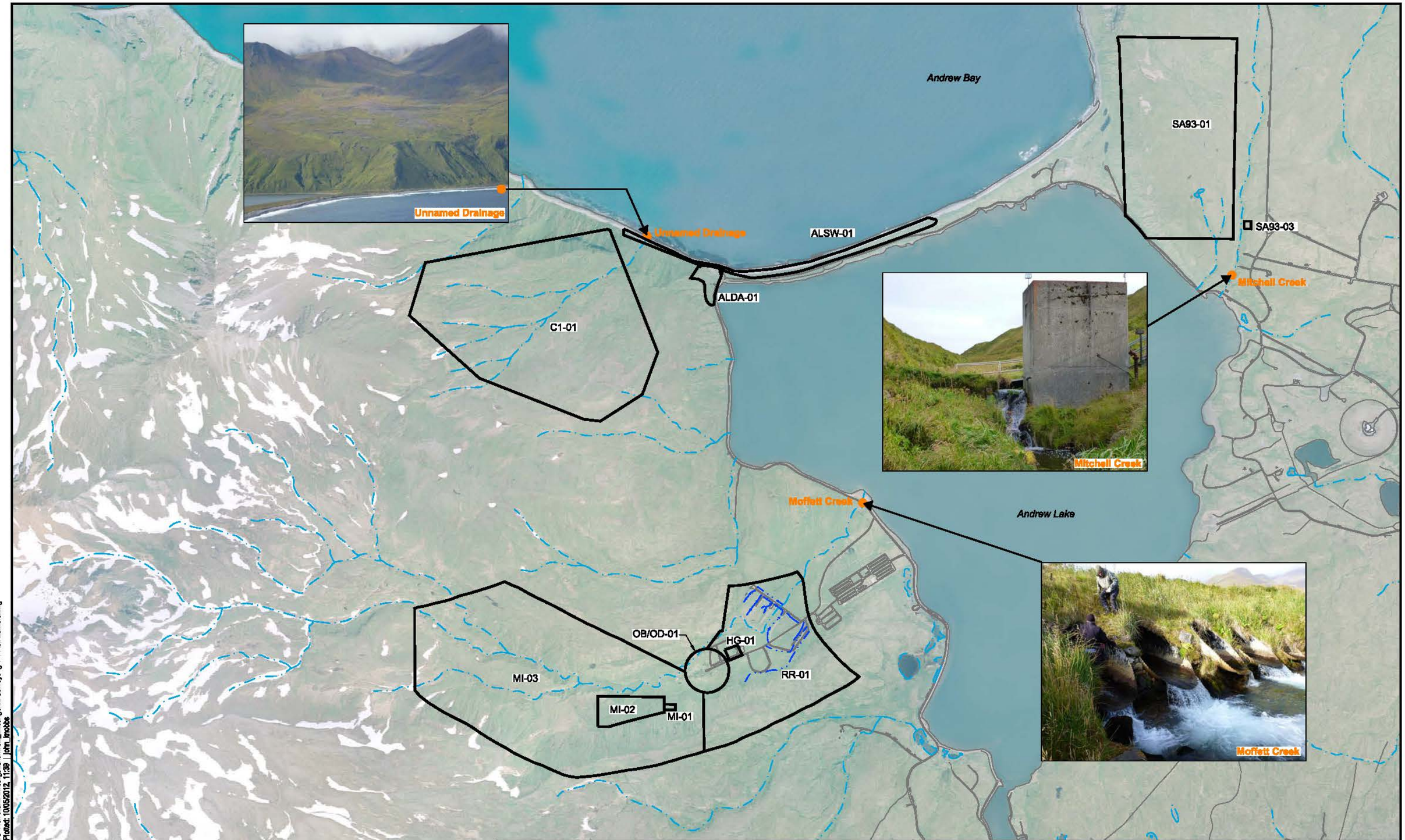
The beach seine catch during the June 2005 sampling period was dominated by juvenile pink salmon, Pacific sandfish, and Pacific sand lance.

In Andrew Lake, known species include pink salmon, sockeye (kokanee) salmon (*Oncorhynchus nerka*), and coho salmon (*Oncorhynchus kisutch*) (USFWS 1995b). Chum salmon (*Oncorhynchus keta*) are known to occur elsewhere on Adak. Pink salmon are the most common. No salmon were observed in any of the creeks draining to Andrew Lake during fall 2011 or June 2012. Elsewhere on Adak, pink salmon were observed spawning during fall 2011, indicating that was an appropriate time of year to see them.

Photo: Pink salmon on Adak, outside the OU B-2 sites. URS/Jennifer Pretare

Some small (2 inch) fish were observed in Moffett Creek during the stream assessment conduced in October 2011. The series of five culverts at the mouth of Moffett Creek may be acting as at least a partial fish passage barrier to migrating salmonids during low-flow conditions. The Andrew Lake spillway is also a potential fish passage barrier to salmonids entering Andrew Lake from the ocean. The Navy clears it once annually in late August or early

September, but winter storms fill the area with large rock and gravel. Please refer to the stream habitat section for more details on the physical stream habitat characteristics.



Legend:

Site Boundary

Stream (Existing Data)

Fish Passage Barrier

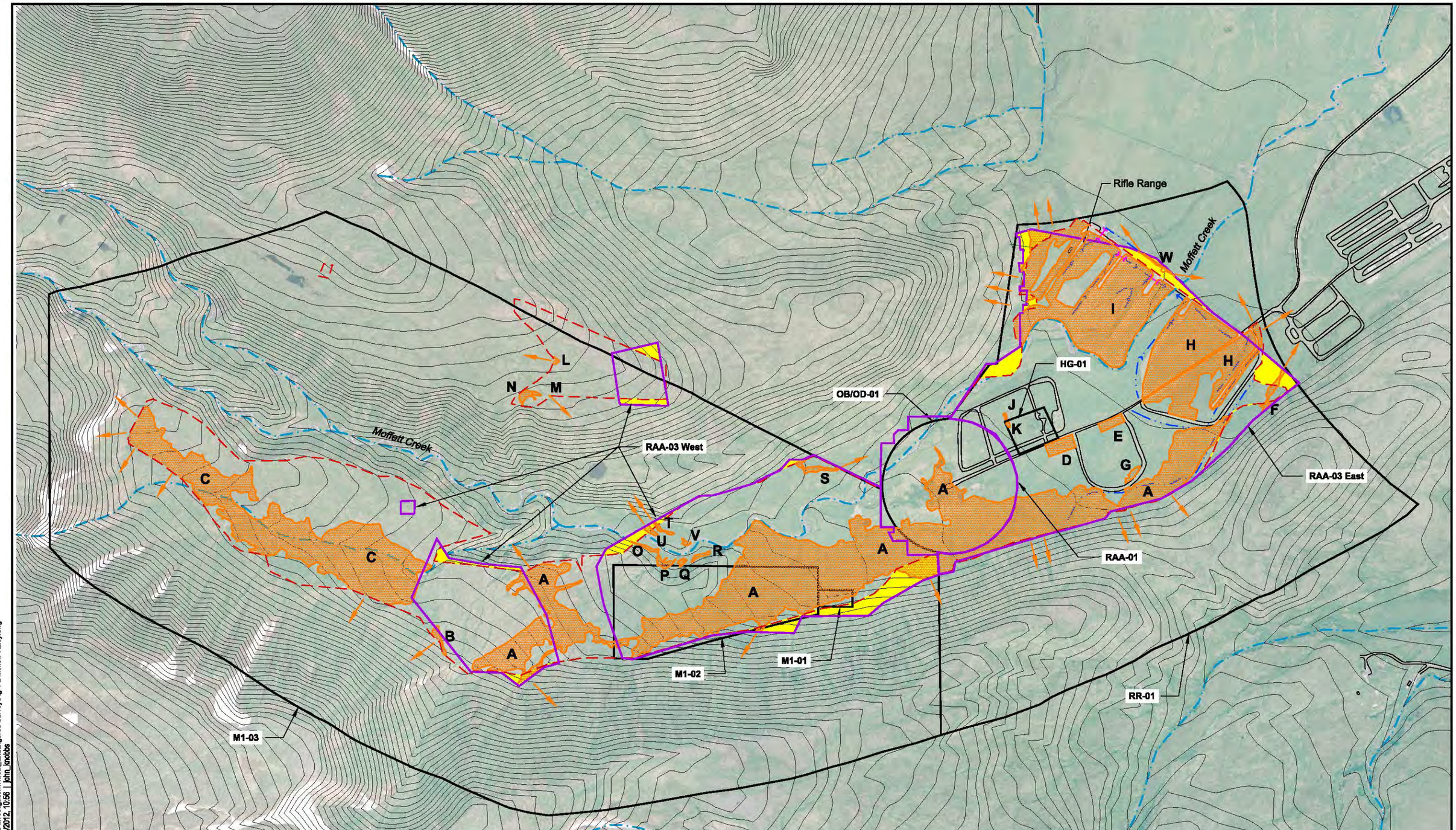
U.S. NAVY

Delivery Order 0041
Adak Island, AK
OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

0 1000 2000
SCALE IN FEET

Figure 4-1
Fish Passage Barriers

T:\ADAK\DIQ\Sub-Tasks\DO 41\Wetland Investigation\Threat_Endangered Survey\Fig 4-1 Fish Barriers.dwg
Mod: 07/05/2012, 08:32 | Plotted: 10/05/2012, 11:39 | John_Knobbs



Legend:

- Site Boundary
- 2011 Survey Area
- Remedial Action Area
- Stream (Existing Data)
- Drainage/Ditch (Field Observation)
- Road (Existing Data)
- 2012 Survey Area
- Culvert
- A Wetland
- Wetland Continues Beyond Survey Area

Note: Contours at 20-foot interval.

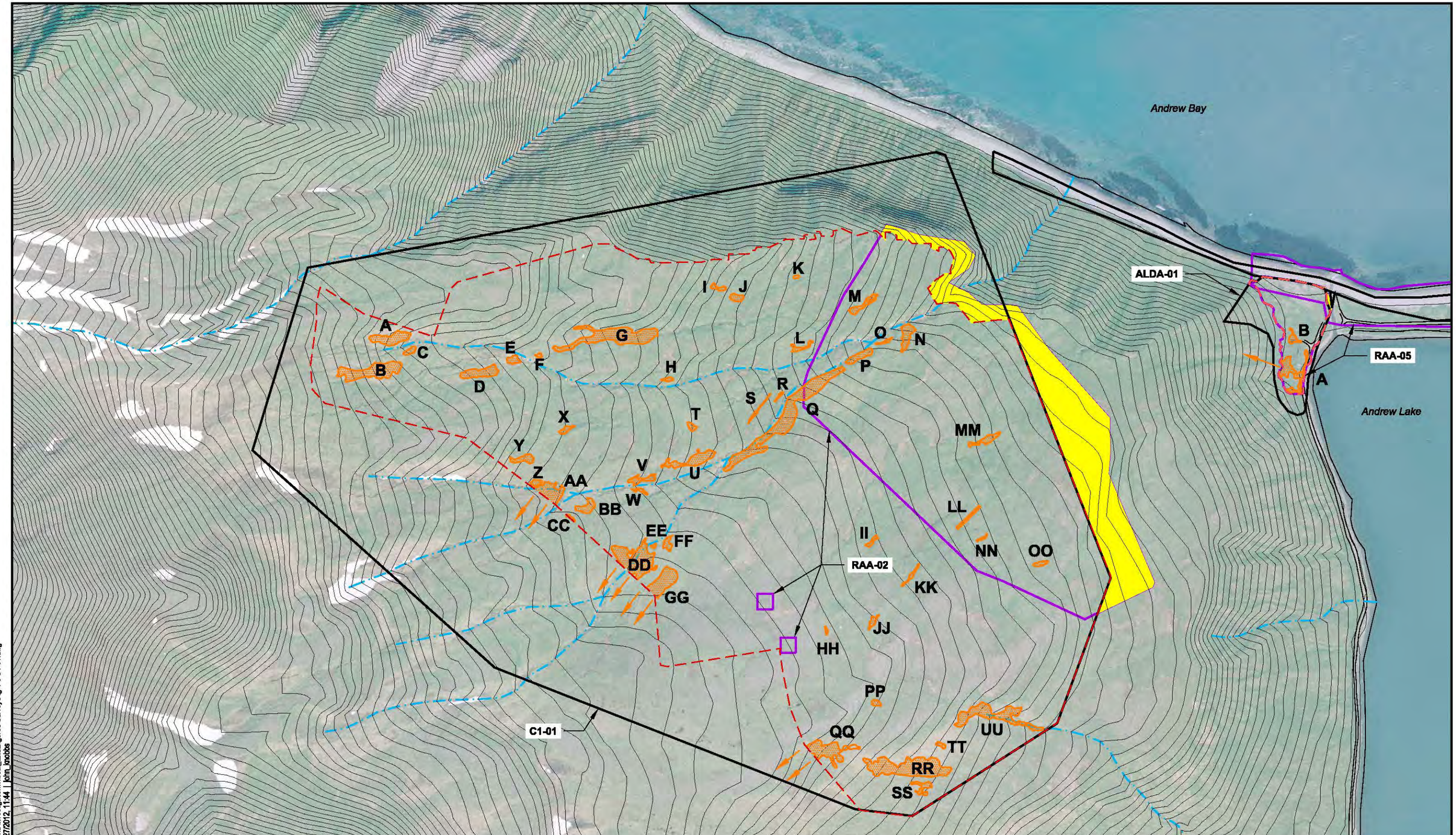
U.S. NAVY

Delivery Order 0041
Adak Island, AK
OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

0 300 600
SCALE IN FEET

Figure 4-2
Sites M1-01, M1-02, M1-03, OB/OD-01, HG-01, and RR-01

T:\ADAK\ID\Q\Sub-Tasks\DO 41\Wetland Investigation\Threat_Endangered Survey\Fig 4-2 Moffett Valley.dwg
Mod: 09/27/2012, 11:44 | Plotted: 10/23/2012, 10:56 | john_knobbs



Legend:

- Site Boundary
- 2011 Survey Area
- Remedial Action Area
- Stream (Existing Data)
- Drainage/Ditch (Field Observation)
- Road (Existing Data)
- 2012 Survey Area
- Culvert
- Wetland
- Wetland Continues Beyond Survey Area

Note: Contours at 20-foot interval.

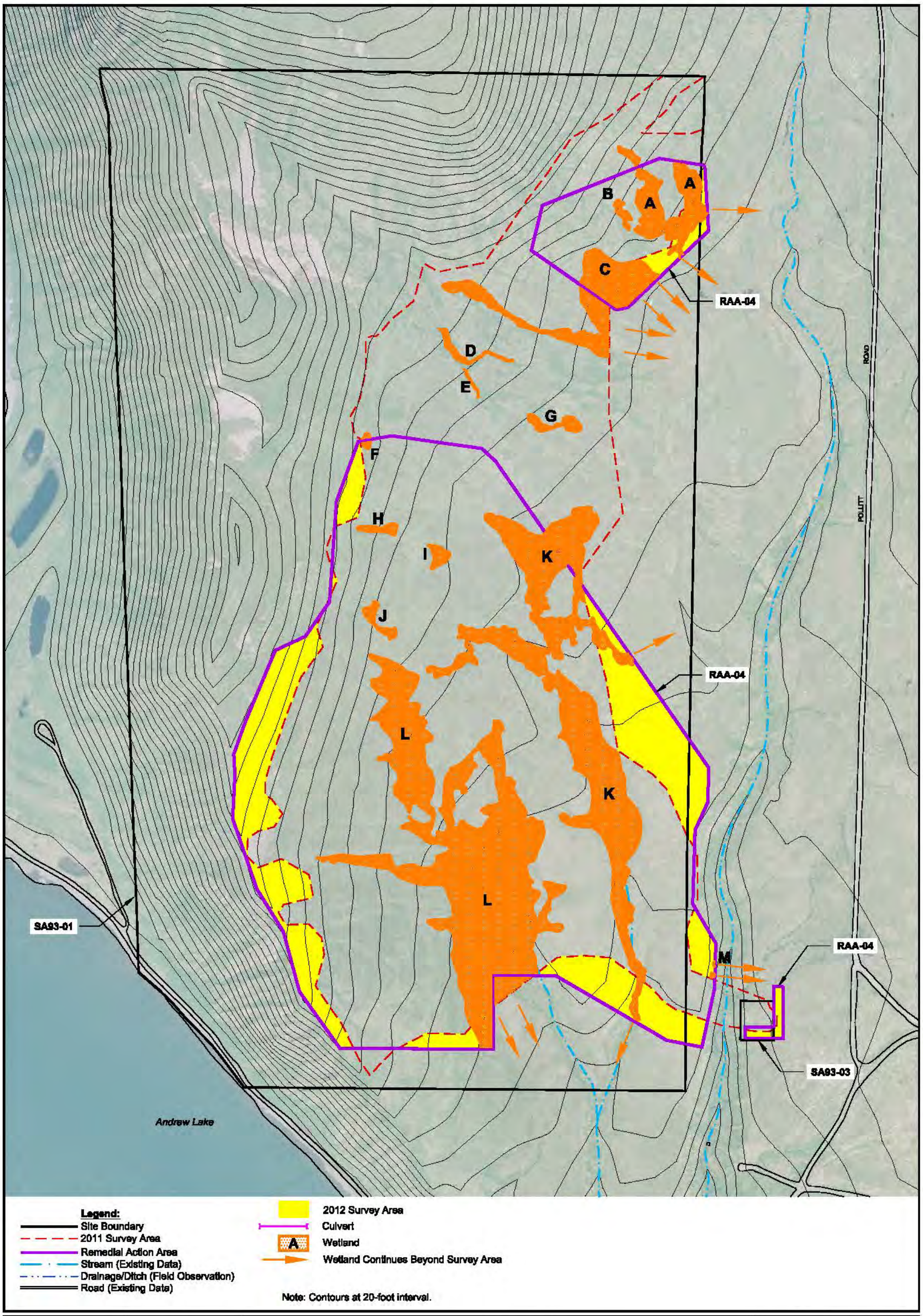
U.S. NAVY

Delivery Order 0041
Adak Island, AK
OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

