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of Engineers
Alaska District

Navigation Improvements
Interim Feasibility Report
and Final Environmental Impact Statement

Vol I

Akutan, Alaska

July 2004

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
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INTERIM FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

NAVIGATION IMPROVEMENTS AKUTAN, ALASKA

July 2004

FINAL
ENVIRONMENTAL IMPACT STATEMENT
for
NAVIGATION IMPROVEMENTS
AKUTAN, ALASKA

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Abstract: This Final Environmental Impact Statement (FEIS) analyzes the impacts of constructing navigation improvements at Akutan, Alaska. Currently, there is no protected moorage at Akutan for the Bering Sea commercial fishing fleet, which must travel to other locations to obtain provisions for fishing and to moor during closed fishing periods. The FEIS considers and assesses potential effects of a variety of structural alternatives at different project locations within Akutan Harbor, a natural fjord-like bay on Akutan Island. No nonstructural measures were identified that will provide solutions to damages, lack of adequate moorage, and other Bering Sea fishing fleet problems identified. Alternative harbor sites at Salthouse Cove, North Point, and the Old Whaling Station were eliminated from consideration because they were not economically feasible. Akutan Point was eliminated because the site was not economically and environmentally feasible. The head of Akutan Harbor proved to be the only economically viable location for navigation improvements.

Initial examinations of the head of Akutan Harbor site focused on three conceptual designs: constructing a harbor entirely offshore; constructing a harbor half offshore and half onshore; and constructing a harbor entirely inland. However, only the inland harbor design had the greatest net economic benefits. Three inland mooring basin alternatives were evaluated and the environmentally preferred, 58-vessel, reconfigured 12-acre harbor basin was selected as the recommended plan. The 80-vessel, 20-acre harbor basin is the most economical plan of those analyzed, and the National Economic Development plan is 20 acres or larger. The recommended plan would require dredging 843,000 cubic yards of sandy/gravely material out of a freshwater wetland complex and non-wetlands that are currently isolated from Akutan Harbor's marine environment. The dredged entrance channel would connect the dredged mooring basin to Akutan Harbor. Dredged material would be stockpiled in the Central Creek drainage area, affecting uplands, wetlands, and the biological resources they support.

The project was formulated, to the maximum extent practicable, to mitigate (i.e., avoid, minimize, restore/rectify, compensate) adverse project effects to natural and cultural resources of particular importance and with special regulatory status, including wetlands, special aquatic habitats, marine mammals, threatened and endangered species, and essential fish habitat. The types of fish and wildlife impacts associated with all the head of Akutan Harbor alternatives are similar; however, the magnitudes of impacts vary with each alternative. Despite all planning efforts to do otherwise, the project would have unavoidable adverse impacts on freshwater wetlands, the area's hydrology, fish-bearing streams and ponds, and marine habitat that support juvenile fish and over-wintering Steller's eiders. The mooring basin has been designed to maximize water circulation and flushing. Chronic releases of petroleum products from harbor operations and vessels may degrade water quality, as well as contaminate marine sediments inhabited by invertebrate epi- and infauna species that are fed upon by marine fish and wildlife.

Lead Agency: U.S. Army Corps of Engineers, Alaska District. Comments on the FEIS may be directed to the address below within 30 days from the date the FEIS's availability is published in the Federal Register.

U.S. Army Corps of Engineers
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Final
Environmental Impact Statement
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ACRONYMS AND ABBREVIATIONS

AEB	Aleutians East Borough
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADGC	Alaska Division of Governmental Coordination
ADNR	Alaska Department of Natural Resources
ADOT/PF	Alaska Department of Transportation and Public Facilities
AHMP	Akutan Harbor Management Plan
AHRS	Alaska Heritage Resources Survey
AOPMP	Alaska Office of Project Management and Printing
BOD	biological oxygen demand
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers Alaska District
CZMA	Coastal Zone Management Act
DO	dissolved oxygen
DOI	Department of Interior
EFH	essential fish habitat
EIS	Environmental Impact Statement
ELW	extreme low water
ER	Engineer Regulations
FAA	Federal Aviation Administration
FMP	fish management plan
FUDS	Formerly Used Defense Sites
FWCA	Fish and Wildlife Coordination Act
LOA	length overall
MHHW	mean higher high water
MHW	mean high water
MLLW	mean lower low water
MLW	mean low water
MSL	mean sea level
MTL	mean tide level
NED	National Economic Development

NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
NTU	nephelometric turbidity units
RPA	reasonable and prudent alternatives
RPM	reasonable and prudent measures
TMDL	total maximum daily limit
SHPO	State Historic Preservation Officer
SSC	species of special concern
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

FINAL ENVIRONMENTAL IMPACT STATEMENT for NAVIGATION IMPROVEMENTS AKUTAN, ALASKA

SUMMARY

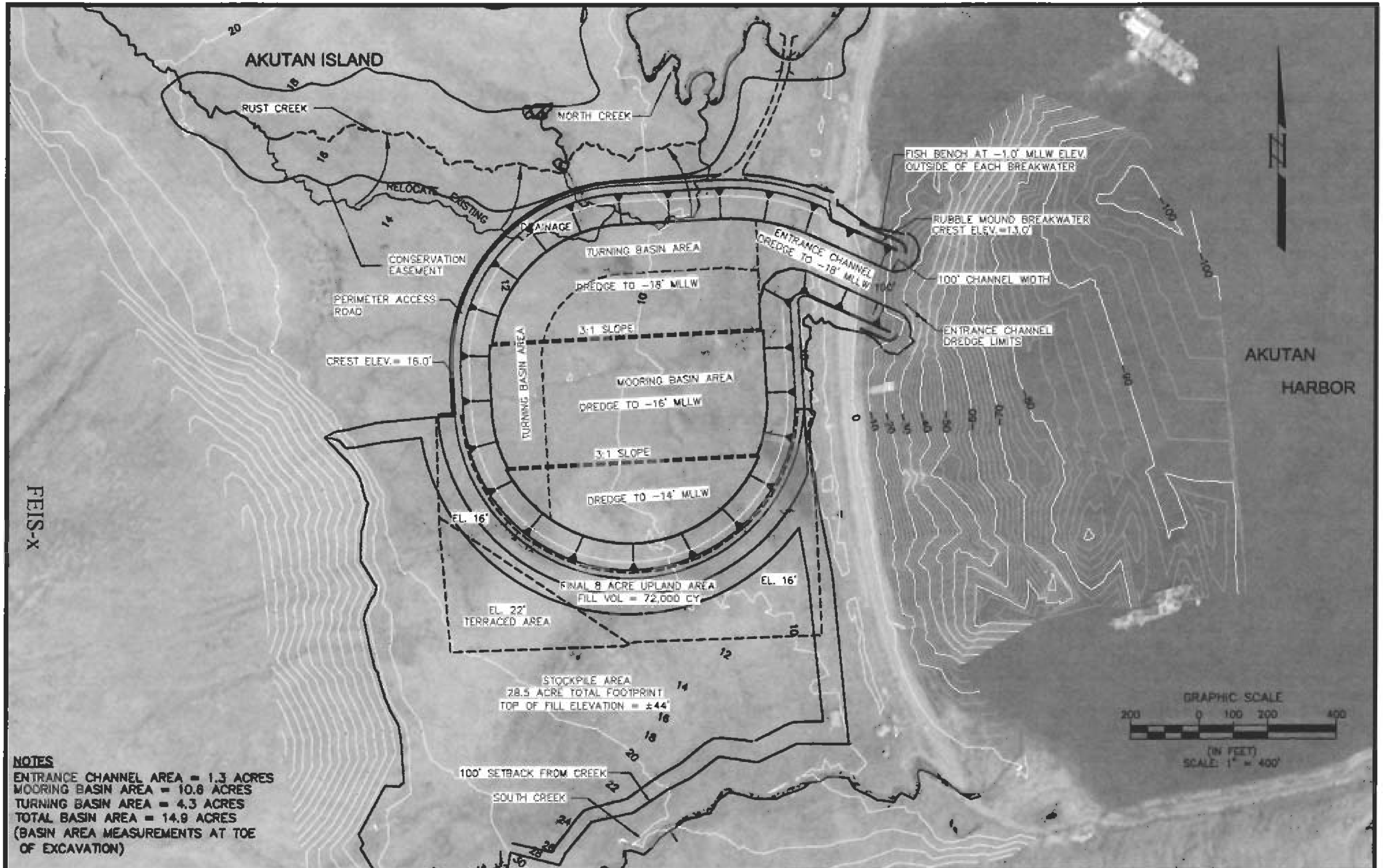
Major Engineering Findings

The U.S. Army Corps of Engineers, Alaska District (Corps) chose the head of Akutan Harbor as the site to construct navigation improvements for the Bering Sea fishing industry and the residents of the City of Akutan. After examining the conceptual cost estimates and performing an economic evaluation of the "alternatives considered in more detail," the inland mooring basin was found to be the most economically feasible alternative, and it also generated the greatest net economic benefits. Several versions of the inland basin (12-acre basin, 15-acre basin, and 20-acre basin) advanced for a more detailed analysis. By varying the size of the basin, different portions of the overall fleet could be serviced and different overall costs and benefits could be compared. Environmental impacts associated with the versions were also identified.

The economic analysis of three inland mooring basin options indicated that all three were economically feasible, but the 20-acre inland harbor would generate the most economic benefits; therefore, the National Economic Development Plan would be 20 acres or larger. However, because the 20-acre mooring basin also generated the most adverse environmental impacts, the smaller 12-acre option was selected as the tentatively selected plan and identified as such in the draft environmental impact statement (DEIS). Based on comments received on the DEIS and the Corps' reevaluation of the project, the 12-acre mooring basin was selected as the recommended plan and reconfigured to further address environmental concerns and mitigation requirements (figure FEIS-i).

Major construction items of the recommended plan include breakwaters, dredging, and inner harbor facilities. Stated concerns about deteriorating water quality in Akutan Harbor, an impaired water body, were addressed by rounding the basin's sides and corners to theoretically improve water circulation/flushing. However, rounding the sides and corners created a larger mooring and turning basin (14.9 acres verses 12.0 acres) to accommodate the same fleet size (i.e., 58 vessels). Narrowing the entrance channel to 100 feet further facilitated the flushing dynamics of the harbor basin and also decreased the channel area from 2.6 acres to 1.3 acres.

Two approximately 300-foot-long rubblemound breakwaters would protect the harbor basin entrance channel. The breakwaters would have a crest elevation of +13.0 feet mean lower low water (MLLW) and a crest width of 5.0 feet. Breakwater foundation materials are unconsolidated sands and breakwater slopes are 2H:1V in lieu of 1.5H:1V to increase stability on the unconsolidated foundation and facilitate nearshore fish movements. A 5-foot-wide bench would be constructed on the



NOTES

ENTRANCE CHANNEL AREA = 1.3 ACRES
MOORING BASIN AREA = 10.6 ACRES
TURNING BASIN AREA = 4.3 ACRES
TOTAL BASIN AREA = 14.9 ACRES
(BASIN AREA MEASUREMENTS AT TOE OF EXCAVATION)

NOTES

TOTAL HARBOR BASIN PROJECT AREA = 16.2 ACRES (TO TOP OF SLOPE)
TOTAL HARBOR USEABLE UPLANDS AREA = 8.0 ACRES (DOES NOT INCLUDE ROADS AND SLOPES)
TOTAL USABLE HARBOR PROJECT AREA = 28.7 ACRES (INCLUDES PERIMETER ROAD, UPLANDS AND SLOPES)
TOTAL STOCKPILE AREA = 28.5 ACRES (INCLUDES 8 ACRES FOR FUTURE USABLE UPLANDS)
TOTAL HARBOR PROJECT AREA =57.2 ACRES (INCLUDES STOCKPILE FOOTPRINT)
TOTAL DREDGE VOLUME = 843,000 CY
VOLUME REQUIRED FOR USABLE UPLAND FILL = 72,000 CY
TOTAL STOCKPILE VOLUME = 771,000 CY

RECONFIGURED
12 ACRE ALTERNATIVE

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE
FEIS-i

outside of the breakwaters at –1.0 foot MLLW to also facilitate nearshore fish movements. The foundation materials would be excavated to entrance channel depth (-18 feet MLLW). Under the breakwater and 50 feet from the toe, the excavation line would slope at 3H:1V. Over-excavation would be backfilled with breakwater core material.

The project would accommodate 58 vessels in a 14.9-acre harbor basin. Vessel sizes using the harbor basin would range from under 24 feet to 180 feet in length. Turning and mooring basins would be dredged to elevations of –18, –16, and –14 feet MLLW. The shallower depths would be positioned furthest from the entrance channel, thereby providing smaller boats more protection from potential waves coming through the entrance channel. Basin slopes would be 3H:1V below mean higher high water (MHHW), 2H:1V above MHHW, and armored with rock to prevent and reduce erosion and sloughing, reduce dredged quantities, and facilitate nearshore fish movements within the harbor basin.

Local service facilities would consist of the docks and floats necessary to moor the fleet. Also included would be the necessary gangways for access from the 8-acre staging area and perimeter road to the docks and floats.

The recommended plan would generate a considerable amount of dredged material, 843,000 cubic yards. The upper 4 to 6 feet of material to be dredged at the head of Akutan Harbor consists of silty sand with organics. The material below this layer has been characterized as coarse to fine-grained sand. There are a number of alternative ways to dredge this material and also a number of sites that could be used for disposal. The fine-grained sand is well suited for a suction dredging operation. Using a suction dredge and a pipeline, the dredged material could be economically moved up to about 2 miles from the project site. Other methods that could be employed to dredge the harbor basin and entrance channel include clamshell dredging, a dragline, a large backhoe, and bulldozers. However, the relatively high water table at the head of Akutan Harbor precludes using bulldozers and backhoes except for the initial site preparation and excavation of the surface soil.

Approximately 72,000 cubic yards of dredged material would be used to construct an 8-acre staging area adjacent to the harbor basin, leaving the remaining 771,000 cubic yards of dredged material to be disposed of.

Six dredged material disposal alternatives were identified. Two involve transporting the dredged material outside Akutan Harbor: Offshore disposal outside Akutan Harbor and onshore disposal at Unalaska, Alaska. Deepwater disposal outside Akutan Harbor within Akutan Bay or barging the dredged material to Unalaska for upland disposal (and subsequent use for construction projects) would be prohibitively expensive primarily due to the high barge-transportation costs and the expenses associated with extending the construction season. The remaining four alternatives have various degrees of cost effectiveness, and associated advantages and disadvantages. Environmental issues aside, disposing of the dredged material on the intertidal beach at the head of Akutan Harbor is the most cost effective alternative, followed by indiscriminately discharging the material (via a suction dredge pipeline) offshore into Akutan Harbor. The costs associated with stockpiling the material onshore at the head of Akutan Harbor or at the Whaling Station are higher because of the required use of earthmoving equipment. However, when environmental issues are incorporated into the decision-making process, the feasibility of each alternative becomes more or less certain.

Two of the four remaining disposal alternatives involve placing dredged material into Akutan Harbor's nearshore and offshore environment. Akutan Harbor's nearshore marine environment (i.e., the intertidal and shallow sub-tidal areas) consists of sand, gravel, and cobble beaches; rock outcroppings; and steep-sloped rock faces, all of which support a species rich and diverse community of benthic organisms, kelp, fish communities, and habitat used by seabirds, sea ducks, and marine mammals. The Corps, U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and Alaska Department of Fish and Game (ADFG) agree that placing dredged material on the intertidal beach habitat at the head of Akutan Harbor is not environmentally feasible because of its significant and adverse impacts on over-wintering Steller's eider (a threatened species) habitat, essential fish habitat, the nearshore movement of fish (especially juvenile salmonids), and on Akutan Harbor's water quality, which is dissolved oxygen-impaired. Placing sandy dredged material on unlike-shoreline material consisting of gravel, cobble, and/or rock is also not environmentally feasible because it would cause significant adverse impacts on the heavily vegetated substrate that is used by juvenile fish for refuge, spawning, and assemblages of benthic organisms.

Ocean disposal of dredged material can in many cases be environmentally benign, and in some cases, environmentally beneficial; however, this would not be the case in Akutan Harbor. First, the cost-effective range (2-miles) of using a suction-dredge pipeline in Akutan Harbor is totally within the area classified as an impaired water body for dissolved oxygen. Second, the indiscriminate discharge of dredged material offshore into Akutan Harbor would adversely impact at a minimum water quality, king crab habitat, benthic epifauna/infauna organisms and their habitat, and the food resources fed upon by Steller sea lions. For the aforementioned reasons, the indiscriminate discharge of dredged material in offshore areas of Akutan Harbor is not considered further. However, opportunities may exist within Akutan Harbor for the beneficial use of dredged material in a manner or location that provides ecological benefit.

Under the auspices of the Water Resources Development Act of 1996 (Section 206) the Corps has authority to conduct aquatic ecosystem restoration projects (with a project sponsor) to restore ecosystem structure, function, and dynamic processes to a less degraded, more natural condition. Additional authorization is granted under the Water Resources Development Act of 1992 (Section 204), which allows the Corps to carry out projects for the protection, restoration, and creation of aquatic and ecologically related habitats in connection with dredging for construction, operation, or maintenance. The USFWS believes that selected areas of deepwater benthic habitat have been adversely impacted by historic releases of seafood processing wastes. The extent of the problem and need to perform environmental restoration (e.g. capping the seafood waste piles with clean sandy dredged material) in these areas has not been defined; therefore, the feasibility of implementing the alternative cannot be determined at this time. A secondary benefit of implementing an ecosystem restoration plan using the dredged material would be that the amount of material to be stockpiled at the head of Akutan Harbor would be reduced, thereby reducing the impacts on area wetlands and associated fishery uses. The Corps, project sponsors, USFWS, U.S. Environmental Protection Agency, and State of Alaska resource agencies will continue to evaluate ecosystem restoration opportunities, and if proven environmentally, engineeringly, and economically feasible, will incorporate plans to do so during the project's Preconstruction Engineering Design phase (which will occur after project authorization by the U.S. Congress).

The presumptive least damaging alternative for the disposal of dredged material would be to use uplands, if sites were available and cost-effective to reach. The only uplands that exist within the cost-effective range (2 miles) of the suction dredging equipment is at the head of Akutan Harbor, at the Whaling Station, at the Trident Seafoods Processing Facility and its commercial fishing gear storage yard, and at the City of Akutan. With the exception of the head of the Akutan Harbor and Whaling Station sites, all the locations are heavily developed and not suitable for the storage of dredged material.

The Whaling Station has approximately 13 acres of privately owned property that is currently being used as a crab pot storage facility. Commercial fishing vessels are known to use its dilapidated woodpile pier. The site is also eligible for listing in the National Register of Historic Places and is currently a U.S. Army, Formerly Used Defense Site military cleanup site. Because of the site's inability to accommodate the 771,000 cubic yards of dredged material, and for the aforementioned circumstances, the site does not appear to be practicable.

Approximately 30 acres of non-wetlands exist near the project area at the head of Akutan Harbor; however, only 9 acres would be reasonably accessible for use in stockpiling dredged material. The remaining 11.2 acres needed for constructing the dredged material stockpile would consist of adjacent wetlands. The impacted wetlands support resident populations of Dolly Varden and threespine stickleback, but are not known to support nesting waterfowl. The drainages to the north and south of the affected wetlands that support anadromous fish resources would not be impacted by dredged material stockpiling activities.

The Corps recognizes that disposing of dredged material onshore (in uplands and wetlands) at the head of Akutan Harbor or in offshore areas within inner-Akutan Harbor will have adverse impacts on the affected area's ecological resources and that there are environmental tradeoffs associated with selecting one over the other as the recommended dredged disposal plan. Deepwater disposal outside Akutan Harbor and transporting the dredged material to Unalaska may be the least environmentally damaging alternatives but are not practical because they are cost-prohibitive.

Disposing of dredged material in Akutan Harbor's nearshore and deepwater environments would totally avoid impacting the Central Creek's wetlands and associated fishery resources; however, it would adversely impact benthic resources; nearshore movement of fish; essential fish habitat; water quality in an impaired water body for dissolved oxygen; over-wintering Steller's eider (a threatened species) habitat; Steller sea lions (an endangered species) and other marine mammals (e.g. sea otters, a candidate species); and, king crab and their habitat. Disposing the dredged material onshore at the head of Akutan Harbor would totally avoid impacting the aforementioned marine resources in Akutan Harbor and utilize available uplands; it would, however, adversely impact Central Creek's wetlands and associated fishery resources. Opportunities may exist to reduce impacts to Central Creek's wetlands and associated fishery resources area wetlands by using some of the dredged material for aquatic restoration projects in Akutan Harbor.

An evaluation of the environmental tradeoffs, in concert with the USFWS, ADFG, and NMFS, has led the Corps to conclude that the onshore disposal of dredged material (771,000 cubic yards) on uplands and wetlands within the Central Creek drainage is the least environmentally damaging and practicable alternative; and that efforts to conduct an aquatic restoration project in Akutan Harbor might reduce impacts further.

Public Involvement and Major Issues

Scoping for the Akutan Harbor project began with the issuance of a Public Notice dated February 3, 1997, inviting the public to assist the Corps in identifying important cultural and natural resources the project might affect. A Notice of Intent to prepare a Draft Environmental Impact Statement for navigation improvements at Akutan, Alaska, was published in the Federal Register on August 5, 1999, (Federal Register Vol. 64, No. 150). Per Executive Order 13175, a letter dated June 7, 2001, was sent to the president of the Akutan Traditional Council initiating government-to-government consultation about the possible effects the project might have on tribally recognized rights or protected resources.

Issues and concerns associated with the Akutan project were defined through public scoping; Federal, State, and local agency coordination; site investigations; and from the review of published and unpublished natural resource information about the region. An immediate concern emerged concerning the lack of information about the Akutan area's fish and wildlife resources, i.e. not enough site-specific information existed to permit a complete environmental evaluation of the project's potential impacts. As a result, field studies were cooperatively developed by the resource agencies, funded by the project sponsor and/or the Corps, and implemented (by contractor and/or government agency) to expand the information-base and more adequately address the following major issues of concern:

- Loss of wetland habitat and the associated ecological repercussions.
- Alterations to the project area's hydrogeology and repercussions on the area's anadromous fish streams and adjacent wetlands.

- Effects of the project on nearshore coastal fishery habitat (e.g. essential fish habitat) and fish movements.
- Petroleum-spill impacts on area fish and wildlife resources.
- Destruction of historical and/or archeological resources.
- Loss of subsistence resources.
- Loss of intertidal and subtidal habitat.
- Effects of project-induced activities (e.g. fuel spills, boat traffic, and construction and operation of harbor-related business) on over-wintering Steller's eiders, which is a threatened species.
- Degradation of water quality in Akutan Harbor and the mooring basin because of potential poor water circulation in each.

Although no foreseeable projects have been identified, constructing a harbor at Akutan would likely stimulate the development of harbor-related businesses, such as fueling stations, vessel repair shops, vessel storage, grocery/supply stores, equipment storage areas, etc. The City of Akutan would likely expand utility and other services (e.g. power generation, water, and waste disposal) to the harbor. Most development would likely occur on upland areas constructed from the mooring basin's dredged disposal material; however, some businesses may choose to apply for a Corps Section 10/404 permit to fill wetlands or intertidal areas and construct their businesses there.

Nature of Significant Effects

The hydrogeologic characteristics of the wetlands at the head of Akutan Harbor are complex and easily impacted. In addition, the area is biologically productive, having fish-bearing (pink and coho salmon, Dolly Varden, and threespine stickleback) streams and ponds, limited passerine bird and waterfowl habitat, and a diverse near-shore marine habitat that supports juvenile marine and anadromous fish, sea otter, Steller sea lions (an endangered species), and concentrations of over-wintering Steller's eiders (a threatened species). All three different-sized mooring basin options would affect the aforementioned environmentally sensitive areas and resources: The larger the mooring basin, the greater the potential impacts.

<u>Physical Environment</u>. Constructing a basin of any size would immediately and permanently impact surface water and groundwater flow into the central basin. Surface drainage and groundwater flow would no longer discharge into Akutan Harbor as they do now, but rather would discharge directly to the excavated basin from areas immediately adjacent to the basin's shoreline.

The area's water table would be impacted in several ways. The shape of the water table would be altered, especially shortly after construction. Extending the shoreline inland would impose a new base level in the interior of the basin. A new base level would shorten the flow path and steepen the flow gradient, thus affecting the overall shape of the water table. It is assumed that water levels would equivalently adjust themselves and eventually establish a new gradient similar to the current gradient. However, the new gradient would depend on the magnitude of recharge, which is

currently unknown, to the shallow aquifer in the headwaters of the valley.
The saltwater interface after dredging a mooring basin would move inland to the new shoreline and the new depth to the saltwater interface would be dependent upon the new elevation of the water table after construction. Exactly what the elevation of the water table would be following construction is unknown because of the limited amount of data on aquifer recharge. However, it is expected that the water table would have a gradient and elevation comparable to existing conditions, providing the volume of aquifer recharge is equivalent to the amount of groundwater discharging into the bay and to nearby streams after construction.

The recommended plan is not expected to affect stream discharge, sediment supply, or salinity of North Creek because the creek flows eastward to the sea and north of the drainage divide. South Creek would not be impacted for similar reasons. Stream discharge and sediment supply along these creeks are not expected to change providing harbor construction directly avoids these creeks.

The recommended plan would affect the water quality at the head of Akutan Harbor. Construction activities (e.g. dredging, dredged material disposal, and placement of jetties) would have the most immediate impact on water quality, while harbor operation activities (e.g. chronic petroleum spills and waste disposal) could affect water quality in the long term. Huge stockpiles of dredged and excavated material would be produced, and it is the turbid water draining from the wet, stockpiled sediment that has the potential to adversely impact water quality at the head of Akutan Harbor and neighboring anadromous fish streams. To prevent this from happening, runoff from the stockpiles would be collected either by perimeter berms and directed back into the mooring basin or in settling basins constructed adjacent to the mooring basin. The known, poor water circulation in inner-Akutan Harbor, the long history of discharging seafood-processing wastes in Akutan Harbor, and periodic petroleum spills exacerbate Akutan Harbor's current water quality problems. However, the Corps expects maximum circulation and water exchange to occur in the mooring basin when strong winds (>10 knots) occur from the west during flooding and ebbing spring tides. In addition, there is ample evidence that harbor design shape and entrance configuration can substantially improve circulation and subsequently water quality. Rounding the inside corners of the mooring basin and narrowing the width of the entrance channel to 100 feet would generate the conditions necessary to facilitate circulation and maintain water quality standards within the mooring basin.

Increases in vessel traffic can be expected to increase the risk of petroleum (e.g. diesel and Bunker C) spilled in the mooring basin and throughout Akutan Harbor. Petroleum products commonly enter the marine environment through bilge pumping, fueling, and improper response to spills. Studies estimate 65 percent of petroleum released into waters is from chronic discharges, and the remaining 35 percent is due to massive spills.[1] Petroleum sheen is sometimes unavoidable near working vessels because even a minute quantity of petroleum tracked on deck or dripping hydraulic lines can produce light surface sheen during wet weather.

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[1] Day, R.H. and A.K. Pritchard. 2000. Task 2C. Estimated future spills. Prepared for the U.S. Army Engineer District, Alaska. ABR, Inc., Fairbanks, Alaska.

Biological Environment. The recommended plan at the head of Akutan Harbor would cause significant adverse impacts to freshwater wetlands. The reconfigured 12-acre inland mooring basin would unavoidably impact 27.7 acres of palustrine emergent wetlands and associated small ponds (palustrine aquatic bed and unconsolidated bottom) and 1 acre of uplands. The staging area would impact 4.8 acres of wetlands and 3.2 acres of uplands. The dredged material stockpile would impact 11.2 acres of wetlands and 9.3 acres of uplands. In total, 43.7 acres of wetlands would be directly impacted by the project.

Additional wetland losses may extend beyond the project outline to adjacent areas due to: (1) drainage of groundwater into the harbor basin; and (2) changes in wetland plant species composition due to possible increases in groundwater salinity. Effects of increased salinity on plant communities are not expected to be significant, however. One of the most abundant wetland plants in the area, Lyngbye's sedge, is commonly found in estuarine areas and should be tolerant of more saline conditions.

Within the footprint of the project, fish-bearing (threespine stickleback and Dolly Varden) ponds and streamlets would be dredged and filled to construct the mooring basin, staging area, and dredged material stockpiles. Dredging and filling activities would destroy marine-dwelling invertebrates inhabiting the footprint of the entrance channel and the rubblemound breakwaters. Sea otters and over-wintering Steller's eiders would be exposed to chronic releases of petroleum products into the marine environment, and if the release were large enough, mortalities may occur. Furthermore, prey species may become contaminated with polycyclic aromatic hydrocarbons (PAHs). Harbor operations and increased vessel use of the head of Akutan Harbor would likely disturb resting and feeding Steller's eiders and sea otters that heavily use the area.

The cumulative effects of petroleum spills and of dumping solid wastes into Akutan Harbor might, in the long-term, adversely affect the area's marine fish and wildlife resources. The chronic release of petroleum products into the marine environment from vessels and refueling facilities could cumulatively reduce water quality and contaminate the marine resources local fish and wildlife rely upon for food. In the long term, this exposure could adversely affect the ability of animals to feed, migrate, and breed, and in some cases cause mortality.

Akutan Harbor's shoreline and near-shore area are currently littered with fishing-industry-related trash (e.g. fishing nets, floats, crab pots, and lines) and trash (e.g. oil cans, lead batteries, and Styrofoam) from unknown sources. In some cases, trash has become a potential entrapment hazard for wildlife, and in other cases, some trash, if ingested, can cause mortality. Increased vessel use in Akutan Harbor may exacerbate the trash problem and cumulatively increase the frequency of wildlife entrapment and mortality.

During the impact analysis process, several environmental tradeoffs were identified that helped determine the project's long-term and unavoidable environmental impacts. Some, freshwater wetlands at the head of Akutan Harbor would be permanently lost by dredging, harbor construction, and harbor-associated growth; however, approximately 12-to-15 acres of soft-bottom marine habitat would be created in its place. The breakwater's rocky, irregular-faced surface would permanently replace the soft-bottom substrate it covers.

Threatened and Endangered Species. Human-induced threats to the endangered short-tailed albatross include hooking and drowning on commercial long-line gear, entanglement in derelict fishing gear, ingestion of plastic debris, and contamination from oil spills. In their July 23, 2001, letter to the Corps, the USFWS stated that based on the project description and considering that the harbor project is not expected to add additional boats to the long-line fisheries fleet, they concur with the Corps' determination that no impacts to the short-tailed albatross would occur as a result of the proposed action.