0 300 600
SCALE IN FEET

Figure 4-3
Sites C1-01 and ALDA-01

T:\ADAK\ID\QSub-Tasks\DO 41\Wetland Investigation\Threat_Endangered Survey\Fig 4-3 C1-01.dwg
Mod: 09/25/2012, 09:56 | Plotted: 09/27/2012, 11:44 | john_knobbs



U.S. NAVY

0 200 400
SCALE IN FEET

Figure 4-4
Sites SA93-01 and SA93-03

Delivery Order 0041
Adak Island, AK
OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

T:\ADAK\DIQ\Sub-Tasks\DO 41\Wetland Investigation\Threat_Endangered Survey\Fig 4-4 SA 93.dwg
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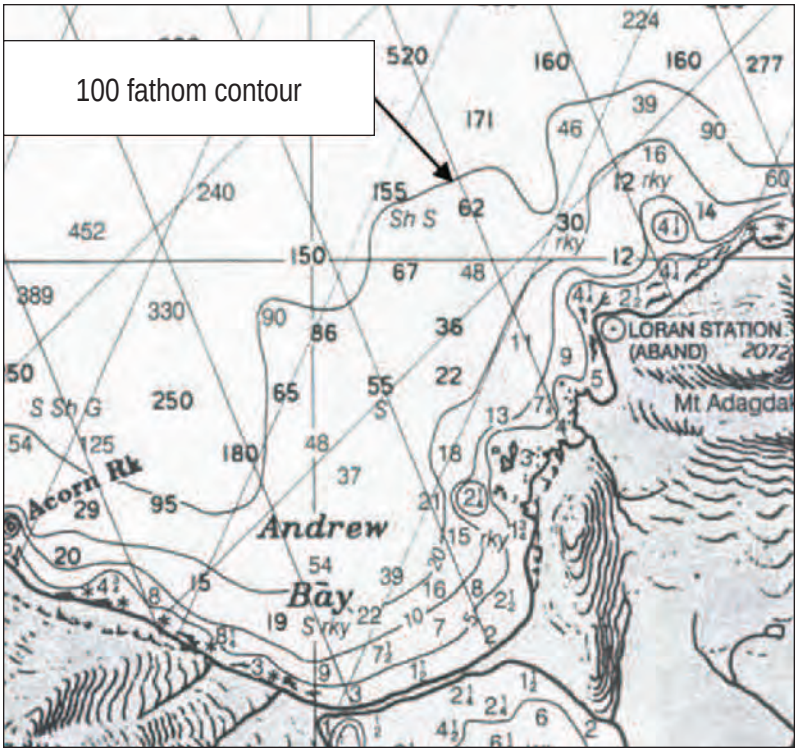
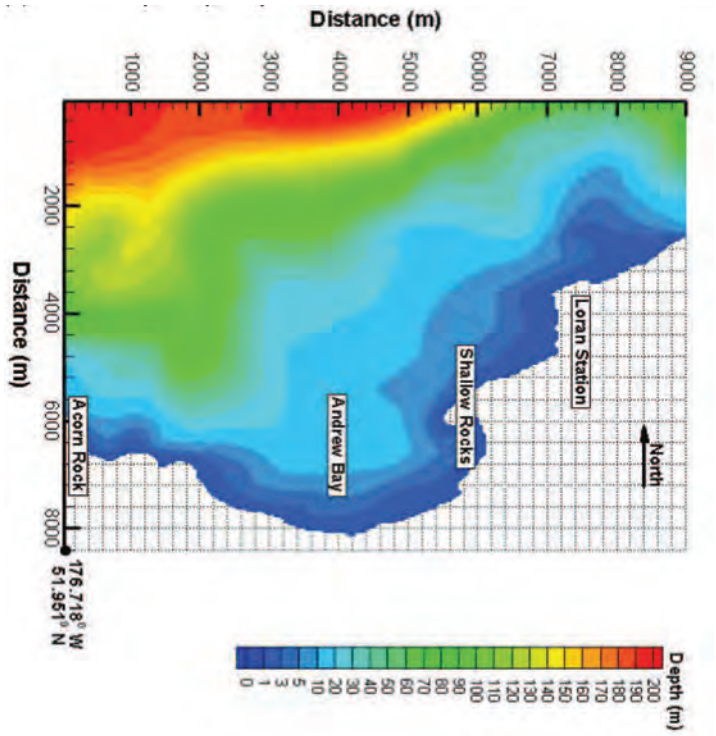
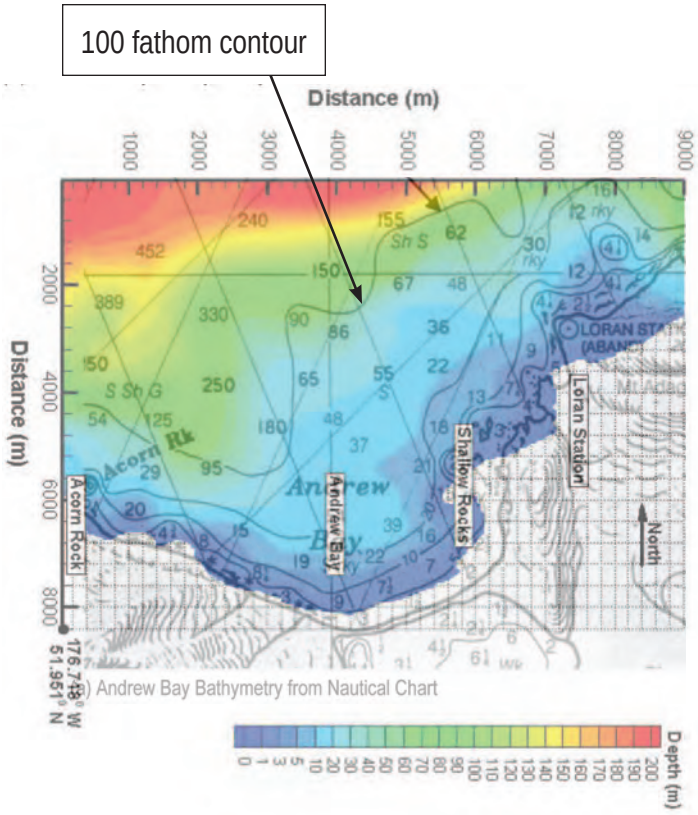


(a) Andrew Bay Bathymetry from Nautical Chart



(b) Model Bathymetry Presented in WHG 2002

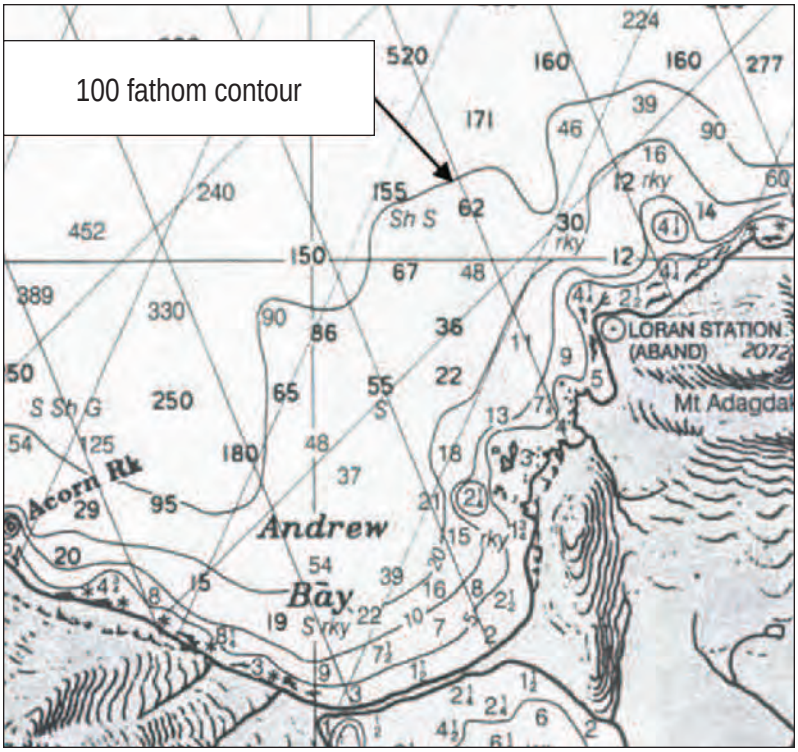


(c) Overlay of Contour Plots

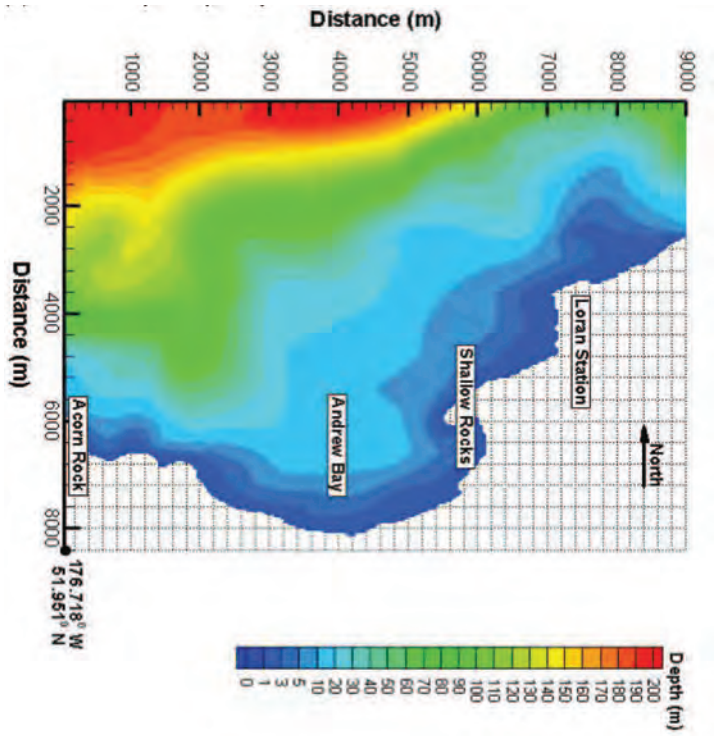
Source: U.S. Navy 2011b

U.S. NAVY	Figure 4-5 Andrew Bay Bathymetry	Delivery Order 0041 Adak Island, AK OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

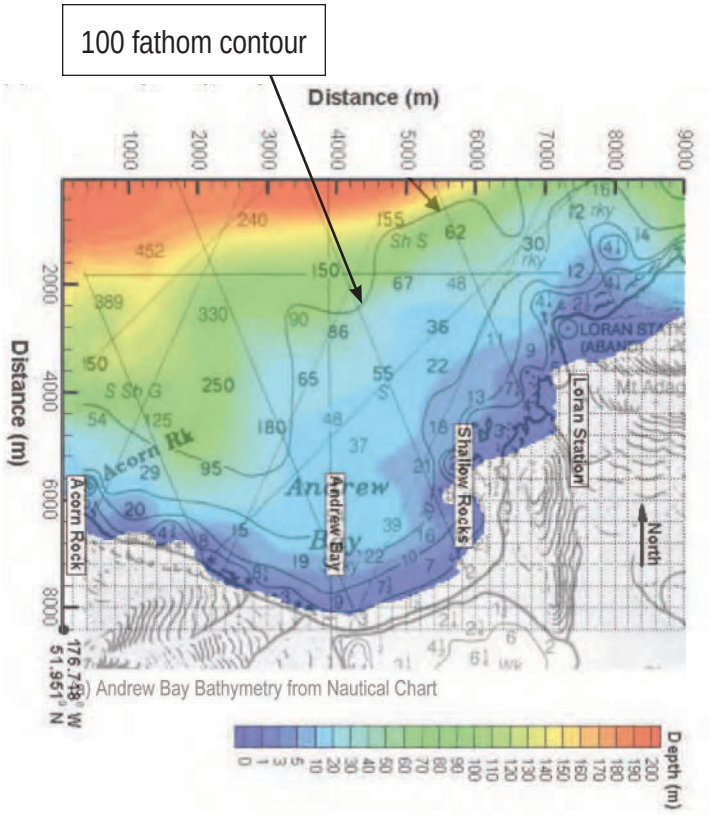
33762056_x.id



(a) Andrew Bay Bathymetry from Nautical Chart



(b) Model Bathymetry Presented in WHG 2002

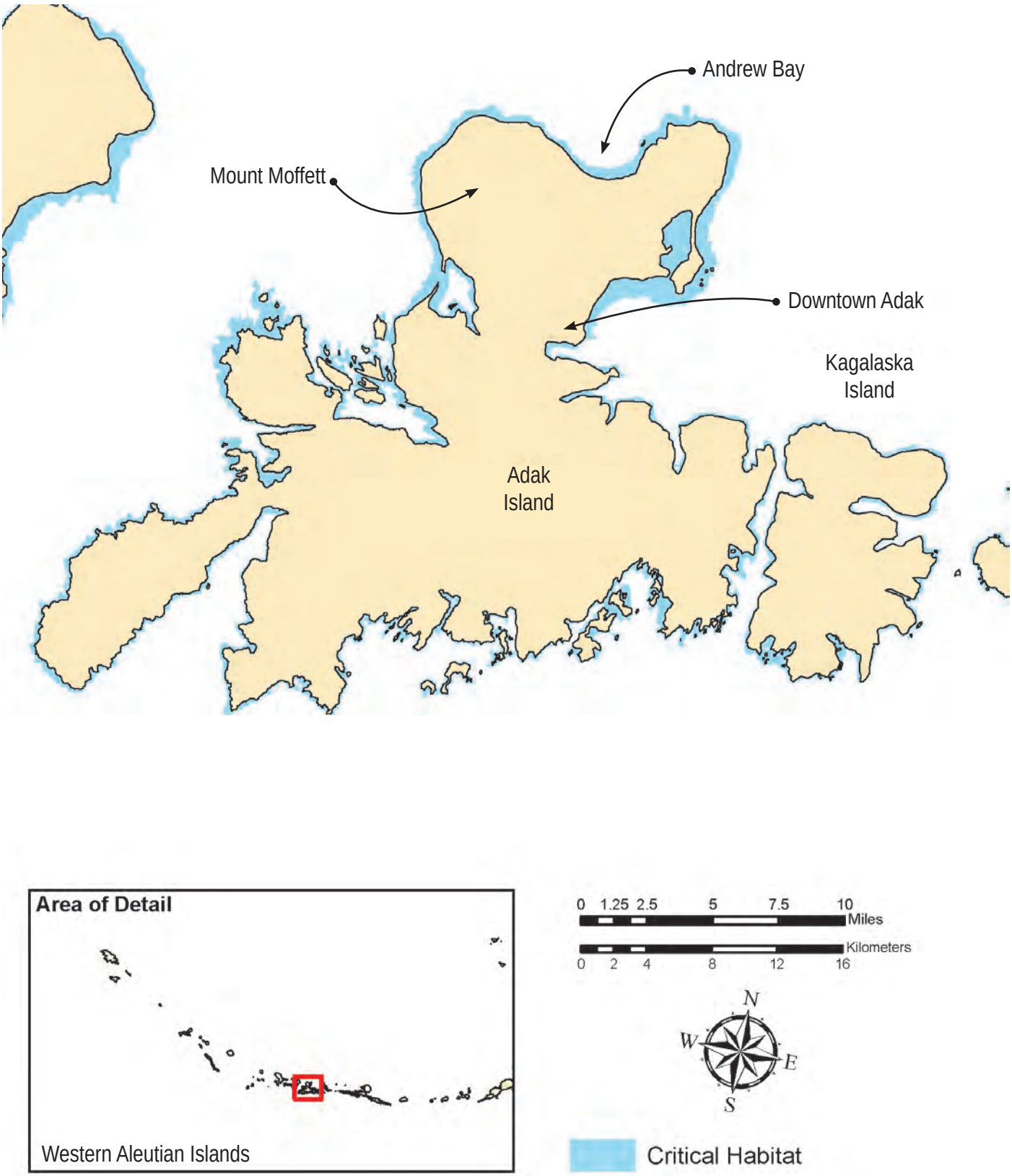


(c) Overlay of Contour Plots

Source: U.S. Navy 2011b

U.S. NAVY	**Figure 4-5** **Andrew Bay Bathymetry**	Delivery Order 0041 Adak Island, AK OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

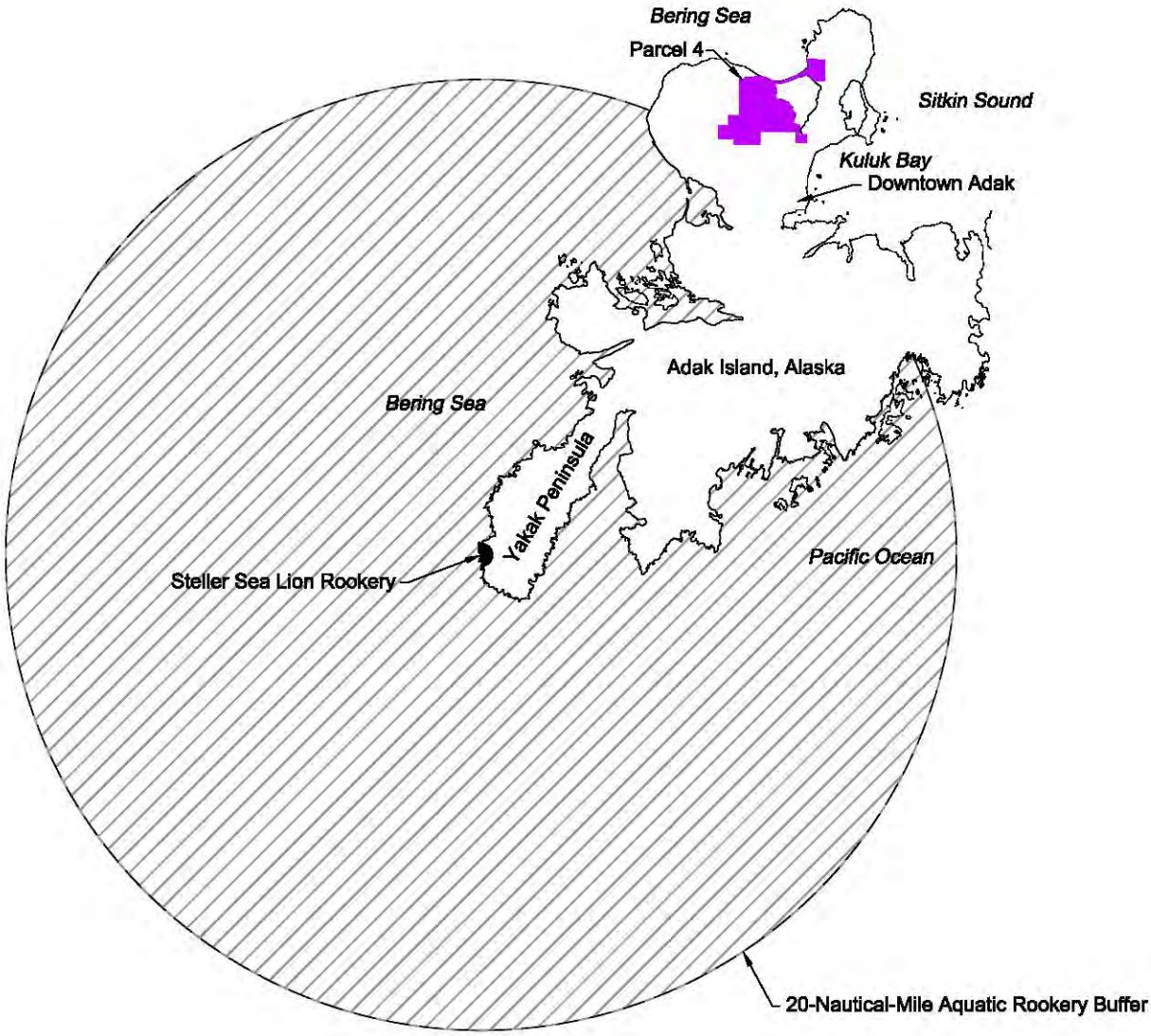
33762056_x.id



Source: USFWS 2011d

U.S. NAVY	Figure 4-6 Northern Sea Otter Critical Habitat Map	Delivery Order 0041 Adak Island, AK OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

33762056_x.id



Legend:

Area of 20-Nautical-Mile Aquatic Rookery Buffer

Area of 3,000-Foot Terrestrial Buffer

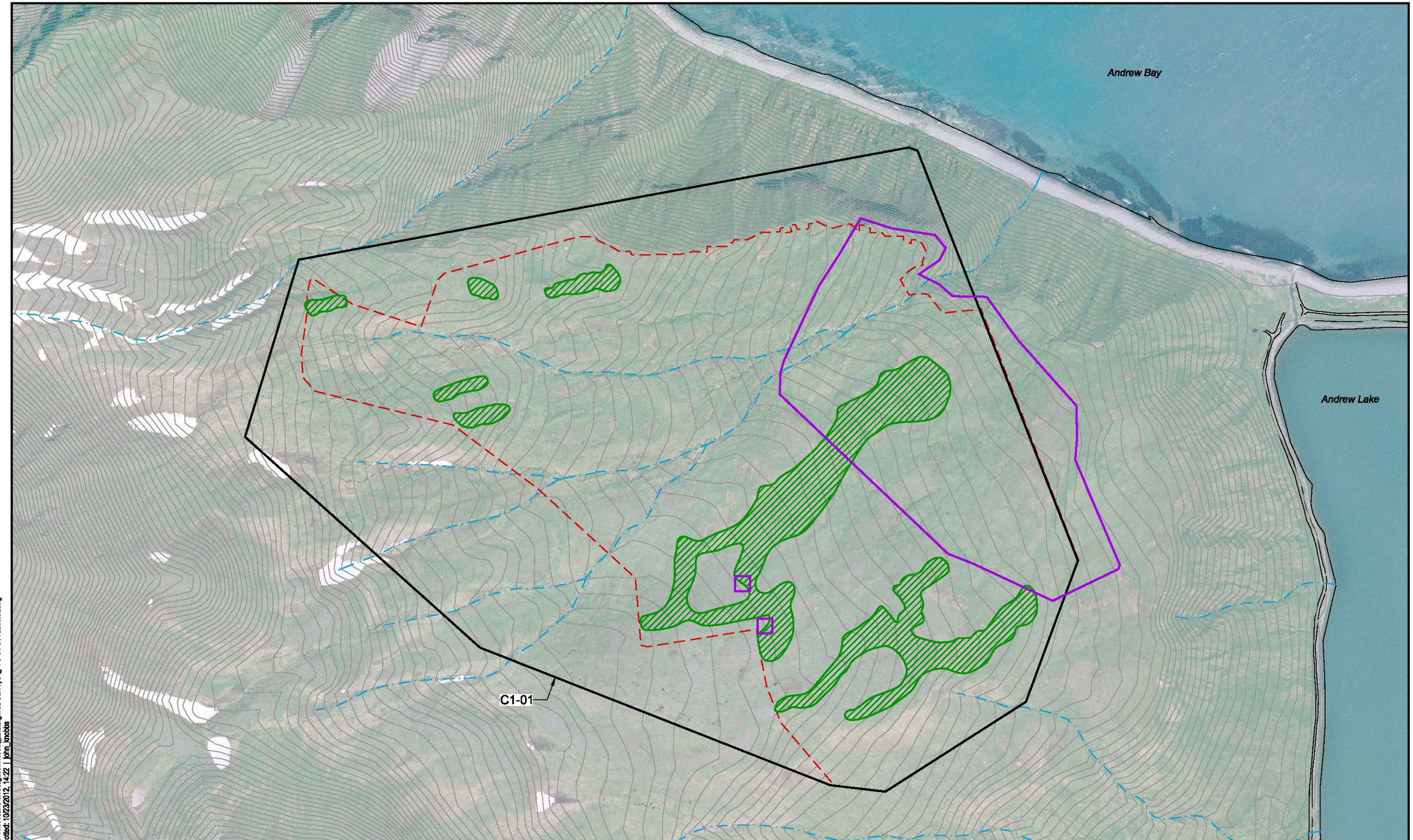
T:\ADAK\IDIQ\Sub-Tasks\DO 41\Wetland Investigation\Threat_Endangered Survey\Fig 4-7 Sea Lion Rook.dwg
Mod: 07/05/2012, 08:32 | Plotted: 10/05/2012, 11:38 | john_knobbs

U.S. NAVY

0 3.5 7
SCALE IN MILES

Figure 4-7
Steller Sea Lion Rookery and Critical Habitat

Delivery Order 0041
Adak Island, AK
OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY



Legend:
- Site Boundary
- 2011 Survey Area
- June 2012 Nest Survey Area (Remedial Action Area)
- Stream (Existing Data)
- Potentially Suitable Kittlitz's Murrelet Nesting Habitat

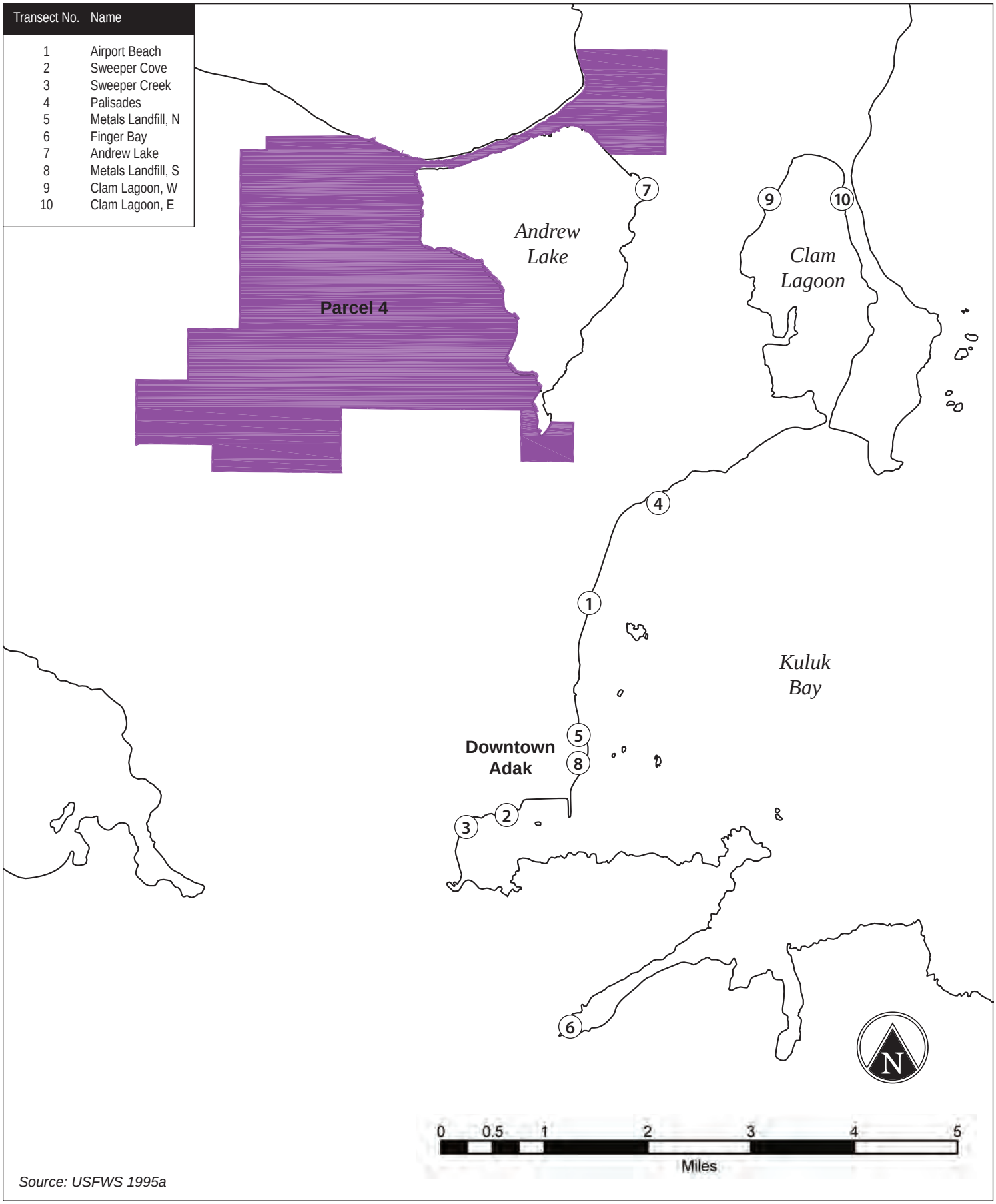
U.S. NAVY

Delivery Order 0041
Adak Island, AK
OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

0 300 600
SCALE IN FEET

Figure 4-8
Site C1-01 Potentially Suitable Kittlitz's Murrelet Nesting Habitat

T:\ADAK\DI\Q\Sub-Tasks\DO 41\Wetland Investigation\Threat_Endangered Survey\Fig 4-8 C1-01 Kitt Nest.dwg
Mod: 10/23/2012, 14:22 | Plotted: 10/23/2012, 14:22 | john_knobbs



Source: USFWS 1995a

U.S. NAVY	Figure 4-9 Dive Survey Transect Locations	Delivery Order 0041 Adak Island, AK OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

33762056_x.id

Table 4-1
Habitats and Vegetation of Adak

Habitat and Description	Site(s) Where Habitat Predominantly Occurs	Common Plant Species
Freshwater Wetlands		
Lacustrine waters and shorelines: small or large ponds, lakes	MI-03, SA93-01	N/A
Fluviate waters and shorelines: streams or creeks	MI-03, OB/OD-01, RR-01	N/A
Wet meadow: located at the edges of ponds and streams, or created by snowmelt or precipitation	C1-01, ALDA-01, HG-01, MI-01, MI-02, MI-03, OB/OD-01, SA93-01	Lyngbye's sedge (*Carex lyngbyei*), russett cottongrass (*Eriophorum russeolum* ssp. *rufescens*), horsetail (*Equisetum arvense*)
Marine Waters		
Nearshore marine waters: large, deep, protected salt water bays	Exists on other parts of Adak, but not associated with OU B-2 sites	N/A
Inshore marine waters: relatively shallow marine waters, less than 40 to 50 meters deep	Adjacent to ALDA-01 and ALSW-01 in Andrew Bay	Kelp: *Agarum cribrosum*, *Alaria fistulosa*, *Cymathera triplicate*, *Laminaria* spp., *Thalassiophyllum clathrus*
Ocean Coastline		
Rocky shores and reefs: boulder beaches where tidal ranges are narrow	ALDA-01 and ALSW-01	N/A
Meadows		
Dwarf shrub meadow: at lower elevations away from beach fringe	C1-01, MI-01, MI-02, MI-03, SA93-01	Crowberry (*Empetrum nigrum* ssp. *nigrum*), blueberry (*vaccinium uliginosum* ssp. *microphyllum*), Artic willow (*salix arctica*), large-awned sedge (*carex macrochaeta*), grasses (*poa turneri*), mosses
Grass meadow: frequently patchy, usually below 300 meters elevation	ALDA-01, OB/OD-01, HG-01, MI-01, MI-02, MI-03, RR-01, SA93-01, SA93-03	Bluejoint (*Calamagrostis canadensis* ssp. *langsdorffii*), American dunegrass (*Leymus mollis*), red fescue (*Festuca rubra* ssp. *aucta*)
Tall forb meadow: usually below 300 meters elevation	ALDA-01, OB/OD-01, HG-01, MI-01, MI-02, MI-03, RR-01, SA93-01	Coastal angelica (*Angelica lucida*), cow parsnip (*Heracleum lanatum*), common lady fern (*Athyrium filix-femina* ssp. *cyclosorum*)

Table 4-1 (Continued)
Habitats and Vegetation of Adak

Habitat and Description	Site(s) Where Habitat Predominantly Occurs	Common Plant Species
Unvegetated and Sparsely Vegetated Highlands		
Dwarf shrub mat: at higher elevations, very short vegetation mixed with bare soil	C1-01	Crowberry (*Empetrum nigrum* ssp. *nigrum*), blueberry (*Vaccinium uliginosum* ssp. *microphyllum*)
Scree: loose rock debris at higher elevations, sometimes interspersed with dwarf shrub mat	C1-01, SA93-01	N/A
Artificial		
Land with buildings, landscaping, or other man-made features	HG-01, OB/OD-01, RR-01	N/A

Notes:
Habitat Classification from Gibson and Byrd (2007) based on Kessel (1979). Kelp species from Estes and Duggins (1995).
fluviate - of or relating to streams
forb - broad-leaved herb other than grass
lacustrine - of or relating to lakes
N/A - not applicable
scree - loose rock debris covering a slope

Table 4-2
Terrestrial and Marine Mammals of Adak

Common Name	Scientific Name	Habitat and Abundance	Native	Non-Native	Special Status[a]
Terrestrial					
Brown rat	*Rattus norvegicus*	Developed areas - common		X	
Caribou	*Rangifer tarandus*	South Adak Island - common		X	
Marine					
Baird's beaked whale	*Berardius bairdii*	Nearshore waters - rare	X		
Blue whale	*Balaenoptera musculus*	Nearshore waters - rare	X		X
Cuvier's beaked whale	*Ziphius cavirostris*	Nearshore waters - rare	X		
Dall's porpoise	*Phocoenoides dalli*	Nearshore waters - common	X		
Fin whale	*Balaenoptera physalus*	Nearshore waters - uncommon	X		X
Gray whale	*Eschrichtius robustus*	Nearshore waters - common, E. Aleutians	X		
Harbor seal	*Phoca vitulina*	Nearly all islands - common	X		
Humpback whale	*Megaptera novaeangliae*	Nearshore waters - common, E. Aleutians (less common in W. Aleutians near Adak)	X		X
Killer whale	*Orcinus orca*	Nearshore waters - common	X		
Minke whale	*Balaenoptera acutorostrata*	Nearshore waters - common	X		
Northern (Alaskan) sea otter	*Enhydra lutris* ssp. *kenyoni*	Nearly all islands - declining sharply.	X		X
Northern (Steller) sea lion	*Eumetopias jubatus*	Nearly all islands, declining.	X		X
Northern elephant seal	*Mirounga angustirostris*	Occasional record - rare	X		
Northern fur seal	*Callorhinus ursinus*	Bogoslof Island	X		
Pacific Walrus	*Odobenus rosmarus*	Occasional record - rare	X		X
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	Nearshore waters - rare	X		
Sei whale	*Balaenoptera borealis*	Nearshore waters - uncommon	X		X
Sperm whale	*Physeter macrocephalus*	Nearshore waters - common	X		X
Stejneger's beaked whale	*Mesoplodon stejnegeri*	Nearshore waters - uncommon	X		