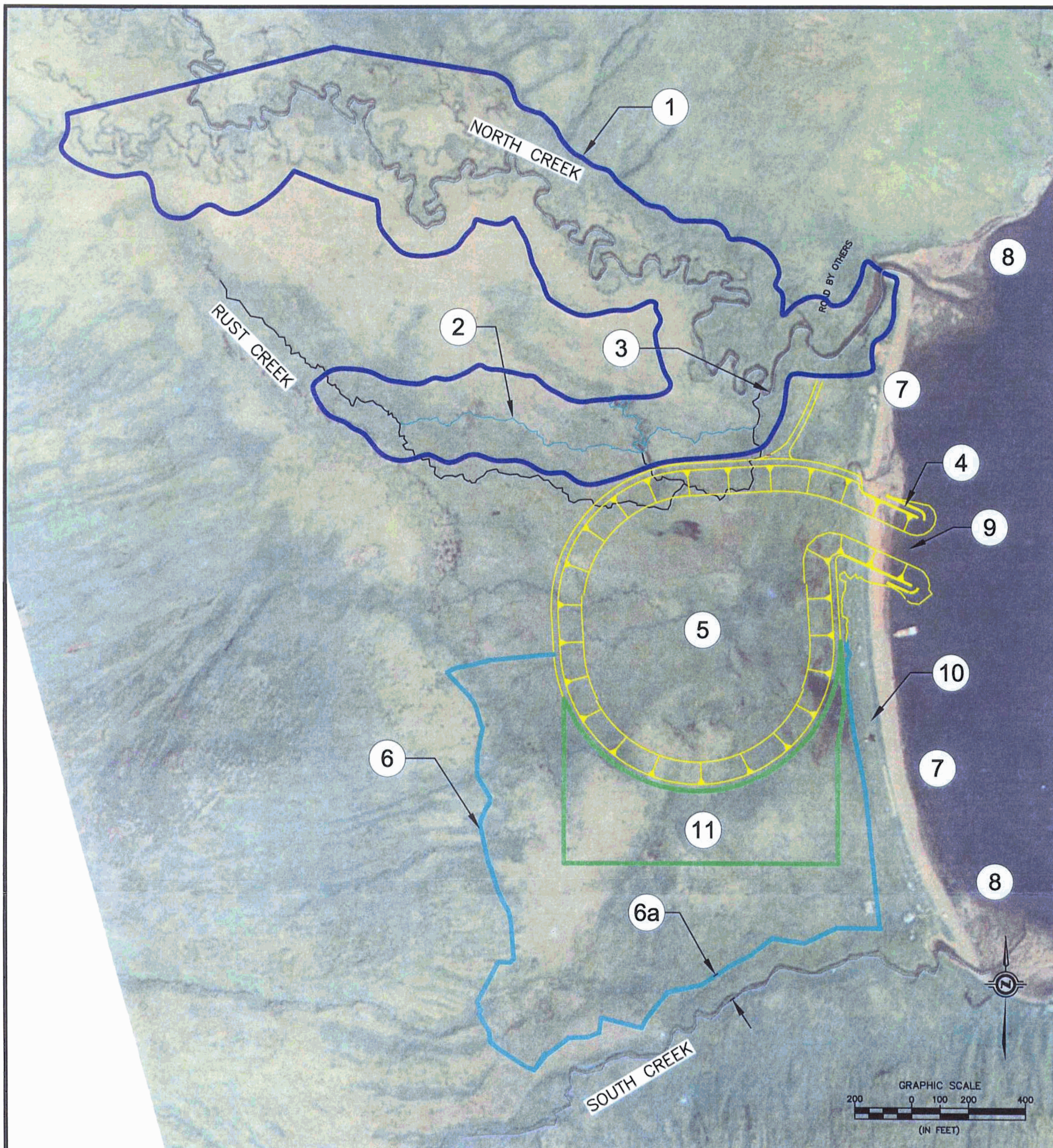
The Corps believes that construction of a 58-vessel mooring basin and entrance channel at the head of Akutan Harbor could directly and indirectly impact over-wintering Steller's eiders, the Alaska breeding population of which is a threatened species. Minimal Steller's eider habitat would be destroyed to construct the harbor (i.e. an inland mooring basin); however, Steller's eiders using the head of Akutan Harbor for foraging, resting, and shelter could be acutely and chronically impacted by increased vessel traffic, activities associated with harbor operations, and petroleum-based spills. Harbor-generated vehicular and foot traffic between the mooring basin and the community on a State of Alaska proposed road connecting the community of Akutan to a proposed airport could periodically displace Steller's eiders that congregate along the north shore of Akutan Harbor.

Given the current status of the Alaska breeding population of Steller's eiders, the environmental baseline for the project area, the cumulative effects, and the overall effects of the proposed action, the USFWS's biological opinion is that the action, as proposed, is not likely to jeopardize the continued existence of the species. Therefore no reasonable and prudent alternatives are recommended. However, the USFWS believes the following reasonable and prudent measures (RPM) are necessary and appropriate to minimize impacts of incidental take of Steller's eider:

- The Corps shall minimize impacts to Steller's eiders during construction of the harbor.
- The Corps shall minimize impacts to Steller's eiders during operation of the harbor.
- The Corps shall monitor impacts of harbor operation to Steller's eiders.

Environmental Protection Measures

Incorporating mitigation measures and Endangered Species Act-related terms and conditions/conservation measures into the harbor's design and construction, operation, development, and monitoring phases, would help ensure the overall environmental feasibility of the project. Figure FEIS-ii illustrates selected mitigation measures incorporated into the Akutan navigation improvements project.



<u>Key of Selected Mitigation Measures</u> *

1. North Creek Conservation easement.
2. Restoration/reconstruction of Rust Creek.
3. Remove fish barrier at the mouth of Rust Creek.
4. <u>Rubblemound breakwater</u>.
   Bench added to outside of breakwater (-1.0 ft. MLLW) to facilitate fish movements.
   Eyebolts installed to facilitate the containment and cleanup of spilled petroleum products.
5. <u>Inland Basin</u>.
   12-acre basin, environmentally preferred plan selected over the 20-acre, NED plan.
   Basin side-slopes 3:1 below MHW and 2:1 above MHW to reduce volume of dredged material.
   Basin reconfigured to a circular design to facilitate water circulation & flushing.
6. <u>Stockpile area</u>
   28.5 acres, top elevation -44 ft., size reduced to minimize impacts to wetlands.

6a. 100-foot setback from South Creek.

7. Minimal impacts to essential fish habitat and marine resources
8. Avoiding Steller's eider over-wintering habitat
9. <u>Entrance channel</u>.
   Narrowed to facilitate water circulation and flushing
   Breached only after the inland basin dredging is complete after June 15
   Avoid dredging between November 15 and June 15
10. Vegetated beach-berm to remain in place to act as a visual barrier to over-wintering Steller's eiders.
11. 8-acre staging area will expand into stockpile area and not into wetlands.

*See section 2.4 for a complete discussion about the project's mitigation plan

ALASKA DISTRICT CORPS OF ENGINEERS CIVIL WORKS BRANCH	SELECTED MITIGATION MEASURES INCORPORATED INTO THE AKUTAN NAVIGATION IMPROVEMENTS PROJECT	Figure FEIS-ii

Back of Figure ES-ii

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Harbor Design and Construction

1. The environmentally preferred alternative (i.e., the reconfigured 12-acre, 58-vessel mooring basin) is selected as the recommended plan, not the 20-acre, 80-vessel mooring basin.

(a) To avoid impacting over-wintering Steller's eiders and their habitat in the vicinity of South Creek, the harbor's entrance channel has been positioned as far north as possible.

(b) To facilitate water circulation and harbor flushing, the basin has been designed in a circular fashion and the entrance channel has been narrowed to 100 feet.

(c) To facilitate long-shore fish movements, a 5-foot-wide bench at –1-foot mean lower low water will be constructed into the breakwaters that protect the harbor entrance.

(d) To facilitate the clean up and containment of petroleum spills in the harbor, eyebolts for attaching spill containment booms will be installed into concrete or steel structures at the outer and inner ends on the breakwaters.

(e) To reduce dredged material quantities and the footprint of the dredged material stockpile, the basin side-slopes will be constructed at a 3:1 slope below mean higher high water and at a 2:1 slope above mean high higher water.

2. Prior to beginning construction, the harbor's contractor will submit a Quarry Development Plan to the Corps and interested resource agencies for their review and approval. Mitigation measures shall be incorporated in the plan to ensure that the quarrying operation will not cause any significant and adverse environmental impacts.

3. The Corps will construct the project primarily within the Central Creek watershed.

4. The Corps will avoid impacting the dimension, pattern, and profile of North Creek and its associated floodplain/wetland hydrology. No-work zones will be clearly established prior to beginning construction activities.

5. Offshore dredging of the entrance channel will be prohibited between November 15 and June 15 to avoid impacting wintering seabirds (e.g. Steller's eider) and juvenile fish (e.g. pink and coho salmon). However, offshore dredging and breakwater construction could occur after March 30 provided it can be clearly demonstrated that the work site can be completely isolated from the adjacent marine waters.

6. The harbor basin will be constructed and dredged while being totally isolated from Akutan Harbor. Dredging the entrance channel will be last and after a period of time has passed to allow turbidity and settleable solids to decrease in the harbor basin.

Breaching the harbor basin shall be further restricted until after June 15 when salmon smolt are thought not to be in the area.

7. The marine waters of the entrance channel will be isolated from Akutan Harbor during dredging by installing a silt curtain or similar material around the work area.

8. Disposal of dredged materials will occur only in uplands and wetlands of the Central Creek watershed; and if proven feasible, also be incorporated into a marine restoration/enhancement project designed in concert with State and Federal resource agencies.

(a) As much dredged material as possible will first be placed in the non-wetland areas to the south of the mooring basin.

(b) To decrease the footprint of the dredged material stockpile, the height of the stockpile has been increased from +35 feet to +44 feet and will not encroach upon adjacent watersheds that contain streams important to anadromous fish.

(c) A Storm Water Pollution Prevention Plan (SWPPP) will be prepared to address anticipated runoff issues associated with dredged material disposal (construction) and long-term stockpile (operations) activities. SWPPP measures would include at a minimum the following:

- Installing silt fences around the dredged material stockpiles at the toe of the slope, placing jute matting on the side-slopes, and seeding the stockpiles with native vegetation.

- Containing runoff from dredged material stockpiles and filtering/treating the material (e.g. primary treatment settling basins) before releasing it back into the marine environment. During construction, the harbor basin would likely function as the primary treatment-settling basin up until the time that the entrance channel to Akutan Harbor has been constructed. If needed, any settling/dewatering basin constructed outside the harbor basin area will be located in the stockpile footprint area such that no additional wetlands are effected, and the harbor basin will function as a secondary-treatment settling basin.

- Preventing runoff from dredged material stockpiles into adjacent freshwater streams unless it is treated to specific, State of Alaska water quality standards for the growth and propagation of fish, shellfish, other aquatic life, and wildlife.

- Establishing a 100-foot setback from the toe of the dredged material stockpile and South Creek.

9. The spur access road leading from the harbor to a road from the City of Akutan to the head of the bay will be designed to the minimum size necessary to accommodate the anticipated traffic and be constructed to avoid adversely impacting North Creek.

10. To minimize construction-related impacts on local air quality, the contractor will maintain all construction equipment and use low-Nox engines, alternative fuels, catalytic converters, particulate traps, and other advanced technology, whenever feasible.

11. To compensate, in part, for the unavoidable loss of fishery habitat, the Corps will remove a waterfall barrier at the mouth of Rust Creek, a tributary to North Creek, which is an anadromous fish stream.

12. The section of Rust Creek that is destroyed by constructing the harbor basin shall be rectified (i.e., relocated and reconstructed of the same dimension, pattern, and profile as the stream segment being impacted) so that it continues to flow into North Creek. Creation of the replacement segment will precede the loss of the original segment.

13. To compensate, in part, for the unavoidable loss of wetlands and fishery resources in the Central Drainage area, a 41.7-acre Conservation Easement will be established along Rust Creek and North Creek.

14. To compensate, in part, for the unavoidable loss of marine habitat due to breakwater construction and the foreseeable and unavoidable littering of Akutan Harbor's shoreline during the harbor's operation, the project sponsor will develop and implement a one-time cleanup of the shoreline between the Old Whaling Station and the Trident Seafoods processing plant to remove plastics, netting, tires, large pieces of scrap metal, rope, buckets, Styrofoam, etc. and transport them to an approved landfill.

15. Should Steller sea lions appear within the project area during dredging, in-water activities will cease and not commence until the National Marine Fisheries Service is contacted and consulted with.

<u>Harbor Operation</u>

1. The Corps will require that the project sponsor (the Aleutians East Borough and City of Akutan) develop, fund, and implement an Akutan Harbor Management Plan (AHMP). The AHMP shall include at a minimum the following:

(a) Elements addressing an on-site waste oil and plastic nylon mesh recovery system;

(b) Elements addressing oil spill prevention, recovery, and cleanup; staging cleanup gear (e.g. absorbent boom) on the breakwater; and training local personnel on how to respond to spills;

(c) Elements addressing rat infestation and eradication;

(d) Elements addressing the collection and disposal of solid waste generated by the fishing industry;

(e) Elements addressing harbor lighting, as unshielded lights can attract and disorientate migrating birds causing injury or mortality; and,

(f) Elements addressing the control of air emissions from harbor-related operations.

2. As dredged materials are used for off-site non-federal projects, the former stockpile space will be used as harbor parking, staging, and equipment storage areas.

Harbor Development

1. To avoid and minimize overall impacts to fish and wildlife resources at the head of Akutan Harbor, the Corps recommends that the City of Akutan, in concert with State and Federal resource agencies, develop an Akutan Harbor Development Plan.

2. To eliminate any possibility of losing essential wetland habitat in the North Creek drainage, the project sponsor will coordinate with the landowner (Akutan Corporation) to establish a 41.7-acre Conservation Easement (e.g., a 100-foot non-development setback) from anadromous fish spawning and rearing habitat in the North Creek drainage and along the reconstructed Rust Creek.

Harbor Monitoring

The Corps shall investigate the effectiveness, ability to implement, and cost of monitoring the salinity of the lower reaches of North Creek, as the project might affect the creek's saltwater/freshwater interface and subsequently impact anadromous fish use of the lower reaches of the stream.

Terms and Conditions/Conservation Measures

As required by Section 7 of the Endangered Species Act, the Corps plans to incorporate into the project "reasonable and prudent measures and terms and conditions" to protect Akutan Harbor's over-wintering Steller's eider and their habitat. A complete description of the "Terms and Conditions" is contained in FEIS-Appendix 4 (U.S. Fish and Wildlife Biological Opinion), and only those unique to the biological opinion are listed below (i.e., terms and conditions identical to aforementioned Fish and Wildlife Coordination Act (FWCA) recommendations are not listed below):

1. Construction activities will be timed so as not to adversely impact Steller's eiders, which generally are present from mid-November to late-March.

2. The vegetated beach-berm at the head of Akutan Harbor will remain intact to act as a visual barrier to over-wintering Steller's eiders.

3. The project sponsors (Aleutians East Borough and City of Akutan) will prepare a Best Management Practice Plan (BMPP) or Harbor Management Plan addressing at a minimum the collection of waste oil, solid waste disposal, shoreline cleanup, and oil spill prevention, response (including wildlife rehabilitation), and cleanup. The BMPP will be made available to harbor customers via the web or by some other means (e.g. printed copies).

4. Collisions of Steller's eider with physical structures associated with the operation of the mooring basin will be monitored and reported according to USFWS protocol.

5. Releases of petroleum products at the proposed mooring basin will be monitored and annually reported to the USFWS.

6. Two Steller's eider/oil spill-related information signs will be developed in cooperation with the USFWS. One will be posted at the harbor basin and the second one will be offered to Trident Seafoods to be posted at their fueling facility.

7. Pre- and post-construction Steller's eider monitoring surveys in the action area will be performed, and a summary report will be submitted to the USFWS annually.

8. The sponsor will design and mail a pamphlet to each tenant vessel owner in the proposed harbor describing the effects of oil on waterfowl, ways that commercial fishing operators can prevent and reduce fuel spills, and explaining that discharge of oil is illegal. The pamphlet will also emphasize the use of fuel collars and in-line bilge water filters.

9. Wildlife hazards will be cleaned up on the beach areas between the Old Whaling Station and the Trident Seafoods facility prior to project completion.

10. The Corps and project sponsors, Aleutians East Borough and City of Akutan, will participate as a working group member in the development of a Geographic Response Strategy (GRS) for Akutan Harbor prior to the start of harbor construction.

11. The Corps and project sponsors will partner with the USFWS in an attempt to secure funding for the procurement of equipment needed to implement the Akutan Harbor GRS. Purchased equipment will be stored and maintained in Akutan Harbor.

Issues to Be Resolved

Many of the mitigation measures and terms and conditions require third party (e.g. Akutan Corporation, Trident Seafoods, State of Alaska, U.S. Coast Guard, or U.S.

Fish and Wildlife Service) agreement/participation to ensure implementation. The development of the project's "Project Cooperation Agreement" between the Corps and project sponsors (City of Akutan and Aleutians East Borough) will help to ensure mitigation implementation, as well as define construction cost-sharing and project feature responsibilities.

The Corps and project sponsors, Aleutians East Borough and City of Akutan, have begun to participate in a State/Federal working group that will develop a GRS for Akutan Harbor. The first GRS meeting was held in Anchorage, Alaska in May 2004. The mechanics of the working group being established and each member's roles and responsibilities will be defined.

The project sponsors will prepare a Best Management Practice Plan (BMPP) or Harbor Management Plan addressing at a minimum the collection of waste oil, solid waste disposal, shoreline cleanup, and oil spill prevention, response (including wildlife rehabilitation), and cleanup. The BMPP will be made available to harbor customers via the web or by some other means (e.g. printed copies).

Disposal of dredged materials will occur only in uplands and wetlands of the Central Creek drainage; and if proven feasible, also be incorporated into a marine restoration/enhancement project designed in concert with State and Federal resource agencies.

Environmental Laws Compliance

Table FEIS-i summarizes the current status of the project's compliance with Federal environmental laws, regulations, and requirements.

Table FEIS-i. Summary of Federal Environmental Compliance

Federal Statute	Status of Compliance
Clean Air Act, as amended.	**Full Compliance**. An analysis has been prepared and is contained in the Final EIS.
Clean Water Act, as amended.	**Full Compliance Pending**. A Section 404(b)(1) analysis has been prepared and is contained in the Final EIS. A Section 401 Water Quality Cert. will be sought from the Alaska Department of Environmental Conservation while the Final EIS is being reviewed.
Coastal Zone Management Act	**Full Compliance Pending**. A coastal consistency determination is being coordinated with the Alaska Office of Project Management and Permitting.
Endangered Species Act of 1973, as amended.A8	**Full Compliance**. Coordination with National Marine Fisheries Service complete. Steller's eider biological opinion received from U.S. Fish and Wildlife Service: formal consultation complete. Short-tailed albatross: no formal consultation required.
Estuary Protection Act	**Full Compliance.** Final EIS discusses project impacts on coastal ecology of Akutan Harbor.
Federal Water Project Recreation Act, as amended.	**Not Applicable**. Corps of Engineers harbor projects do not consider recreation opportunities in the planning and design processes.
Fish and Wildlife Coordination Act	**Full Compliance**. A Final Coordination Act Report has been prepared by the U.S. Fish and Wildlife Service and is contained in the Final EIS.
Land and Water Conservation Fund Act, as amended.	**Full Compliance**. Corps of Engineers undertaking will not affect properties or facilities acquired or developed with assistance from this act.
Magnusen - Stevens Fishery Management and Conservation Act.	**Full Compliance**. An Essential Fish Habitat Assessment has been completed in coordination with the National Marine Fisheries Service and is contained in the Final EIS.
Marine Mammal Protection Act	**Full Compliance**. Final EIS discusses project impacts on Akutan Harbor's marine mammals. Information obtained from the National Marine Fisheries Service and U.S. Fish and Wildlife Service.
Marine Protection, Research and Sanctuaries Act, as amended.	**Not Applicable**. No ocean disposal of dredge material proposed.
Migratory Bird Treaty Act	**Full Compliance**. Final EIS discusses project impacts on migratory birds that use Akutan Harbor. Information obtained from the U.S. Fish and Wildlife Service.

Table FEIS-i. (cont.) Summary of Federal Environmental Compliance

Federal Statute	Status of Compliance
National Environmental Policy Act of 1969, as amended. CEQ Regulations for Implementing the Procedural Provisions of NEPA.	**Full Compliance.** A Final EIS has been prepared in accordance with CEQ and Corps of Engineers regulations. A Record of Decision will be prepared following final EIS review.
National Historic Preservation Act of 1966, as amended.	**Full Compliance.** The Alaska State Historic Preservation Officer (SHPO) determined that the project will not affect National Register eligible or listed properties.
Rivers and Harbors Appropriation Act of 1899	**Full Compliance Pending**. A permit will be obtained by local sponsor, as structures (jetties) will be placed in the navigable waters of the United States.
Watershed Protection and Flood Prevention Act, as amended.	**Not Applicable**. The Secretary of Agricultural does not have any flood preservation or soil conservation projects in the Akutan area.
Wild and Scenic Rivers Act, as amended.	**Not Applicable**. No wild and scenic rivers in the project area.
Wilderness Act	**Full Compliance**. Corps project will not affect designated wilderness areas in the Alaska Maritime National Wildlife Refuge.
Executive Orders, Memorandums, etc.	
Floodplain Management (E.O. 11988)	**Full Compliance**. No federally built structures to be constructed within floodplain.
Protection of Wetlands (E.O. 11990)	**Full Compliance**. No practicable alternative to such construction. Wetland impacts discussion provided in Final EIS and in the Section 404(b)(1) analysis.
Environmental Effects Abroad of Major Federal Action (E.O. 12114)	**Not Applicable.** Federal project will not affect another country.
Protection and Enhancement of Environmental Quality (E.O. 11514 and 11991)	**Full Compliance**. Mitigation measures incorporated to protect the areas environmental resources. Actions to be taken to enhance the area's environmental quality.
Analysis of Impact on Prime and Unique Farmlands (CEQ Memo Aug. 11, 1980)	**Not Applicable.** No prime or unique farmlands within the project area.
Protection and Enhancement of the Cultural Environment (E.O. 11593)	**Full Compliance**. The Alaska State Historic Preservation Officer (SHPO) determined that the project will not affect National Register eligible or listed properties.
Environmental Health and Safety Risks to Children, 1997. (E.O. 13045)	**Full Compliance**. Analysis provided in the Final EIS.
Environmental Justice in Minority and Low-income Populations, 1994. (E.O. 12898)	**Full Compliance**. Analysis provided in the Final EIS.
Consultation and Coordination with Indian Tribal Government, 2000. (E.O. 13175)	**Full Compliance.** Via letters and Public Notices, the Akutan Traditional Council has been invited to participate in the EIS scoping process.

Final Environmental Impact Statement
Navigation Improvements
Akutan, Alaska

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

This navigation improvements study is authorized under the Rivers and Harbors in Alaska study resolution adopted by the U.S. House of Representatives Committee on Public Works on December 2, 1970. The House Conference Agreement, dated September 12, 1996, appropriated funds to initiate reconnaissance studies of navigational needs at several of Alaska's coastal communities, including Akutan. The navigation improvements would accommodate the needs of the Bering Sea commercial fishing industry and the City of Akutan, Alaska (figure FEIS-1).

Guidance for implementing the National Environmental Policy Act (NEPA) (42 USC 4341 *et seq.)* is provided through the U.S. Army Corps of Engineers (Corps) Engineering Regulation (ER) 200-2-2, which implements Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508). This final environmental impact statement (FEIS) fulfills the requirements of NEPA.

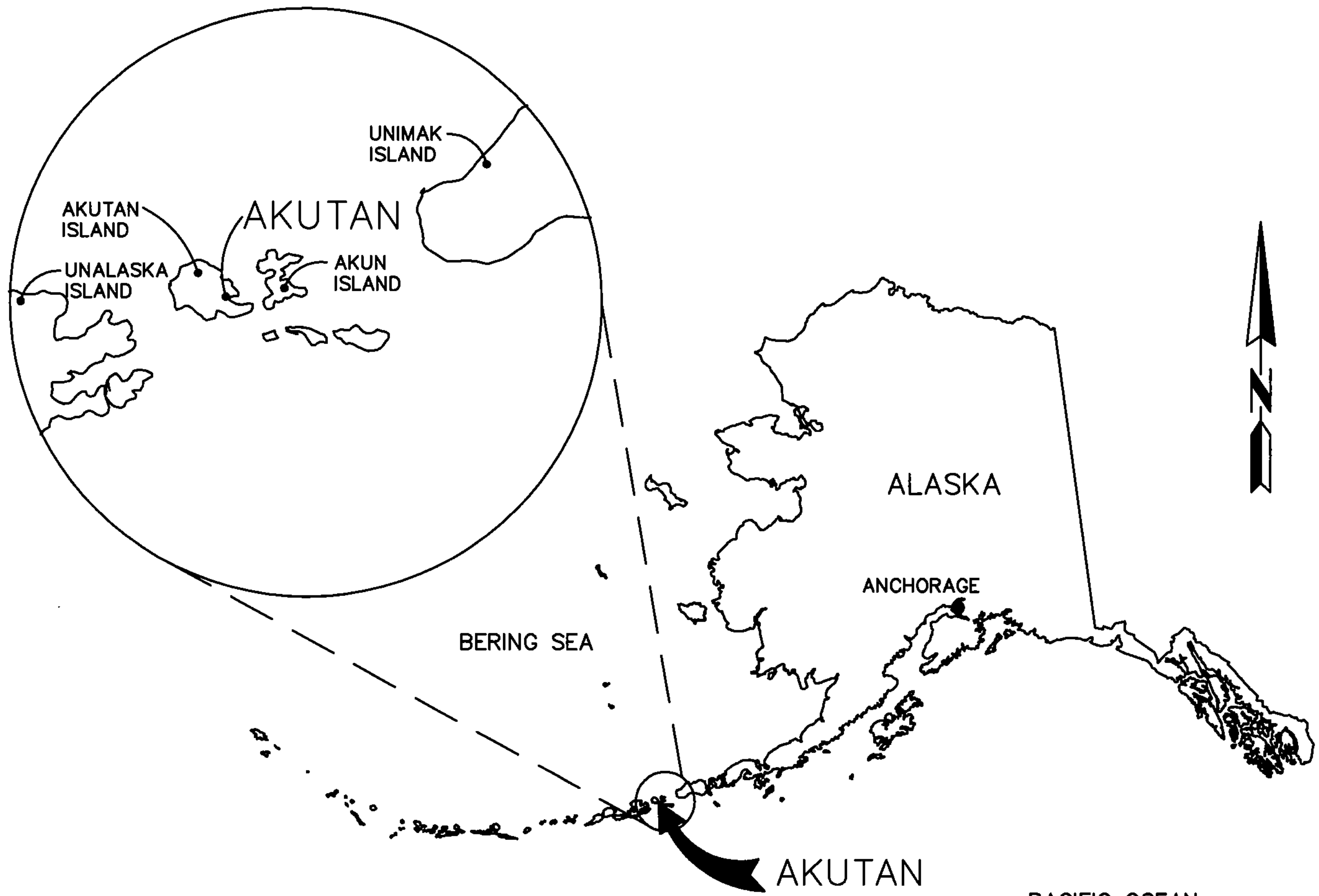
The FEIS considers and assesses the potential effects of a variety of alternatives at different project locations within Akutan Harbor, which is the geographic and oceanographic name for the body of water where the harbor site and City of Akutan are located (figure FEIS-2). In addition, the FEIS analyzes the short- and long-term, unavoidable, cumulative, and project-induced impacts, and identifies a recommended plan and mitigation/environmental protection measures.

1.2 Project Location and Setting

Akutan Island (54° 08' North latitude, 165° 46' West longitude) is 35 miles east of Dutch Harbor and 766 air miles southwest of Anchorage (figure FEIS-1). It is in the eastern Aleutian Islands and is one of the Krenitzin Islands of the Fox Island group. The proposed harbor facility is in a glacially carved, steep walled, volcanic bedrock valley, or fjord, at the head of Akutan Harbor.

Akutan is in the maritime climatic zone, characterized by heavy precipitation, cool summers, and mild winters. Precipitation averages 79 inches per year. The mean annual snowfall is 19.5 inches, with a maximum accumulation of 11 inches. January has the highest mean monthly snowfall of 13.9 inches. The average annual temperature is 40.9 °F, and the average winter and summer temperatures are 34.7 °F and 49.8 °F, respectively.

Winds at Akutan Harbor have a bi-modal pattern from the northwest and the southeast. Such a pattern would be expected given the strong, linear shape (east-west



LOCATION MAP, AKUTAN, AK

TRYCK NYMAN HAYES, INC.

NAVIGATION IMPROVEMENTS

AKUTAN, ALASKA

FIGURE FEIS–1

axis) of Akutan Harbor and the relatively high elevations that border its north and south shoreline. Average wind speeds during winter (October through April) are 17 to 21 knots and during summer (May through September) are 9 to13 knots.

1.3 Purpose and Need

Akutan, although it is one of the most important fishing ports in the United States in terms of volume and value of seafood production, has very little infrastructure. The community, along with the Aleutians East Borough, has worked for many years to address the need for a small boat harbor in the community. The navigation improvements evaluated in this FEIS are focused on resolving several navigation problems currently facing vessels utilizing Akutan Harbor. These problems include: (1) the necessity to travel to other ports in-season in order to secure safe moorage, (2) the necessity of travel to the Pacific Northwest every other year, and (3) problems associated with the practice of rafting. In addition, residents of Akutan are hampered in their ability to develop a small boat commercial fishery and their subsistence harvests are also being constrained by the lack of available moorage.

Portions of the crab and groundfish vessels operating in the Bering Sea that do not deliver product to Akutan require seasonal moorage. The Alaska Port of Kodiak and the Pacific Northwest (Washington and Oregon) are the without-project locations for protected moorage during closed seasons, as other existing and to-be-expanded harbors in the Aleutians and southwest Alaska do not have available space.

The typical vessel using Akutan Harbor is a larger sized Bering Sea commercial fishing vessel, consisting of trawlers and catch processors. These vessels range in size from 80 feet length overall (LOA) to more than 160 feet LOA. Beams range from 24 to more than 40 feet. Drafts range from 8 to 16 feet. A 'core' fleet of approximately 76 vessels, ranging in length from 85 to 210 feet, is associated with the Trident Seafoods plant in Akutan. Trident Seafoods is one of the largest shore-based fish processing facilities in the United States, and its vessels participate in the crab, pollock, Pacific cod, and halibut commercial fisheries. The Aleutians East Borough built a fair weather skiff and small craft mooring facility adjacent to the city/ferry dock in 2001. This facility is for a limited number of boats and does not have protection from storm waves. All skiffs and small boats must be taken from the water during inclement weather. The Native village residents have the opportunity to participate in the Bering Sea fisheries under the Individual Fishing Quota and Community Development Quota programs.

The harbor's mooring basin at the recommended site (Head of Akutan Harbor, inland design) would accommodate 38 vessels of the Bering Sea trawler type, plus 20 local vessels. Although larger vessels, such as catcher processors, may use the mooring basin, the design-vessel is thought to represent the upper end in terms of size of a Bering Sea commercial fishing vessel that might reasonably be expected to use the mooring basin. The design-vessel dimensions are: 180 feet LOA, 35-foot beam, and a 14-foot draft. To the best of our knowledge, no vessels in the 32- to 85-foot range participate in the Bering Sea crab/groundfish industry and require moorage in Akutan Harbor.

Therefore, the Akutan Harbor mooring basin is not being designed to accommodate such sized vessels.

1.4 Public Involvement and Issues of Concern

The Corps initially began conducting navigation and environmental studies in Akutan Harbor in the early 1980s in conjunction with its bottomfish harbor investigations. The Corps produced a "Bottomfish Interim Study Reconnaissance Report" in 1982, and the U.S. Fish and Wildlife Service (USFWS) prepared a planning aid report summarizing its biological investigations in Akutan Harbor. Many of the issues raised in the Corps and USFWS bottomfish reports were applicable when scoping began in 1997 for the Akutan navigation improvements project. A public notice, dated February 3, 1997, invited the public to assist the Corps in identifying important cultural and natural resources the Akutan navigation improvements project might affect. The first Federal and State-scoping meeting occurred on March 24, 1997, and major environmental concerns were identified. A Notice of Intent to prepare a draft environmental impact statement (DEIS) for navigation improvements at Akutan, Alaska was published in the Federal Register on August 5, 1999, (Federal Register Vol. 64, No. 150). Per Executive Order 13175, a letter dated June 7, 2001, was sent to the President of the Akutan Traditional Council initiating government-to-government consultation about the possible effects of the project on tribally recognized rights or protected resources. The Corps sent out a public notice (ER 02-16) on September 24, 2002, stating the DEIS was available for public review, and the U.S. Environmental Protection Agency published its Notice of Availability (ER-FRL-6633-7) on October 4, 2002 (Federal Register, Vol.67, No.193). FEIS-Appendix 1 contains a list of agencies and individuals who were mailed copies of the DEIS and copies of the FEIS for their review and comment. The Corps conducted a public meeting on the project in Akutan, Alaska, on November 6, 2002.

Issues and concerns associated with the Akutan project were defined through public scoping, agency coordination, site investigations, and from a review of published and unpublished natural resources information about the region. The following Federal, State, and local agencies, and interested parties participated in the scoping process:

- U.S. Fish and Wildlife Service (USFWS)
- National Marine Fisheries Service (NMFS)
- U.S. Environmental Protection Agency, Anchorage, AK Field Office & Region X, Seattle, WA (USEPA)
- U.S. Amy Corps of Engineers, Regulatory Branch
- Alaska Department of Fish and Game (ADFG)
- Alaska Department of Natural Resources (ADNR)
- Alaska Department of Environmental Conservation (ADEC)
- Alaska Department of Transportation and Public Facilities (ADOT/PF)
- Alaska Office of Project Management and Permitting (AOPMP)
- City of Akutan
- Aleutians East Borough
- Akutan Traditional Council

During preparation of the DEIS an immediate concern surfaced upon reviewing available information about the Akutan area's fish and wildlife resources—not enough site-specific information existed to permit a complete environmental evaluation of the project's potential impacts. As a result, field studies were cooperatively developed by the resource agencies, funded by the project sponsor and/or the Corps, and implemented by contractor and/or government agency to expand the information base and more adequately address the following major issues of concern:

- Loss of wetland habitat and the associated ecological repercussions.
- Alterations to the project area's hydrogeology and repercussions on the area's anadromous fish streams and adjacent wetlands.
- Effects of the project on near-shore coastal fishery habitat (i.e. essential fish habitat) and fish movements.
- Impacts from petroleum spills on area fish and wildlife resources.
- Destruction of historical and/or archeological resources.
- Loss of subsistence resources
- Loss of intertidal and subtidal habitat.
- Effects of project-induced activities (e.g. fuel spills, boat traffic, construction and operation of harbor-related business) on over-wintering Steller's eiders, a threatened species.
- Degradation of water quality in Akutan Harbor and the mooring basin because of potential inadequate water circulation in each.

Findings from the field investigations were presented and the environmental impacts of the project were discussed in the DEIS. The Corps received many comments on the DEIS (FEIS-Appendix 2), which were used to improve the Corps' environmental assessment of the project and FEIS document and to develop a more comprehensive mitigation plan. In addition, interagency meetings and teleconferences were held to discuss environmental concerns (e.g., wetland impacts, water quality, harbor water circulation and flushing) and develop strategies to better document project impacts and develop mitigation measures.

1.5 Plan Formulation

The objectives of this navigation improvements study relate to achieving the National Economic Development (NED) goal for improving the value of goods and services to the Nation and to meeting the local sponsors' (Aleutians East Borough and the City of Akutan) needs, consistent with protecting the nation's environment. Plan formulation must be consistent with the NED objective while considering engineering, economic, social, and environmental factors.

Environmental constraints appear to preclude future harbor expansion at the recommended site to accommodate the projected 19 vessels not able to moor at Akutan Harbor. These 19 vessels would have to seek moorage at other Aleutian and southwest Alaska harbors or travel to Pacific Northwest harbors in Washington and Oregon.

Environmental factors and resources were considered equally in the evaluation of project features and alternatives. The project was formulated, to the maximum extent feasible, to avoid or minimize adverse project effects to natural and cultural resources of particular importance and with special regulatory status, including wetlands and special aquatic habitats, marine mammals, threatened and endangered species, and essential fish habitat.

2.0 ALTERNATIVES AND RECOMMENDED PLAN

The Corps examined a broad range of sites and configurations for harbors near the City of Akutan before selecting a recommended plan, which is to construct a 58-boat inland mooring basin, entrance channel, and protective breakwaters at the head of Akutan Harbor.

Ten geographic areas within Akutan Harbor were equally evaluated as possible harbor sites: Akutan Point, North Shore Area 1, North Shore Area 2, Salthouse Cove, Head of the Bay, Old Whaling Station (aka Whaling Station), South Shore Area 1, South Shore Area 2, South Shore Area 3, and North Point, (figure FEIS-2, table FEIS-1). No other locations outside the Akutan Harbor area, including existing harbors in the Aleutian Islands, were examined because those sites would not fulfill the needs of the City of Akutan, while also serving the needs of the Bering Sea commercial fishery.

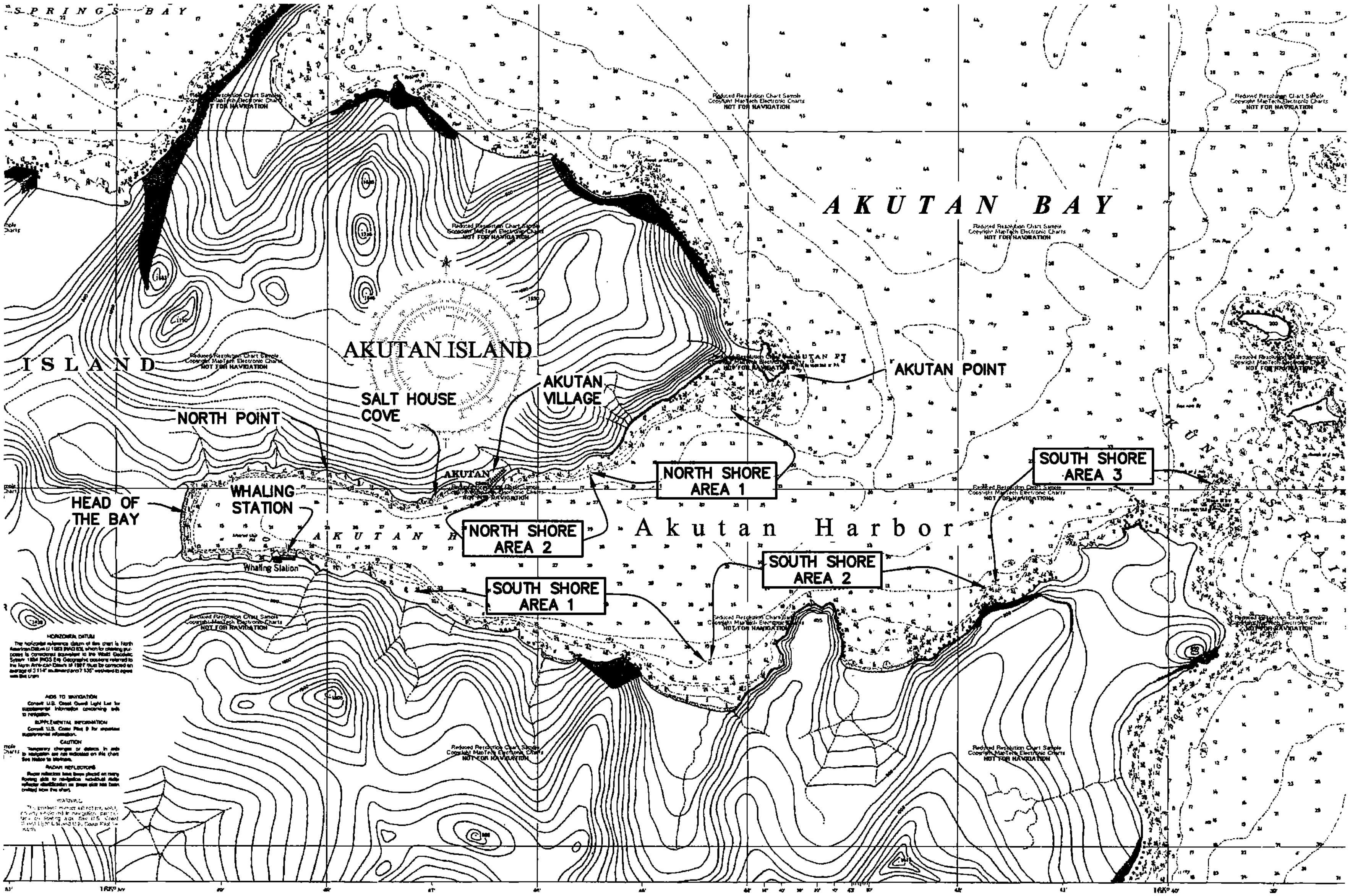
2.1 Alternatives Eliminated from Further Consideration

A Phase I, 1998 Corps report (*Akutan Harbor Feasibility Study, Phase 1, Preliminary Site Assessment Report*) and subsequent evaluations dismissed eight of the ten aforementioned locations as not being economically, engineeringly, and/or environmentally feasible. Only two locations appeared economically feasible: North Point and Head of the Bay. North Point was identified as the locally-preferred alternative; however, further economic and engineering evaluations determined that the North Point site was not feasible and that the Head of the Bay site was the only site capable of supporting a viable project. The information that follows describes the nine locations eliminated from further consideration and the main reasons why.

2.1.1 Akutan Point

Coarse gravel beaches and sea cliffs characterize the site's shoreline in a small cove at the entrance to Akutan Harbor, 1.9 miles east of the village. Village residents currently access the area by boat for recreation and setting subsistence nets for salmon.

Of all the locations considered, this area is the most exposed to wind and waves, with large ocean waves/swells coming from the south. Steep terrain limits upland development at this site. Bathymetry data is not available; however, the area appears shallow and would need to be dredged to the desired basin depth. Fixed breakwaters of rubblemound construction would likely afford the best wave protection at this site.



GRAPHIC SCALE

2,500 0 2,500 5,000

(IN FEET)
1" = 5,000'

LOCATIONS OF POTENTIAL NAVIGATION IMPROVEMENTS IN AKUTAN HARBOR, AK

ENGINEERING/SURVEYING & LANDSCAPING ARCHITECTURE
TRYCK NYMAN HAYES, INC.

AKUTAN ALASKA

FIGURE FEIS-2

Table FEIS-1. Comparative criteria used to equally screen the feasibility of constructing navigation improvements in Akutan Harbor.

	Akutan Point	North Shore Area 1	North Shore Area 2	Salthouse Cove	North Point	Head of Bay	Whaling Station	South Shore Area 1	South Shore Area 2	South Shore Area 3
Engineering, Economic Criteria										
Initial Estimated Benefit-Cost Ratio greater than 1					X*	X				
Site protected from Bering Sea long period waves				X	X	X	X			
Site sheltered and protected from North and West storm waves	X	X	X	X	X	X	X			
Site sheltered from southerly ocean swells				X	X	X	X			
Absence of deep water at breakwater location	X					X			X	
Absence of shallow bedrock	X					X			X	
Absence of contaminated soil requiring cleanup	X	X	X	X				X	X	X
Environmental Criteria										
Absence of impaired water Quality	X	X							X	X
Absence of bird rookeries			X	X	X	X	X	X	U	U
Absence of fresh water wetlands	X	X	X	X	X		X	X		X
Absence of large offshore kelp beds				X	X	X	X	X		
Absence of over-wintering Eider habitat									U	U
Absence of resident and/or anadromous fish streams	X	X	X	X	X		X	X		X
Absence of historical/archeological resources		X	X	X	X			X	X	U
SocioEconomic Criteria										
Avoid environmental justice impacts					X	X	X	X	X	X
Avoid direct traffic impacts on City of Akutan					X	X	X	X	X	X
Site is preferred locally					X	X				
potential uplands for marine services development						X	X		X	

* Initial evaluation showed a Benefit Cost Ratio (BCR) greater than 1. As the alternative was developed in greater detail, the BCR fell to less than 1.

U=unknown

Constructing a harbor here would require constructing a 2-mile mostly intertidal-fill road from the site to the village. Because the City of Akutan occupies all available flat land, the road would have to be positioned in front of or behind the village. Placing the road in front of the village would disrupt direct access to the beach and the view of all the dwellings. Steep slopes immediately behind the village would require blasting for road construction, which would be complicated by the many houses within 50 feet of the hillside. Constructing a road through town would require moving the village's hydropower and water supply lines, and one or more buildings.

Akutan Point is one of Akutan Harbor's most environmentally sensitive areas. Project features would eliminate kelp beds and diverse and species-rich near-shore and subtidal habitats. The adjacent terrestrial habitat supporting nesting bald eagles and cliff-nesting/burrow-nesting seabirds would be either physically destroyed or rendered useless by its proximity to harbor-related activities. Steller's eiders, a threatened species, use the area during the winter, and sea otters frequent the site year round. Anecdotal evidence suggests there may be prehistoric sites and cultural resources in the uplands area.

This site was dropped from further study primarily because of the estimated high cost to build an access road and rubblemound breakwater; the lack of developable uplands to support harbor-related facilities; and, associated adverse impacts on marine habitat, Steller's eider over-wintering habitat, sea otters, nesting seabirds and bald eagles, and prehistoric sites.

2.1.2 North Shore Areas 1 and 2

These areas are respectively 1.4 and 0.5 miles east of the community of Akutan. Steeply sloping bluffs on the upland side border both areas. A relatively shallow bench with depths of about 25 feet extends offshore for approximately 400 feet before the bottom drops rapidly to depths of 60 feet and greater. Very few adverse environmental impacts are associated with these sites. However, exposure to long-period waves and large ocean swells, deep water offshore, the high cost associated with constructing an access road from the City of Akutan to the areas, and the lack of available uplands for development collectively preclude constructing an economically viable harbor in either area.

2.1.3 Salthouse Cove

Salthouse Cove, in a shallow bight, serves as a buffer between the Trident Seafoods processing plant to the west and the community of Akutan to the east. In the limited upland area at Salthouse Cove, Trident constructed a church with a large gymnasium, which is sometimes used by the Akutan community and Trident for social and recreational purposes. Trident Seafoods has a lease for most of the uplands near this site, and plans to construct expanded dock facilities between Salthouse Cove and its plant.

The cove is naturally protected from the east and west. Water depths are known to be relatively deep, although bathymetry is not available. The existing seaplane ramp is in the cove, and the city dock and small boat moorage are on the east edge of the cove adjacent to the village. A harbor at this site would likely be positioned toward the west, approaching the Trident plant and avoiding the existing church and seaplane ramp. No access road would need to be constructed a this site.

Few fish and wildlife resources would be impacted at this site because of its proximity to surrounding commercial and residential developments. However, Steller's eiders are known to over-winter and feed in the area and schools of juvenile pink salmon have been observed inhabiting the near-shore environment in the spring.

Trident's plans to expand in the Salt Cove area, unfavorable oceanographic conditions (e.g. deep water) similar to other areas in the Akutan Harbor, and lack of available uplands preclude construction. Furthermore, the local community opposes the site because of its proximity to the city and its support facilities.

2.1.4 Old Whaling Station

Originally a whaling station, the U.S. Navy occupied the site during World War II. Currently, an individual residing in Seattle, Washington owns the adjacent uplands and is leasing them to Trident Seafoods, who allows the fishing fleet to store fishing gear there. Trident has also expressed an interest in purchasing the site.

The upland area and selected intertidal and subtidal areas are contaminated with Bunker C fuel oil resulting from historic military spills (Jacobs Engineering, 2001). The Corps' Formerly Used Defense Sites (FUDS) program conducted an upland-area cleanup of the site, including the excavation of petroleum-contaminated soil, in 1998 and 1999, but deteriorated timber docks and pilings, abandoned steel, and commercial fishing equipment still litter the site. Marine investigations have identified petroleum hydrocarbons concentrations in subtidal sediment that are above background levels; however, the subtidal habitat continues to support a diverse and species-rich biological community (Jacobs Engineering, 2001). The Corps' FUDS program is finalizing a closure plan for the site that will include allowing some petroleum-contaminated soil to remain below the ground surface and not removing the contaminated marine sediment. Chemical testing of the potential dredged material would be required before deciding how to dredge and dispose of the material. Existing docks (which are now dilapidated) were constructed near-shore when it was operating as a whaling station; beyond the pilings the bathymetry drops off rapidly into deep water, limiting offshore expansion and the cost-effectiveness of constructing rubblemound breakwaters and/or wave barriers at the site. An access road would be constructed to the site.

Because the upland and offshore marine environment have been previously disturbed, environmental considerations here would be less restrictive than at the other sites in Akutan Harbor. However, this location was not considered further because of the high cost to construct an access road to the site, the issues surrounding the area's petroleum-related contamination, and the prohibitive cost of constructing wave protection features (e.g. breakwaters) in deep water. This alternative site would not meet economic criteria for construction under existing water resource development authorities.

2.1.5 South Shore Area 1

This location extends east of the Old Whaling Station for about 2 miles to a point near the mouth of Akutan Harbor. A steeply sloped shoreline and a deep offshore bathymetry characterize the area. It also is exposed to high wave energy from Akutan Bay to the northeast.

Very few adverse environmental impacts are associated with this location. However, exposure to long-period waves and large ocean swells, deep water offshore, the lack of available uplands for development, and the high costs associated with constructing an access road from the City of Akutan, preclude constructing an economically feasible harbor at this site. This alternative site would not meet economic criteria for construction under existing water resource development authorities.

2.1.6 South Shore Area 2

South Shore Area 2 lies just inside the mouth of Akutan Harbor, west of a small peninsula. A slight cove-like feature that results in an offshore bench characterizes the site. The area has associated flat areas for "upland" development; however, a likely anadromous fish stream flows out of the heart of the associated uplands and wetlands into the harbor site. The shallow water might be able to support effective construction methods; however, the site's unacceptable wave climate, environmental impacts (e.g. wetlands, anadromous fish stream), distance from the community, and high construction costs associated with the access road preclude its feasibility. This alternative site would not meet economic criteria for construction under existing water resource development authorities.

2.1.7 South Shore Area 3

This area is outside Akutan Harbor and is exposed to the full fetch and resultant wave energy from the north (Bering Sea) and east. A pocket beach characterizes the site. Like South Shore Area 2, the shallow water at this site would likely support effective construction methods; however, the site's unacceptable wave climate, distance from the community, and high construction costs associated with the access road preclude its feasibility. This alternative site would not meet economic criteria for construction under existing water resource development authorities.

2.1.8 North Point

The City of Akutan and the Aleutians East Borough (the local project sponsors) considered this location as their first choice for a harbor location. A rocky coastline, with rock outcrops and rocky points, extends west of the Trident plant through this site to the head of Akutan Harbor. Steep hillsides descend directly to the edge of the high water line and the bathymetry drops off rapidly into deep water. Two gullies and associated alluvial fans exist along this section of coastline. The second and larger gully is about 4,000 feet west of the Trident plant, and four submerged HDPE pipes supply water from a hillside dam in this drainage to the Trident complex.

This site is close to the village, although access to the site would be through the Trident plant. The Alaska Department of Transportation and Public Facilities' (ADOT/PF) road to a new airport would probably be constructed along the hillside behind the harbor site. A ¼-mile-long access road would be constructed from this harbor site to the existing trail/road system at the west end of the Trident plant. The access road would likely be constructed in the intertidal area because of the steep topography of the adjacent hillside. Tideland fill, contained by structural bulkheads or conventional slopes, would also be required to construct uplands adjacent to the harbor.

Environmental constraints on development are not as apparent here as they are for some of the other sites in Akutan Harbor. Primary impacts would be associated with dredging and filling near-shore and subtidal areas. Terrestrial biological resources near the site are sparse. Proximity to Trident's seafood wastewater discharge could adversely impact the mooring basin's water quality. The threatened Steller's eider is known to over-winter in the area.

Alternative wave protection concepts and initial cost estimates indicated it was possible to economically build a harbor at this location. Subsequent to the initial determination, site surveys and geo-technical investigations were performed and preliminary designs were developed. Deep water immediately offshore limits offshore expansion and decreases the cost effectiveness of using conventional fill for constructing rubblemound breakwaters. The most effective protection was determined to be a pile supported wave barrier (wall) limited to a water depth of 60 feet. The steep bathymetry would limit the wave barrier to 320 feet offshore.

A conceptual harbor 1,200 feet long by 320 feet wide with a moorage basin of 8.8 acres was evaluated. This basin size would hold 46 vessels of the identified fleet. The economic evaluation showed that the number of boats accommodated in this harbor would not justify the construction cost. The study team evaluated several other design options to expand a harbor at this location, but because of the constraints limiting size increases to linear expansion, engineering and economic analyses could not justify a harbor.

The only remaining location yet to be evaluated in detail was at the head of Akutan Harbor.

2.2 Alternatives Considered in More Detail

2.2.1 No-action Alternative

Under the no-action alternative, no navigation improvements would be constructed. Protected moorage for the Bering Sea commercial fishing fleet (i.e., 58 to 80 vessels) would not be provided. Damage to vessels and docking facilities from overcrowding at the Trident Seafoods facility would continue, economic benefits to the Bering Sea fleet from constructing a harbor would not be achieved, and vessels unable to secure moorage in existing harbors would continue seeking refuge at other ports.

2.2.2 Nonstructural Alternatives

No nonstructural measures would provide solutions to damages, lack of adequate moorage, and other identified Bering Sea fishing fleet problems. Dutch Harbor, 40 miles west of Akutan, is the nearest port, and does not have any permanent moorage for vessels of the same size operating out of Akutan and Dutch Harbor. Other Alaska ports, from Akutan to the Pacific Northwest, do not have permanent moorage for the larger commercial vessels of the Bering Sea fleet. The limited moorage available is on a first-come first-served basis.

2.2.3 Head of the Bay

Initial examinations of the Head of the Bay site focused on three conceptual designs:

- Constructing a harbor entirely offshore (figure FEIS-3)
- Constructing a harbor half offshore and half onshore (figures FEIS-4 and 5)
- Constructing a harbor entirely inland (figures FEIS-6, 7 and 8)

Table FEIS-2 lists the comparative criteria used to evaluate the feasibility of the conceptual designs. Table FEIS-3 summarizes in a general fashion the environmental impacts associated with the three conceptual designs located at the head of Akutan Harbor. A more thorough discussion of the impacts associated with the conceptual designs and the recommended plan is provided in section 4.0 (Environmental Consequences of Alternatives).

Table FEIS-2 Comparative criteria used to equally evaluate the feasibility of the head of Akutan Harbor conceptual designs that were considered in more detail.

	Entirely Offshore	Off/Onshore Rubblemound	Off/Onshore Wave Barrier	Entirely Inland	No Action
Environmental Criteria					
Degree of impacting wetlands	L	M	M	H	N
Degree of impacting over-wintering Steller's eider habitat	H	H	H	L	N
Degree of impacting essential fish habitat	H	H	H	L	N
Degree of impacting resident and/or anadromous fish streams	M	H	H	H	N
Impacting historical/archeological resources	N	N	N	N	N
Engineering Criteria					
Site protected from Bering Sea long period waves	X	X	X	X	NA
Site sheltered and protected from North and West storm waves	X	X	X	X	NA
Site sheltered from southerly ocean swells	X	X	X	X	NA
Absence of deep water at breakwater location	X	X	X	X	NA
Absence of shallow bedrock	X	X	X	X	NA
Absence of contaminated soil					NA
SocioEconomic Criteria					
Avoid environmental justice impacts	X	X	X	X	X
Avoid direct traffic impacts on City of Akutan	X	X	X	X	X
Site is preferred locally	X	X	X	X	
Potential uplands for marine services development	X	X	X	X	
Economic Criteria					
Initial Estimated Benefit-Cost Ratio greater than 1		X		X	NA
Least cost alternative				X	NA

Degree - a designation of high (H), medium (M), low (L), and none (N) used to qualitatively differentiate (between the conceptual designs only) the relative magnitude of impacts.

X - Criterion exists at the site; an empty box means that the criterion doesn't exist at the site.

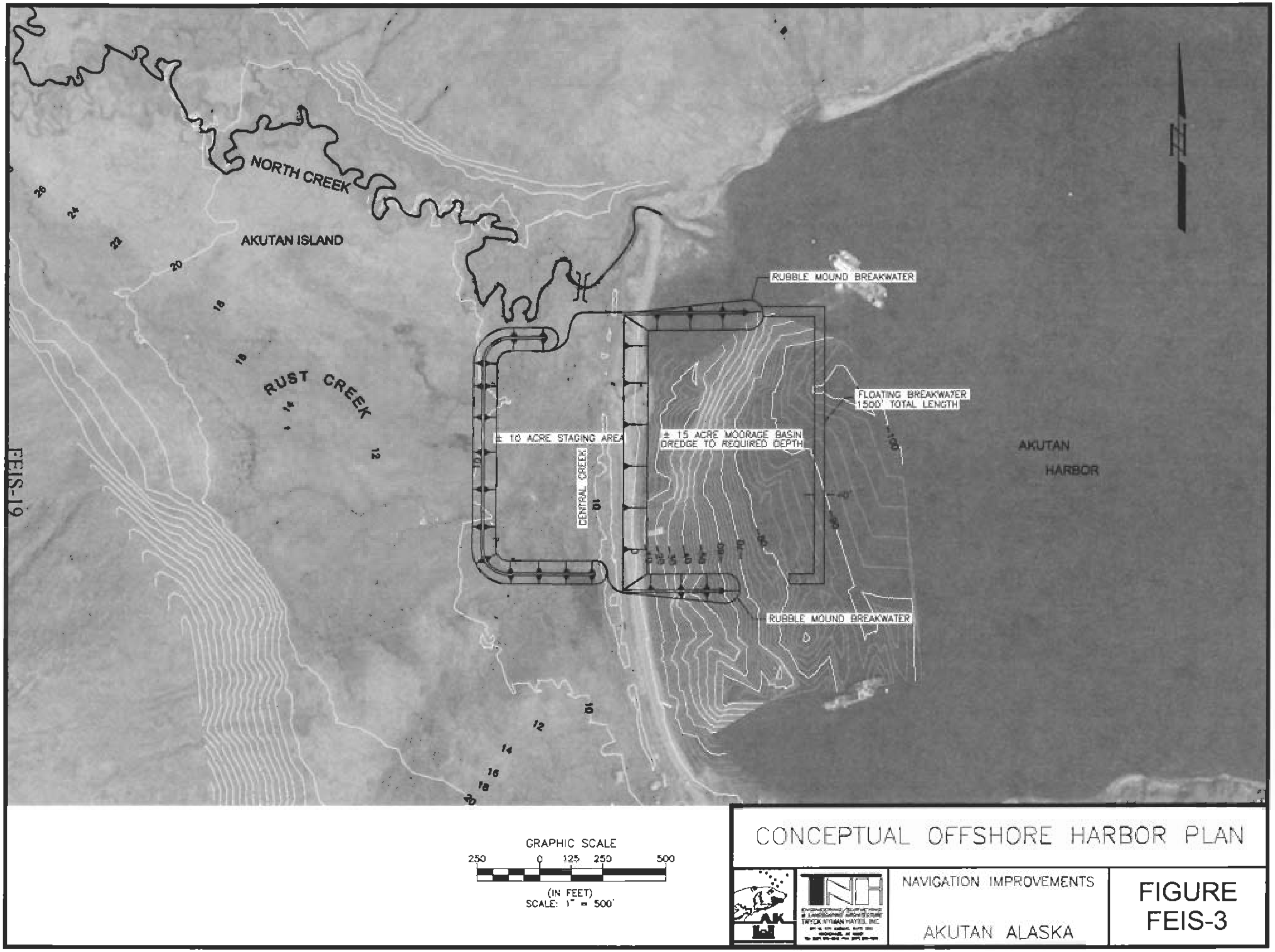
NA - Criteria not applicable.