[a]Threatened, endangered, or candidate for listing under the ESA

Sources: USFWS 2011a, 2011b, and 2011c and MacDonald and Cook 2009

Table 4-3
Reptiles and Amphibians Potentially Found in Adak Marine Waters

Common Name	Scientific Name	Likelihood of Occurrence	Special Status[a]
Green sea turtle	*Chelonia mydas*	Extremely rare	X
Leatherback turtle	*Dermochelys coriacea*	Very rare	X
Loggerhead turtle	*Caretta caretta*	Extremely rare	X
Olive Ridley turtle	*Lepidochelys olivacea*	Extremely rare	X

[a]Threatened, endangered, or candidate for listing under the ESA

Table 4-4
Marine Plant and Invertebrate Species Found During Dive Surveys at Adak

Common Name	Scientific Name
PLANTS	
Brown algae	*Agarum fimbriatum*
Brown algae	*Alaria valida*
Brown algae	*Desmarestia* sp.
Brown algae	*Fuscus furcatus*
Brown algae	*Laminaria* sp.
Brown algae	*Punctaria latifolia*
Green algae	*Ulva* sp.
Green algae	Unidentified green algae
Red algae	*Constantinea* sp.
Red algae	*Lithothamnium* sp.
Red algae	*Rhodymenia* sp.
INVERTEBRATES	
Mollusks	
Black leather chiton	*Katharina tunicata*
Blue mussel	*Mytilus edulis*
Butter clam	*Saxidomus giganteus*
Chiton	*Mopalia* sp.
Chiton	*Tonicella* sp.
Common littleneck clam	*Protothaca staminea*
Greenland cockle	*Serripes groenlandicus*
Hairy triton	*Fusitriton oregonensis*
Heart cockle	*Clinocardium nuttalli*
Jingle shell (rock oyster)	*Pododesmus cepio*
Limpet	*Notoacmea* sp.
Mya clam	*Mya* sp.
Periwinkle	*Littorina sitkana*
Snail	Unidentified gastropod
Annelids (Segmented Roundworms)	
Bristleworms	Unidentified polychaeta
No common names	*Spirorbis* sp.
Tube worm	*Serpula vermicularis*
Porifera (Sponges)	
Sponge	*Suberites ficus*
Sponge	Unidentified sponge
Echinoderms (Starfish, Sea Urchins, Sand Dollars)	
Brittle star	Unidentified ophiuroid
Green sea urchin	*Strongylocentrotus droebachiensis*

Table 4-4 (Continued)
Marine Plant and Invertebrate Species Found During Dive Surveys at Adak

Common Name	Scientific Name
Sand dollar	*Dendraster excentricus*
Sea cucumber	*Eupentacta quinquesemita*
Sea star	*Evasterias troschelii*
Crustaceans	
Acorn barnacle	*Semibalanus cariosus*
Acorn barnacle	*Balanus glandula*
Helmet crab	*Telmessus cheiragonus*
Hermit crab	Unidentified *Pagurus* sp.
Shrimp	*Unidentified Pandalus* sp.
Cnidaria (Jellyfish, Hydroids, Sea Anemones)	
Jellyfish	Unidentified hydrozoan
Lions mane jellyfish	*Cyanea capillata*
Moon jelly	*Aurelia labiata*
Sea anemone	*Anthopleura* sp.
Sea anemone	*Cribrinopsis fernaldi*
Sea nettle jelly	*Chrysaora melanaster*
White plumed (or Frilled) anemone	*Metridium senile*
Bryoazoa (Moss Animalcules)	
Bryozoan	Unidentified bryozoan
Chordata (Chordates)	
Sea squirt	Unidentified ascidian

Source: USFWS 1995a

Table 4-5
Marine and Anadromous Fish Species Potentially Found in Adak Waters

Common Name	Scientific Name
Freshwater Streams	
Chum salmon	*Oncorhynchus keta*
Coastrange sculpin	*Cottus aleuticus*
Coho salmon	*Oncorhynchus kisutch*
Dolly Varden	*Salvelinus malma malma*
Kokanee (Sockeye salmon)	*Oncorhynchus nerka*
Pink salmon	*Oncorhynchus gorbuscha*
Rainbow trout	*Oncorhynchus mykiss*
Three-spined stickleback	*Gasterosteus aculeatus*
Nearshore Marine Waters	
Armorhead sculpin	*Gymnocanthus galeatus*
Crescent gunnel	*Pholis laeta*
Dolly Varden	*Salvelinus malma malma*
Frog sculpin	*Myoxocephalus stelleri*
Juvenile chum salmon	*Oncorhynchus keta*
Juvenile cod	N/A
Juvenile flatfish	N/A
Juvenile pink salmon	*Oncorhynchus gorbuscha*
Juvenile sculpin	N/A
Masked greenling	*Hexagrammos octogrammus*
Pacific sand lance	*Ammodytes hexapterus*
Pacific sandfish	*Trichodon trichodon*
Red Irish lord	*Hemilepidotus hemilepidotus*
Rock greenling	*Hexagrammos lagocephalus*
Rock sole	*Lepidopsetta* spp.
Silverspotted sculpin	*Blepsias cirrhosus*
Snake prickleback	*Lumpenus sagitta*
Starry flounder	*Platichthys stellatus*

Note: N/A - not applicable
Sources: USFWS 1995b, USGS 2011, and NOAA 2011c.

5.0 CONCLUSIONS

Seven federally listed species regularly occur at Adak. They are blue whale, fin whale, humpback whale, northern (Alaska) sea otter, sei whale, northern (Steller) sea lion, and Aleutian shield fern. The Aleutian shield fern is the only species that occurs primarily in the terrestrial environment, and surveys confirm that it is extremely unlikely to occur within OU B-2 sites. It was not documented during focused surveys by a qualified botanist. Bald eagles, which are protected under the Bald and Golden Eagle Protection Act, occur year round on Adak. A pair was observed in the southeast corner of SA93-01. However, it is unknown if they nested in the vicinity. The northern sea lion rests and spends a portion of its breeding cycle on the marine shoreline. The nearest rookery is on Adak's southwest coast, well away from OU B-2 sites. The remaining species are almost entirely confined to the marine environment. Other federally listed species may occur rarely as transients at Adak. They are summarized in Appendix J.

As discussed in Section 4.2.2, Kittlitz's murrelet is known to nest on high elevation rocky slopes and overwinter in marine waters surrounding Adak. There is potentially suitable nesting habitat for this species within Site C1-01. However, characteristics of the habitat on C1-01 are different than the site on Mount Reed on southern Adak Island where active nests have been found. Mount Reed offers steep, high elevation talus slopes lacking at C1-01.

The habitat at C1-01 was surveyed and mapped by URS biologists in the field (Figure 4-8) during 2011. During 2012, nest surveys were conducted during the breeding season in C1-01. Concurrent to focused surveys in 2012 at C1-01, USFWS biologists found active Kittlitz's murrelet nests on Mount Reed (outside the RAAs), indicating that the survey timing was appropriate. No Kittlitz's murrelets, or active or inactive nest sites, were observed during either of the surveys at C1-01. Furthermore, the habitat conditions in C1-01 were reviewed with USFWS biologist Robb Kaler, who has observed numerous Kittlitz's murrelet nests on other parts of Adak. Based on the results of the surveys and the discussion with Robb Kaler, it is unlikely they nest within the RAA boundary.

Kittlitz's murrelet is currently a candidate for listing under the ESA. It is expected to be listed or removed from the candidate list by the end of 2013. If it is removed from the candidate list at that time, the Navy will need to provide no additional protection for Kittlitz's murrelet, other than the existing protections under the MBTA. If it is listed as threatened or endangered by 2013, the Navy will be required to conduct formal consultation with USFWS for effects to Kittlitz's murrelet as a result of remedial activities. Formal consultation can be a lengthy process, and project activities at Site C1-01 may be delayed until consultation can be completed.

Adak's terrestrial environment is dominated by low-growing vegetation, and there are no trees in the study area. Herbaceous plant communities vary by elevation, topography, soil conditions, and available moisture. In general, tall grasses dominate the lowlands and relatively protected areas. The higher elevation communities have a very low-growing "mat" of herbaceous vegetation, bare ground, and rocks. A mix of these communities occurs in patches throughout the OU B-2 sites. Adak's terrestrial environment is largely free from invasive weeds, including OU B-2 sites.

The marine environment adjacent to OU B-2 sites (Andrew Bay) includes a high-energy beach susceptible to heavy surf and a shallow nearshore area capable of supporting kelp. Listed northern sea otter and designated critical habitat occur in Andrew Bay. Many additional marine mammals may occur in the waters of Andrew Bay.

At the present time, the proposed project activities do not include any underwater removal of MEC in Andrew Bay. If that should change in the future, the Navy will be required to initiate formal consultation with NOAA Fisheries under the ESA for effects to northern sea otter. Consultation can be a lengthy process and will include other effects to the species and to designated critical habitat in Andrew Bay. Northern sea otter is known to occur in Andrew Bay, and kelp beds important to the otter also grow there. A permit under the MMPA for potential disturbance to marine mammals may also be needed for marine work.

Relatively few species of wildlife occur as permanent residents of Adak, with no native terrestrial mammal, reptile, or amphibian. The caribou is the most prominent non-native mammal on Adak, and it is hunted on the island. Many migrant species of birds have been recorded, but the resident species that remain all year and/or nest during the summer are fewer. Birds have been well studied and recorded on Adak. The marine and anadromous fish assemblages contain quite a few species, although it is likely that many more could be identified with further surveys. Information about other taxonomic groups, such as marine and freshwater invertebrates and marine plants, is known only from a series of surveys conducted in the mid-1990s.

6.0 QUALIFICATIONS OF THE FIELD TEAM AND AUTHORS

The qualifications of the field team, report authors, and senior technical reviewer are provided below.

Jennifer Pretare, Ph.D.

Dr. Jennifer Pretare was the field team leader for both deployments to Adak Island discussed in this report and one of two report authors. She is a senior biologist at URS in Seattle, Washington, with over 16 years of experience as a professional biologist. She received her Ph.D. in 2000 from the University of California, Berkeley in environmental science, policy, and management. She received her B.S. degree from the Evergreen State College in Olympia, Washington in 1993. Dr. Pretare has specialized training in preparation of biological assessments and EFH assessments under the ESA (training by Washington Department of Transportation in 2011), ESA laws and regulations (training by University of California, Davis Extension in 2001), and wetland delineation (training by Wetland Training Institute in 2001). Dr. Pretare has coordinated and completed numerous large field deployments throughout her career at URS. She is a senior technical specialist on issues related to wildlife, especially birds.

Jeff Walker

Jeff Walker was a field team member for both 2011 and 2012 deployments to Adak and is an author of this report. Mr. Walker is a senior biologist at URS in Seattle, Washington. Jeff has a B.S. degree in botany and environmental studies from the University of Washington. He has completed the University of Washington Wetland Science and Management Program and is a registered Professional Wetland Scientist. Jeff has more than 17 years of experience as a botanist and more than 12 years of experience as a wetland scientist, including several projects in southeast and interior Alaska.

Kimberley Degutis

Ms. Degutis is a senior ecologist with URS in Portland, Oregon. Kim was a member of the 2011 field team. She is a certified Professional Wetland Scientist with over 13 years of experience in providing wetland and habitat assessments, including delineation, functional analysis, rating, mitigation, permitting, and monitoring services. She holds an M.S. degree in environmental management from Montclair State University in New Jersey. She has specialized experience conducting wetland delineations and habitat assessments in Arctic tundra, Bering tundra and intermontane boreal ecoregions of Alaska.

Jan Novak

Jan Novak is a senior soil scientist with URS in Oakland, California. Mr. Novak is a registered Professional Wetland Scientist with 10 years of experience. He has a B.S. degree in soil science from California Polytechnic State University in San Luis Obispo, California. Mr. Novak has completed numerous large and complex wetland delineations in his career. He has specialized training in determining federal wetlands jurisdiction (training by University of California Berkeley Extension in 2005) and wetland plant identification. Mr. Novak has lectured on hydric soils for an introduction to wetland delineation course at San Francisco State from 2007 through 2010.

Eric Lillywhite

Eric Lillywhite was part of the 2011 field team. Mr. Lillywhite is a senior environmental scientist with URS in Seattle, Washington. He has a B.A. degree from the Evergreen State College in Olympia, Washington. He has 20 years of experience in a wide range of environmental studies. Eric has been to Adak over 30 times since 1996, where he has worked on a variety of projects, including studies on rock sole and blue mussels.

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APPENDIX A

USFWS Threatened and Endangered Species in Alaska

Species Reports

Environmental Conservation Online System

(http://www.fws.gov)

How many listed species currently occur in and are listed in Alaska?

Notes:

- This report shows the species listed in this state that also occur in this state.
- This list does not include experimental populations and similarity of appearance listings.
- This list includes non-nesting sea turtles and whales in State/Territory coastal waters.
- This list includes species or populations under the sole jurisdiction of the National Marine Fisheries Service.
- Click on the highlighted scientific names below to view a Species Profile for each listing.

Species listed in this state and that occur in this state -- 15 listings

Animals -- 14

Status (javascript:launch ('/tess_public/html/db-status.html'))	Species/Listing Name
E	Albatross, short-tailed (*Phoebastria (=Diomedea) albatrus* (/speciesProfile/profile/speciesProfile.action?spcode=B00Y))
T	Bear, polar (*Ursus maritimus* (/speciesProfile/profile/speciesProfile.action?spcode=A0IJ))
E	Curlew, Eskimo (*Numenius borealis* (/speciesProfile/profile/speciesProfile.action?spcode=B01A))
T	Eider, spectacled (*Somateria fischeri* (/speciesProfile/profile/speciesProfile.action?spcode=B08Z))
T	Eider, Steller's AK breeding pop. (*Polysticta stelleri* (/speciesProfile/profile/speciesProfile.action?spcode=B090))
T	Otter, Northern Sea southwest Alaska DPS (*Enhydra lutris kenyoni* (/speciesProfile/profile/speciesProfile.action?spcode=A0HK))
T	Sea-lion, Steller eastern pop. (*Eumetopias jubatus* (/speciesProfile/profile/speciesProfile.action?spcode=A0FS))
E	Sea-lion, Steller western pop. (*Eumetopias jubatus* (/speciesProfile/profile/speciesProfile.action?spcode=A0FS))
E	Sea turtle, leatherback (*Dermochelys coriacea* (/speciesProfile/profile/speciesProfile.action?spcode=C00F))
E	Whale, blue (*Balaenoptera musculus* (/speciesProfile/profile/speciesProfile.action?spcode=A02M))
E	Whale, bowhead (*Balaena mysticetus* (/speciesProfile/profile/speciesProfile.action?spcode=A02N))
E	Whale, finback (*Balaenoptera physalus* (/speciesProfile/profile/speciesProfile.action?spcode=A02O))
E	Whale, humpback (*Megaptera novaeangliae* (/speciesProfile/profile/speciesProfile.action?spcode=A02Q))
E	Whale, sperm (*Physeter catodon (=macrocephalus)* (/speciesProfile/profile/speciesProfile.action?spcode=A02T))

Plants -- 1

Status (javascript:launch ('/tess_public/html/db-status.html'))	Species/Listing Name
E	Fern, Aleutian shield (*Polystichum aleuticum* (/speciesProfile/profile/speciesProfile.action?spcode=S00V))

Last updated: December 12, 2011

ECOS Home (/ecos/indexPublic.do) | Contact Us (/ecos/helpdesk.do?version=TESS_PUBLIC-1_1_6)

APPENDIX B

NOAA Fisheries Endangered, Threatened, Proposed, Candidate and Delisted Species in Alaska

ENDANGERED, THREATENED, PROPOSED, CANDIDATE AND DELISTED SPECIES IN ALASKA (Updated February, 2011)

SPECIES MANAGED BY U.S. FISH AND WILDLIFE SERVICE[1]

SPECIES AND STATUS	DATE OF STATUS	CRITICAL HABITAT DESIGNATION DATE	LEAD OFFICE for RECOVERY	RANGE IN ALASKA
Endangered				
Short-tailed albatross (*Phoebastria albatrus*)	7/31/00	n/a	Anchorage	U.S. Territorial waters, Gulf of Alaska, Aleutian Islands, Bering Sea Coast, Japan, Russia, high seas
Eskimo curlew (*Numenius borealis*)	3/11/67	n/a	Fairbanks	No longer occurs in Alaska
Aleutian shield fern (*Polystichum aleuticum*)	2/17/88	n/a	Anchorage	Adak Island
Threatened				
Spectacled eider (*Somateria fischeri)*	5/10/93	2/6/01	Fairbanks	Western and Northern Alaska (coastal)
Steller's eider (*Polysticta stelleri*)	6/11/97	2/2/01	Fairbanks	Southwestern, Western and Northern Alaska
Northern Sea otter (*Enhydra lutris kenyoni*) (Southwest Alaska population)	8/9/05	10/8/09	MMM[2]	Aleutian Islands, Alaska Peninsula, Kodiak Island
Polar bear (*Ursus maritimus*)	5/15/08	11/24/2010	MMM[2]	On sea ice and coastline of Chuckchi and Beaufort seas
Candidate				
Kittletz's Murrelet (*Brachyramphus brevirostris)*	4/4/04	n/a	Anchorage	Coastal waters in southern and northwestern Alaska
Yellow-Billed Loon (*Gavia adamsii*)	3/25/09	n/a	Fairbanks	Breeding: Arctic tundra lakes; Wintering: Kodiak, Prince William Sound, Southeast AK
Pacific walrus (*Odobenus rosmarus divergens*)	2/10/11	n/a	MMM[2]	Continental shelf waters Bering & Chukchi Seas
Delisted				
Arctic peregrine falcon (*Falco peregrinus tundrius*)	10/5/94	n/a	Fairbanks	Northern and Western Alaska
American peregrine falcon (*Falco peregrinus anatum)*	8/25/99	n/a	Fairbanks	Interior Alaska
Aleutian Canada goose (*Branta canadensis leucopareia*)	3/20/01	n/a	Anchorage	Aleutian Is., Semidi Is.