Resource Categories of Primary Concern	Head of Akutan Harbor			No Action
	Offshore	Offshore / Inland	Inland	
Air Quality	Short term degradation of air quality during construction activities will generate additional air emissions from the operation of heavy equipment. During harbor operation, moored vessels will generate engine room emissions. Land-based facilities will generate emissions from power generating equipment. No Federal or State air quality standards will likely be exceeded because locally high winds and frequent storm events will continually disperse emissions.	Short term degradation of air quality during construction activities will generate additional air emissions from the operation of heavy equipment. During harbor operation, moored vessels will generate engine room emissions. Land-based facilities will generate emissions from power generating equipment. No Federal or State air quality standards will likely be exceeded because locally high winds and frequent storm events will continually disperse emissions.	Short term degradation of air quality during construction activities will generate additional air emissions from the operation of heavy equipment. During harbor operation, moored vessels will generate engine room emissions. Land-based facilities will generate emissions from power generating equipment. No Federal or State air quality standards will likely be exceeded because locally high winds and frequent storm events will continually disperse emissions.	Current emissions from Trident Seafoods, the City of Akutan, and vessels associated with the Trident facility would continue at the present level. Additional air emission sources would likely be generated when an airport is constructed on the inland and becomes operational.
Hydrology	Limited direct impacts. Associated shoreline and onshore fill activities would unavoidably and adversely alter the hydrogeology of the wetlands complex west of the harbor site. The streamlets and pond associated with the lower Central Creek drainage would be destroyed by fill activities associated with constructing a 10-acre staging area. Community development fills beyond the staging area pad would impact surface waters.	Major direct impacts. Dredging and disposal activities would unavoidably and significantly cause adverse impacts to the Central Creek drainage's hydrogeology. Area ponds and streamlets would be dredged and filled to construct the 15-acre harbor basin and 10-acre staging area. Groundwater may be impacted by saltwater intrusion.	Significant adverse impacts. Dredging and disposal activities would unavoidably and significantly impact the Central Creek drainage's hydrogeology. Area ponds and streamlets would be dredged and/or filled to construct the 15-acre harbor basin and 25-plus-acre staging/dredged material disposal area. The lower section of Rust Creek would be reconstructed. Groundwater may be impacted by saltwater intrusion.	Hydrological features (ponds, streams, etc.) at the head of the bay likely impacted by community development activities (e.g. airport-induced development activities, fills for roads and support facilities; and road to the head of Akutan Harbor).
Water Quality	Site located in a water quality-impaired (BOD and settleable solids) waterbody. Water circulation/harbor flushing inadequacies unlikely because of the harbor's open system of floating breakwaters. Chronic releases of petroleum products from vessels would occur in the harbor, despite implementing a Harbor Management Plan. Elevated turbidity during construction activities (breakwater placement and basin dredging).	Site located in a water quality-impaired (BOD and settleable solids) waterbody. Water circulation/harbor flushing inadequacies possible because of the harbor's semipermeable (wave barrier) or impermeable (rubblemound) designs. Chronic releases of petroleum products from vessels would occur in the harbor, despite implementing a Harbor Management Plan. Elevated turbidity during construction activities (breakwater placement and basin dredging).	Site located in a water quality-impaired (BOD and settleable solids) waterbody. Water circulation/harbor flushing inadequacies likely because of the harbor's totally inland design. Chronic releases of petroleum products from vessels would occur in the harbor, despite implementing a Harbor Management Plan. Elevated turbidity during construction activities (breakwater placement and entrance channel dredging).	Impaired water body designation of inner Akutan Harbor would continue. Chronic releases of petroleum products likely to continue at present level from the Trident-related fishing vessels, local vessels, and vessels using Akutan Harbor for refuge. Future developments at the head of Akutan Harbor would likely produce facilities and operations requiring effluent discharge permits.
Wetlands	Approximately 15-plus acres of freshwater wetlands unavoidably impacted by constructing a harbor basin, staging area, and berm.	Approximately 20-plus acres of freshwater wetlands unavoidably impacted by constructing a harbor basin, dredge material stockpile, and staging area.	Approximately 43 acres of wetlands unavoidably impacted by constructing a harbor basin, staging area, and dredged material stockpile.	An undetermined amount of wetlands at the head of Akutan Harbor would likely be impacted by community development activities associated with the development of an airport on the island and the construction of a road to the head of Akutan Harbor.
Intertidal and Subtidal Habitat	Approximately 21 acres of habitat would be unavoidably impacted from dredging the mooring basin, side-slopes, and the entrance channel, and constructing the rubblemound breakwaters.	Approximately 15 acres of habitat would be lost/altered from dredging the mooring basin and entrance channel and the construction of a breakwater.	Approximately 2.6 acres of habitat would be lost/altered from dredging the entrance channel and the construction of rumblemound jetties.	An undetermined amount of intertidal and subtidal areas at the head of Akutan Harbor would likely be impacted (i.e. impacted by fill activities) by community development activities associated with the development of an airport on the island and the construction of a road to the head of Akutan Harbor.
Fish	Displacement of fish during construction. Shallow, near-shore feeding and rearing habitat replaced with deeper water within a harbor and entrance channel. No direct impacts to neighboring anadromous fish streams. Adult and juvenile salmon may enter harbor basin. Resident fish in lower Central Creek and its streamlets would be displaced by fill activities associated with constructing the staging area and berms. Rubblemound breakwaters disrupting near-shore fish movements.	Displacement of fish during construction. Shallow, near-shore feeding and rearing habitat replaced with a breakwater structure and/or with deeper water associated with the mooring basin and entrance channel. No direct impacts to neighboring anadromous fish streams. Adult and juvenile salmon may enter harbor basin. Resident fish in lower Central Creek and its streamlets would be displaced by fill activities associated with constructing the staging area and berms. Rubblemound breakwaters disrupting near-shore fish movements.	Displacement of fish during construction of entrance channel and jetties. Shallow, near-shore feeding and rearing habitat replaced with a breakwater structure and/or with deeper water associated with the entrance channel. No direct impacts to neighboring anadromous fish streams. Adult and juvenile salmon may enter harbor basin. Resident fish in lower Central Creek and its streamlets would be displaced by dredging and dredged material disposal activities. Rubblemound breakwaters disrupting near-shore fish movements.	An undetermined amount of fish habitat within intertidal, subtidal, and wetland areas at the head of Akutan Harbor would likely be impacted by fill activities associated with community development, the development of an airport on the island, and the construction of a road to the head of Akutan Harbor from the City of Akutan.

Table FEIS-3. General comparison of the environmental impacts associated with the conceptual harbor basin alternatives at the head of Akutan Harbor, Alaska.

Resource Categories of Primary Concern	Head of Akutan Harbor			No Action
	Offshore	Offshore / Inland	Inland	
Mammals	On-shore construction activities would displace small mammals from the area. Area sea otters and other marine mammals would be exposed to fuel products released directly into marine waters or from contaminated stormwater runoff. Vessel movements in the area would disturb marine mammals.	On-shore construction activities would displace small mammals from the area. Area sea otters and other marine mammals would be exposed to fuel products released directly into marine waters or from contaminated stormwater runoff. Vessel movements in the area would disturb marine mammals.	On-shore construction activities would displace small mammals from the area. Area sea otters and other marine mammals would be exposed to fuel products released directly into marine waters or from contaminated stormwater runoff. Vessel movements in the area would disturb marine mammals.	Existing harbor and community development activities will continue to expose sea otters and other marine mammals to chronic releases of fuel products. Vessels currently using Akutan Harbor as a place of refuge and using the Trident Seafoods facility would continue to disturb marine mammals. Future on-shore development would displace small mammals.
Birds	Passerines, waterfowl, shore birds, and seabirds would be displaced during construction activities and harbor operations. Approximately 1,250 feet of beach habitat used by shore birds for feeding would be unavoidably destroyed by harbor construction. About 15 acres of wetland habitat periodically used by passerines and waterfowl would be destroyed by fill activities associated with constructing the staging area and berms.	Passerines, waterfowl, shore birds, and seabirds would be displaced during construction activities and harbor operations. Approximately 2,000 feet of beach habitat used by shore birds for feeding would be unavoidably destroyed by harbor construction. About 20 acres of wetland habitat periodically used by passerines and waterfowl would be destroyed by fill activities associated with constructing the mooring basin, entrance channel, staging area, and berms.	Passerines, waterfowl, shore birds, and seabirds would be displaced during construction activities and harbor operations. Approximately 200 feet of beach habitat used by shore birds for feeding would be unavoidably destroyed by harbor construction. About 43 acres of wetland habitat periodically used by passerines and waterfowl would be destroyed by fill activities associated with constructing the mooring basin, entrance channel, staging area, and dredged material disposal site.	Present level of Akutan Harbor activities (e.g. vessel traffic, working heavy equipment, pedestrian movement) will continue to displace area avian species.
Threatened and Endangered Species	Local Steller's eider over-wintering habitat would be unavoidably impacted. Released petroleum products could affect the larger concentrations of Steller's eiders that use the area. Vessel traffic into and out of the harbor could disrupt Steller sea lions and Steller's eiders.	Local Steller's eider over-wintering habitat would be unavoidably impacted. Released petroleum products could affect the larger concentrations of Steller's eiders that use the area. Vessel traffic into and out of the harbor could disrupt Steller sea lions and Steller's eiders.	Minimal Steller's eider over-wintering habitat would be unavoidably impacted. Released petroleum products could affect the larger concentrations of Steller's eiders that use the area. Vessel traffic into and out of the harbor could disrupt Steller sea lions and Steller's eiders.	Current level of vessel activity in Akutan Harbor would continue to disturb over-wintering Steller's eiders and Steller sea lions. Chronic releases of petroleum products from vessels will continue and impact Steller's eiders and their habitat. Community expansion to the head of Akutan Harbor could impact the near-shore movement of Steller's eider and their habitat.
Essential Fish Habitat (EFH)	Near-shore EFH within the footprint of the project (~30 acres) adversely impacted, as substrate would be altered and water depths would increase.	Near-shore EFH within the footprint of the project (~15 acres) adversely impacted, as substrate would be altered and water depths would increase.	EFH within the footprint of the entrance channel (~4 acres) would be impacted, as the substrate would be altered and water depths would increase.	Future shoreline fill activities associated with community development (e.g. road construction) could impact EFH.
Socio-Economic Resources	No impact on the physical setting of the existing community; however, the project alternative provides opportunities for local economic development and expansion of the community boundaries. Subsistence fishing at North and South creeks could be adversely impacted because of the proximity of the harbor's features. High construction costs preclude this alternative from being economically feasible.	No impact on the physical setting of the existing community; however, the project alternative provides opportunities for local economic development and expansion of the community boundaries. Subsistence fishing at North and South creeks not likely to be adversely impacted. High construction costs preclude the wave barrier alternative from being economically feasible; however, the rubblemound feature appears economically feasible.	No impact on the physical setting of the existing community; however, the project alternative provides opportunities for local economic development and expansion of the community boundaries. Subsistence fishing at North and South creeks not likely to be adversely impacted. Conceptual design appears economically feasible, and would generate the greatest net benefits.	No impact on subsistence activities. Community development would continue to support the local seafood processing industry and associated fleet. Community development would likely expand after the airport and road to the head of Akutan Harbor are constructed.
Archeological and Historical Resources	No impacts.	No impacts.	No impacts.	No impacts.

Table FEIS-3 (continued). General comparison of the environmental impacts associated with the conceptual harbor basin alternatives at the head of Akutan Harbor, Alaska.

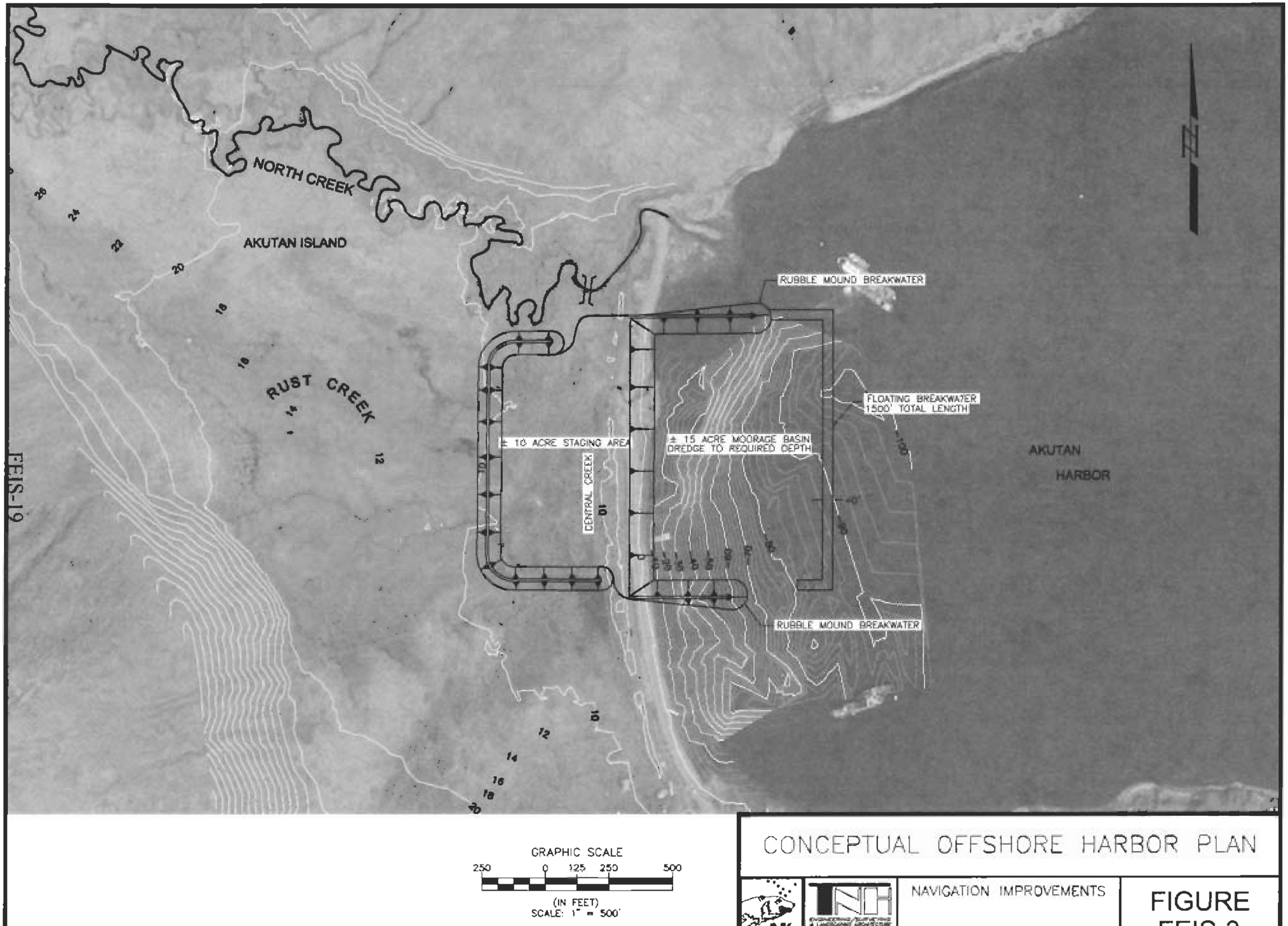


CONCEPTUAL OFFSHORE HARBOR PLAN

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS-3

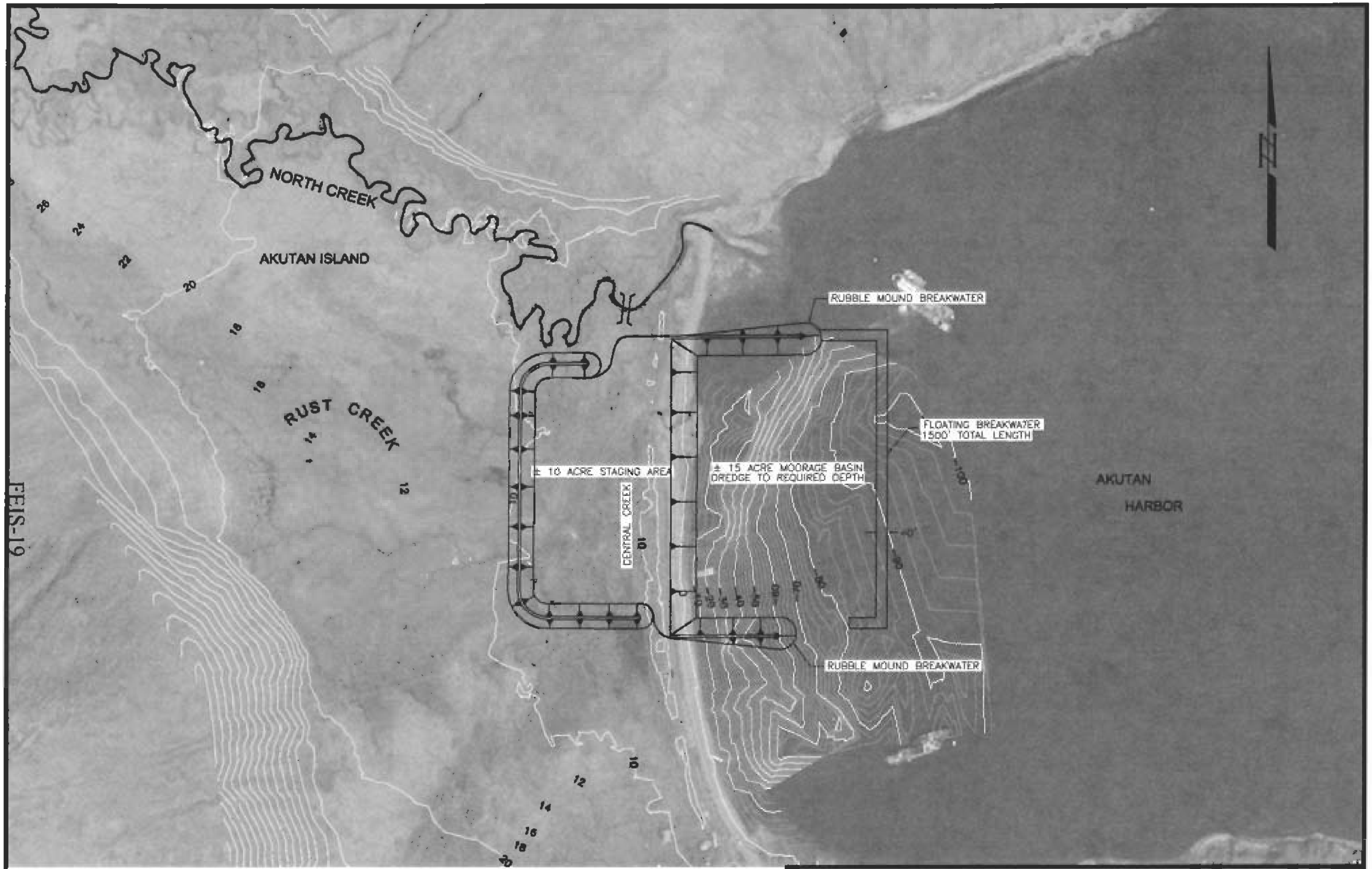


CONCEPTUAL OFFSHORE HARBOR PLAN

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS-3



GRAPHIC SCALE

250 0 125 250 500

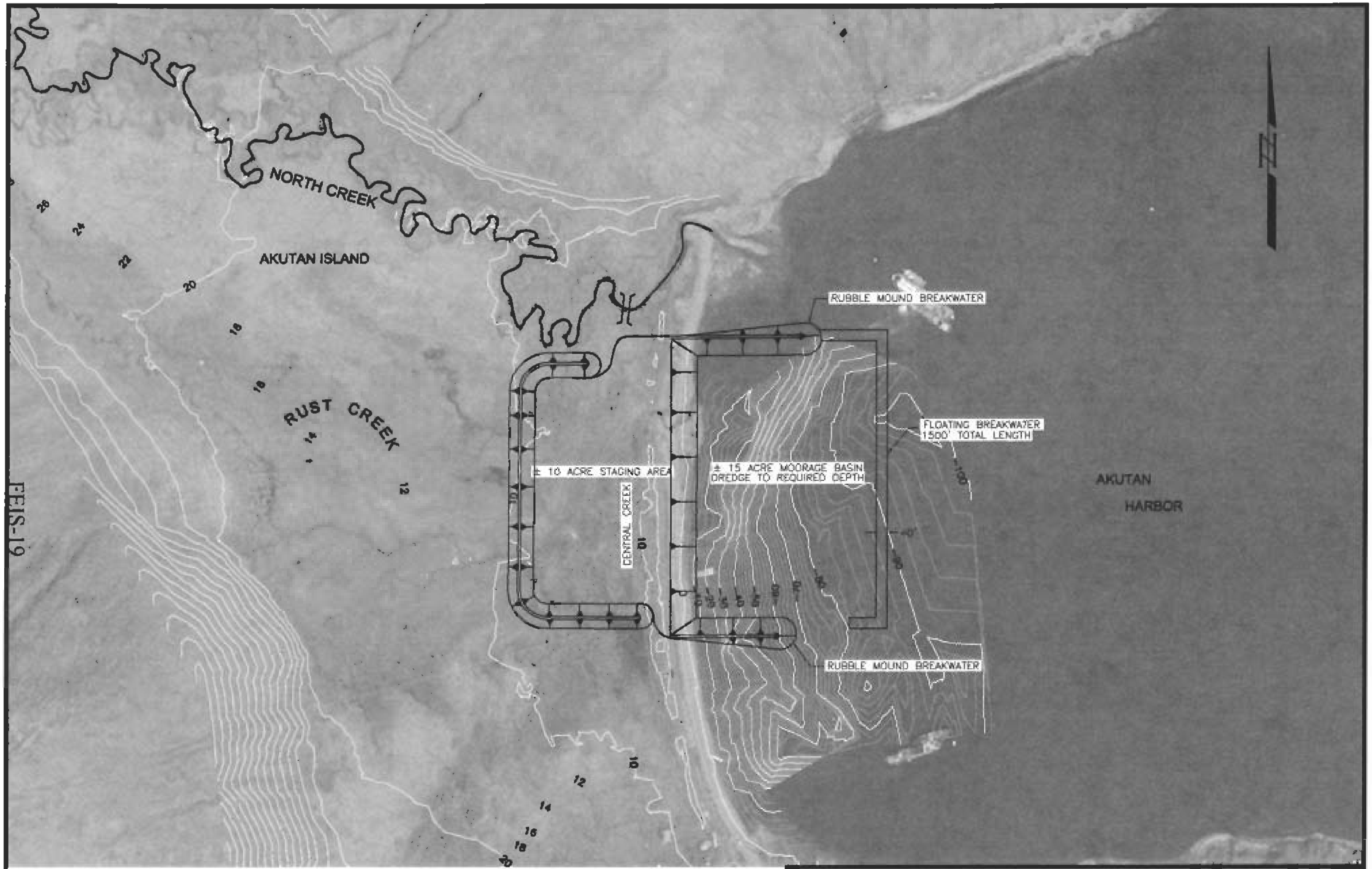
(IN FEET)
SCALE: 1" = 500'

CONCEPTUAL OFFSHORE HARBOR PLAN

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS-3



GRAPHIC SCALE

250 0 125 250 500

(IN FEET)
SCALE: 1" = 500'

CONCEPTUAL OFFSHORE HARBOR PLAN

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS-3

GRAPHIC SCALE
250 0 125 250 500
(IN FEET)
SCALE: 1" = 500'

CONCEPTUAL OFFSHORE HARBOR PLAN
(RUBBLE MOUND)

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE
FEIS-4

GRAPHIC SCALE

250 0 125 250 500

(IN FEET)
SCALE: 1" = 500'

CONCEPTUAL ONSHORE HARBOR PLAN
(WAVE BARRIER)

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE
FEIS-5

necessarily all the way to the bottom. An estimated elevation of +12 feet above MHHW would be required to minimize over topping. An approximately 450-foot-long section of the rubblemound jetty would traverse the breaking wave zone and connect the wave barrier to the beach on one side. The pile-supported structure could work well in the liquefaction prone soils at the head of the bay; however, the combined cost of the wave barrier, rubblemound jetty, and other structures and features outweigh any anticipated per acre benefits, so they would not be economically feasible.

Both harbor variations would directly impact essential fish habitat, over-wintering Steller's eider habitat at the head of Akutan Harbor, and to varying degrees, the wetland complex behind the beach berm. Some impacts to the neighboring anadromous stream (North Creek) could occur because wetland streamlets feeding into the stream would be impacted by inland dredging operations. Near-shore marine habitat would be unavoidably lost with both harbor designs.

2.2.3.3 Inland Harbor Basin

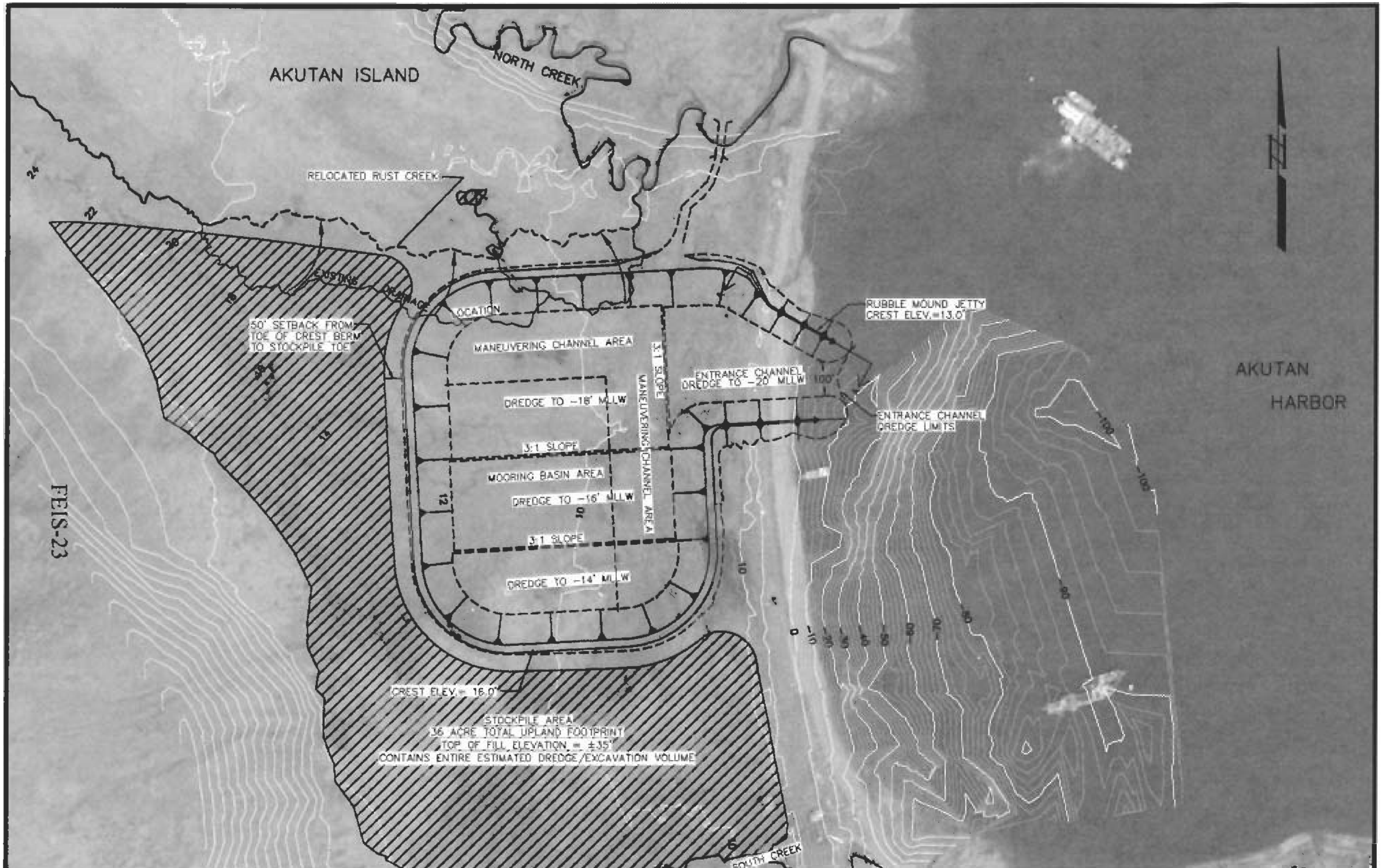
Because of known environmental concerns in the area (e.g. presence of over-wintering Steller's eider, essential fish habitat, wetlands, anadromous fish streams), several mooring basin sizes (12-, 15-, and 20-acres; figures FEIS-6, 7, and 8) were evaluated to avoid and minimize adverse environmental impacts. The same design criteria and engineering features also were used to evaluate each design's feasibility (table FEIS-4).

Initially, each design's entrance channel was aligned with a natural offshore channel near the south side of the head of Akutan Harbor. Subsequent environmental studies indicated that the southwest shoreline of Akutan Harbor is most frequently used by over-wintering Steller's eiders. For this reason, the entrance channel was moved north, just south of North Creek's mouth where fewer Steller's eiders reside between November and March.

Aligning the mooring basin east/west would maximize the distance from nearby streams, but would expose broadside-moored vessels to the prevailing winds and the offshore wave environment. Therefore, each design's mooring basin was oriented to align the long axis of the harbor north/south so that better wave protection would be provided and permit moored vessels to align into the wind in a rafting-type arrangement.

Geotechnical data collected at the site indicates that the dredged material would consist mostly of coarse to fine-grained sands (Shannon and Wilson, 2001). Dredged disposal alternatives include depositing the material near shore, on land, and/or in open/deep water.

The only road the Corps may have to build, as part of the harbor project would be a spur to connect the harbor's perimeter road and staging area to a road being constructed by the State of Alaska and the Federal Aviation Administration (FAA).



NOTES

TOTAL DREDGE VOLUME = 850,000 CY
BASIN AREA = 12.7 ACRES
ENTRANCE CHANNEL AREA = 2.6 ACRES
(AREA MEASUREMENTS AT TOE OF EXCAVATION)
TOTAL HARBOR PROJECT AREA = 15.3 ACRES

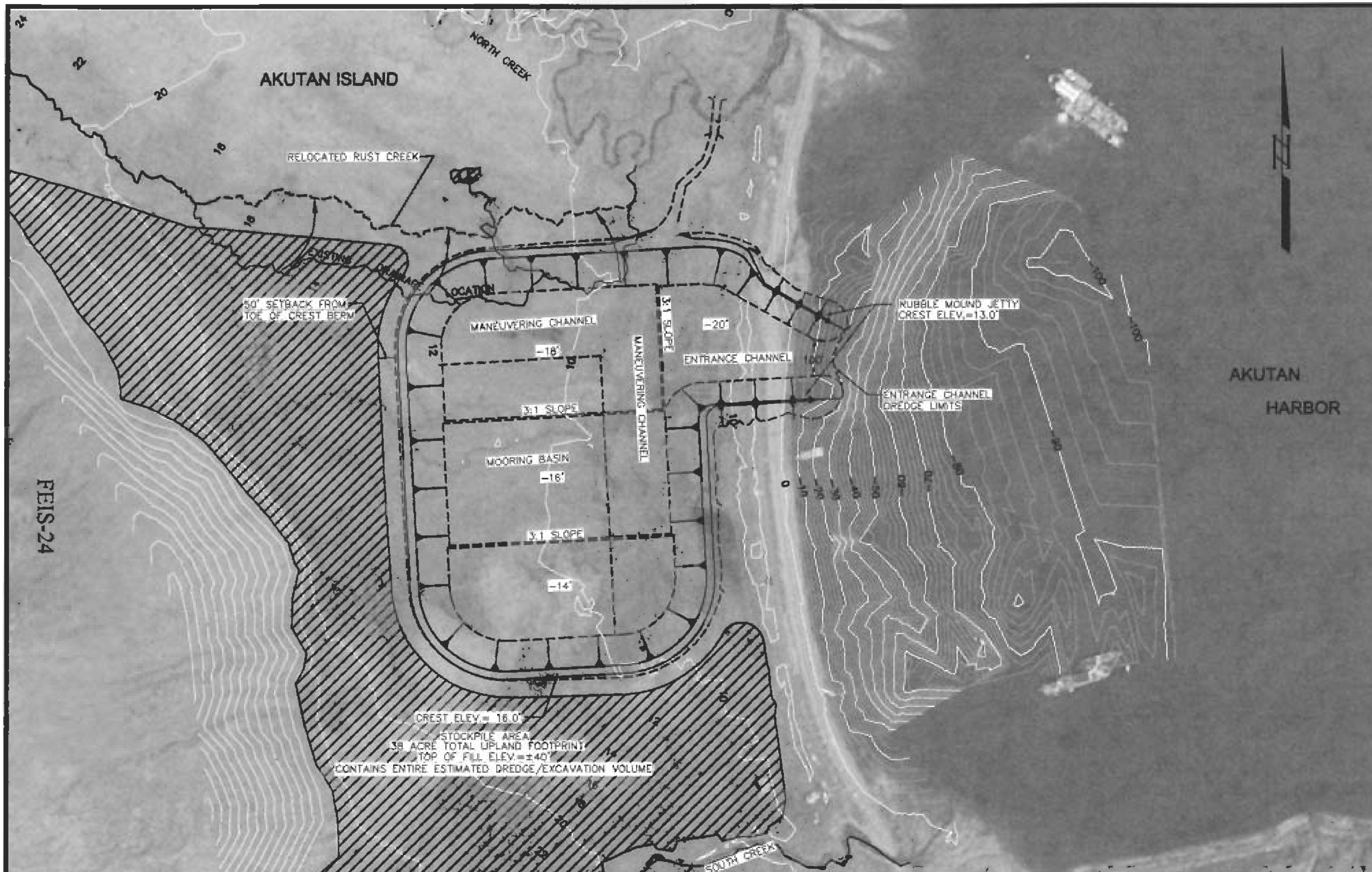
GRAPHIC SCALE
200 0 100 200 400
(IN FEET)
SCALE: 1" = 400'

INLAND HARBOR PLAN
12-ACRE MOORING BASIN

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS-6



NOTES
TOTAL DREDGE VOLUME = 990,000 CY
BASIN AREA = 15 ACRES
ENTRANCE CHANNEL AREA = 2.6 ACRES
(AREA MEASUREMENTS AT TOE OF EXCAVATION)
TOTAL HARBOR PROJECT AREA = 17.6 ACRES

GRAPHIC SCALE
200 0 100 200 400
(IN FEET)
SCALE: 1" = 400'

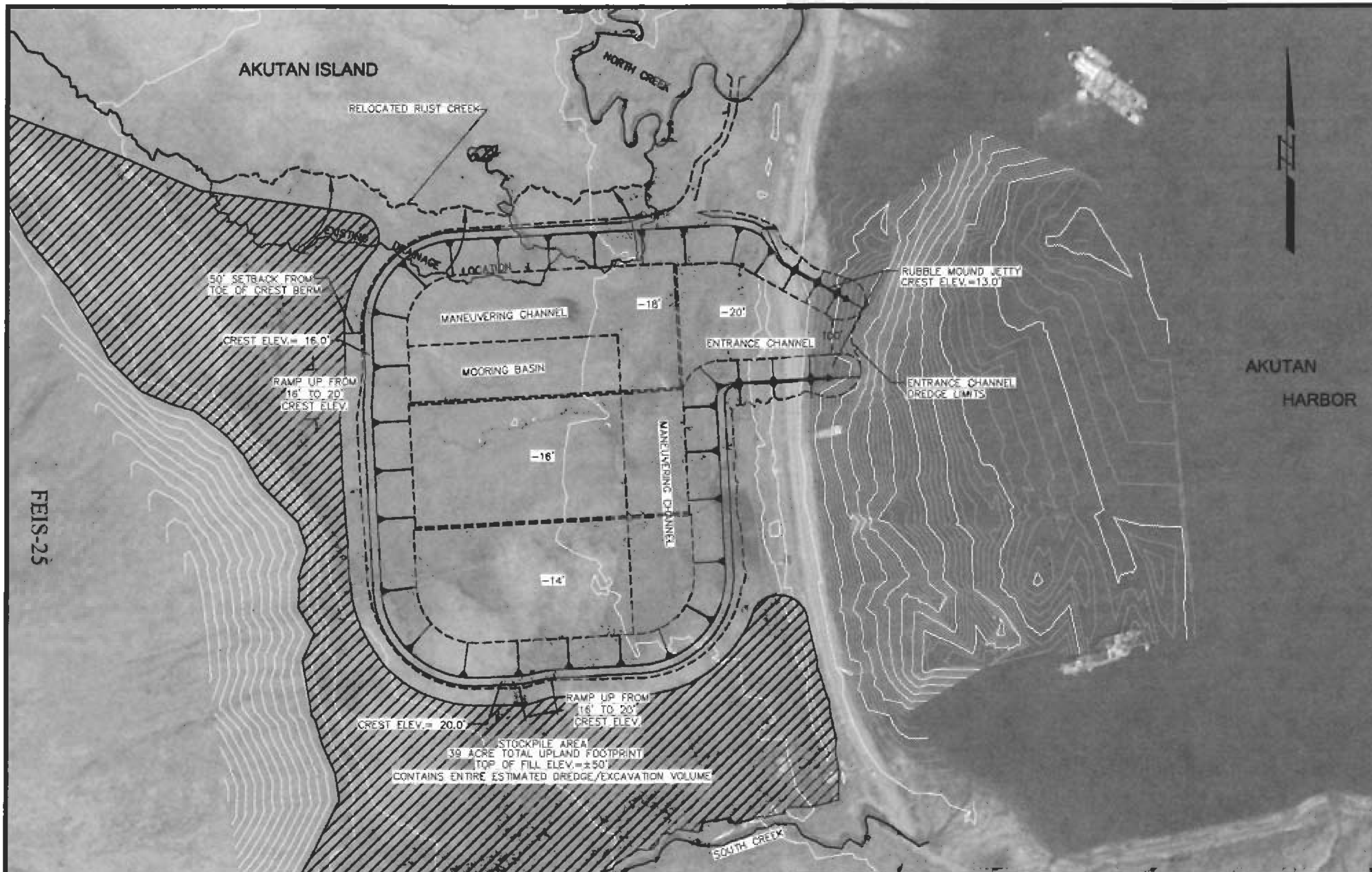
INLAND HARBOR PLAN
15-ACRE MOORING BASIN

TRYCK NYMAN HAYES, INC.

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS-7



NOTES

TOTAL DREDGE VOLUME = 1,175,000 CY
BASIN AREA = 19.2 ACRES
ENTRANCE CHANNEL AREA = 2.6 ACRES
(AREA MEASUREMENTS AT TOE OF EXCAVATION)
TOTAL HARBOR PROJECT AREA = 21.8 ACRES

GRAPHIC SCALE
200 0 100 200 400
(IN FEET)
SCALE: 1" = 400'

INLAND HARBOR PLAN
20-ACRE ALTERNATIVE

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS-8

Table FEIS-4. Comparative engineering features of the inland harbor basin alternatives considered in detail, Akutan, Alaska.

Comparative Enginering Features	Inland Harbor Basin Alternatives Considered in Detail			
	DEIS			FEIS Recommended Plan
	20-acre basin	15-acre basin	12-acre* basin	Redesigned "12-acre basin"
Fleet size	80	68	58	58
Dredged material volume (cubic yards)				
Entrance channel; -18 ft. MLLW	180,000	180,000	180,000	82,000
Turning basin; -18 ft. MLLW	385,000	335,000	300,000	280,000
Mooring basin; -14 to –18 ft. MLLW	610,000	475,000	370,000	481,000
Total dredged material volume	1,175,000	990,000	850,000	843,000
Breakwater rock/fill (cubic yards)	67,809	67,809	67,809	67,809
Harbor basin/channel slope protective rip-rap (cubic yards)	22,537	20,441	17,241	19,600
Project Footprints (acres)				
(a) Turning & mooring basins	19.2	15.0	12.7	14.9
(b) Entrance channel; 100 ft. wide	2.6	2.6	2.6	1.3
(c) Perimeter road and basin side-slopes	17.1	14.9	14.0	12.5
(d) Total harbor area (a + b + c)	38.9	32.5	29.3	28.7
(e) Staging area	12.0	9.0	8.0	8.0
(f) Stockpile area and elevation	27.0; +50 ft.	29.0; +40 ft.	28.0; +35 ft.	20.5; +44 ft.
Total footprint of harbor project (d + e + f)	77.9	70.5	65.3	57.2

* Identified in the draft environmental impact statement as the tentatively selected plan.

The State-FAA road would connect the City of Akutan to a proposed airport on Akutan Island.

All three inland harbor designs would minimally impact Akutan Harbor's marine environment, which supports over-wintering Steller's eiders and other sensitive marine resources (i.e. essential fish habitat). The only unavoidable loss of marine habitat would be within the footprint of the entrance channel and rubblemound jetties. However, each design would unavoidably and permanently impact wetlands by mooring basin dredging and disposing the dredged material onshore.

Cost estimates indicated that dredging an inland basin and depositing the dredged material on land would be the least expensive harbor design of those considered and would also produce the greatest net economic benefits.

2.3 Recommended Plan

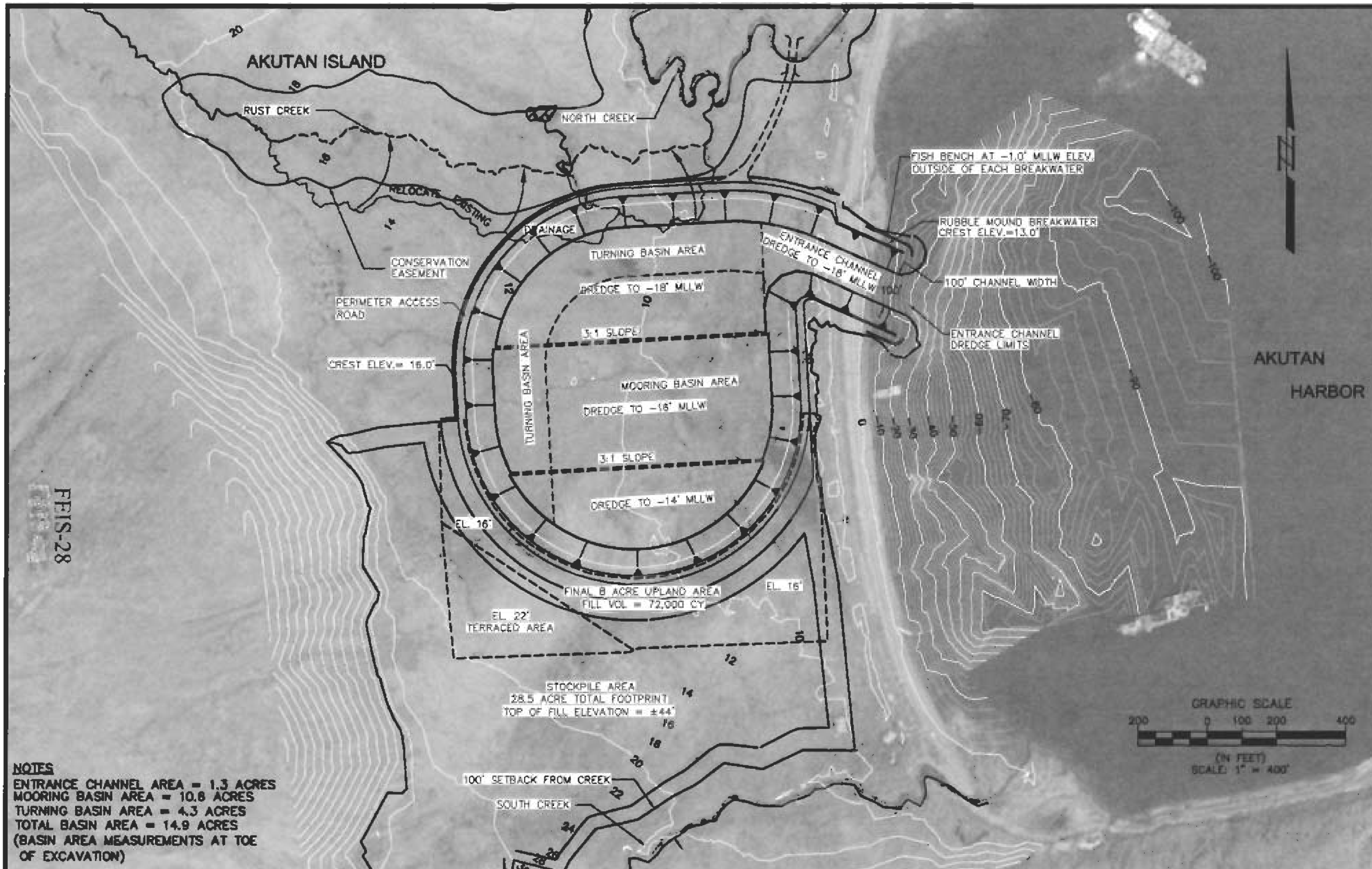
After examining the conceptual cost estimates and performing an economic evaluation of the "alternatives considered in more detail," the inland mooring basin at the head of Akutan Harbor was found to be the only economically feasible alternative and also generated the greatest net economic benefits. The Corps then advanced several versions of the inland basin (12-acre basin, 15-acre basin, and 20-acre basin) for a more detailed analysis (table FEIS-4). By varying the size of the basin, different portions of the overall fleet could be serviced and different overall costs and benefits could be compared. Environmental impacts associated with the versions were also identified.

The economic analysis of three inland mooring basin options indicated that all three were economically feasible, but the 20-acre inland harbor would generate the most economic benefits; therefore, the National Economic Development Plan would be 20 acres or larger. However, because the 20-acre mooring basin also generated the most adverse environmental impacts, the smaller 12-acre option was selected as the tentatively selected plan and identified as such in the DEIS. Based on comments received on the DEIS and the Corps' reevaluation of the project, the 12-acre mooring basin was selected as the recommended plan and reconfigured to further address environmental concerns and mitigation (figure FEIS-9).

Major construction items of the recommended plan include breakwaters, dredging, and inner harbor facilities, the specifics of which are described in more detail in the sections that follow. Section 2.4 (Recommended Plan Mitigation and Environmental Protection Measures) describes in more detail the mitigation features and measures incorporated in the recommended plan

2.3.1 Reconfigured 12-acre, 58-Vessel Mooring Basin

Stated concerns about deteriorating water quality in Akutan Harbor, an impaired water body (see section 3.2.5), were addressed by rounding the basin's sides and corners to theoretically improve water circulation/flushing (figure FEIS-9). However,



NOTES

ENTRANCE CHANNEL AREA = 1.3 ACRES
MOORING BASIN AREA = 10.6 ACRES
TURNING BASIN AREA = 4.3 ACRES
TOTAL BASIN AREA = 14.9 ACRES
(BASIN AREA MEASUREMENTS AT TOE OF EXCAVATION)

NOTES

TOTAL HARBOR BASIN PROJECT AREA = 16.2 ACRES (TO TOP OF SLOPE)
TOTAL HARBOR USEABLE UPLANDS AREA = 8.0 ACRES (DOES NOT INCLUDE ROADS AND SLOPES)
TOTAL USABLE HARBOR PROJECT AREA = 28.7 ACRES (INCLUDES PERIMETER ROAD, UPLANDS AND SLOPES)
TOTAL STOCKPILE AREA = 28.5 ACRES (INCLUDES 8 ACRES FOR FUTURE USABLE UPLANDS)
TOTAL HARBOR PROJECT AREA =57.2 ACRES (INCLUDES STOCKPILE FOOTPRINT)
TOTAL DREDGE VOLUME = 843,000 CY
VOLUME REQUIRED FOR USABLE UPLAND FILL = 72,000 CY
TOTAL STOCKPILE VOLUME = 771,000 CY

RECONFIGURED
12 ACRE ALTERNATIVE

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE
FEIS-9

rounding the sides and corners created a larger mooring and turning basin (14.9 acres verses 12.0 acres, table FEIS-4) to accommodate the same fleet size (i.e., 58 vessels). Narrowing the entrance channel to 100 feet further facilitated the flushing dynamics of the harbor basin and also decreased the area of the channel from 2.6 acres to 1.3 acres.

Two approximately 300-foot-long rubblemound breakwaters would protect the harbor basin entrance channel (figure FEIS-9). The breakwaters would have a crest elevation of +13.0 feet MLLW and a crest width of 5.0 feet (figure FEIS-10). Breakwater foundation materials would be unconsolidated sands and breakwater slopes would be 2H:1V in lieu of 1.5H:1V to increase stability on the unconsolidated foundation and facilitate fish near-shore fish movements. A 5-foot-wide fish bench would be constructed on the outside of the breakwaters at –1.0 feet MLLW to also facilitate near-shore fish movements (figure FEIS-10). The foundation materials would be excavated to entrance channel depth (-18 feet MLLW). Under the breakwater and 50 feet from the toe, the excavation line would slope at 3H:1V. Over-excavation would be backfilled with breakwater core material.

The project would accommodate 58 vessels in a 14.9-acre harbor basin (figure FEIS-9). Vessel using the harbor basin would range in size from under 24 feet to 180 feet in length. Turning and mooring basins would be dredged to elevations of –18, –16, and –14 feet MLLW. The shallower depths would be away from the entrance channel providing smaller boats more protection from potential waves coming through the entrance channel. Basin slopes would be 3H:1V below mean higher high water (MHHW), 2H:1V above MHHW, and armored with rock to prevent and reduce erosion and sloughing, reduce dredging quantities, and facilitate near-shore fish movements within the harbor basin (figure FEIS-11).

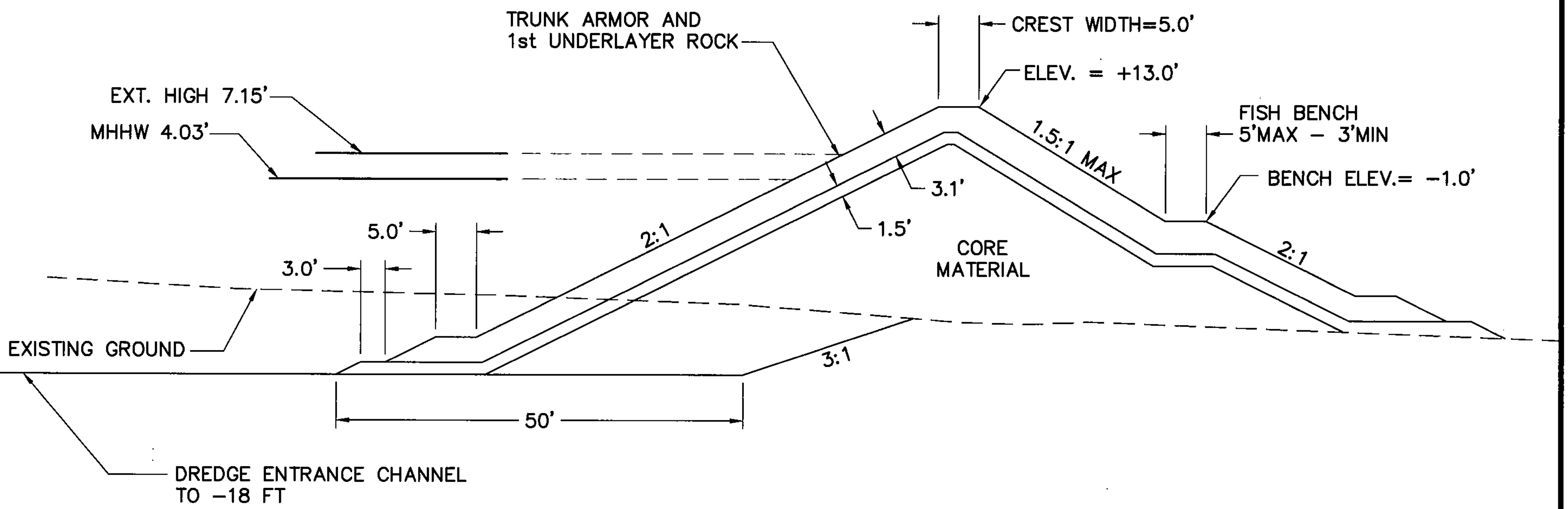
Local service facilities would consist of the docks and floats necessary to moor the fleet. Also included would be the necessary gangways for access from the 8-acre staging area and perimeter road to the docks and floats.

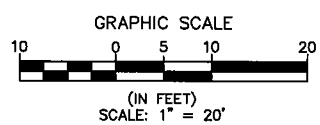
2.3.2 Dredging Activities and Disposal Alternatives

2.3.2.1 Alternatives Identification and Analysis

The recommended plan would generate a considerable amount of dredged material, 843,000 cubic yards (table FEIS-4). The upper 4-to-6 feet of material to be dredged at the head of Akutan Harbor consists of silty sand with organics. The material below this layer has been characterized as coarse to fine-grained sands (Shannon & Wilson, 2001).

There are a number of alternative ways of dredging this material and also a number of sites that could be used for disposal, which are summarized in table FEIS-5. The fine-grained sand is well suited for a suction dredging operation. Using a suction dredge and a pipeline, the dredged material could be economically moved up to about 2 miles from the project site. The Trident Seafoods processing plant, the city, and the





TYP. RUBBLE MOUND BREAKWATER SECTION

ENGINEERING/SURVEYING & LANDSCAPING ARCHITECTURE
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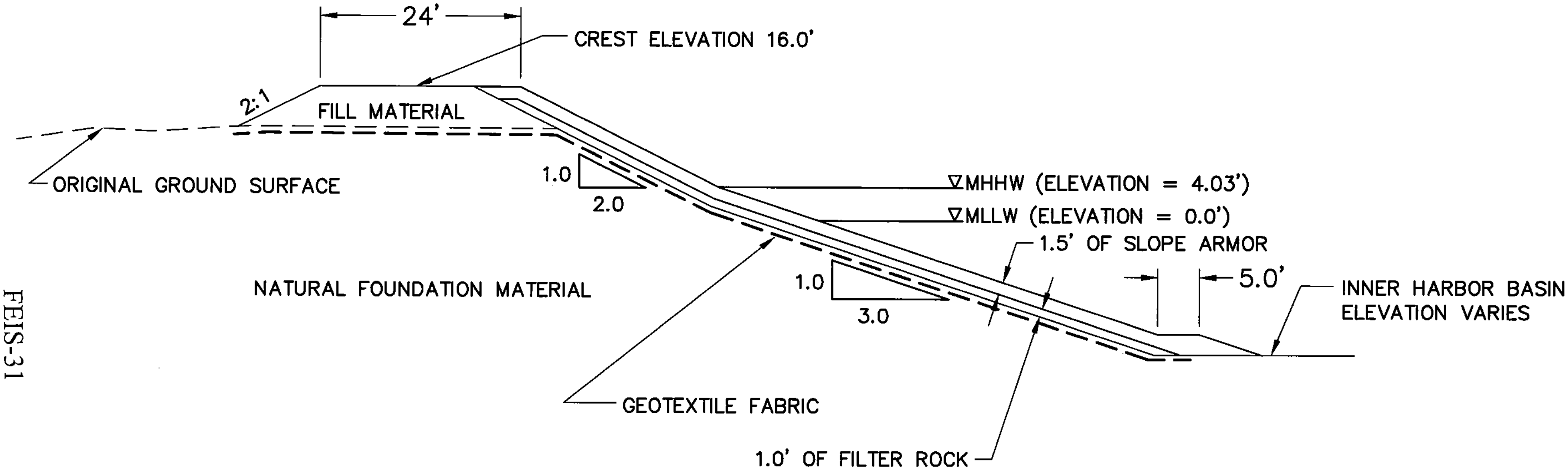
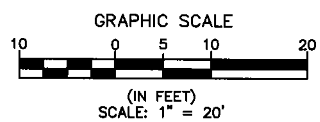
NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS–10





TYP. INNER HARBOR ARMORED SLOPE

ENGINEERING/SURVEYING & LANDSCAPING ARCHITECTURE
TRYCK NYMAN HAYES, INC.

NAVIGATION IMPROVEMENTS

AKUTAN ALASKA

FIGURE FEIS–11

Whaling Station are respectively 1.4, 2, and 2/3 miles from the head of Akutan Harbor. Other methods that could be employed to dredge the harbor basin and entrance channel include clamshell dredging, a dragline, a large backhoe, and bulldozers. However, the relatively high water table at the head of Akutan Harbor precludes using bulldozers and backhoes except for the initial site preparation and excavation of the surface soil.

Six dredged material disposal alternatives have been identified (table FEIS-5). Two involve transporting the dredged material outside Akutan Harbor: Offshore disposal outside Akutan Harbor and Onshore disposal at Unalaska, AK. Deepwater disposal outside Akutan Harbor within Akutan Bay (figure FEIS-12) or barging the dredged material to Unalaska for upland disposal (and subsequent use for construction projects) would be prohibitively expensive primarily due to the high barge-transportation costs and the expenses associated with extending the construction season[2]. Furthermore, it is unlikely that the construction timing of the Akutan Harbor project would exactly match the timing of another large construction project (albeit undefined) in Unalaska requiring the material, and/or the amount of reusable dredged material brought to Unalaska would be likely greater than would be required for most single projects. For all the aforementioned reasons, the alternatives are not considered further.

The remaining four alternatives have various degrees of cost effectiveness and associated advantages and disadvantages. Environmental issues aside, disposing the dredged material on the intertidal beach at the head of Akutan Harbor is the most cost effective alternative, followed by indiscriminately discharging the material (via a suction dredge pipeline) offshore into Akutan Harbor. The costs associated with stockpiling the material onshore at the head of Akutan Harbor or at the Whaling Station are higher because of the required use of earthmoving equipment. However, when environmental issues are incorporated into the decision-making process, the feasibility of each alternative becomes more or less certain.

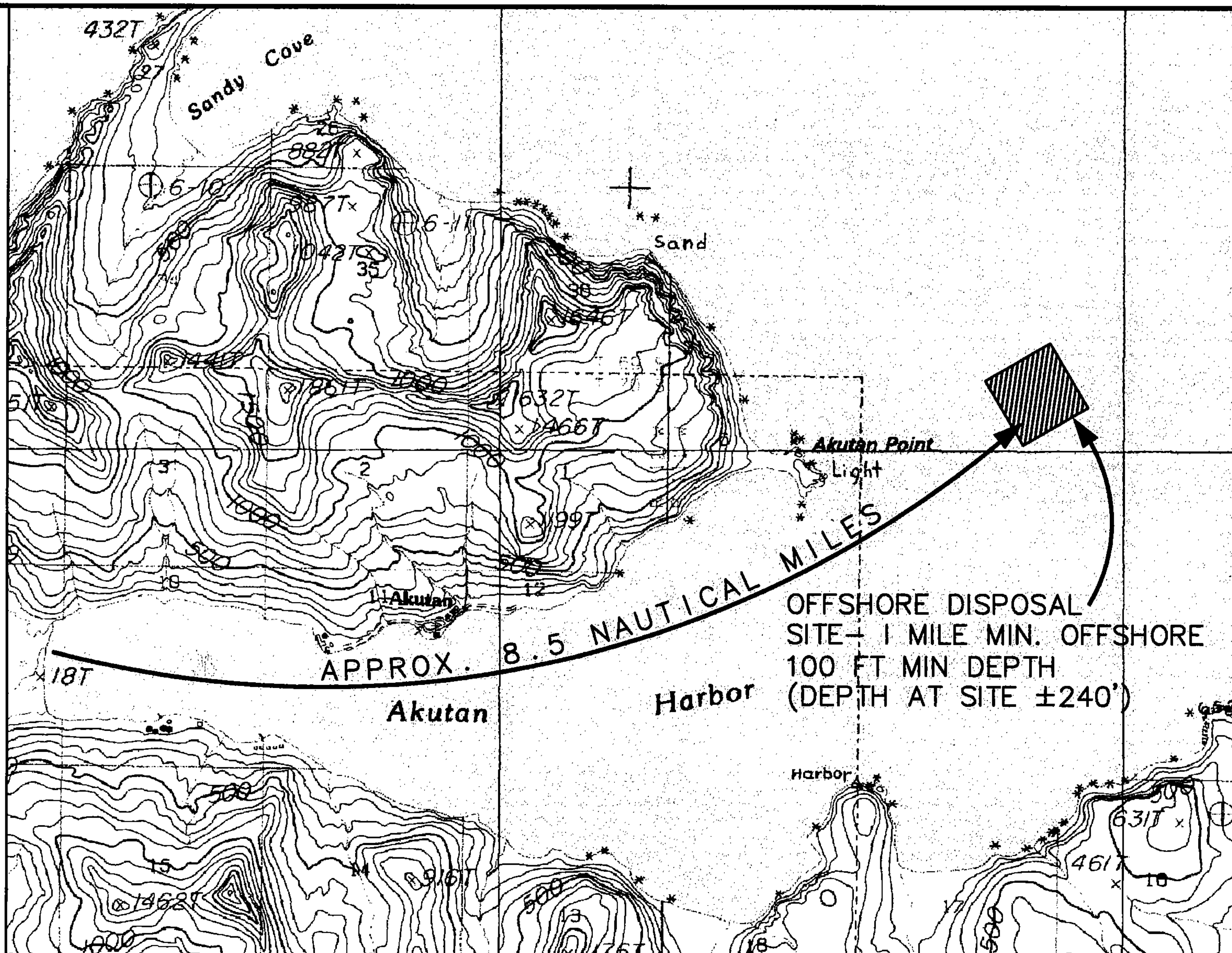
Two of the four remaining disposal alternatives would involve placing dredged material into Akutan Harbor's near-shore and offshore environment. Akutan Harbor's near-shore marine environment (i.e., the intertidal and shallow sub-tidal areas) consists of sand, gravel, and cobble beaches; rock outcroppings; and steep-sloped rock faces, all of which support a species rich and diverse community of benthic organisms, kelp, fish communities, and habitat used by seabirds, sea ducks, and marine mammals (see section 3.0 Existing Environment). The Corps, USFWS, NMFS, and ADFG agree that placing dredged material on the intertidal beach habitat at the head of Akutan Harbor is not environmentally feasible because of its significant and adverse impacts on over-wintering Steller's eider (a threatened species) habitat,

[2] This site was chosen after an examination of the currently permitted fish waste disposal permit for the Trident Seafoods Processing plant. This permit requires dumping outside Akutan Harbor, in over 100 feet of water and over 1 mile from any shoreline point…the proposed offshore disposal site meets all of these requirements. Because offshore disposal of dredged material is different from fish wastes, additional permitting requirements would be anticipated.

Table FEIS-5 Summary of dredged material disposal options associated with the Akutan navigation improvements project.