SPECIES MANAGED BY NATIONAL MARINE FISHERIES SERVICE[1,3]

SPECIES AND STATUS	FREQUENCY OF OCCURRENCE	RANGE IN ALASKA
Endangered		
Cook Inlet beluga whale (*Delphinapterus leucas)*	Regular	Cook Inlet
Steller sea lion (*Eumetopias jubatus)* **west of 144°**	Regular	Bering Sea, N. Pacific
Blue whale (*Balaenoptera musculus*)	Rare	Bering Sea, Gulf of Alaska, N. Pacific
Bowhead whale (*Balaena mysticetus)*	Regular	Chukchi Sea, Beaufort Sea
Fin whale (*Balaenoptera physalus)*	Regular	Chukchi Sea, Bering Sea, Gulf of Alaska, N. Pacific
Humpback whale (*Megaptera novaeangliae)*	Regular	Bering Sea, Gulf of Alaska, N. Pacific
North Pacific right whale (*Eubalaena japonica)*	Rare	Bering Sea, Gulf of Alaska, N. Pacific
Sperm whale (*Physeter macrocephalus)*	Regular	Bering Sea, Gulf of Alaska, N. Pacific
Sei whale *(Balaenoptera borealis)*	Rare	Gulf of Alaska, N. Pacific
Leatherback sea turtle (*Dermochelys coriacea)*	Rare	Gulf of Alaska
Threatened		
Steller sea lion (*Eumetopias jubatus)* **east of 144°**	Regular	Bering Sea, Gulf of Alaska, N. Pacific
Loggerhead sea turtle (*Caretta caretta)*	Rare	Gulf of Alaska
Green sea turtle (*Chelonia mydas)* (incl. *agassizi*)	Rare	Gulf of Alaska
Proposed		
Bearded seal (*Erignathus barbatus nauticus*)	Regular	Bering, Chukchi and Beaufort Seas
Ringed seal (*Phoca hispida hispida*)	Regular	Bering, Chukchi and Beaufort Seas
Candidate		
None		
Delisted		
Gray whale (*Eschrichtius robustus)*	Regular	Chukchi Sea, Bering Sea, Gulf of Alaska, N. Pacific

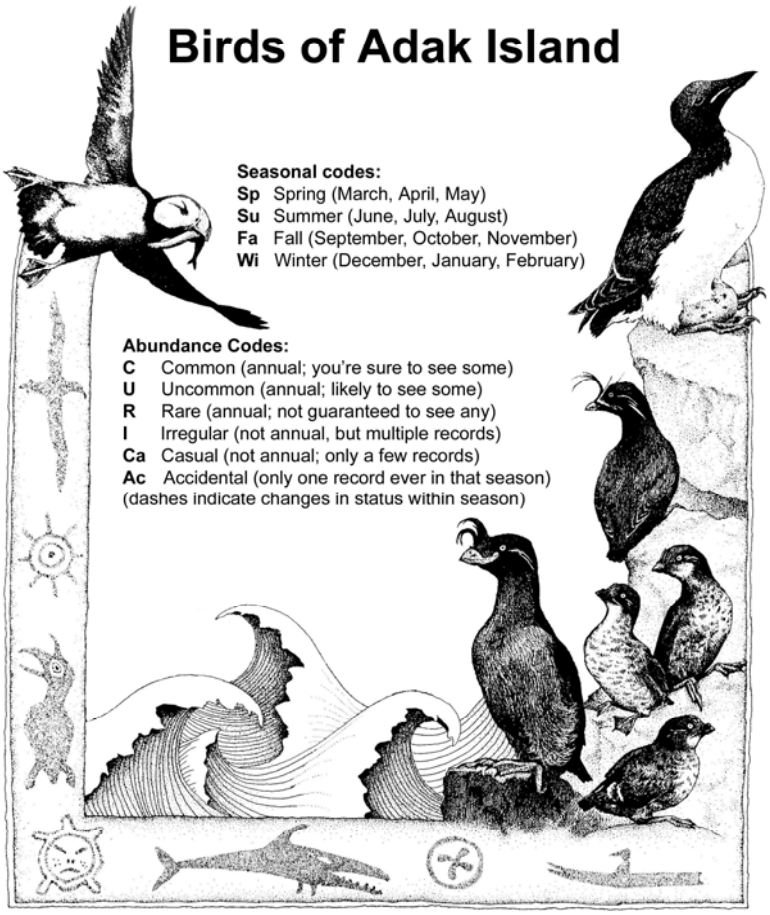
[1]Under the Endangered Species Act of 1973, as amended, the National Marine Fisheries Service is responsible for listed anadromous and marine fishes and marine mammals other than sea otters, manatees, and dugongs.
[2]Marine Mammals Management, FWS Alaska (Region 7) Regional Office
[3]A number of listed trout and salmon species that spawn in the lower 48 Pacific Northwest may occur in Alaskan waters during the marine phase of their life cycle. For information on these, you may visit the NMFS Northwest Region website: http://www.nmfs.noaa.gov/prot_res/overview/es.html or call (907) 586-7221.

APPENDIX C

Birds of Adak Island

U.S. Fish & Wildlife Service

Birds of Adak Island



Bold* = Breeding	Sp	Su	Fa	Wi
DUCKS, GEESE and SWANS				
Taiga Bean Goose	I			
Tundra Bean Goose				
Greater White-fronted Goose	Ac		Ca	Ac
Emperor Goose	C-I	Ca	Ca-C	C
Snow Goose				Ac
Brant	Ca	Ac	Ca	Ca
Cackling Goose	U	Ca	I	Ac
Tundra Swan *(columbianus)*	Ca	Ac	Ac	
Tundra Swan *(bewickii)*				Ca
Whooper Swan	R-Ca		Ca	R
Gadwall	I	Ca	I	I
Falcated Duck	Ca	Ca	Ac	Ac
Eurasian Wigeon	U	I	U	C
American Wigeon	I	Ca	Ca	Ca
Mallard*	C	C	C	C
Spot-billed Duck	Ca	Ca	Ca	Ca
Blue-winged Teal			Ac	
Northern Shoveler*	R	R	R	R
Northern Pintail*	C	U	C	C
Garganey	Ca	Ac	Ac	
Green-winged Teal *(carolinensis)*	I	Ca		Ac
Green- winged Teal* *(crecca)*	C	C	C	C
Canvasback	Ca	Ac	Ca	I
Redhead				Ac
Common Pochard	Ca	Ca	Ac	Ca
Ring-necked Duck	Ac	Ac		
Tufted Duck	U	I	R	U
Greater Scaup*	C	U	C	C
Lesser Scaup	Ca	Ac	Ac	Ac
Steller's Eider	I	Ac	Ca	I
King Eider	Ca	Ca	Ca	Ca
Common Eider*	U	C	U	U
Harlequin Duck	C	U	C	C
Surf Scoter	Ca	Ac	Ca	Ca
White-winged Scoter	U	I	R	U

Bold* = Breeding	Sp	Su	Fa	Wi
DUCKS, GEESE and SWANS, continued…				
American (Black) Scoter	C	I	U	C
Long-tailed Duck	U	I	U	C
Bufflehead	C	I	U	C
Common Goldeneye	C	R	U	C
Barrow's Goldeneye	I	Ac		Ca
Smew	I	Ca	Ca	I
Hooded Merganser	Ac		Ac	Ca
Common Merganser *(americanus)*	I	I	I	I
Goosander *(merganser)*				
Red-breasted Merganser*	C	C	C	C
GROUSE				
Rock Ptarmigan*	C	C	C	C
LOONS and GREBES				
Red-throated Loon	Ca	Ca	Ca	Ca
Arctic Loon	Ca		Ac	Ac
Pacific Loon	I	Ca	I	I
Common Loon*	R	R	R	R
Yellow-billed Loon	Ca	Ca	Ca	Ca
Horned Grebe	U	Ca	R	U
Red-necked Grebe	U	Ca	R	U
Western Grebe				Ac
ALBATROSSES, SHEARWATERS, PETRELS and STORM-PETRELS				
Laysan Albatross	Ca	Ca	Ca	
Black-footed Albatross	Ca	Ca	Ca	
Northern Fulmar	R	R		
Cook's Petrel		Ac		
Sooty Shearwater	R	R	R	
Short-tailed Shearwater	R	R	R	
Fork-tailed Storm-Petrel*	U	U	U	
Leach's Storm-Petrel	R	R	R	
CORMORANTS				
Double-crested Cormorant	(Ac)		Ac	Ac
Red-faced Cormorant*	U	U	U	U
Pelagic Cormorant*	C	C	C	C
HERONS and BITTERNS				
Great Egret	Ac		Ac	Ca
HAWKS, EAGLES and FALCONS				
Osprey	Ca	Ca	Ac	
Bald Eagle*	C	C	C	C
Northern Harrier	Ca		Ca	Ca
Rough-legged Hawk		Ac	Ca	Ca
Merlin			Ca	Ca
Gyrfalcon	I	I	I	I
Peregrine Falcon* *(pealei)*	U	U	U	U
CRANES				
Sandhill Crane	I	I	Ca	
PLOVERS				
Black-bellied Plover	Ac	Ca	Ca	
Pacific Golden-Plover	R	R	U	
Lesser Sand-Plover	Ca	Ca	Ca	
Common Ringed Plover		Ac		
Semipalmated Plover*	U	U	Ca	
OYSTERCATCHERS				
Black Oystercatcher*	U	U	U	U
SANDPIPERS, PHALAROPES and ALLIES				
Terek Sandpiper	Ac			
Common Sandpiper	Ca		Ca	
Gray-tailed Tattler	Ca	Ca	Ca	
Wandering Tattler	R	R	R	
Spotted Redshank	Ac		Ac	
Greater Yellowlegs			Ac	
Common Greenshank	I	Ac	Ca	
Lesser Yellowlegs	Ac	Ca		
Marsh Sandpiper		Ca	Ca	
Wood Sandpiper	R	I	Ca	Ac
Whimbrel	Ca	Ca	Ca	
Bristle-thighed Curlew	I	Ac		
Far Eastern Curlew	Ca	Ca		
Black-tailed Godwit	Ca			
Bar-tailed Godwit	R	I	I	
Ruddy Turnstone	Ca-R	U	U-Ca	
Black Turnstone	Ac	Ac	Ac	

Bold* = Breeding	Sp	Su	Fa	Wi
SANDPIPERS, PHALAROPES and ALLIES, continued…				
Great Knot		Ac		
Red Knot	Ca	Ca	Ca	
Sanderling	U	R	R	U
Western Sandpiper		Ca	I	Ac
Red-necked Stint	Ca	Ca	I	
Little Stint		Ca	Ca	
Temminck's Stint	Ca	Ac	Ac	
Long-toed Stint	Ca	Ac	Ac	
Least Sandpiper	Ac	Ac		
Baird's Sandpiper	Ac	Ca	Ca	
Pectoral Sandpiper	Ca	Ac	R	
Sharp-tailed Sandpiper		Ac	R	
Rock Sandpiper*	C	C	C	C
Dunlin	I	Ca	I	Ca
Broad-billed Sandpiper		Ac		
Buff-breasted Sandpiper		Ca	Ac	
Ruff	Ca	Ca	Ca	
Long-billed Dowitcher			Ca	
Wilson's Snipe	Ca			
Common Snipe	I	Ca	Ca	
Red-necked Phalarope*	U	R	Ac	
Red Phalarope	Ca	Ca	Ca	
GULLS and TERNS				
Black-headed Gull	R	I	Ca	
Bonaparte's Gull	Ac			
Mew Gull *(brachyrhynchus)*	I	Ca	Ca	I
Mew Gull *(kamtschatschensis)*				
Herring (Vega) Gull *(vegae)*	I	Ca	Ca	I
Iceland Gull	Ac		Ca	R
Slaty-backed Gull	Ca	Ac	Ac	Ca
Glaucous-winged Gull*	C	C	C	C
Glaucous Gull	R	Ca	Ac	R
Sabine's Gull		Ac	(Ac)	
Black-legged Kittiwake	R	R	R	Ca
Red-legged Kittiwake			Ca	
Aleutian Tern*	Ac-U	U	Ac	
White-winged Tern		Ac		
Common Tern		Ac	(Ac)	
Arctic Tern*	Ac-U	U	U-Ac	
JAEGERS				
Pomarine Jaeger	Ac	Ca		
Parasitic Jaeger*	U	U	U	
Long-tailed Jaeger		Ca		
AUKS, MURRES and PUFFINS				
Common Murre*	R	R	R	R
Thick-billed Murre	I	I	I	R
Pigeon Guillemot*	C	C	C	C
Long-billed Murrelet	Ac			
Marbled Murrelet*	C	U	R	R
Kittlitz's Murrelet*	C	U	R	R
Ancient Murrelet	C	C	R	R
Cassin's Auklet	Ca	Ca	Ac	
Parakeet Auklet	Ca	Ac		Ca
Least Auklet	Ca	Ca	Ca	Ca
Whiskered Auklet*	Ac	Ca	Ac	Ca
Crested Auklet	Ca	Ca		Ca
Horned Puffin*	I-C	C	C-I	I
Tufted Puffin*	I-C	C	C-I	I
CUCKOOS				
Common Cuckoo		Ca	Ca	
Oriental Cuckoo			Ac	
OWLS				
Snowy Owl	I	Ca	I	I
Short-eared Owl*	R	R	R	R
SWIFTS				
Fork-tailed Swift			Ac	
SHRIKES				
Northern Shrike	Ca		Ca	Ca
CROWS and JAYS				
Common Raven*	C	C	C	C
LARKS				
Sky Lark		Ca		

Bold* = Breeding	Sp	Su	Fa	Wi
SWALLOWS				
Tree Swallow	Ac	Ca	Ac	
Bank Swallow	Ac	Ca	Ca	
Cliff Swallow	Ac			
Barn Swallow		Ca		
WRENS				
Pacific (Winter) Wren*	U	U	U	U
OLD WORLD WARBLERS				
Dusky Warbler			Ac	
OLD WORLD FLYCATCHERS				
Gray-streaked Flycatcher			Ac	
THRUSHES				
Siberian Rubythroat			Ac	
Northern Wheatear		Ac	Ca	
Eyebrowed Thrush	Ca	Ac	Ac	
Dusky Thrush	(Ac)		Ac	
American Robin			Ac	
WAGTAILS and PIPITS				
Eastern Yellow Wagtail	Ca	Ac	Ca	
Gray Wagtail	Ac		Ac	
White Wagtail (*lugens*)	Ca	Ca	Ca	
Olive-backed Pipit	Ac		Ac	
Red-throated Pipit		Ac		
American Pipit	Ca	Ca	I	Ca
WAXWINGS				
Bohemian Waxwing	Ac		Ca	
WOOD-WARBLERS				
Yellow Warbler			Ac	
Yellow-rumped Warbler			Ac	
EMBERIZIDS				
American Tree Sparrow	Ac			
Savannah Sparrow	Ac	Ca	Ca	
Song Sparrow*	C	C	C	C
Golden-crowned Sparrow	Ac			
Dark-eyed Junco				Ac
Lapland Longspur*	Ac-C	C	C-Ac	Ac
Rustic Bunting	Ca		Ac	
Snow Bunting*	C	C	C	C
McKay's Bunting	Ac			Ac
BLACKBIRDS				
Rusty Blackbird	Ac			
FINCHES				
Brambling	Ca	Ca	Ca	
Gray-crowned Rosy-Finch* *(griseonucha)*	C	C	C	C
Gray-crowned Rosy-Finch *(littoralis)*				Ac
Common Rosefinch		Ac		
White-winged Crossbill			Ac	
Common Redpoll	I	Ca	Ca	I
Hoary Redpoll	Ca	Ac	Ac	Ca
Pine Siskin	I	Ac		I
Oriental Greenfinch			Ac	
Hawfinch	Ca	Ca		
"HYPOTHETICAL" species needing more documentation				
Eurasian Kestrel				(Ac)
American Golden-plover	(Ac)			
Bluethroat			(Ac)	

Number of confirmed species: 195 and counting...