Disposal Site	Site Ownership	Disposal and Transport Method	Advantages	Disadvantages
Onshore at the head of Akutan Harbor	Akutan Village Corporation, Aleut Corporation, and the City of Akutan. Tidelands owned by the State of Alaska.	Combination of earthmoving equipment & suction dredge.	Disposal method is not cost prohibited. Essential fish habitat and over-wintering Steller's eider habitat avoided. No marine resources or their habitat impacted. Large tracts of property owned by project sponsor. Non-wetlands (uplands) available for stockpiling.	Insufficient amount of uplands available for stockpiling the entire quantity of dredged material. Stockpiling in wetlands would adversely affect associated fish and wildlife habitat and the area's hydrologic features.
Onshore in the Akutan Harbor area[1]: Whaling Station	William Lagen, who resides in Seattle, Washington.	Material would either be pumped directly to the site or placed on a barge and transported to the site. Earthmoving equipment would be used to place the material and/or construct a stockpile.	Commercial fishing and military cleanup activities have already heavily impacted the site; therefore, no quality fish or wildlife habitat exists on the site. Essential fish habitat and over-wintering Steller's eider habitat in Akutan Harbor not impacted. Avoids impacting the wetland complex and fishery resources located at the head of Akutan Harbor. Possibly a cost effective alternative.	Private property. The site of a military cleanup project of WWII-related debris and petroleum spills. Offshore and onshore petroleum contamination still exists. Site is too small to accommodate a significant quantity of dredged material. Feasibility not determined.
Intertidal fill at the head of Akutan Harbor	Tidelands below mean high water (MHW) owned by the State of Alaska. Above MHW, the land is owned by the Akutan Village Corporation, Aleut Corporation, and the City of Akutan	Combination of earthmoving equipment & suction dredge.	Placing the dredged material on the existing beach at the head of Akutan Harbor is a simple and cost effective alternative. Avoids impacting the wetland complex and fishery resources located at the head of Akutan Harbor.	Existing beach may not be able to accommodate the entire quantity of dredged material. Essential fish habitat and over-wintering Steller's eider habitat in Akutan Harbor adversely impacted. Short-term water quality concerns in a dissolved oxygen-impaired water body. Nearshore movement of fish adversely impacted. Benthic assemblages within footprint of fill adversely impacted.
Offshore disposal within Akutan Harbor	Subtidal land below MHW and within three miles of shore is owned by the State of Alaska. USFWS suggests disposing material on seafood processing waste piles.	Depending on the site's location, the material would either be deposited using a suction dredge pipeline or dumped from a barge.	Avoids impacting the wetland complex and fishery resources located at the head of Akutan Harbor. The quality of already impacted areas could possibly be improved to a state that facilitates the development of a healthy benthic community.	The extent of the problem has not been defined (i.e., Is there a need to restore historic seafood processing waste piles in Akutan Harbor?). No candidate sites have been identified and the feasibility of the project has not been determined. High research costs to address the issue and determine its feasibility. The cost of this alternative may be effective, depending on the scope of the project and the methods used to dispose of the material. Project areas likely in a water quality-impaired water body.
Offshore disposal outside Akutan Harbor	Subtidal land below MHW and within three miles of shore is owned by the State of Alaska. Potential site determined by using USEPA criteria for disposing of seafood processing wastes from the Trident Seafoods processing plant.	Use suction dredge to load barge; transport material to dump site; dump dredged material through the water column onto the seafloor.	Site avoids impacting the wetland complex, over-wintering Steller's eider habitat, and fishery resources located at the head of Akutan Harbor.	Short-term impacts to water quality and long-term impacts on subtidal benthic resources and their habitat. Disposal method is cost prohibited.
Onshore disposal at Unalaska, AK	No sites identified	Load material into barge with earthmoving equipment; transport to site; off-load with earthmoving equipment; construct a stockpile.	Avoids impacting any fish and wildlife resources and their habitat within the Akutan Harbor area.	Potential environmental impacts at stockpile and/or construction sites located on Unalaska. Stockpiled material available for reuse. Disposal method is cost prohibited.

[1] No other upland areas within the Akutan Harbor area were determined to be suitable for disposing of dredged material.



OFFSHORE DISPOPSAL SITE

HARBOR FEASIBLIITY STUDY

AKUTAN ALASKA

TRYCK NYMAN HAYES, INC.

FIGURE FEIS-12

essential fish habitat, the near-shore movement of fish (especially juvenile salmonids), and on Akutan Harbor's water quality, which is dissolved oxygen-impaired. Placing sandy dredged material on unlike-shoreline material consisting of gravel, cobble, and/or rock is also not environmentally feasible because it would cause significant adverse impacts on the heavily vegetated substrate that is used by juvenile fish for refuge, spawning, and assemblages of benthic organisms.

Ocean disposal of dredged material can in many cases be environmentally benign, and in some cases, environmentally beneficial; however, this would not be the case in Akutan Harbor. First, the cost-effective range (2-miles) of using a suction-dredge pipeline in Akutan Harbor is totally within the area classified as a water-impaired water body for dissolved oxygen. Second, the indiscriminate discharge of dredged material offshore into Akutan Harbor would adversely impact at a minimum water quality, king crab habitat, benthic epifauna/infauna organisms and their habitat, and the food resources fed upon by Steller sea lions. For the aforementioned reasons, the indiscriminate discharge of dredged material in offshore areas of Akutan Harbor is not considered further. However, opportunities may exist within Akutan Harbor for the beneficial use of dredged material in a manner or location that provides ecological benefit.

Under the auspices of the Water Resources Development Act of 1996 (Section 206), the Corps has authority to conduct aquatic ecosystem restoration projects (with a project sponsor), to restore ecosystem structure, function, and dynamic processes to a less degraded, more natural condition. Additional authorization is granted under the Water Resources Development Act of 1992 (Section 204), which allows the Corps to carry out projects for the protection, restoration, and creation of aquatic and ecologically related habitats in connection with dredging for construction, operation, or maintenance.

The USEPA has determined that selected areas of deep-water benthic habitat have been adversely impacted by historic releases of seafood processing wastes. The extent of the problem and need to perform environmental restoration (e.g. capping the seafood waste piles with clean sandy dredged material) in these areas has not been defined; therefore, the feasibility of implementing the alternative cannot be determined at this time. A secondary benefit of implementing an ecosystem restoration plan with the dredged material would be that the amount of material to be stockpiled at the head of Akutan Harbor would be reduced, thereby reducing the impacts on area wetlands and associated fishery uses. The Corps, project sponsors, USFWS, USEPA, and state resource agencies will continue to evaluate ecosystem restoration opportunities, and if proven environmentally, engineeringly, and economically feasible, will incorporate plans to do so during the project's Preconstruction Engineering Design phase (which will occur after project authorization by the U.S. Congress).

The presumptive least damaging alternative for the disposal of dredged material would be to use uplands if sites are available and cost-effective to reach. The only uplands that exist within the cost-effective range (2 miles) of the suction dredging equipment are at the head of Akutan Harbor, at the Whaling Station, at the Trident Seafoods Processing Facility and its commercial fishing gear storage yard, and at the City of Akutan. With the exception of the head of the Akutan Harbor and Whaling Station sites, all the locations are heavily developed and not suitable for the storage of dredged material.

The Whaling Station has approximately 13 acres of privately owned property that is currently being used as a crab pot storage facility. Commercial fishing vessels are known to use its dilapidated woodpile pier. The site is also eligible for listing in the National Register of Historic Places and is currently a U.S. Army, Formerly Used Defense Site military cleanup site. Because the site cannot accommodate the 771,000 cubic yards of dredged material, and for the aforementioned reasons, the site does not appear to be practicable.

Approximately 30 acres of non-wetlands were identified within the survey area at the head of Akutan Harbor (see sections 3.3.1, Vegetation; and, 3.3.5, Wetlands); however, only 9 acres would be reasonably accessible for use in stockpiling dredged material. The remaining 11.2 acres needed for constructing the dredged material stockpile would consist of adjacent wetlands. The impacted wetlands support resident populations of Dolly Varden and threespine stickleback, but are not known to support nesting waterfowl. The drainages to the north and south of the affected wetlands that support anadromous fish resources would not be adversely impacted by dredged material stockpiling activities.

The Corps recognizes that disposing of dredged material onshore (in uplands and wetlands) at the head of Akutan Harbor or in offshore areas within inner-Akutan Harbor would have adverse impacts on the affected area's ecological resources, and that there are environmental tradeoffs associated with selecting one over the other as the recommended dredged disposal plan. Deepwater disposal outside Akutan Harbor and transporting the dredged material to Unalaska may be the least environmentally damaging alternatives but are not practical because they are cost-prohibitive.

Disposing of dredged material in Akutan Harbor's near-shore and deep water environments would totally avoid impacting the Central Creek's wetlands and associated fishery resources; however, it would adversely impact benthic resources; near-shore movement of fish; essential fish habitat; water quality in an impaired water body for dissolved oxygen; over-wintering Steller's eider (a threatened species) habitat; Steller sea lions (an endangered species) and other marine mammals (e.g. sea otters, a candidate species); and, king crab and their habitat. Disposing of the dredged material onshore at the head of Akutan Harbor would totally avoid impacting the aforementioned marine resources in Akutan Harbor and utilize available uplands; it would, however, adversely impact Central Creek's wetlands and associated fishery resources. Opportunities may exist to reduce impacts to Central Creek's wetlands and associated fishery resources area wetlands by using some of the dredged material for aquatic restoration projects in Akutan Harbor.

An evaluation of the environmental tradeoffs, in concert with the USFWS, ADFG, and NMFS, has led the Corps to conclude that the onshore disposal of dredged material on uplands and wetlands within the Central Creek drainage is the least environmentally damaging and practicable alternative; and that efforts to conduct an aquatic restoration project in Akutan Harbor could reduce impacts further.

2.3.2.2. Dredging and Dredged Material Disposal Plan

The project would be constructed in a sequence such that the harbor basin would be essentially completed prior to the entrance channel being dredged and the harbor basin connected to Akutan Harbor. This would allow the contractor to dewater the dredged material back into the enclosed basin as it was constructed. The advantage of this method is that turbid water formed by the dredging operation would remain in the enclosed basin. After the inner harbor basin was constructed, the "berm" separating the basin and Akutan Harbor would be removed and the entrance channel and breakwaters would be completed.

Many alternatives are capable of dewatering the dredged material stockpiles. For example, ditches and regularly spaced culverts could provide the most efficient way to direct runoff under and around the stockpile areas. Culverts could be used to direct runoff from the mountains into streams, and have solid walls so that saline water draining from the dredged piles would not mix with the fresh, surface water runoff. Perforated culverts could be used to help drain the stockpiles, but would be directed into flat areas where the water could infiltrate into the native soil or into the mooring basin. The contractor would undoubtedly have a preferred method based on their specific equipment, construction sequencing, and previous experiences. Therefore, the construction contract and specifications would require that the contractor submit a work plan that includes construction sequencing to minimize turbidity and outlines how dewatering the dredged material would occur.

The dredged material disposal area was reduced from 36 acres to 28.5 acres in the design of the reconfigured 12-acre basin (figure FEIS-9). A 100-foot setback from the toe of the dredge disposal pile to South Creek would be established. The area reduced was the result of decreasing the dredged material quantity and raising the stockpile's elevation to 44 feet from 35 feet. The 7.5-acre reduction in stockpile area and the setback from South Creek would decrease impacts on wetlands. The 28.5 acres in dredged material disposal area is composed of 8 acres of staging area and 20.5 acres of stockpile area (table FEIS-4). The staging area follows the ADOT/PF general criteria, 60 percent of the developed area is the harbor basin and 40 percent is the related staging area. Staging areas are typically used for parking, restrooms, harbor maintenance facilities, storing oil spill response equipment, oil and solid waste disposal receptacles, etc. The local sponsor would perform maintenance dredging, if any, of the mooring basin, perhaps every 25 years.

The Corps, project sponsors, USFWS, USEPA, and state resource agencies would continue to evaluate ecosystem restoration opportunities for the beneficial use of dredged material, and if proven environmentally, engineeringly, and economically feasible, would incorporate plans to do so during the project's Preconstruction Engineering Design phase (which would occur after project authorization by the U.S. Congress).

2.3.3 Access Road

The only road the Corps may need to construct as part of the harbor project is a spur road connecting the harbor's perimeter road to a yet-to-be-constructed road by the ADOT/PF and the Federal Aviation Administration (FAA), as part of their Akutan Island Airport Project. The ADOT/PF and FAA road would provide a means for vehicles to travel between the City of Akutan and the proposed airport on Akutan Island or for vehicles to travel to a ferry facility that would in turn provide transportation to the airport. The Corps expects and has received assurances from the project sponsors (Aleutians East Borough and City of Akutan) that the airport-related road would be constructed before the harbor and harbor-spur-road would be constructed.

The U.S. House and Senate Appropriations Conference Committee has approved the fiscal year 2004 Omnibus Appropriations bill that includes Department of Transportation, Airport Improvement Program funds for an airport road.

2.3.4 Quarry Site

The breakwaters protecting the entrance channel and harbor basin side-slopes would require a source of rock for fill, core material, and protective riprap. The current Alaska District Corps policy is that quarry sites would not be designated or studied by the U.S. Government. The selected contractor would have the option to select an existing quarry, develop a new quarry source, or use a manufactured concrete armor system.

Prior to beginning construction, the contractor would be required to submit a Quarry Development Plan to the Corps and interested resource agencies for their review and approval. The environmental review would focus on the plan for obtaining and delivering the rock to the project site. Depending on the plan submitted, an additional NEPA document might be prepared and circulated for public and government agency review. Mitigation measures could be required in the plan to ensure that the quarrying operation would not cause significant adverse environmental impacts.

2.3.5 Anticipated Construction Sequence

The following conceptual sequence of harbor construction is anticipated:

1. Following the stipulations of the project's Storm Water Pollution Prevention Plan, install silt fences and other abatement measures around local streams; redirect drainages as required; and establish project limits around the work site.

2. Work would begin in the inner harbor by blading off and stockpiling the top 2 or 3 feet of the vegetative mat into a stockpile area in non-wetland areas.

3. Create a stockpile drainage containment berm, which may include temporary sub-drains, that direct runoff into the harbor basin.

4. Excavate down to the water table using bulldozers and backhoes, push the material into the upper section of the stockpile area, and allow the saturated material to drain into the containment area.

5. Begin suction dredging when the water table is reached. The entrance channel would remain plugged. Pump the dredged material into the bermed stockpile containment area to drain. As the material is drained, push it into the upper sections of the stockpile area. The stockpile footprint would begin in uplands/non-wetland areas and only proceed into wetland areas, as space is needed.

6. Excavate the basin slopes to grade and lay down the geotextile fabric. Place the slope filter rock and armor.

7. Once the main basin has been dredged, excavate the entrance channel to open the harbor basin to Akutan Harbor. This work would begin on the inland/basin side to minimize turbidity and sedimentation from getting into Akutan Harbor.

8. Stabilize dredged material stockpiles and install/construct soil erosion mitigation measures.

9. Construct breakwater jetties and install eye-bolts for petroleum spill abatement.

10. Construct inner harbor features, such as float systems, etc. Install aids to navigation.

11. Prepare constructed staging area for intended use.

2.4 Recommended Plan Mitigation and Environmental Protection Measures

The project area at the head of Akutan Harbor contains a vast freshwater wetland complex; fish-bearing (pink and coho salmon, Dolly Varden, and threespine stickleback) streams and ponds; passerine bird and waterfowl habitat; and a diverse near-shore marine habitat that supports juvenile marine and freshwater fish, sea otters, Steller sea lions (an endangered species), and concentrations of over-wintering Steller's eiders (a threatened species).

The project impacts the Corps is mitigating for include, at a minimum: the direct loss of 43.7 acres of freshwater wetlands and altering the area's hydrology; altering Rust Creek which supports Dolly Varden and other resident fish species; breakwater effects on near-shore coastal fishery habitat, fish movement, and the loss of intertidal and subtidal habitat; the effects of project-induced activities (e.g. fuel spills, boat traffic, and construction and operation of harbor related businesses) on over-wintering Steller's eiders; and, the possible degradation of water quality in Akutan Harbor and in the harbor basin itself.

Substantial changes were made to the harbor basin design, based on the comments received on the DEIS (Appendix FEIS-2). For example, to mitigate potential impacts on water quality (i.e., to improve water circulation and flushing), the harbor basin's corners and sides were curved and the entrance channel was narrowed to 100 feet. Design changes were also made to address stated concerns about the project's impacts on the freshwater wetlands that currently occupy the project site. To reduce dredging quantities (and subsequent disposal of the dredged material), basin side-slopes were changed. The harbor design in the DEIS had a side-slope of 3:1 but the new basin design has a 3:1 below mean high water MHHW and 2:1 above MHHW. To decrease the impacts on wetlands, the footprint of the stockpile area was reduced to 20.5 acres from 28 acres by raising its top elevation to 44 feet from 35 feet. All the aforementioned changes resulted in generating a slightly lower volume of dredge material (843,000 cubic yards verses 850,000 cubic yards).

The Corps believes that incorporating the USFWS's recommendations [as identified in their Fish and Wildlife Coordination Act (FWCA) reports], (Appendix FEIS-3), other agency recommendations, and Endangered Species Act-related terms and conditions (Appendix FEIS-4) into the project's design and construction, operation, development, and monitoring phases (see sections 2.4.1 through 2.4.5) will mitigate[3] to the maximum extent practicable, the potential environmental impacts associated with the project. Unavoidable impacts have been compensated to the extent justified. Figure FEIS-13 identifies selected mitigation measures incorporated into the Akutan navigation improvements project.

2.4.1 Harbor Design and Construction

1. The environmentally preferred alternative (the reconfigured 12-acre, 58-vessel mooring basin) is selected as the recommended plan; not the National Economic Development Plan, which is the 20-acre, 80-vessel or larger mooring basin. Choosing the environmentally preferred alternative as the recommended plan is substantial avoidance-related mitigation in and of itself.

[3] Mitigation measures include avoidance, minimization, rectification, reduction or elimination of impacts over time, and compensation.

(a) To avoid impacting over-wintering Steller's eiders and their habitat in the vicinity of South Creek, the harbor's entrance channel has been positioned as far north as possible (figure FEIS-13).

(b) To facilitate water circulation and harbor flushing, the basin has been designed in a circular fashion and the entrance channel has been narrowed to 100 feet (figure FEIS-13).

(c) To facilitate long-shore fish movements, a 5-foot-wide bench at –1 foot MLLW would be constructed into the breakwaters that protect the harbor entrance (figure FEIS-13).

(d) To facilitate the cleanup and containment of petroleum spills in the harbor, eyebolts for attaching spill containment booms would be installed into concrete or steel structures at the outer and inner ends on the breakwaters.

(e) To reduce dredged material quantities and the footprint of the dredged material stockpile, the basin side-slopes would be constructed at a 3:1 slope below MHHW and at a 2:1 slope above MHHW (figure FEIS-13).

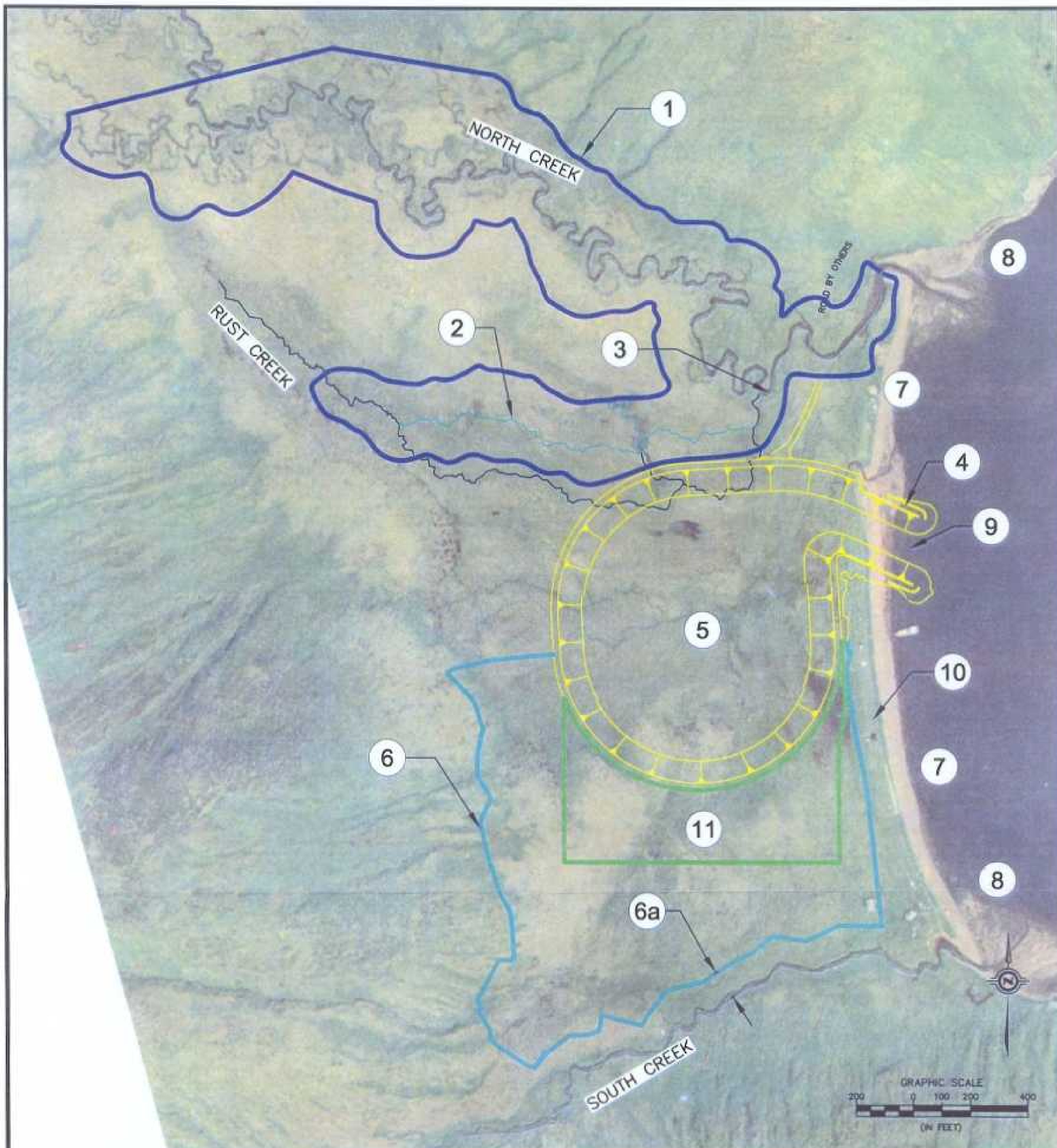
2. Prior to beginning construction, the harbor's contractor would submit a Quarry Development Plan to the Corps and interested resource agencies for their review and approval. Mitigation measures shall be incorporated in the plan to ensure that the quarrying operation will not cause any significant and adverse environmental impacts.

3. The Corps would construct the project primarily within the Central Creek watershed (figure FEIS-13).

4. The Corps would avoid impacting the dimension, pattern, and profile of North Creek, and its associated floodplain/wetland hydrology. No-work zones would be clearly established prior to beginning construction activities.

5. Offshore dredging of the entrance channel would be prohibited between November 15 and June 15 to avoid impacting wintering seabirds (e.g. Steller's eider) and juvenile fish (e.g. pink and coho salmon) at the site. However, offshore dredging and breakwater construction could occur after March 30 provided it can be clearly demonstrated that the work site can be completely isolated from the adjacent marine waters.

6. The harbor basin would be constructed and dredged while being totally isolated from Akutan Harbor. The entrance channel would be dredged last, after a period of time has passed to allow turbidity and settleable solids to decrease in the harbor basin. Breaching the harbor basin would be further restricted until after June 15 when salmon smolt are thought not to be in the area.



Key of Selected Mitigation Measures *

1. North Creek Conservation easement.
2. Restoration/reconstruction of Rust Creek.
3. Remove fish barrier at the mouth of Rust Creek.
4. Rubblemound breakwater.
   Bench added to outside of breakwater (-1.0 ft. MLLW) to facilitate fish movements.
   Eyebolts installed to facilitate the containment and cleanup of spilled petroleum products.
5. Inland Basin.
   12-acre basin, environmentally preferred plan selected over the 20-acre, NED plan.
   Basin side-slopes 3:1 below MHW and 2:1 above MHW to reduce volume of dredged material.
   Basin reconfigured to a circular design to facilitate water circulation & flushing.
6. Stockpile area
   28.5 acres, top elevation -44 ft., size reduced to minimize impacts to wetlands.

6a. 100-foot setback from South Creek.

7. Minimal impacts to essential fish habitat and marine resources
8. Avoiding Steller's eider over-wintering habitat
9. Entrance channel.
   Narrowed to facilitate water circulation and flushing
   Breached only after the inland basin dredging is complete after June 15
   Avoid dredging between November 15 and June 15
10. Vegetated beach-berm to remain in place to act as a visual barrier to over-wintering Steller's eiders.
11. 8-acre staging area will expand into stockpile area and not into wetlands.

*See section 2.4 for a complete discussion about the project's mitigation plan

ALASKA DISTRICT CORPS OF ENGINEERS CIVIL WORKS BRANCH	SELECTED MITIGATION MEASURES INCORPORATED INTO THE AKUTAN NAVIGATION IMPROVEMENTS PROJECT	Figure FEIS-13

7. The marine waters of the entrance channel would be isolated from Akutan Harbor during dredging by installing a silt curtain or similar material around the work area.

8. Disposal of dredged materials would occur only in uplands and wetlands of the Central Creek watershed, or be incorporated into a marine restoration/enhancement project. The Corps, project sponsors, USFWS, USEPA, and State resource agencies will continue to evaluate ecosystem restoration opportunities for the beneficial use of dredged material. If proven environmentally, engineeringly, and economically feasible, the Corps will incorporate plans for ecosystem restoration during the project's preconstruction engineering design (PED) phase (which will occur after project authorization by the U.S. Congress). If during PED the District finds that the beneficial use of dredged material represents the least-cost-disposal-option or pursues such an alternative (if not least cost under the authority of Section 204 of WRDA 1992, as amended, with appropriate cost sharing) then a beneficial use plan developed during PED could be recommended.

(a) As much dredged material as possible would first be placed in the non-wetland areas to the south of the mooring basin (figure FEIS-13).

(b) To decrease the footprint of the dredged material stockpile, the height of the stockpile has been increased from +35 feet to +44 feet and would not encroach upon adjacent watersheds that contain streams important to anadromous fish.

(c) A Storm Water Pollution Prevention Plan (SWPPP) would be prepared to address anticipated runoff issues associated with dredged material disposal (construction) and long-term stockpile (operations) activities. SWPPP measures would include at a minimum the following:

- Installing silt fences around the dredged material stockpiles at the toe of the slope, placing jute matting on the side-slopes, and seeding the stockpiles with native vegetation.
- Runoff from dredged material stockpiles being contained and filtered/treated (e.g. primary treatment settling basins) before being released back into the marine environment. During construction, the harbor basin would likely function as the primary treatment-settling basin up until the time that the entrance channel to Akutan Harbor has been constructed. If needed, any settling/dewatering basin constructed outside of the harbor basin area would be located in the stockpile footprint area such that no additional wetlands are effected; and the harbor basin would function as a secondary-treatment settling basin.
- Preventing runoff from dredged material stockpiles into adjacent freshwater streams unless it is treated to specific, State of Alaska water quality standards for the growth and propagation of fish, shellfish, other aquatic life, and wildlife.

- Establishing a 100-foot setback from the toe of the dredged material stockpile and South Creek (figure FEIS-13).

9. The spur access road leading from the harbor to a road from the City of Akutan to the head of the bay would be designed to the minimum size necessary to accommodate the anticipated traffic and be constructed to avoid adversely impacting North Creek.

10. To minimize construction-related impacts on local air quality, the contractor would maintain all construction equipment and use low-Nox engines, alternative fuels, catalytic converters, particulate traps, and other advanced technology, whenever feasible.

11. To compensate, in part, for the unavoidable loss of fishery habitat, the Corps would remove a waterfall barrier at the mouth of Rust Creek, a tributary to North Creek, which is an anadromous fish stream (figure FEIS-13).

12. The section of Rust Creek that would be destroyed by constructing the harbor basin would be rectified (i.e., relocated and reconstructed of the same dimension, pattern, and profile as the stream segment being impacted) so that it continued to flow into North Creek. Creation of the replacement segment would precede the loss of the original segment (figure FEIS-13).

13. To compensate, in part, for the unavoidable loss of wetlands and fishery resources in the Central Drainage area, a 41.7-acre Conservation Easement will be established along Rust Creek and North Creek (figure FEIS-13).

14. To compensate, in part, for the unavoidable loss of marine habitat due to breakwater construction and the foreseeable and unavoidable littering of Akutan Harbor's shoreline during the harbor's operation, the project sponsor will develop and implement a one-time cleanup of the shoreline between the Old Whaling Station and the Trident Seafoods processing plant to remove plastics, netting, tires, large pieces of scrap metal, rope, buckets, Styrofoam, etc. and transport them to an approved landfill.

15. Should Steller sea lions appear within the project area during dredging, in-water activities will cease and not commence until the National Marine Fisheries Service is contacted and consulted with.

2.4.2 Harbor Operation

1. The project sponsor (the Aleutians East Borough and City of Akutan) will develop, fund, and implement an Akutan Harbor Management Plan (AHMP). The AHMP shall include at a minimum the following:

(a) Elements addressing an on-site waste oil and plastic nylon mesh recovery system;

(b) Elements addressing oil spill prevention, recovery, and cleanup; staging cleanup gear (e.g. absorbent boom) on the breakwater; and training local personnel on how to respond to spills;

(c) Elements addressing rat infestation and eradication;

(d) Elements addressing the collection and disposal of solid waste generated by the fishing industry;

(e) Elements addressing harbor lighting, as unshielded lights can attract and disorientate migrating birds causing injury or mortality; and,

(f) Elements addressing the control of air emissions from harbor-related operations.

2. As dredged materials are used for off-site, non-federal projects, the former stockpile space will be used as harbor parking, staging, and equipment storage areas.

2.4.3 Harbor Development

1. To avoid and minimize overall impacts to fish and wildlife resources at the head of Akutan Harbor, the Corps recommends that the City of Akutan, in concert with State and Federal resource agencies, develop an Akutan Harbor Development Plan.

2. To eliminate any possibility of losing essential wetland habitat in the North Creek drainage, the project sponsor will coordinate with the landowner (Akutan Corporation) to establish a 41.7-acre Conservation Easement (e.g., a 100-foot non-development setback) from anadromous fish spawning and rearing habitat in the North Creek drainage and along the reconstructed Rust Creek.