Check out Gibson and Byrd (2007): Birds of the Aleutian Islands, Alaska

Please send your observations to:

Aleutian Islands Unit Biologist
Alaska Maritime National Wildlife Refuge
95 Sterling Hwy, Suite 1; Homer, AK 99603
Ph: 907/235 6546 Fax: 907/235 7783
alaskamaritime@fws.gov
http://alaskamaritime.fws.gov

September 2010

APPENDIX D

Alaska Maritime National Wildlife Refuge – Native Mammals

Alaska Maritime National Wildlife Refuge
Native Mammals

X-Occurs in unit XX-Recorded in vicinity but not in unit	Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Masked Shrew *Sorex cinereus*			X	X	X
Pribilof Shrew *S. pribilofensis*		X			
Dusky Shrew *S. obscurus*				X	X
Arctic Shrew *S. articus*			X		
Little Brown Bat *Myotis lucifugus*					X
Snowshoe Hare *L. americanus*					X
Hoary Marmot *Marmota caligata*			X	X	X
Arctic Ground Squirrel *Cittellus parryi*				X	
Red Squirrel *Tamiasciurus hudsonicus*					X
Beaver *Castor canadensis*					X
Muskrat *Ondatra zibethicus*			X		
St. George Lemming *Lemmus trimucronatus nigripes*		X			
Collared Lemming *Dicrostonyx groenlandicus*			X	X	
Unalaska Collared Lemming *D. unalascensis*	X				
Brown Lemming *Lemmus sibircus*			X	X	
Insular Vole *M. abbreviatus*		X			
Northern Red-backed Vole *Clethrionomys rutilus*			X	X	X
Singing Vole *Microtus miurus*			X		
Tundra Vole *M. oeconomus*	X		X	X	X
Coronation Island Vole *M. coronarius*					X
St. Matthew Vole *M. abbreviatus*		X			
Sitka Mouse *P. sitkensis*					X
Meadow Jumping Mouse *Zapus hudsonius*				X	
Porcupine *Erithizon dorsatum*			X	X	
Northern Right Whale *Eubalaena glacialis*	X			X	
Gray Whale *Eschrichtius robustus*	X			X	X
Blue Whale *Balaenoptera musculus*	X			X	
Fin Whale *B. physalus*	X			X	X
Sei Whale *B. borealis*	X			X	X
Minke Whale *B. acutorostrata*	X			X	X
Humpback Whale *Megaptera novaeangliae*	X			X	X
Sperm Whale *Physeter catodon*	X			X	
Baird's Beaked Whale *Berardius bairdii*	X			X	X
Stejneger's Beaked Whale *Mesoplodon stejnegeri*	X			X	
Cuvier's Beaked Whale *Ziphius cavirostris*	X			X	
Killer Whale *Orcinus orca*	X			X	X
Long-finned Pilot Whale *Globicephala melaena*				X	
Pacific Pilot Whale *Globicephala macrorhynchus*					X
Pacific White-sided Dolphin *Lagenorhynchus obliquidens*				X	
Northern Right Whale Dolphin *Lissodelphis borealis*				X	

Alaska Maritime National Wildlife Refuge
Native Mammals

X-Occurs in unit XX-Recorded in vicinity but not in unit

	Aleutian Islands	Bering Sea	Chukchi Sea	Alaska Peninsula	Gulf of Alaska
Harbor Porpoise *Phocoena phocoena*	X			X	X
Dall Porpoise *Phocoenoides dalli*	X			X	X
Coyote *Canis latrans*				XX	X
Wolf *C. lupus*				X	X
Arctic Fox *Alopex lagopus*		X	X		
Red Fox *Vulpes fulva*	X	X	X	X	
Black Bear *Ursus americanus*					X
Grizzly or Brown Bear *U. arctos*			X	X	X
Polar Bear *U. maritumus*			X		
Pine Marten *Martes americana*					X
Short-tailed Weasel or Ermine *Mustela erminea*			X	X	X
Least Weasel *M. nivalus*			X		
Mink *M. vison*			XX	X	X
Wolverine *Gulo gulo*			X	X	X
River Otter *Lutra candensis*			XX	X	X
Sea Otter *Enhydra lutris*	X	X		X	X
Lynx *Felus lynx*			XX		
Northern Fur Seal *Callorhinus ursinus*	X	X		X	X
Steller Sea Lion *Eumelopius jubatus*	X	X		X	X
Walrus *Odobensus rosmarus*	X	X	X	X	
Harbor Seal *Phoca vitulina*	X	X		X	X
Ringed Seal *P. hispida*			X		
Bearded Seal *Erignatus barbatus*			X		
Northern Elephant Seal *Mirounga angustirostris*	X				
Sitka Black-tailed Deer *Odocoileus hemionus*					X
Moose *Alces alces*			X		
Caribou (Reindeer) *Rangifer tarandus*			X	X	
Muskox *Ovibos moschatus*			X		
Dall Sheep *Ovis dalli dalli*			XX		

APPENDIX E

Marine Mammals of the Aleutian Islands

U.S. Fish & Wildlife Service

Alaska Maritime National Wildlife Refuge

Alaska Region

Search

Wildlife

Marine Mammals of the Aleutian Islands

Marine mammals are the only mammals native to most of the Aleutian Islands unit of the Alaska Maritime National Wildlife Refuge. One exception is the red fox, endemic only to the easternmost islands of Umnak, Unalaska, Akutan, and Akun islands. (Humans introduced foxes and other animals to more islands from the late 1700s to the 1930s.)

Marine Mammals

Cetacea		**Refuge Habitat - Abundance**
Gray whale	*Eschrichtius robustus*	Nearshore waters - common, E. Aleutians
Blue whale	*Balaenoptera musculus*	Nearshore waters - rare
Fin whale	*Balaenoptera physalus*	Nearshore waters - uncommon
Sei whale	*Balaenoptera borealus*	Nearshore waters - uncommon
Minke whale	*Balaenoptera acutorostrata*	Nearshore waters - common
Humpback whale	*Megaptera novaeangliae*	Nearshore waters - common, E. Aleutians
Sperm whale	*Physeter catodon*	Nearshore waters - common
Baird's beaked whale	*Berardius bairdii*	Nearshore waters - rare
Stejneger's beaked whale	*Mesoplodon stejnegeri*	Nearshore waters - uncommon
Cuvier's beaked whale	*Ziphius cavirostris*	Nearshore waters - rare
Killer whale	*Orcinus orca*	Nearshore waters - common
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	Nearshore waters - rare
Dall porpoise	*Phocoenoides dalli*	Nearshore waters - common
Carnivora		
Sea otter	*Enhydra lutris*	Nearly all islands - declining sharply
Northern fur seal	*Callorhinus ursinus*	Bogoslof Island
Steller sea lion	*Eumatopias jubatus*	Endangered species
Walrus	*Odobensus rosmarus*	Occasional record - rare
Harbor seal	*Phoca vitulina*	Nearly all islands - common
Northern elephant seal	*Mirounga angustirostris*	Occasional record - rare

APPENDIX F

Plants Observed in the Study Area

Plant Species Observed in Study Area—September 2011 and June 2012

Family	Species	Common Name	Hulten Synonym	N/I	Status[a]
SHRUBS					
Ericaceae	*Cassiope lycopodioides*	Alaska cassiope		N	
Empetraceae	*Empetrum nigrum* ssp. *Nigrum*	crowberry		N	
Caprifoliaceae	*Linnaea borealis* ssp. *borealis*	twinflower		N	
Ericaceae	*Loiseleuria procumbens*	alpine azalea		N	
Ericaceae	*Phyllodoce aleutica* ssp. *aleutica*	Aleutian mountain heather		N	
Rosaceae	*Rubus articus*	northern blackberry		N	
Rosaceae	*Rubus chamaemorus*	cloudberry		N	
Salicaceae	*Salix arctica*	Arctic willow		N	
Salicaceae	*Salix rotundifolia*	least willow		N	
Ericaceae	*Therorhodion camtschaticum*	Kamchatka rosebay		N	
Ericaceae	*Vaccinium uliginosum* ssp. *microphyllum*	bog blueberry		N	
HERBS					
Asteraceae	*Achillea borealis*	yarrow		N	
Ranunculuaceae	*Aconitum maximum*	northern monkshood		N	
Asteraceae	*Anaphalis margaritacea*	pearly everlasting		N	
Ranunculuaceae	*Anemone narcissiflora* ssp. *villosissima*	white anemone		N	
Apiaceae	*Angelica lucida*	coastal angelica		N	
Asteraceae	***Antennaria dioica***	**stoloniferous pussytoes**		N	**G5, S2/S3**
Asteraceae	*Arnica unalaschcensis*	Unalaska arnica		N	
Asteraceae	*Artemisia unalaskensis* var. *aleutica*	wormwood		N	
Ranunculuaceae	*Caltha palustris* ssp. *asarifolia*	marsh marigold		N	

Plant Species Observed in Study Area—September 2011 and June 2012 (Continued)

Family	Species	Common Name	Hulten Synonym	N/I	Status[a]
Brassicaceae	*Cardamine umbellata*	umbel bittercress		N	
Campanulaceae	*Campanula lasiocarpa* ssp. *lasiocarpa*	mountain harebell		N	
Caryophyllaceae	*Cerastium fontanum* ssp. *triviale*	mouse-ear chickweed		I	
Onagraceae	*Chamerion angustifolium*	fireweed	*Epilobium angustifolium*	N	
Portulacaceae	*Claytonia sibirica*	Siberian springbeauty		N	
Apiaceae	*Conioselinum chinense*	western hemlock parsley		N	
Ranunculuaceae	*Coptis trifolia*	goldthread		N	
Cornaceae	*Cornus suecica*	dwarf dogwood		N	
Onagraceae	*Epilobium sertulatum*	-		N	
Asteraceae	*Erigeron peregrinus* ssp. *peregrinus*	coastal fleabane		N	
Scrophulariaceae	*Euphrasia mollis*	eyebright		N	
Rosaceae	*Fragaria chiloensis* ssp. *pacifica*	beach strawberry		N	
Liliaceae	*Fritillaria camschatcensis*	Kamchatka lily		N	
Rubiaceae	*Galium trifidum* ssp. *columbianum*	small bedstraw		N	
Geraniaceae	*Geranium erianthum*	wild geranium		N	
Rosaceae	*Geum calthifolium*	avens		N	
Apiaceae	*Heracleum lanatum*	cow parsnip		N	
Haloragaceae	*Hippuris vulgaris*	mare's tail		N	
Caryophyllaceae	*Honckenya peploides* ssp. *major*	seabeach sandwort		N	
Saxifragaceae	*Leptarrhena pyrolifolia*	leatherleaf saxifrage		N	
Apiaceae	*Ligusticum scoticum* ssp. *hultenii*	beach lovage		N	
Orchidaceae	*Listera convallarioides*	broad-leaved twayblade		N	
Orchidaceae	*Listera cordata*	heart-leaved twayblade		N	

Plant Species Observed in Study Area—September 2011 and June 2012 (Continued)

Family	Species	Common Name	Hulten Synonym	N/I	Status[a]
Fabaceae	*Lupinus nootkatensis*	Nootka lupine		N	
Liliaceae	*Maianthemum dilatatum*	false lily-of-the-valley		N	
Scrophulariaceae	*Mimulus guttatus*	yellow monkeyflower		N	
Scrophulariaceae	*Pedicularis chammisonis*	chamisso lousewort		N	
Asteraceae	*Petasites frigidus*	sweet coltsfoot		N	
Lentibulariaceae	*Pinguicula vulgaris*	butterwort		N	
Plantaginaceae	*Plantago macrocarpa*	seashore plantain		N	
Orchidaceae	*Platanthera convallariaefolia* var. *dilatatoides*	bog orchid		N	
Orchidaceae	*Platanthera dilatata*	white bog orchid		N	
Polygonaceae	*Polygonum viviparum*	alpine bistort		N	
Primulaceae	*Primula cuneifolia* ssp. *cuneifolia*	wedgeleaf primrose		N	
Ranunculuaceae	*Ranunculus confervoides*	threadleaf crowfoot		N	
Ranunculuaceae	*Ranunculus occidentalis*	western buttercup		N	
Ranunculuaceae	*Ranunculus reptans*	creeping spearwort		N	
Polygonaceae	*Rumex acetosella*	sheep sorrel		I	
Caryophyllaceae	*Sagina crassicaulis*	stickystem pearlwort		N	
Saxifragaceae	*Saxifraga nelsoniana*	heartleaf saxifrage	*Saxifraga punctata*	N	
Asteraceae	*Senecio pseudo-arnica*	seabeach senecio		N	
Rosaceae	*Sibbaldia procumbens*	sibbaldia		N	
Rosaceae	***Sieversia pentapetala***	**Aleutian avens**	***Geum pentapetalum***	**N**	**G3/G4, S2/S3**
Caryophyllaceae	*Stellaria calycantha*	starwort		N	

Plant Species Observed in Study Area—September 2011 and June 2012 (Continued)

Family	Species	Common Name	Hulten Synonym	N/I	Status[a]
Liliaceae	*Streptopus amplexifolius*	watermelon berry		N	
Liliaceae	*Tofieldia coccinea*	northern asphodel		N	
Primulaceae	*Trientalis europaea* ssp. *arctica*	Arctic starflower		N	
Scrophulariaceae	*Veronica americana*	American brooklime		N	
Scrophulariaceae	*Veronica stelleri*	Steller speedwell		N	
Violaceae	*Viola langsdorffii*	Alaska violet		N	
GRASSES, SEDGES, AND RUSHES[b]					
Poaceae	*Bromus sitchensis*	Alaska brome		N	
Poaceae	*Calamagrostis canadensis* ssp. *langsdorffii*	bluejoint		N	
Poaceae	*Calamagrostis nutkaensis*	Pacific reedgrass		N	
Cyperaceae	*Carex anthoxanthea*	grassyslope arctic sedge		N	
Cyperaceae	*Carex aquatilis*	water sedge		N	
Cyperaceae	*Carex circinata*	coiled sedge		N	
Cyperaceae	*Carex lenticularis*	lakeshore sedge		N	
Cyperaceae	*Carex macrochaeta*	large-awned sedge		N	
Cyperaceae	*Carex pluriflora*	many-flowered sedge		N	
Cyperaceae	*Carex saxatilis* ssp. *laxa*	rock sedge		N	
Cyperaceae	*Carex lyngbyei*	Lyngbye's sedge		N	
Poaceae	*Deschampsia beringensis*	Bering's tufted hairgrass		N	
Cyperaceae	*Eriophorum russeolum* ssp. *rufescens*	russet cottongrass		N	
Poaceae	*Festuca rubra* ssp. *aucta*	red fescue		N	
Juncaceae	*Juncus arcticus* ssp. *sitchensis*	Arctic rush		N	
Juncaceae	*Juncus castaneus* ssp. *castaneus*	chestnut rush		N	

Plant Species Observed in Study Area—September 2011 and June 2012 (Continued)

Family	Species	Common Name	Hulten Synonym	N/I	Status[a]
Juncaceae	*Juncus ensifolius*	daggerleaf rush		N	
Juncaceae	*Juncus mertensianus*	Merten's rush		N	
Poaceae	*Leymus mollis*	American dunegrass	*E. arenarius* ssp. *mollis*	N	
Juncaceae	*Luzula multiflora* ssp. *kobayashii*	common woodrush		N	
Juncaceae	*Luzula wahlenbergii* ssp. *piperi*	Wahlenberg's woodrush		N	
Poaceae	*Phleum commutatum* var. *americanum*	alpine timothy		N	
Poaceae	*Poa turneri*	bluegrass		N	
Cyperaceae	*Trichophorum caespitosum*	tufted bulrush		N	
FERNS, HORSETAILS, AND CLUBMOSSES[b]					
Athyriaceae	*Athyrium filix-femina* ssp. *cyclosorum*	common lady fern		N	
Equisetaceae	*Equisetum arvense*	common horsetail		N	
Equisetaceae	*Equisetum variegatum* ssp. *alaskanum*	variegated scoring-rush		N	
Aspidiaceae	*Gymnocarpium dryopteris*	oak fern		N	
Lycopdiaceae	*Lycopodium alpinum*	alpine clubmoss		N	
Lycopdiaceae	*Lycopodium annotinum* ssp. *annotinum*	stiff clubmoss		N	
Lycopdiaceae	*Lycopodium clavatum* ssp. *clavatum*	running clubmoss		N	
Lycopdiaceae	*Lycopodium sabinaefolium* var. *sitchense*	Sitka clubmoss		N	
Lycopdiaceae	*Lycopodium selago* ssp. *selago*	fir clubmoss		N	
Polypodiaceae	*Polypodium glycyrrhiza*	licorice fern	*P. vulgare*	N	

[a]Status: G5 =globally secure; S2 = imperiled in state (6 to 20 occurrences); S3 = vulnerable to extirpation in state (21 to 100 occurrences)
[b]Also considered "herbs" because they are nonwoody, but have been separated out on this list to provide more detail

Notes:

Plant Species Observed in Study Area—September 2011 and June 2012 (Continued)

N/I - native or introduced (introduced species in red)
Rare plants in **bold**

APPENDIX G

Photographs of Habitat Types

Photo 1.

Habitat type: Freshwater wetland
Subtype: Lacustrine waters and shorelines
Location: MI-03

Photo 2.

Habitat type: Freshwater wetlands
Subtype: Fluviate waters and shorelines
Location: OB/OD-01

Photo 3.

Habitat type: Freshwater wetlands
Subtype: wet meadow
Location: C1-01

Photo 4.

Habitat type: Marine waters
Subtype: Inshore marine waters
Location: ALDA-01 and ALSW-01, seen from SA93-01

Photo 5.

Habitat type: Ocean coastline
Subtype: Rocky shores and reefs
Location: ALSW-01

Photo 6.

Habitat type: Meadows
Subtype: Dwarf shrub meadows
Location: SA93-01

Photo 7.

Habitat type: Meadows
Subtype: Grass meadow
Location: RR-01

Photo 8.

Habitat type: Meadows
Subtype: Tall forb meadow
Location: ALDA-01

Photo 9.

Habitat type: Unvegetated and sparsely vegetated highlands
Subtype: Dwarf shrub mat
Location: C1-01

Photo 10.

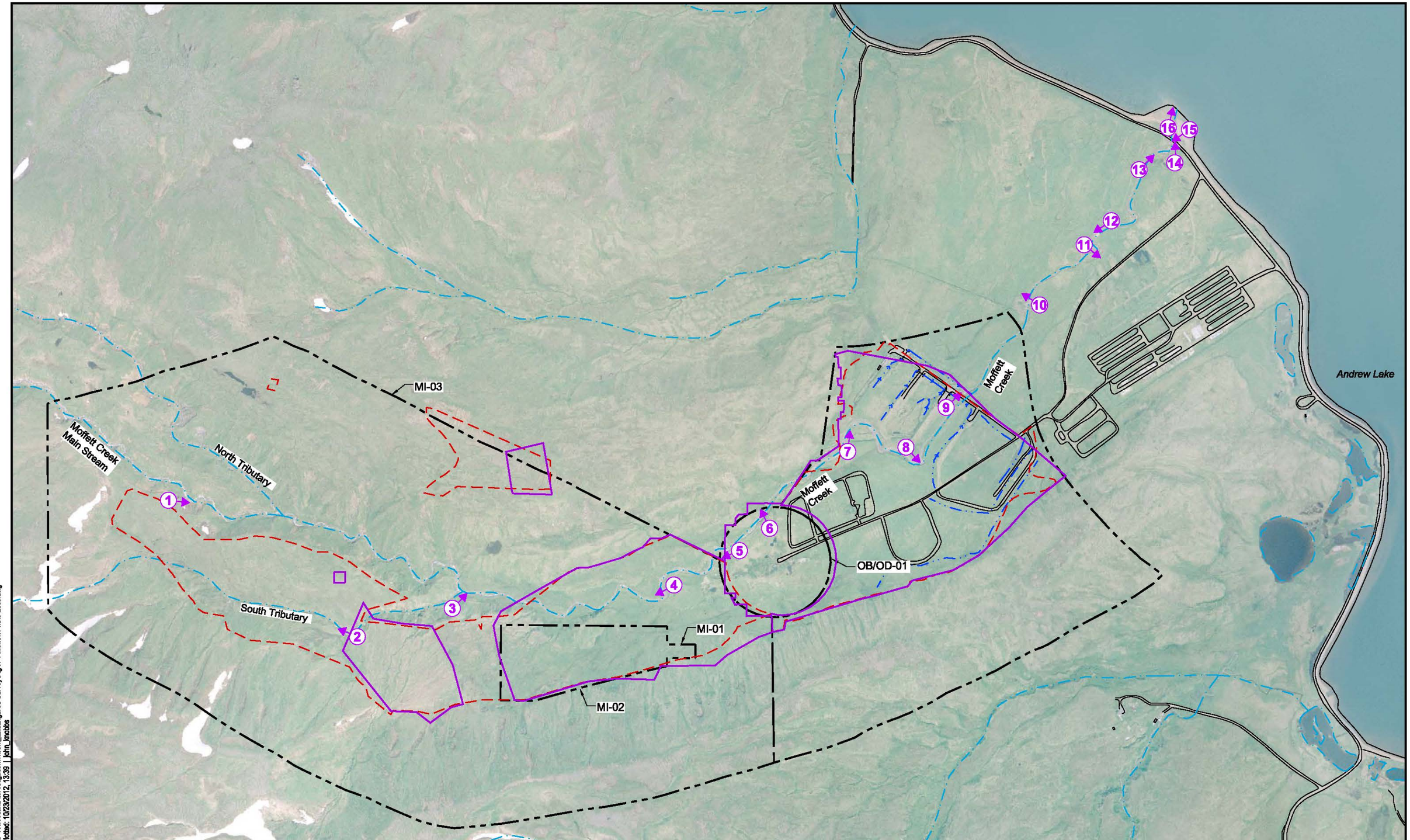
Habitat type: Unvegetated and sparsely vegetated highlands
Subtype: Scree
Location: SA93-01

Photo 11.

Habitat type: Artificial
Subtype: None
Location: RR-01

APPENDIX H

Photographs of Moffett Creek



Legend:

- Site Boundary
- 2011 Survey Area
- Remedial Action Area
- Stream (Existing Data)
- Drainage/Ditch (Field Observation)
- Road (Existing Data)
- Photo ID and Direction of View

U.S. NAVY

Delivery Order 0041
Adak Island, AK
OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

0 400 800
SCALE IN FEET

Figure H-1
Moffett Creek Stream Photo Locations

T:\ADAK\ID\Q\Sub-Tasks\DO 41\Wetland Investigation\Threat_Endangered Survey\Fig H-1 Moffett Photo Locs.dwg
Mod: 10/23/2012, 13:35 | Plotted: 10/23/2012, 13:39 | john_lockobs

Photo 1.

Moffett Creek main stem, west end of Site MI-03 looking towards the east

Photo 2.

Moffett Creek south tributary, central portion of Site MI-03 looking west

Photo 3.

Moffett Creek in Site MI-03 where south tributary joins the main stem of Moffett Creek, looking northeast

Photo 4.

Moffett Creek, east side of Site MI-03 looking west: Note the floodplain begins to widen and progressively expand down valley to the east.

Photo 5.

Moffett Creek in Site OB/OD-01 looking southwest: The posts were part of a bridge.

Photo 6.

Moffett Creek in Site OB/OD-01 looking at the north stream bank

Photo 7.

Moffett Creek, west side of Site RR-01 looking north

Photo 8.

Moffett Creek, central portion of Site RR-01 looking southeast

Photo 9.

Moffett Creek, in Site RR-01 looking northeast: Culverts under the road leading to the rifle range target area, looking northeast

Photo 10.

Moffett Creek looking northwest between Site RR-01 and Andrew Lake: This was a side channel that formed adjacent to Moffett Creek where a culvert was floating.

Photo 11.

Moffett Creek between Site RR-01 and Andrew Lake: Some slow water occurs where Moffett Creek bends.

Photo 12.

Moffett Creek looking southwest between Site RR-01 and Andrew Lake

Photo 13.

Moffett Creek looking northeast between Site RR-01 and Andrew Lake

Photo 14.

Moffett Creek looking north: Five culverts (inlet) passing under the main road

Photo 15.

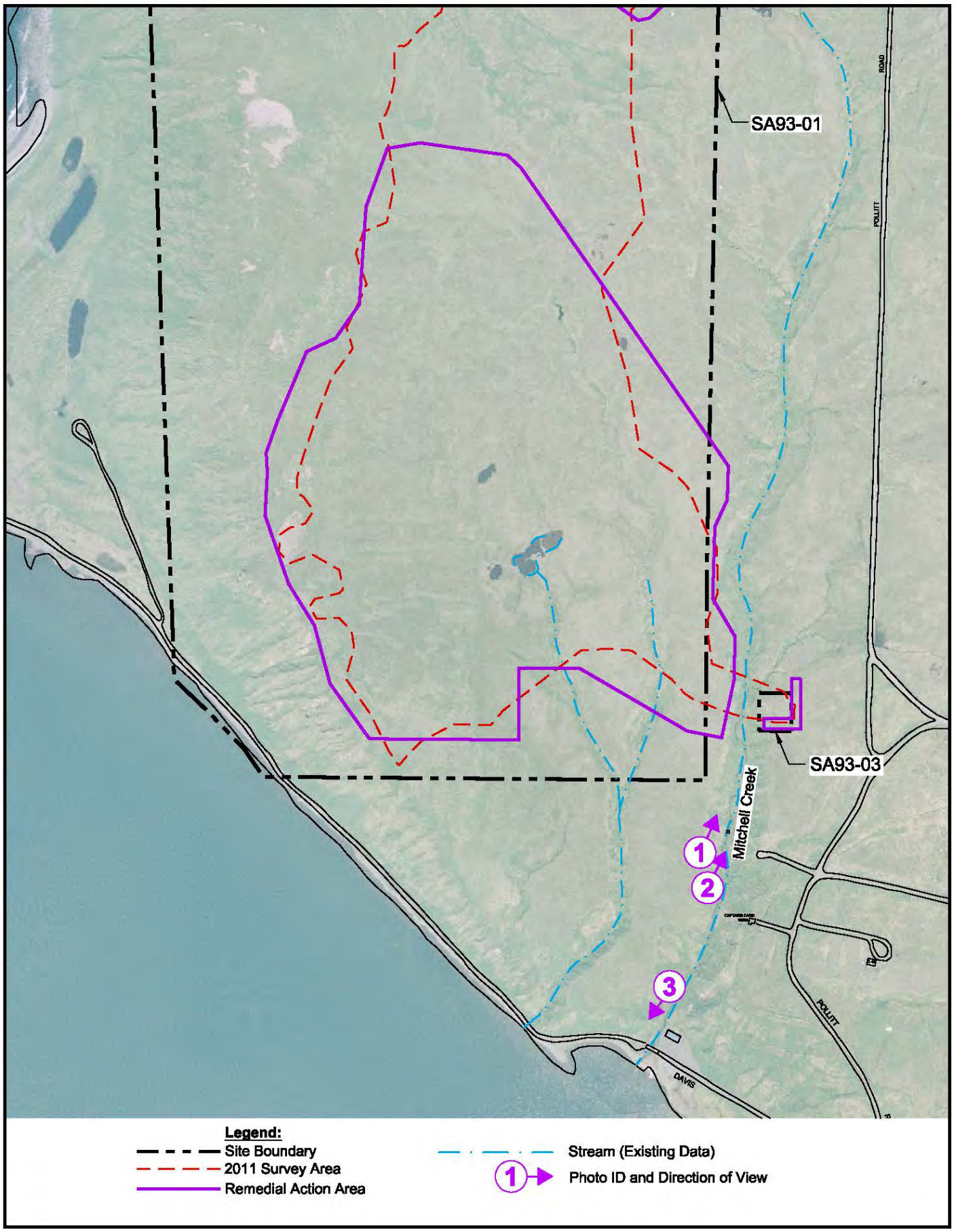
Moffett Creek, five culverts (outfall) under main road: The distance from the bottom of the culverts to the water surface is approximately 1.5 feet and considered likely to be a fish passage barrier.

Photo 16.

Moffett Creek looking northeast: Moffett Creek draining to Andrew Lake

APPENDIX I

Photographs of Mitchell Creek



U.S. NAVY	0 300 600 SCALE IN FEET	**Figure I-1 Mitchell Creek Photo Locations**	Delivery Order 0041 Adak Island, AK OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

T:\ADAK\IDIQ\Sub-Tasks\DO 41\Wetland Investigation\Threat_Endangered Survey\Fig I-1 Mitch Photo Locs.dwg
Mod: 10/23/2012, 10:38 | Plotted: 10/23/2012, 10:40 | john_knobbs

Photo 1.

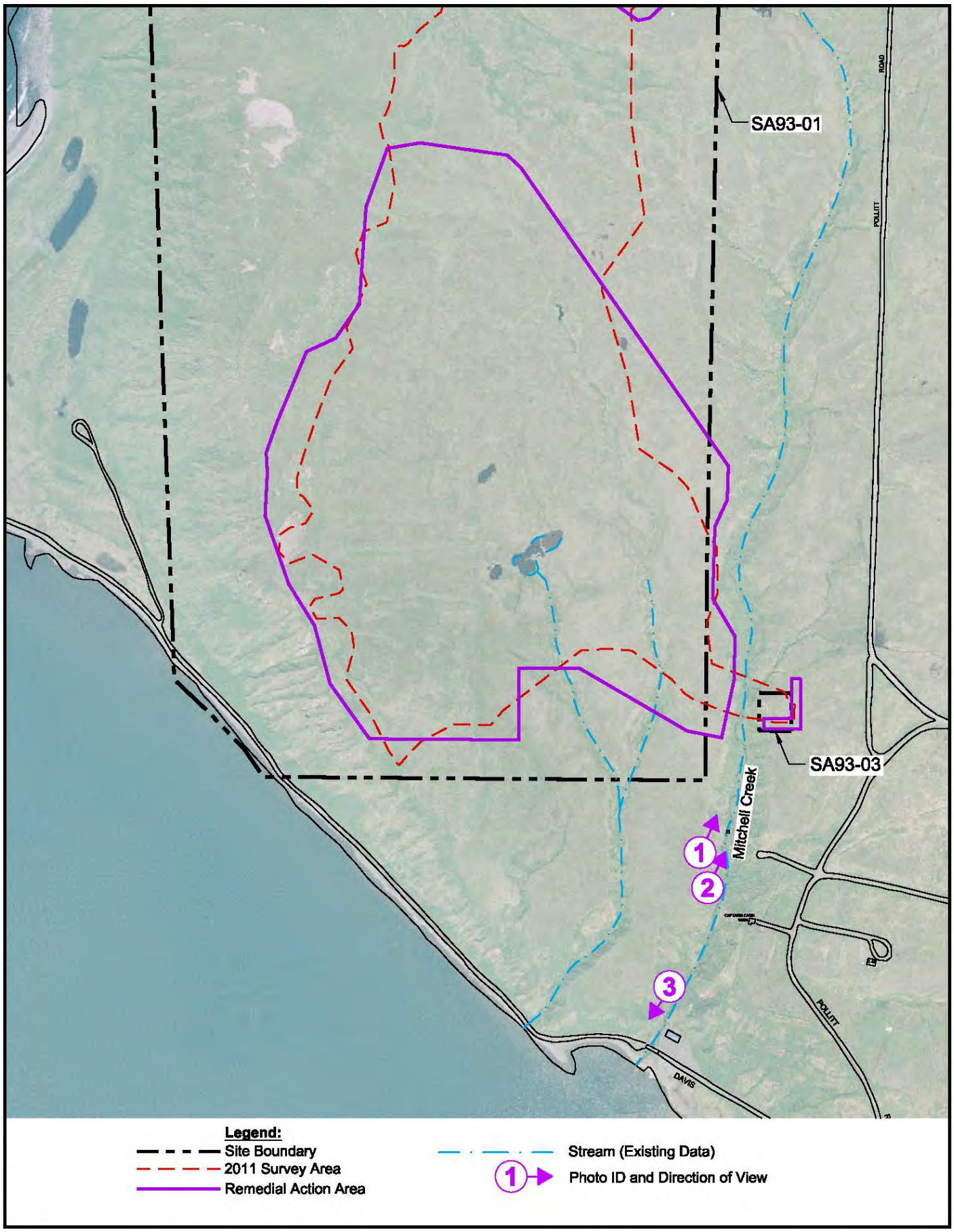
Mitchell Creek Looking north: Dam and hydropower generating facility, considered a fish passage barrier

Photo 2.

Mitchell Creek looking north: Natural waterfall just downstream of the hydropower facility. May also be a fish passage barrier.

Photo 3.

Mitchell Creek looking southwest: Near the recreation center



U.S. NAVY	0 300 600 SCALE IN FEET	**Figure I-1 Mitchell Creek Photo Locations**	Delivery Order 0041 Adak Island, AK OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

T:\ADAK\IDIQ\Sub-Tasks\DO 41\Wetland Investigation\Threat_Endangered Survey\Fig I-1 Mitch Photo Locs.dwg
Mod: 10/23/2012, 10:38 | Plotted: 10/23/2012, 10:40 | john_knobbs

APPENDIX J

Federally Listed Species Occurring in Alaska and Their Potential to Occur in the Vicinity of Former Adak Naval Complex, Adak, Alaska

Federally Listed Species Occurring in Alaska and Their Potential to Occur in the Vicinity of Former Naval Complex, Adak, Alaska

Scientific Name/ Common Name	Federal Status[a]	Preferred Habitat and Distribution in Alaska	Likelihood That Species May Occur in Project Area	Designated Critical Habitat	Information Source
Birds					
Eskimo curlew (*Numenius borealis)*	E	Breeds in the Arctic and migrates though the Great Plains region of North America to winter in South America. No longer occurs in Alaska.	None; extinct or nearly extinct. Would be a vagrant during migration.	None	ADF&G 2011; USFWS 2011a
Kittlitz's murrelet (*Brachyramphus brevirostris*)	C	Their breeding habitat is rocky treeless slopes and mountains, often associated with glaciers. Kittlitz's murrelets forage during the summer months in the cold nearshore marine waters of their breeding areas.	Known to occur on Adak. During the summer breeding season, they are scattered throughout the coastal marine waters through the Aleutian Islands to the Sea of Okhotsk. Common during spring/summer period on Adak.	None	ADF&G 2011; USFWS 2011a,g; USFWS 2010; Kaler et al. 2010; Meehan 1996; Day et al. 1983
Short-tailed albatross (*Phoebastria albatrus*)	E	Known to breed in northwestern Hawaiian Islands (Midway Island) and Torishima Island, Japan; wanders widely during nonbreeding season in Gulf of Alaska, Aleutian Islands, Bering Sea coast, Japan, Russia and high seas. The birds are typically found near islands and mainland coastlines, as opposed to midocean regions. This species spends a vast majority of its time soaring over the ocean, only coming to land to nest.	Very unlikely. Short-tailed albatross may be found offshore of Adak occasionally, but it is unlikely to be found in nearshore waters.	None	ADF&G 2011; USFWS 2011a

Federally Listed Species Occurring in Alaska and Their Potential to Occur in the Vicinity of Former Naval Complex, Adak, Alaska (Continued)