2.4.4 Harbor Monitoring

The Corps shall investigate the effectiveness, ability to implement, and cost of monitoring the salinity of the lower reaches of North Creek, as the project might affect the creek's saltwater/freshwater interface and subsequently impact anadromous fish use of the lower reaches of the stream.

2.4.5 Terms and Conditions/Conservation Measures

As required by Section 7 of the Endangered Species Act, the Corps plans to incorporate into the project "reasonable and prudent measures and terms and conditions" to protect Akutan Harbor's over-wintering Steller's eider and their habitat. A complete description of the "Terms and Conditions" is contained in FEIS-Appendix 4 (U.S. Fish and Wildlife Biological Opinion), and only those unique to the biological opinion are listed below (i.e., terms and conditions identical to FWCA report recommendations are not listed):

1. Construction activities will be timed so as not to adversely impact Steller's eiders, which generally are present from mid-November to late-March.

2. The vegetated beach-berm at the head of Akutan Harbor will remain intact to act as a visual barrier to over-wintering Steller's eiders.

3. The project sponsors (Aleutians East Borough and City of Akutan) will prepare a Best Management Practice Plan (BMPP) or Harbor Management Plan addressing at a minimum the collection of waste oil, solid waste disposal, shoreline cleanup, and oil spill prevention, response (including wildlife rehabilitation), and cleanup. The BMPP will be made available to harbor customers via the web or by some other means (e.g. hard copies).

4. Collisions of Steller's eider with physical structures associated with the operation of the mooring basin will be monitored and reported according to USFWS protocol.

5. Releases of petroleum products at the proposed mooring basin will be monitored and annually reported to the USFWS.

6. Two Steller's eider/oil spill-related information signs will be developed in cooperation with the USFWS. One will be posted at the harbor basin and the second one will be offered to Trident Seafoods to be posted at their fueling facility.

7. Pre- and post-construction Steller's eider monitoring surveys in the action area will be performed, and a summary report will be submitted to the USFWS annually.

8. The sponsor will design and mail a pamphlet to each tenant vessel owner in the proposed harbor describing the effects of oil on waterfowl, ways that commercial fishing operators can prevent and reduce fuel spills, and explaining that discharge of oil is illegal. The pamphlet will also emphasize the use of fuel collars and in-line bilge water filters.

9. Wildlife hazards will be cleaned up on the beach areas between the Old Whaling Station and the Trident Seafoods facility prior to project completion.

10. The Corps and project sponsors, Aleutians East Borough and City of Akutan, will participate as a working group member in the development of a Geographic Response Strategy (GRS) for Akutan Harbor prior to the start of harbor construction.

11. The Corps and project sponsors will partner with the USFWS in an attempt to secure funding for the procurement of equipment needed to implement the Akutan Harbor GRS. Purchased equipment will be stored and maintained in Akutan Harbor.

Many of the mitigation measures and terms and conditions require third party (e.g. Akutan Corporation, Trident Seafoods, State of Alaska, U.S. Coast Guard, or U.S. Fish and Wildlife Service) agreement/participation to ensure implementation. The development of the project's "Project Cooperation Agreement" between the Corps and project sponsors (City of Akutan and Aleutian East Borough) will help to ensure mitigation implementation, as well as define construction cost-sharing and project features responsibilities.

3.0 EXISTING ENVIRONMENT

3.1 Community and People

Akutan is a fishing community and is the site of a traditional Aleut village within the Aleutians East Borough (AEB). The AEB comprises the eastern 300-mile portion of the Aleutian Islands and western Alaska Peninsula area. The 1,000-mile area west of the AEB is an unincorporated area generally referred to as the Aleutians West Census Area. At present, the inhabitants of the Aleutian Islands are settled in six communities in the Aleutian East Borough and five communities in the Aleutian West Census Area. The 2000 U.S. Census populations of these communities are as follows:

COMMUNITY	POPULATION
Aleutians East Borough	
Sand Point	952
King Cove	792
Akutan	713
Cold Bay	88
Nelson Lagoon	83
False Pass	64
Aleutians West Census Area	
Unalaska	4,283
Adak	316
Atka	92
Nikolski	39
Attu	20
TOTAL	**7,442**

As described in the Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority and Low-income Populations), minority is defined as African American, Hispanic, Asian and Pacific Islander, American Indian, Alaska Native, and other non-white persons. A minority population exists if the percentage of minority individuals in the affected area is greater than 50 percent or "meaningfully greater" than the minority percentage in the surrounding area (NEPA Fact Sheet, http://hydra.gsa.gov/pbs/pt/call-in/factshet/0298b/02_98_3.htm). The racial breakdown of the AEB, the Western Aleutians census area, and Akutan are presented in figures FEIS-14, 15, and 16, respectively.

Table FEIS-6 provides a summary of racial demographic changes from 1990 to 2000 in Akutan, the Aleutians West census area, and the AEB. Between 1990 and 2000, the population generally increased in the AEB and in the City of Akutan. The decrease in some demographic categories may be due to changes in the racial choices offered in the 2000 census that were not in the 1990 census (e.g. 'two or more races'). Much of the change in the Aleutians West census area was caused by the closure and downsizing of several military bases. Among racial groups, the largest percentage increase in Akutan occurred in the Asian and Pacific Islander category. In the AEB,

Figure FEIS-14. Racial demographics for the Aleutians East Borough, (source, U.S. 2000 census).

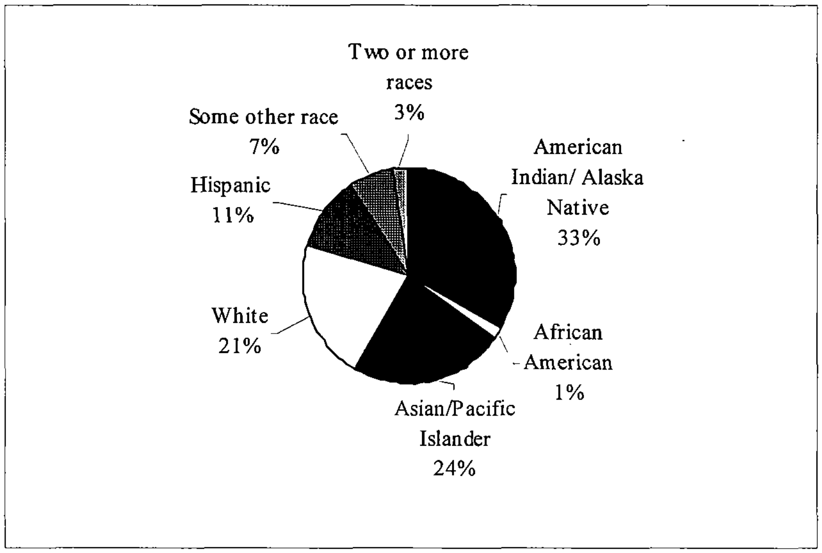


Figure FEIS-15. Racial demographics for the Aleutians West census area (source, U.S. 2000 census).

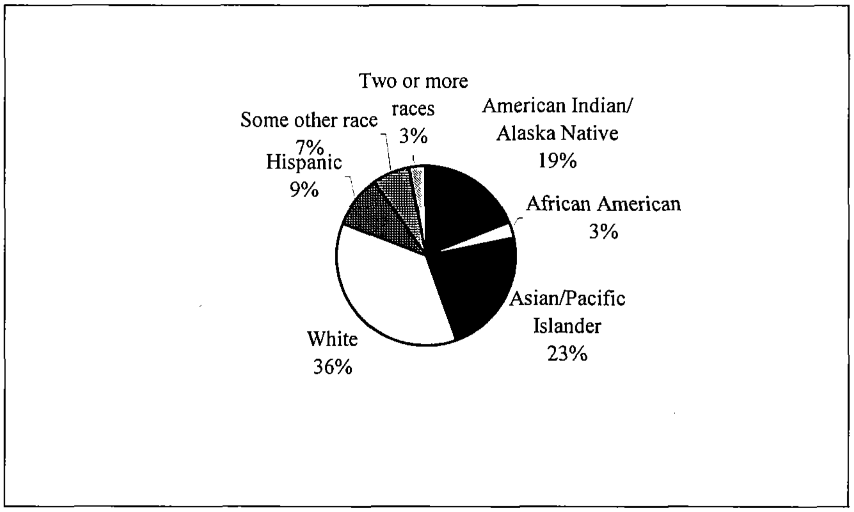


Figure FEIS-16. Racial demographics for the City of Akutan, (source, 2000 U.S. census).

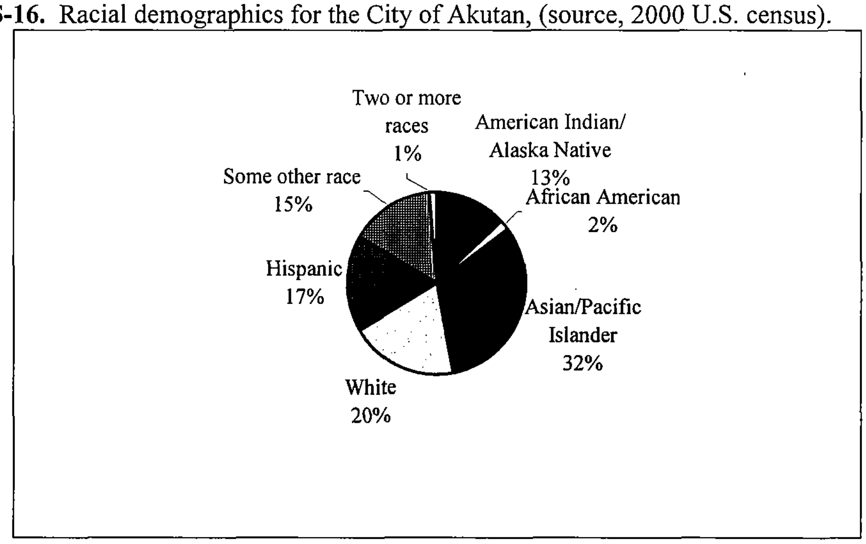


Table FEIS-6. Summary of demographic changes by race in Akutan and the Aleutians region, 1990 – 2000.

Race	Community	1990	1990 Percent of Total	2000	2000 Percent of Total	1990-2000 Change
American Indian / Alaska Native	Aleutians East	1,042	42.3%	1,005	37.3%	37 (decrease)
	Aleutians West	1,076	11.4%	1,145	21%	69 (increase)
	Akutan	80	13.6%	112	15.7%	32 (increase)
African American	Aleutians East	16	0.6%	45	1.7%	29 (increase)
	Aleutians West	662	7%	165	3%	497 (decrease)
	Akutan	6	1%	15	2.1%	9 (increase)
Asian / Pacific Islander	Aleutians East	463	18.8%	723	26.8%	260 (increase)
	Aleutians West	979	10.3%	1,378	25.2%	399 (increase)
	Akutan	247	41.9%	277	38.9%	30 (increase)
Some Other Race	Aleutians East	116	4.7%	199	7.4%	83 (increase)
	Aleutians West	401	4.2%	400	7.3%	1 (decrease)
	Akutan	29	4.9%	130	18.2%	101 (increase)
Two or More Races	Aleutians East	-	-	79	2.9%	This category
	Aleutians West	-	-	189	3.5%	was not used
	Akutan	-	-	11	1.5%	in 1990 census
White	Aleutians East	827	33.6%	646	24%	181 (decrease)
	Aleutians West	6,360	67%	2,188	40%	4,172 (decrease)
	Akutan	227	38.5%	168	23.6%	59 (decrease)
Hispanic*	Aleutians East	180	7.3%	339	12.6%	159 (decrease)
	Aleutians West	742	7.8%	573	10.5%	169 (increase)
	Akutan	45	7.6%	148	20.8%	103 (increase)
Total	Aleutians East	2,464		2,697		233 (increase)
	Aleutians West	9,478		5,465		4,013 (decrease)
	Akutan	589		713		124 (increase)

Table FEIS-7. Percentage of People Living Below the Poverty Level in Aleutians East Borough, Aleutians West census area, and Akutan, (source, 2000 U.S. census).

Community	Population	# Individuals below poverty threshold	% Of total population
Aleutians East	2,697	588	21.8%
Aleutians West	5,465	642	11.9%
Akutan	713	297	45.5%

the largest percentage increase among racial groups was in the American Indian and Alaska Native category. The largest percentage increase in racial groups in the Aleutians West census area was in the white category.

Commercial fish processing dominates Akutan's cash-based economy, and many residents are seasonally employed. Trident Seafoods operates a large cod, crab, Pollock, and fishmeal processing plant west of the community and seasonally employs hundreds of temporary workers.

The threshold for low-income status is best defined using the Department of Health and Human Services poverty guidelines, which are adjusted annually. The per capita income is $18,421 a year in the AEB and $24,037 a year in the Aleutians West area. In the City of Akutan, the per capita income is $12,259 a year. Of the current population of Akutan, almost half (45.5%) were living below the weighted average poverty threshold, compared to 21.8% in the AEB and 11.9% in the Aleutians West Census Area (table FEIS-7).

Under the guidelines established by the order, more than half of the population of Akutan is of minority status. However, this is relatively similar to the proportion of minorities in the surrounding AEB and Aleutians West Census Area. The percent of individuals living below the poverty threshold in Akutan in 2000 is significantly greater than the surrounding AEB and Aleutians West Census Area.

Boats and amphibious aircraft are the only means of transportation into Akutan. A dock and adjoining small boat moorage is available, but there is no harbor for larger vessels. The Alaska State ferry system operates between Kodiak and Akutan monthly between April and October. Freighters from Seattle deliver cargo to Akutan weekly. Akutan currently has no airstrip due to the steep terrain; however, a seaplane ramp is available. Daily air service is provided from nearby Dutch Harbor Airport; however, high waves limit accessibility during winter months. The ADOT/PF is in the planning process for constructing an airport and access road on Akutan Island.

A local stream that was dammed in 1927 supplies water. Water from the dam is treated before being piped into all homes. Funds have been requested to develop two new water catchment dams, and to construct a new 125,000-gallon water storage tank and treatment plant. Sewage is piped to a community septic tank, with effluent discharged through an ocean outfall. Refuse is collected three times a week; a new landfill site and incinerator were recently completed. The city recycles aluminum. Trident Seafoods operates its own water, sewer, and electric facilities.

3.2 Physical Environment

3.2.1 Air Quality

Air pollution sources in Akutan Harbor include the Trident Seafood processing plant, moored fishing vessels and floating seafood processors, aircraft, and the community of Akutan. Activities that generate polluted emissions include incinerating solid wastes; vessel, motor vehicle, and aircraft exhaust; and electrical power generating equipment and facilities. Despite the presence of air pollution point sources in the area, air quality in Akutan is generally considered to be excellent because of the predominant winds that occur in the area year-round.

3.2.2 Geology and Soils

Akutan Island is in the seismically active Aleutian Islands. Akutan Volcano on the western end of Akutan Island is 4,265 feet high and has reportedly erupted 23 times since 1700. The volcanic activity on the island is indicative of an environment where geothermal resources occur. The study area and Akutan Harbor are situated in a glacially carved valley or fjord that has subsequently been flooded by a rise in sea level. The steep, U-shaped valley topography is characteristic of Alpine glaciations.

The surface geology at the proposed harbor site at the head of Akutan Harbor consists of unconsolidated fill representing the accumulation of Holocene age sediment deposited under specific depositional processes and associated environments, e.g., volcanic eruptions, glacial ice, glacial melt water, precipitation driven upland drainage, valley streams, and near-shore processes. Available boring and offshore seismic data indicate the unconsolidated sedimentary fill is generally coarse-grained and may extend more than 150 feet beneath the present shoreline (Dunbar *et al.*, 2001).

Landforms at the head of Akutan Harbor are grouped under four general geomorphology categories for discussion purposes: fluvial (flood plain, terrace), near shore (beach, relic beach, delta), paludal (marsh), and hill slope (alluvial fan, colluvium/alluvial fan, and volcanic uplands) (figure FEIS-17) (Dunbar *et al.*, 2001).

The flood plain is the land area adjacent to the North and South creeks' active stream channel that is subjected to annual flooding. Contained on the active flood plain are several undifferentiated depositional environments. These environments include abandoned channels or oxbows, abandoned stream courses, point bars, and natural levees. These environments are produced as the stream or river migrates laterally across its alluvial valley. Sediment types observed in channel banks and streambeds are generally coarse grained. Coarse gravels and cobbles are common in the streambeds, while the stream banks are formed of finer-grained sediments (Dunbar *et al.*, 2001).

A prominent high-level terrace is present on the south side of North Creek. This terrace separates the central marsh area from the flood plain of North Creek. A terrace represents an abandoned flood plain surface that is at a higher elevation than the current flood plain. A terrace is generally not subjected to annual stream flooding, except for occasional flooding events (5-, 10-, and 15-year floods). Multiple stream terraces adjacent to North Creek, plus the abandoned beach ridge at the head of Akutan Harbor, are evidence of an active component of isostatic-tectonic uplift in the study area (Dunbar *et al.*, 2001). Sediments underlying the terrace are coarse grained and similar to those present in the bed and banks of North Creek.

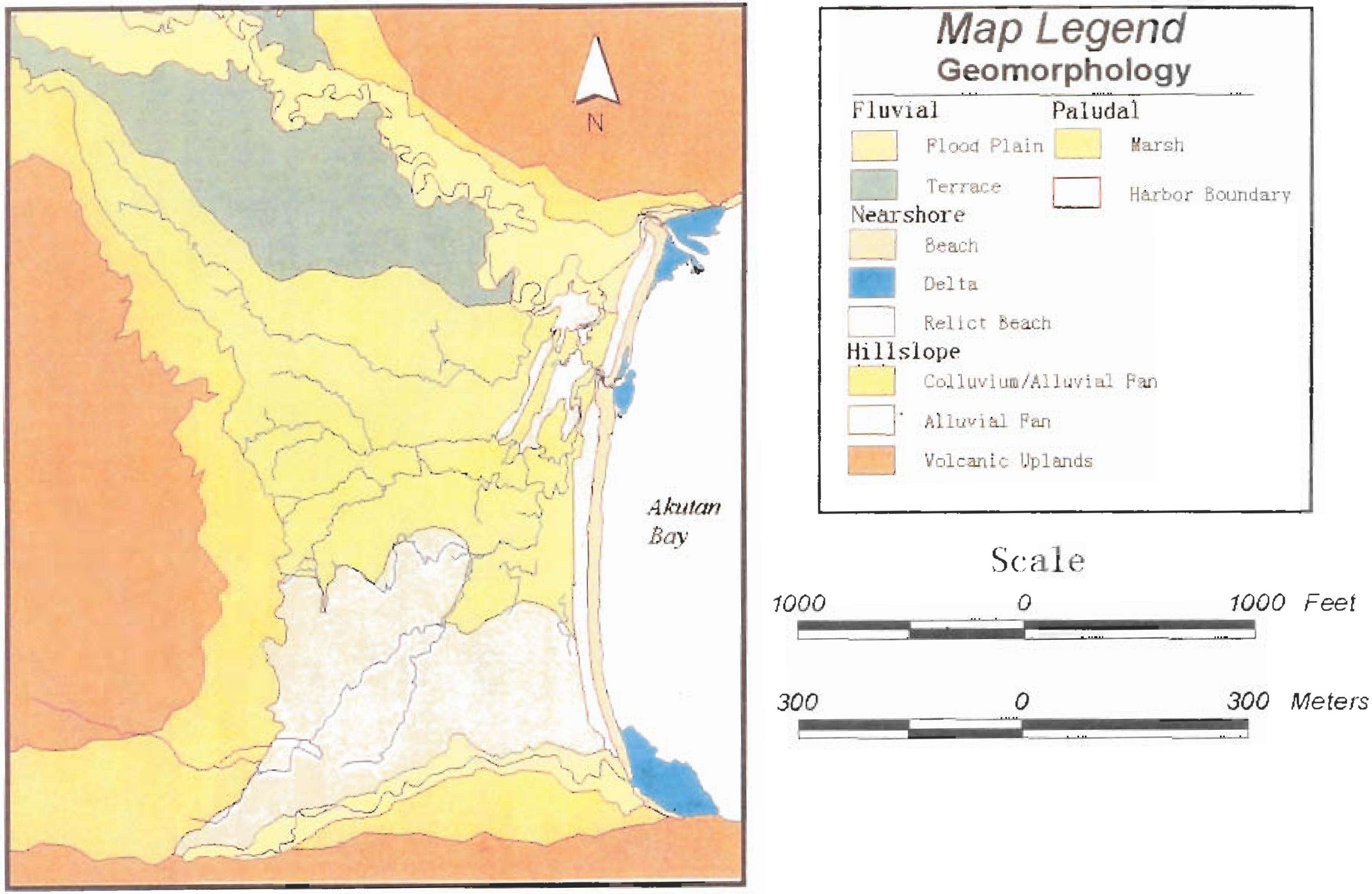


Figure FEIS-17. Primary landforms in the project area at the head of Akutan Harbor.

Deltas have formed at the mouths of each project site's two major and one minor creek (figure FEIS-17). Tidal fluctuation, wave wash, storm surge, and other near-shore processes rework sediments deposited at the streams' mouths. At the head of Akutan Harbor, the active beach ranges from 20 to 50 feet wide and is composed of unconsolidated volcanic sand and gravel (Dunbar *et al.*, 2001). Two abandoned (relic) beaches occur behind the active beach. The relic beach (approximately 8 to 10 feet high) nearest Akutan Harbor is one of the most prominent topographic features within the project area. Sediments forming the abandoned beach are dominated by medium-to-coarse sand.

Wetland and wetland-deposited sediments are termed "paludal." Wetland deposits at the head of Akutan Harbor are relatively thin and considered geologically young based on their thickness and geologic setting (Dunbar *et al.*, 2001). Local tectonic-isostatic uplift has formed the relict beach and effectively blocked the surface drainage, thereby producing wetland conditions throughout a large part of the central study area.

Soils in the study area range from organic soils in the wettest portions, to mineral soils with organic surface layers in intermediate areas, to relatively dark-colored mineral soils in drier portions of the alluvial plain and immediate hill slopes (Wakeley, 2001). The dark color of many soils in the project area are due, in part, to the basic color of the volcanic parent material and, in part, to the accumulation of organic matter in wet areas.

Colluvium and alluvial fans are a common feature in Akutan Harbor due to the steep, volcanic uplands that border the study area (Dunbar *et al.*, 2001). Alluvial fans consisting of unconsolidated coarse material and sediment have formed around Akutan Harbor and where a change in slope occurred on major streams or gullies that drain the uplands.

A large alluvial fan exists in the southern third of the study area. This large fan probably represents the ancient drainage network from the South Creek basin prior to formation of the beach ridge and the subsequent stream down-cutting that has occurred along South Creek (Dunbar *et al.*, 2001).

Upland soils surrounding Akutan Harbor are classified as well-drained, loamy soils, of medium erosion potential that were formed in predominantly coarse volcanic ash over other materials (Dunbar *et al.*, 2001). Hillside slopes are generally steeper than 12 percent, and there is no permafrost in the area. No data are available to determine the exact bedrock depth, but based on a 45-degree average slope for the valley walls, the estimated depth to bedrock at the shoreline is 350 to 500 feet below sea level (Dunbar *et al.*, 2001).

Offshore boring data from the geotechnical characterization of the proposed harbor indicate relatively uniform gravelly sand to about –40 feet mean sea level (Shannon and Wilson, 1998). Seismic data indicates this gravelly sand unit extends to about –163 feet mean sea level.

3.2.3 Hydrology

Wetland hydrology dominates the study area, even in areas that lack hydrology indicators based on the presence of hydric soils and hydrophytic vegetation. See section 3.3.5 for the discussion on wetlands.

3.2.3.1 Surface Water

Three primary drainage basins (figure FEIS-18) and streams traverse the valley at the head of Akutan Harbor: one on the north side (North Creek, figure FEIS-19) of the valley, one on the south side of the valley (South Creek, figure FEIS-20), and one in the middle of the valley (Central Creek, figure FEIS-21). North and South creeks are near the toes of the steep slopes that define the edges of the valley. All three streams have an associated alluvial fan of deposited sediment at their mouths. North and South creeks are undergoing active stream down-cutting, probably caused by regional and local tectonic and glacial-isostatic uplift of the earth's crust. Central Creek, however, is not likely down cutting because of insufficient flow volume and velocity.

North Creek is the largest of the streams draining the project area. It has two forks in the headwaters, one draining the divide between Akutan Harbor and Hot Springs Bay and the other draining a cirque basin to the southeast (LGL, 2001). Several tributary streams enter North Creek, most notably Falls Creek from the north and Rust Creek from the south. Gradients on North Creek are high in the upper tributary reaches, but low in the lower 4 kilometers where the stream meanders (LGL, 2001). The creek receives inflow from springs and sheet flow from adjacent uplands, and the lower approximately 1000 feet of the stream is influenced by tidewater (LGL, 2001).

In June 1983, Jones and Stokes, Inc. estimated the flow in North Creek to be 27 cubic feet per second (ft^3/sec). This appears to be a peak value, as in April 1992; the same company reported a much lower "base flow" of 2.0 ft^3/sec for this creek. In August 1982, Peratrovich and Nottingham, Inc. (1982) recorded a flow of 10.9 ft^3/sec; however, measurements taken at different locations along the stream resulted in different flows, pointing to high groundwater infiltration and influence in the flows. Along North Creek, a 24 percent increase in stream discharge (8.8 ft^3/sec to 10.9 ft^3/sec) was reported along a 1,200-foot reach, indicating the magnitude of the groundwater contribution (Dunbar *et al.*, 2001). During the course of the Corps' 10-day monitoring effort, the flow rate on North Creek varied between 6.7 and 10.9 ft^3/sec., and water temperatures averaged 8.3 °C (Dunbar *et al.*, 2001). Upland drainage to North Creek likely represents the more significant component of its streamflow, as a waterfall in the northwest corner of the study area flows continuously.

Rust Creek is a narrow-channeled streamlet that follows the edge of a prominent terrace and enters North Creek at the eastern terrace edge. At this location (about 1,000 feet upstream of North Creek's mouth) the stream has created a 4-foot-high waterfall as it descends to the level of North Creek. The August flow of Rust Creek was measured to be 0.27 ft^3/sec., and water temperature averaged 10.3 °C (Dunbar *et al.*, 2001).

South Creek forms the smallest watershed and starts as a series of high-gradient tributaries (LGL, 2001). Approximately 2 kilometers from its mouth, South Creek flows as a single channel that is relatively straight and of moderate gradient. South Creek receives inflow from springs and sheetflow from adjacent uplands and the lower approximately 100-meter reach is tidally influenced (LGL, 2001). In August 1982, Peratrovich and Nottingham, Inc. (1982) recorded a flow of 3.9 ft^3/sec in the South Creek and an average water temperature of 5.2 °C.

The Central Creek watershed lies in the mountains immediately north of South Creek's upper basin, but includes substantial drainage from springs and the wetlands between North and South creek basins (LGL, 2001). Central Creek is formed by the outflow of a pond that the drainage's streamlets flow into; however, Hidden Creek appears to be the pond's largest tributary (LGL, 2001). Hidden Creek originates as a high-gradient stream in its upper reaches and then becomes a low-gradient meandering stream as it cuts through overhanging wetlands and grasslands before entering the pond (LGL, 2001). The pond also receives substantial inputs of water from sheet flow, especially during periods of high rainfall and runoff. The mouth of Central Creek, at its outlet to Akutan Harbor, is a small waterfall (about 3 feet). Central Creek had an August 2000 flow of 0.30 ft^3/sec. and an average water temperature of 8.9 °C (Dunbar *et al.*, 2001).

Measuring the conductivity of water is the easiest way to indicate the total salinity of water. The average water conductivity (in μ Siemens) by month, for streams at the head of Akutan Harbor are tabulated below (LGL, 2001):

Creek Name	May 2000	Aug. 2000	Sept. 2000	Oct. 2000
North	95.0	92.6	95.0	92.4
Rust	96.7	111.9	not sampled	64.2
Central	78.1	111.6	102.1	70.4
South	90.3	95.0	102.1	86.1
Average	90.0	102.8	99.7	78.3

For comparison, Akutan Harbor's conductivity ranges between 450 and 550 μ Siemens depending on location and time of year.

3.2.3.2 Groundwater

Water level contours (reflecting water level elevations from monitoring wells, stream gages, and elevations on wetland streams and ponds) indicate the direction of groundwater flow is to the east and towards the Akutan Harbor (Dunbar *et al.*, 2001). The groundwater environment at the head of Akutan Harbor supports a single layer system consisting of an unconfined aquifer, herein referred to as the Akutan aquifer. Two subsurface flow regimes are recognized within the Akutan aquifer: shallow freshwater and deep saltwater, separated by an interface of brackish water (Dunbar *et al.*, 2001).

The water table is shallow throughout much of the project area, generally between 2 and 3 feet below ground surface (Dunbar *et al.*, 2001). Water tables in spring and

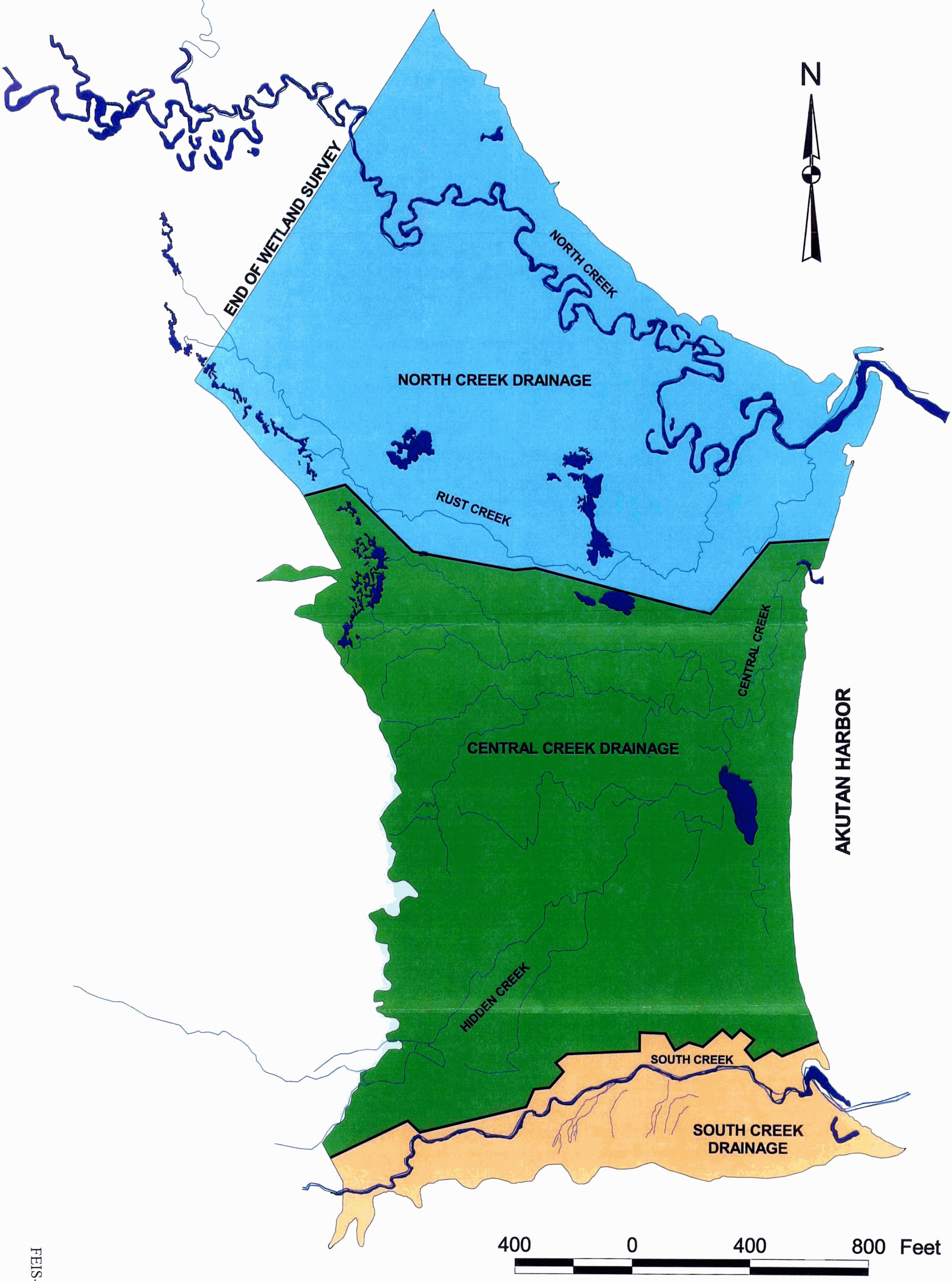


Figure FEIS-18 . Primary drainage and surface water features in the project area at the head of Akutan Harbor.