Scientific Name/ Common Name	Federal Status[a]	Preferred Habitat and Distribution in Alaska	Likelihood That Species May Occur in Project Area	Designated Critical Habitat	Information Source
Spectacled Eider (*Somateria fischeri*)	T	Breeds in the Arctic coasts of Alaska and Russia and in the Yukon-Kuskokwim Delta. In winter, entire population congregates in gaps in ice between St. Lawrence and St. Matthew Islands, approximately 700 miles northwest of Adak.	Very unlikely; not documented in project area. Would be considered a transient.	Yes, but not on Adak Island	ADF&G 2011; USFWS 2011a; USFWS 2010
Steller's Eider (*Polysticta stelleri*) AK breeding population	T	Breeds in Arctic coastal plain of Russia (primarily) and a few in Alaska, near Barrow. Also breeds in Yukon-Kuskokwim Delta of Alaska. In winter they can be found in the Aleutian Islands and Alaskan Peninsula.	None. Only breeding population is listed, and they do not nest on Adak; this species is accidental on Adak, and very unlikely to occur in the future. Irregular appearance on Adak during winter and spring.	Yes, but not on Adak Island	ADF&G 2011; USFWS 2011a; USFWS 2010
Yellow-billed loon (*Gavia adamsii*)	C	Northwestern Canada and Alaska. During the winter, they are found in nearshore marine waters of southcoastal and southeastern Alaska.	Unlikely. Casual appearance on Adak with only a few recorded observations.	None	ADF&G 2011; USFWS 2011a,g; USFWS 2010
Mammals					
Cook Inlet beluga whales (*Delphinapterus leucas*)	E	Cook Inlet	None	None	NOAA Fisheries 2011a,b
Bearded seal (*Erignathus barbatus* ssp. *nauticus*)	C	Bering, Chukchi, and Beaufort Seas. Range does not include the Aleutian Islands. Commonly found with drifting sea ice.	None. Not documented in project area, but considered regular within its range.	None	ADF&G 2011; NOAA Fisheries 2011a,b

Federally Listed Species Occurring in Alaska and Their Potential to Occur in the Vicinity of Former Naval Complex, Adak, Alaska (Continued)

Scientific Name/ Common Name	Federal Status[a]	Preferred Habitat and Distribution in Alaska	Likelihood That Species May Occur in Project Area	Designated Critical Habitat	Information Source
Blue whale (*Balaenoptera musculus*)	E	North Pacific Ocean, Bering Sea, and Gulf of Alaska	Unlikely. Present either year-round or on a migratory basis. Considered rare within its range.	None	ADF&G 2011; NOAA Fisheries 2011 a,b
Bowhead whale (*Balaena mysticetus*)	E	Arctic Ocean, Chukchi Sea, and Beaufort Sea. They spend most of the summer in relatively ice-free waters of seas adjacent to the Arctic Ocean. They are associated with sea ice the rest of the year.	Very unlikely. Considered regular within its range.	None	ADF&G 2011; NOAA Fisheries 2011a,b
Fin whale (*Balaenoptera physalus*)	E	Deep, offshore waters of all major oceans, including North Pacific Ocean, Bering Sea, Gulf of Alaska, and Chukchi Sea.	Unlikely. Potentially present either year-round or on a migratory basis. Considered regular within its range.	None	ADF&G 2011; NOAA Fisheries 2011a,b
Humpback whale (*Megaptera novaeangliae*)	E	All major oceans including the Bering Sea, Gulf of Alaska, and North Pacific Ocean.	Unlikely. Potentially present either year-round or on a migratory basis. Considered regular within its range.	None	ADF&G 2011; NOAA Fisheries 2011a,b
North Pacific right whale (*Eubalaena japonica*)	E	Bering Sea, Gulf of Alaska, and North Pacific Ocean, particularly between 20° and 60° latitude.	Very unlikely. Extremely rare. Potential to occur offshore.	Yes. North of the Alaska Peninsula in the Bering Sea	ADF&G 2011; NOAA Fisheries 2011a,b

Federally Listed Species Occurring in Alaska and Their Potential to Occur in the Vicinity of Former Naval Complex, Adak, Alaska (Continued)

Scientific Name/ Common Name	Federal Status[a]	Preferred Habitat and Distribution in Alaska	Likelihood That Species May Occur in Project Area	Designated Critical Habitat	Information Source
Northern sea otter (SW AK pop.) (*Enhydra lutris* ssp. *kenyoni*)	T	Habitat includes the nearshore waters and shallow bays along the coast of the Aleutian Islands and the Alaska Peninsula.	Likely. Present year-round. The northern sea otter subspecies is found in the Aleutian Islands. On Adak, northern sea otters can be found in Andrew Bay and in the surrounding nearshore shallow waters and kelp beds.	Yes, all contiguous waters from the mean high tide line to the 20-m (65.6-foot) depth contour, as well as waters within 100 m (328.1 feet) of the mean high tide line that occurs adjacent to Adak Island	ADF&G 2011; NOAA Fisheries 2011a,b; USFWS 2009; Doroff et al. 2003; Estes et al. 2005; Estes et al. 1998; Estes and Duggins 1995.
Pacific walrus (*Odobenus rosmarus* ssp. *divergens*)	C	In Alaska, continental shelf waters of Bering and Chukchi Seas. The southernmost extent of their range is located northeast of Adak Island in Bristol Bay.	Unlikely. May be present on a migratory basis.	None	ADF&G 2011; NOAA Fisheries 2011a,b; USFWS 2011g.
Polar bear (*Ursus maritimus*)	T	On sea ice and coastline of Chuckchi and Beaufort Seas.	None. Not documented in project area.	Yes	ADF&G 2011; NOAA Fisheries 2011a,b.
Ringed seal (*Pusa hispida*)	C	Bering, Chukchi, and Beaufort Seas. They reside in Arctic waters commonly associated with ice floes and pack ice.	Very unlikely. Not documented in project area.	None	ADF&G 2011; NOAA Fisheries 2011a,b.

Federally Listed Species Occurring in Alaska and Their Potential to Occur in the Vicinity of Former Naval Complex, Adak, Alaska (Continued)

Scientific Name/ Common Name	Federal Status[a]	Preferred Habitat and Distribution in Alaska	Likelihood That Species May Occur in Project Area	Designated Critical Habitat	Information Source
Sei whale (*Balaenoptera borealis*)	E	Gulf of Alaska and North Pacific Ocean. Distribution is worldwide and irregular; not well known.	Unlikely. Present either year-round or on a migratory basis. Considered rare within its range.	None.	ADF&G 2011; NOAA Fisheries 2011a,b.
Sperm whale (*Physeter macrocephalus*)	E	All oceans of the world. In Alaska; Bering Sea, Gulf of Alaska, Northern Pacific ocean. Tend to occur in deep waters (>600 m) typically far from land.	Very unlikely. Present either year-round or on a migratory basis. Considered regular within its range.	None	ADF&G 2011; NOAA Fisheries 2011a,b
Northern (Steller) sea lion, western Distinct Population Segment (*Eumetopias jubatus*)	E	Bering Sea and North Pacific Ocean. Haul-outs and rookeries along the Aleutian chain and into the central Bering Sea.	Likely. Present either year-round or on a migratory basis. Considered regular within its range. An existing rookery and haul-out on Adak Island are near Cape Yakak on the island's southwest side within AMNWR-designated land.	Yes, includes Adak Island. Includes all major haul-outs, rookeries, and a terrestrial zone that extends 3,000 feet landward from the rookery or haul-out (measured vertically from sea level). Also includes an aquatic zone that extends 20 nautical miles seaward from rookery or haul-out in Alaska that is west of 144 degrees longitude.	ADF&G 2011; NOAA Fisheries 2011a,b; USFWS 1993.

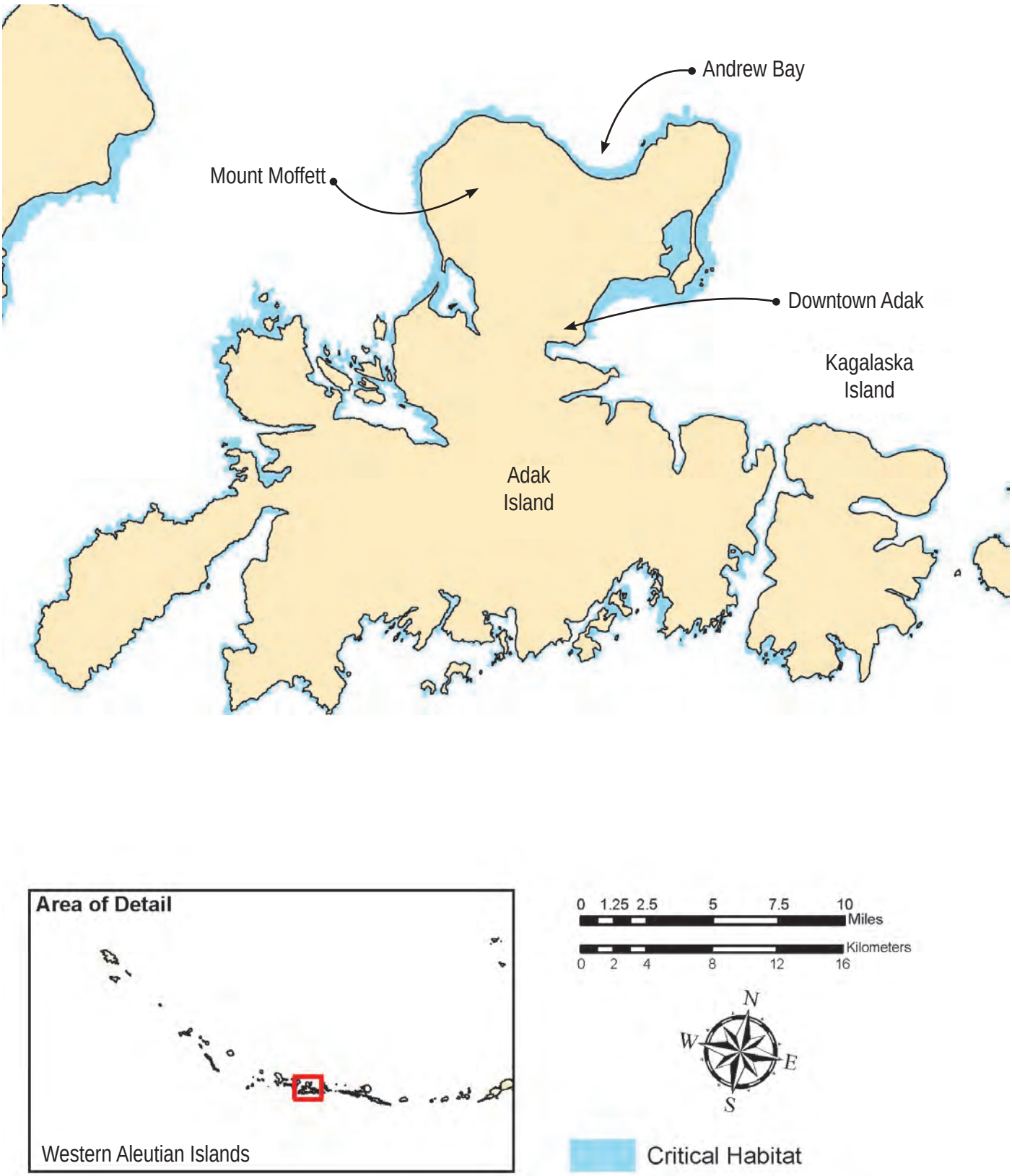
Federally Listed Species Occurring in Alaska and Their Potential to Occur in the Vicinity of Former Naval Complex, Adak, Alaska (Continued)

Scientific Name/ Common Name	Federal Status[a]	Preferred Habitat and Distribution in Alaska	Likelihood That Species May Occur in Project Area	Designated Critical Habitat	Information Source
Reptiles					
Green sea turtle (*Chelonia mydas)*	T	Pacific Ocean. In the eastern North Pacific, green sea turtles are seen from Baja, California to southeast Alaska.	Very unlikely. In Alaska, there have been 15 green sea turtle sightings since 1960. The green sea turtle has been the most common species in Alaskan waters since 1993, but most of these occurrences were dead turtles.	None	ADF&G 2011; NOAA Fisheries 2011a.
Leatherback sea turtle (*Dermochelys coriacea*)	E	Pacific Ocean; Gulf of Alaska within Alaskan waters.	Very unlikely. 19 leatherbacks have been reported in Alaska between 1960 and 2007. Prior to 1993, they were the most common sea turtle species in Alaskan waters.	None	ADF&G 2011; NOAA Fisheries 2011a.
Loggerhead sea turtle (*Caretta caretta*)	T	Pacific Ocean; Gulf of Alaska within Alaskan waters.	Very unlikely. Though rare in Alaska, loggerhead sea turtles occasionally visit Alaska's Gulf Coast waters. They have been reported in Alaska only twice between 1960 and 2007.	None	ADF&G 2011; NOAA Fisheries 2011a.
Olive Ridley sea turtle (*Lepidochelys olivacea*)	T	Pacific Ocean	Very unlikely. Olive Ridley sea turtles have been reported in Alaska three times between 1960 and 2007.	None	ADF&G 2011; NOAA Fisheries 2011a.

Federally Listed Species Occurring in Alaska and Their Potential to Occur in the Vicinity of Former Naval Complex, Adak, Alaska (Continued)

Scientific Name/ Common Name	Federal Status[a]	Preferred Habitat and Distribution in Alaska	Likelihood That Species May Occur in Project Area	Designated Critical Habitat	Information Source
Plants					
Aleutian shield fern *(Polystichum aleuticum)*	E	Mount Reed on Adak Island	Unlikely. Present on Mount Reed, but never found on northern part of Adak.	None	USFWS 2011f; Byrd and Williams 2007

[a]Federal Listing Codes: E – endangered, T – threatened, C – candidate, D – delisted, PT - proposed threatened



Source: USFWS 2011d

U.S. NAVY	**Figure 4-6** **Northern Sea Otter Critical Habitat Map**	Delivery Order 0041 Adak Island, AK OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

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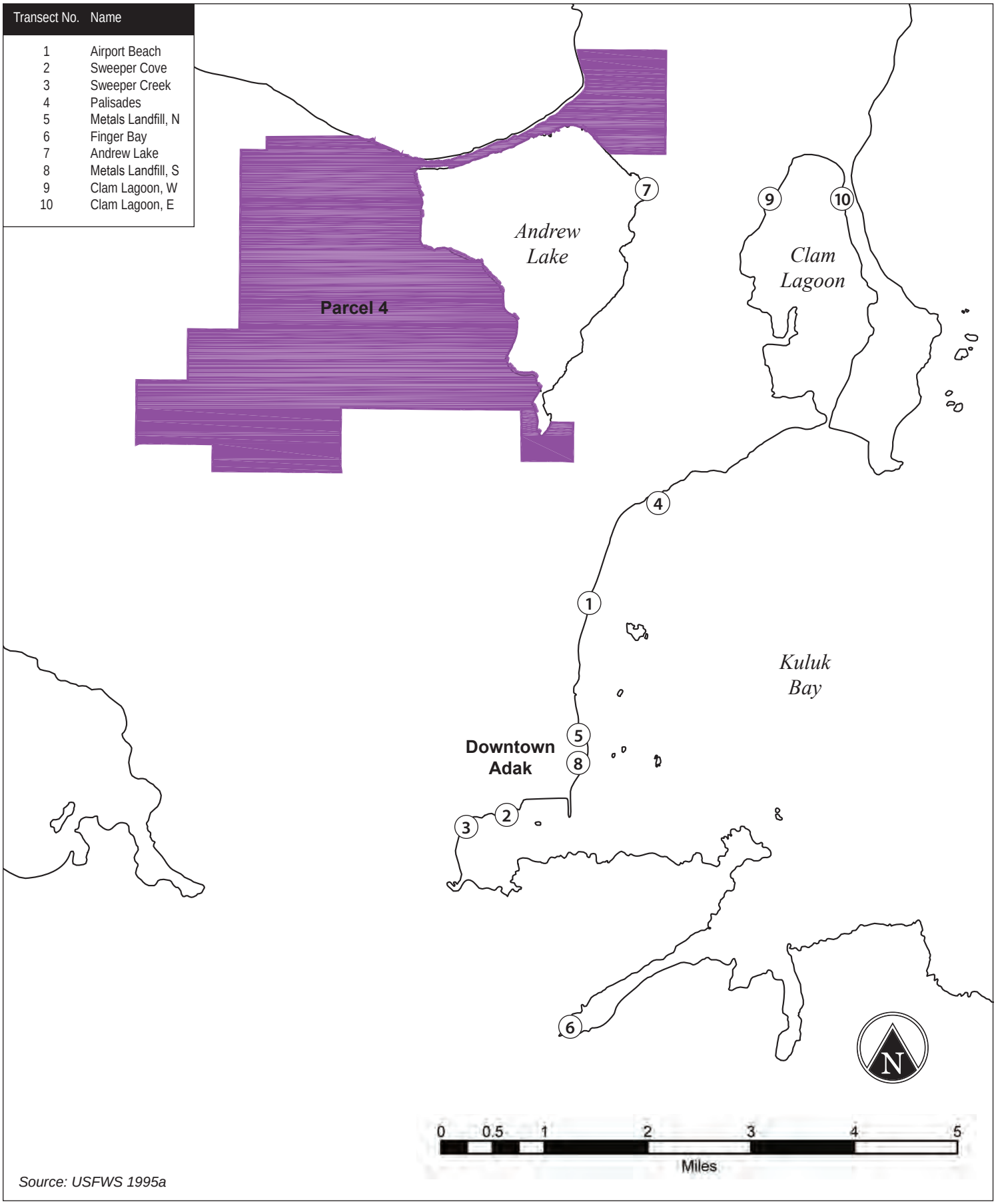

Source: USFWS 1995a

U.S. NAVY	Figure 4-9 Dive Survey Transect Locations	Delivery Order 0041 Adak Island, AK OU B-2 THREATENED & ENDANGERED SPECIES & HABITATS SURVEY

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