Figure FEIS-19. North Creek, looking upstream.

Figure FEIS-20. South Creek, looking upstream

Figure FEIS-21. Central Creek and its drainage basin looking east into Akutan Harbor.

during early summer are likely at or above the ground surface across much of the project site due to abundant runoff and shallow groundwater flow from the surrounding mountains during snowmelt and spring rains. The northern and southern arms of the basin show a monoclinal, uniform slope of the water table to the sea (Dunbar *et al.*, 2001). The central basin is much flatter in the west-central portion and steepens toward the sea on the eastern side. The flattening of the water table in the central basin probably reflects ponding in the marshlands between the elevated relict beach near the shore and the uplands to the west (Dunbar *et al.*, 2001). Groundwater recharge to the shallow aquifer occurs by precipitation, surface drainage into the valley, and by fracture flow along the valley walls in contact with the unconsolidated Holocene fill (Dunbar *et al.*, 2001).

A one-dimensional model based on the Ghyben-Herzberg principle was developed to describe the position of the freshwater/saltwater interface at Akutan Harbor and to predict the degree of saltwater encroachment after construction (Dunbar *et al.*, 2001). The principle states that the depth to which freshwater extends below sea level is approximately 40 times the height of the water table above sea level. Application of this principle is limited to situations in which both freshwater and saltwater are static and flow is nearly horizontal. Because the head of the bay water table is in continuous motion near the shoreline, the freshwater/saltwater system is not in equilibrium and the Ghyben-Herzberg relationship does not strictly apply. However, in the absence of precise data on the aquifer's permeability, flow velocities and directions, and direct measurements of the interface depth, Ghyben-Herzberg permits at least an approximation of the position of the interface.

Based on the Ghyben-Herzberg principle and water level measurements of monitoring wells and stream gages, the saltwater wedge presently beneath the harbor site extends from the harbor shoreline at 0 feet mean sea level to about –1,200 feet mean sea level along the western valley margin of the proposed maximum harbor outline (USACE, 2001). Currently, the saltwater interface extends inland into the fractured bedrock beneath the valley fill.

Salinity measurements were made on water samples obtained from monitoring wells and from various depths in Akutan Harbor to characterize the salinity (USACE, 2001). All values obtained from these measurements identified the water table beneath the wetlands as fresh water. Salinity measurements for Akutan Harbor water samples (collected 200 feet from shore and midway in the harbor at depths of 10, 25, and 40 feet) ranged from 32 to 38 parts per thousand, representing a normal salinity range for seawater.

3.2.4 Oceanography

The following information was obtained from Corps-funded site investigations and the U.S. Environmental Protection Agency, which studied the oceanography of Akutan Harbor in 1983, 1992, and 1993, primarily because of wastewater permitting issues associated with the seafood industry.

The following tidal information is extrapolated from nearby Unalaska tidal statistics, as there is no published tidal information from Akutan.

Extreme high water	7.15 feet
Mean higher high water	4.03 feet
Mean high water	3.74 feet
Mean tidal level	2.41 feet
Mean low water	1.07 feet
Mean lower low water	0.00 feet
Extreme low water	-2.90 feet

Water circulation in Akutan Harbor is driven by five mechanisms (Jones and Stokes, 1992): freshwater influxes to the marine waters, responses to larger scale (regional) wind stresses that modify ocean circulation patterns, responses to seasonal oceanic conditions, local wind stresses acting over the specific area, and local responses to open-ocean tides. Unfortunately, waves and seas entering Akutan Harbor do not greatly facilitate circulation because they are greatly diminished by the time they reach the head of the bay.

Akutan Harbor does not have appreciable freshwater influx, and freshwater inflow represents about 0.01 percent of the mean harbor volume (USEPA, 1984). On a regional scale, the winds over the Bering Sea and the position and strength of the Alaska current can cause temporary changes in sea level in the region, which in the Akutan area could be on the order of one meter. Seasonally, Akutan Harbor is unstratified during the winter and is likely to remain so throughout the year.
The oceanographic/meteorological situation in Akutan Harbor is unique in that winds, especially intermittent wind currents, are the primary forces generating circulation at the head of the bay (USEPA, 1993). According to USEPA (1993), wind-driven circulation refers to currents created by wind stress on surface waters. This stress causes two responses: (1) surface waters are pulled in the same direction as the winds, piling up against any boundary (shoreline) impeding the flow, and (2) a deep recirculating countercurrent (opposite to the wind direction) develops to offset water transport near the surface.

USEPA deployed three Aanderra current meters in Akutan Harbor to collect current speed and direction, pressure, and temperature continuously from April 6, 1992, to June 4, 1992, a period of 60 days. Based on the current meter records, tidal currents were found to be weak (1 to 2 cm/sec). Tides accounted for less than 10 percent of the observed current velocities. The dominant currents observed were primarily generated by wind events. Westerly winds occurred about 70 percent of the time and the winds seldom exceeded 20 knots in sustained hourly wind speed. Currents related to these winds were generally in the 5 to 20-cm/sec range, with the stronger 15-to 20-cm/sec currents occurring following and during westerly windstorms. Severe storms with winds in excess of 40 knots are common in Akutan Harbor, and these storm events produce higher velocity currents.

USEPA chose a 2-1/2 dimensional circulation model (Koutitas, 1988) to analyze the wind-driven circulation in Akutan Harbor and predict depth-averaged velocities and sea level. Under short-term, strong wind conditions, the circulation model predicted incomplete mixing between the inner harbor (west of Trident Seafoods) and the outer harbor. Under longer term, weak wind conditions, predicted currents 32 hours after the onset of the winds were slow (generally less than 10 cm/sec), with very little apparent net transport of water between the inner and outer harbor.

The hydrodynamics of Akutan Harbor indicate that the surface currents along the center of the outer harbor align with the wind sheer and that the compensatory flow occurs along the north and south boundaries. Easterly winds appear to enhance the flow of water in the bay. When the wind blows from the east into Akutan Harbor, surface currents move into the harbor at mid-channel and out along the outer harbor shores. Surface water blown toward the head of the bay also sets up a deeper down-welling water re-circulation pattern that drives bottom waters seaward, i.e., upwelling at the mouth of the harbor. When the wind blows from the west out of Akutan Harbor, currents move out of the harbor at mid-channel and into the outer harbor along its shores. Circulation and current velocities decrease and turnover or replacement time increases from the outer harbor to the inner harbor (USEPA, 1993).

The tides in Akutan Harbor are mixed, showing about equal contributions by diurnal and semidiurnal components. The diurnal range is 3.9 feet (1.2 meters) and the semidiurnal range is 2.4 feet (0.73 meters). This is small in comparison to most of the mainland sites in southcentral and southeast Alaska. The limited tidal prism contributes to minimizing the tidal currents in the harbor. It is estimated that a volumetric tidal exchange is less than 5 percent on consecutive tides.

3.2.5 Water Quality

Akutan Harbor has a long history of water quality problems. The primary source of water quality degradation in the harbor was and continues to be related to the discharge and accumulation of seafood processing wastes (USEPA, 1993). The largest seafood processing waste pile in Akutan Harbor lies off the Trident Seafoods processing plant at a depth of 88 feet and is composed of both crab and finfish waste. The pile is estimated to cover 12.6 acres and to have a maximum height of 26 to 33 feet. In addition, shoreline inspections conducted by ADEC and the USEPA reported floating, seafood waste-related scum and particulate accumulations along the shoreline east and west of the Trident facility (USEPA, 1993).

Ambient water quality conditions were characterized throughout the harbor in 1992 and 1993 (USEPA, 1993), which coincided with the Pollock B-Season Fishery and Trident's discharge of wastes associated with the production of surimi and fish meal. More than 170 vertical profiles of pH, temperature, dissolved oxygen (DO), conductivity, and salinity were obtained during September at 38 sampling stations. The minimum and maximum pH level recorded was 7.0 and 8.2, respectively. Measured water temperature ranged from 7.3 to 10.8 °C. Water temperature was generally higher at sampling stations located in the inner harbor and decreased toward the harbor mouth. A minimum salinity of 9.5 parts per thousand (ppt) was measured near the north shore at the head of the harbor, and maximum salinity recorded was 33.6 ppt at several stations. Turbidity ranged from 2 nephelometric turbidity units (NTU) at an unaffected area of the harbor to 48 NTU near the Trident discharge. The lowest DO concentrations (less than 7 mg/L) occurred in inner-Akutan Harbor, west of Trident's discharge. The USEPA has established a DO concentration of 5 milligrams per liter (mg/L) as the minimum concentration for maintaining healthy aquatic habitats (USEPA, 1986). The biochemical oxygen demand (BOD_5) of the water in Akutan Harbor was 1.5 mg/L (USEPA, 1995).

Discrete samples of total Kjeldahl nitrogen (TKN), nitrate-nitrite (N-N), oil and grease, and sulfide were collected at 15 stations by the USEPA from water depths of 5, 10, and 15 meters. Four of the 15 stations were within a ¼ mile of the project site. Water quality data indicated that the waters in the harbor contained very low concentrations of TKN [below detection levels (0.25 mg/L) to 0.92 mg/L], N-N [below detection levels (0.01 mg/L) to 0.079 mg/L], hydrogen sulfide [below detection levels (1.0 mg/L) at 13 of the 15 sampling stations], and total oil and grease (below detection limit of 1.0 mg/L) at the time of the study.

The USEPA, for National Pollution Discharge Elimination System (NPDES) permitting purposes, has divided Akutan Harbor into two areas: east of longitude 165°46' West is the outer harbor and west of the same longitude is the inner harbor (figure FEIS-22). The inner harbor is on the USEPA's impaired water body list for TMDL (total maximum daily load) BOD_5 and settleable solid residues (SSR) (Chris Cora, personal communication). Individual NPDES permits are required for discharge activities in the inner harbor and general permit stipulations apply for discharges in the outer harbor.

The current BOD_5 TMDL is 149,000 pounds per day, and is applicable from May 1 through October 31. No BOD_5 TMDLs were established by the USEPA for the period November 1 through April 30 because their model predicted that for the discharge of organic loads comparable to those observed during the September 1993 study, the water quality standards for dissolved oxygen would not be exceeded (USEPA, 1995).

Trident Seafoods has an individual permit (AK-003730-3) for a shore-based facility and has many point-source outfalls. Outfalls 001-A, B, and C discharge seafood-processing wastewater into Akutan Harbor. Outfalls 002A and 002B discharge non-contact cooling water. Outfalls 003-A, B, and C discharge scrubber, condenser, and evaporate water. Outfall 004 discharges live-tank and boat-hold transfer wastewater. Outfall 005 discharges plate and frame condenser wastewater. Outfall 006 discharges sanitary wastewater. Trident is also required to submit annual reports to the USEPA documenting the effects of their seafood waste piles on the neighboring benthic community.

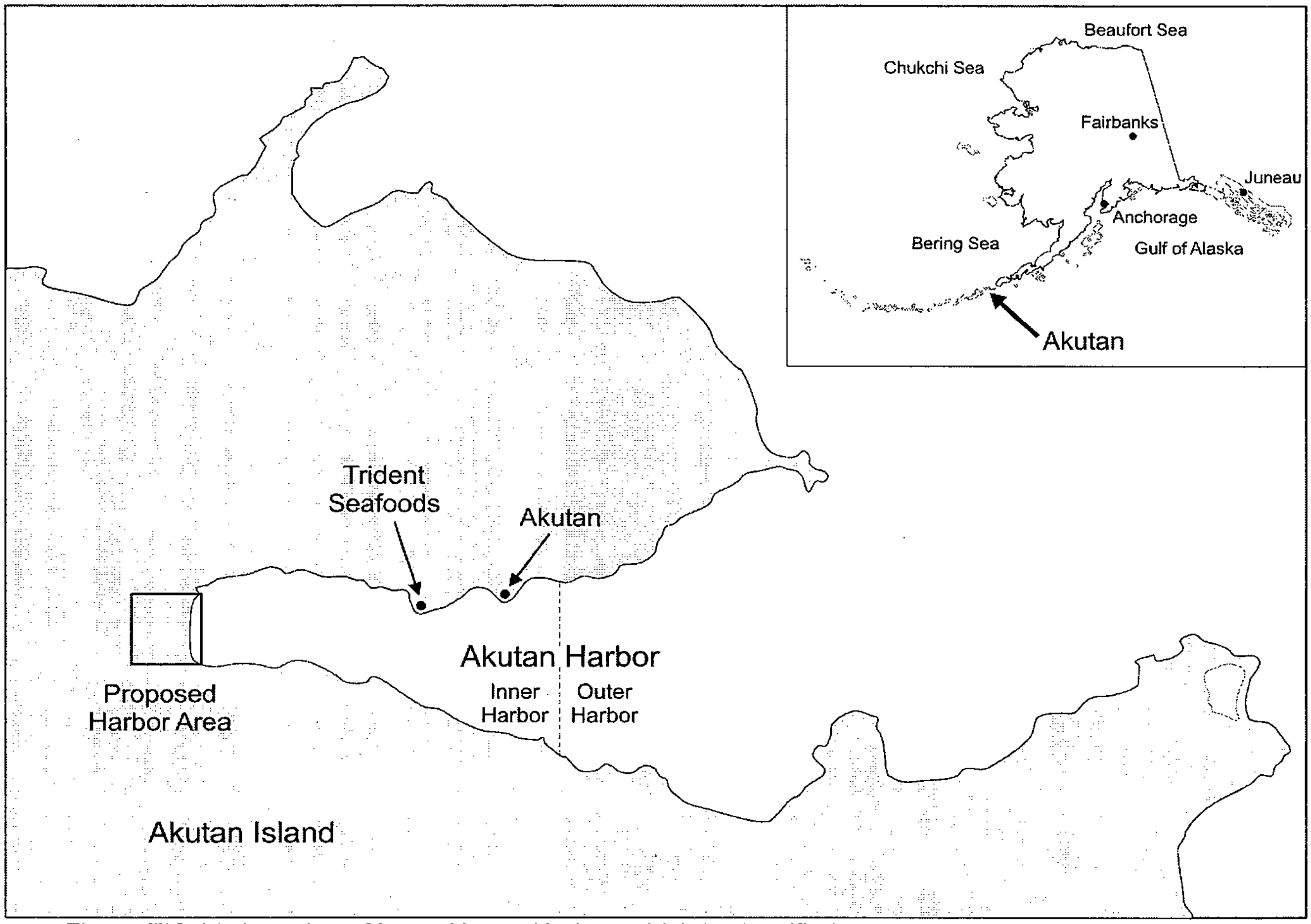


Figure EIS-22. Location of inner Akutan Harbor, which is classified as water quality impaired for dissolved oxygen.

Discharge 007 requires Trident to transport and dispose of seafood processing wastewater and wastes measuring no more than ½ inch in width, and ungrounded mollusk shells, to a discharge area outside of Akutan Harbor that is more than 1 nautical mile from shore and more than 100 feet in depth at mean lower low water while traveling at 3 knots or more.

Two general permits have been issued in Akutan Harbor: *Arctic Enterprise*, a processing vessel (EPA AKG520075); and *Arctic Five*, a fishmeal vessel (EPA AKG520523). *Arctic Five* intends to barge their seafood waste to the Trident facility for processing into fishmeal. *Arctic Enterprise* currently barges its waste out of Akutan Harbor, and according to general permit stipulations, discharges it into waters no closer than 1 mile from any point of land.

Petroleum spills of various types are associated with the operation of vessels in and around Akutan Harbor, and along with the fishing industry, currently contribute to degrading Akutan Harbor's water quality. Approximately 65 spills were reported to have occurred in Akutan Harbor between 1991 and 1999, the largest being approximately 10,000 gallons (Day and Pritchard, 2000). Diesel fuel appears to be the most common product spilled. Operator error and equipment failure accounted for 49 percent and 34 percent, respectively, of the spills (Day and Pritchard, 2000).

Water quality problems are also associated with improperly disposed solid wastes. The Akutan Harbor shoreline is littered with solid waste generated by the community and fishing industry. Garbage bags containing an assortment of items (e.g. oil filters, aluminum and tin cans, glass and plastic bottles, putrefying foods, and empty oil containers) have been observed on the shoreline and floating in the harbor. Discarded fishing gear (e.g. petroleum-tainted crab-pot floats and rope, fishing nets, and crab pots) and other items from unknown sources also litter the shoreline.

3.3 Biological Resources

The content of this section was obtained and developed from existing literature, findings from on-site inspections and field studies, agency coordination (Appendix FEIS-4, Fish and Wildlife Coordination Act Report), and anecdotal observations from local residents.

3.3.1 Vegetation

Vegetation in the Akutan Harbor area is primarily moist tundra and alpine tundra/barren ground. Commonly occurring plants include blue-joint reed grass, lupine, cow parsnip, monks hood, orchids, Indian paintbrush, chocolate lily, wild geranium, ferns, and a variety of aster and grass species. Tree species are limited to a few low-growing willows near streams and drainages.

Within the project area at the head of Akutan Harbor, the plant communities are primarily wetland-affiliated and generally characterized as either sedge dominated or grass dominated (figure FEIS-23) (Wakeley, 2001)[4]. However, not all grass-dominated communities at the head of Akutan Harbor are classified as wetlands. All sedge-dominated plant communities sampled by the Corps were hydrophytic, as were many of the grass-dominated samples in low-lying areas and in seeps (Wakeley, 2001). Within each type, there is considerable variability and several plant species occur as dominants in both community types (Wakeley, 2001). Sedge-dominated communities range from pure stands of Lyngbye's sedge in areas that contain standing water to diverse communities of sedges, grasses, broad-leaf herbs, and low shrubs on drier sites. Narrow-leaf and russet cotton-grasses are showy subdominants in many sedge-dominated areas. Grass-dominated communities generally occupy topographically higher and somewhat drier sites than the sedge-dominated communities. The predominant grasses are blue-joint reedgrass and tufted hairgrass. Other dominant plants in grass-dominated wetland communities include Siberian aster, Canada burnet, under-green willow, and hooded ladies'-tresses.

3.3.2 Fish and Wildlife

3.3.2.1 Avians

Akutan Island is used by a variety of bird species for feeding, nesting, molting, and over-wintering. Field studies documented 33 bird species using the marine and near-shore areas of the bay. The most abundant birds in Akutan Harbor appear to be seabirds and waterfowl, but shorebirds and passerines (wrens, sparrows, etc.)

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[4] Wetlands are discussed in Section 3.3.5.

commonly use local wetlands and coastal habitats as well. Waterfowl (e.g. mallard, teal, and scaup) and sea ducks (e.g. king and Steller's eider) concentrate in Akutan Harbor during the winter. With the exception of one teal, no waterfowl were seen using the wetlands at the head of Akutan Harbor. Emperor geese, harlequin duck, and oldsquaw likely spend at least part of the winter in Akutan Harbor or stop over during migration. The seafood waste plume from the Trident plant is known to attract small numbers of larids and alcids. These birds are likely attracted to fish waste particles and/or to fish feeding on the same food particles. Bald eagles are year-round residents, and the only known bald eagle nest in the area is at Akutan Point.

Surveys conducted in 1980 and 1981 found several small seabird colonies on Akutan Point, including a colony containing more than 300 red-faced cormorant nests, a few pelagic and double-crested cormorant nests, and approximately 2,000 tufted puffin burrows (USFWS, 1978). The Aleutians East Borough Coastal Resources Inventory and Environmental Sensitivity Maps (RPI, 2001) identify Akutan Point [Resources at Risk (RAR) #489] as having 4 double-crested cormorants, 66 horned puffins, 4 pelagic cormorants, 636 red-faced cormorants, 2,500 tufted puffins, and 2 whiskered auklets.

Akutan Harbor is used by a variety of birds during the winter. Between 750 and 2,150 marine birds were recorded in Akutan Harbor in November 1999, and in January, February, and March 2000 (LGL, 2000). These birds belonged to seven species of sea duck; four species of freshwater duck; nine species of seabird; five species of loon, grebe, and merganser; two species of raptor; two species of shorebird; and one passerine specie. During November 1999, harlequin ducks and glaucous-winged gulls occurred in the highest densities. In January 2000, the most abundant species were Steller's eiders, white-winged scoters, and harlequin ducks. In February 2000, black-legged kittiwakes were the most abundant, followed by Steller's eiders, glaucous-winged gulls, and harlequin ducks.

Very few aerial bird surveys have been conducted in the Akutan area during the winter. Aerial surveys conducted by Larned (2000) in February observed approximately 17,000 birds including 7,100 auklets, 3,120 black-legged kittiwakes, and 5,759 miscellaneous gulls. In March, approximately 900 birds were observed, and the most abundant bird species were miscellaneous gulls (311), black scoters (209), harlequin ducks (121), and Steller's eiders (141).

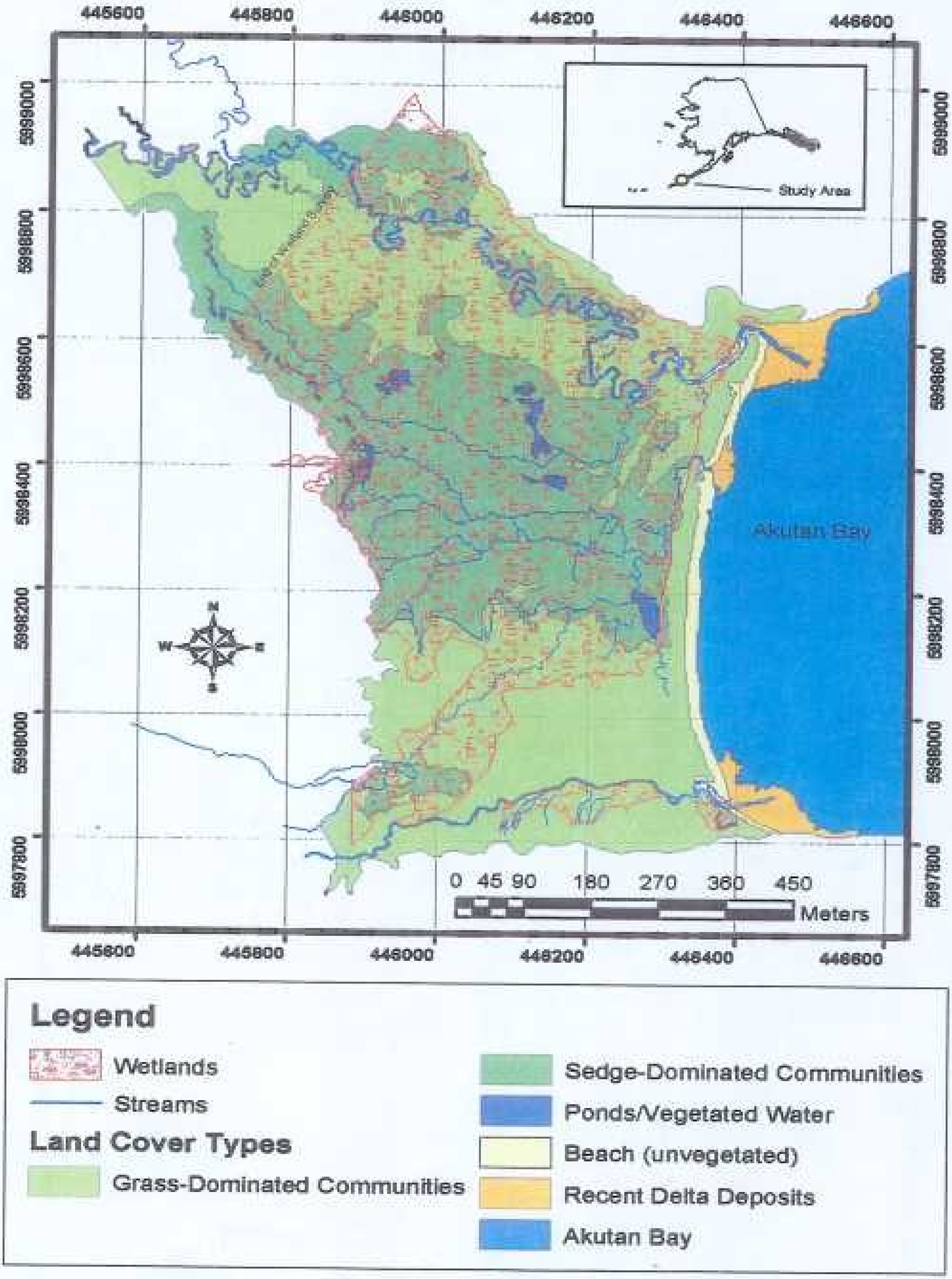


Figure FEIS-23. Plant communities in the project area at the head of Akutan Harbor (Wakeley, 2001).

3.3.2.2 Terrestrial and Marine Mammals

The only terrestrial mammals endemic to the eastern Aleutian Islands are tundra voles and red fox. Other mammals occurring in the Aleutians were introduced, including the Norway rat, arctic ground squirrel, Greenland collared lemming, arctic fox, wild cattle, and rabbits. The Norway rat and red fox are known to inhabit the Akutan Harbor area. Fox scat collected from the Old Whaling Station and analyzed, indicated that fox feed on birds, and perhaps voles and shrews.

Marine mammal species that occur in and around Akutan Harbor include sea otter, harbor seal, and the Steller sea lion. Less abundantly observed are the minke, humpback, and killer whales and the Dall's and harbor porpoise (NMFS, 2001). Fur seals are known to use Akutan Pass (located at the western end of Akutan Island) during seasonal movements between the Bering Sea and North Pacific Ocean. Juvenile fur seals pass through the Akutan Pass area between November and January during their migration south. Adult males wintering in the southeastern Bering Sea and northern Gulf of Alaska also forage in the Akutan area. Migrating gray whales in their movements between the Pacific Ocean and Bering Sea are also known to use Akutan Pass.

More information about marine mammals is discussed in in section 3.3.3 (Threatened and Endangered Species) because of their special protected status.

- Western population of the Steller sea lion - Federal endangered species and State of Alaska species of special concern.

- Aleutian population of the northern sea otter - Federal candidate species.

- Harbor seal - State of Alaska species of special concern.

3.3.2.3 Freshwater Fish

Only a few freshwater streams in Akutan Harbor support fish. At the head of the bay, North (ADF&G #302-16-10300) and South creeks support pink and coho salmon and Dolly Varden. The Aleutians East Borough Coastal Resources Inventory and Environmental Sensitivity Maps identify only pink salmon using South Creek (RAR #110), but the maps verify that pink and coho salmon use North Creek (RAR #164) (RPI, 2001). Central Creek and associated streamlets in the same area support stickleback and Dolly Varden. Although not investigated as part of this project, a salmon stream might also exist near the mouth of Akutan Harbor on the south shore.

North Creek is the largest of the streams draining the project area. It has two forks in the headwaters, one draining the divide between Akutan Harbor and Hot Springs Bay and the other draining a cirque basin to the southeast. Gradients on North Creek are high in the upper tributary reaches, but low in the lower 4 kilometers where the stream meanders. Rust Creek, which drains a wetland basin, flows into North Creek near its mouth to Akutan Harbor. North Creek receives inflow from springs and sheetflow from adjacent uplands. The lower 300 meters of the stream is influenced by tidewater (LGL, 2001).

South Creek originates in the mountains south of North Creek and starts as a series of high-gradient tributaries. Approximately 2 kilometers from its mouth, South Creek flows as a single channel that is relatively straight (compared with the meandering channel in North Creek) and of moderate gradient. South Creek receives inflow from springs and sheetflow from adjacent uplands. The lower reach (approximately 100 meters) of South Creek is influenced by tidewater.

The Central Creek watershed ties in the mountains immediately north of South Creek's upper basin, but includes substantial drainage from springs and wetlands between the North and South creek basins. The creek flows from the discharge of a small pond that has formed behind the beach berm.

Numerous fish surveys have been conducted in the project area's streams. The earliest known survey of the area's streams recorded 10,500 pink salmon (9,000 live and 1,500 carcasses) in a year (1982) of historic high abundance for the entire Aleutian Island chain (Holmes, 1997). A "good odd year" return to the area's streams would be 250-500 pink salmon; whereas, a "good even year" would be 1,000-2,000 salmon (LGL, 2001). In 1998, a USFWS and Corps survey observed a run of approximately 100 pink salmon in South Creek and approximately 10,000 pink salmon in North Creek, as well as hundreds of adult salmon in the salt/brackish waters close to the mouths of North and South creeks.

The most recent and most thorough fish surveys conducted at the head of the bay occurred in 2000 (LGL, 2001). The seasonally-timed surveys attempted to document out-migrating pink salmon fry, identify salmonid rearing habitat and potential spawning habitat, and assess the abundance and distribution of the adult pink and coho salmon return. Following is a summary of LGL's findings.
North and South creeks both have salmon spawning habitat. However, spawning habitat is more abundant in North Creek, as several meanders offer protected areas with ample gravel/pebble/cobble substrate for spawning and embryo development. No adult salmon occur in the Central Creek drainage, probably due to the majority of the drainage substrate consisting of fine particle sediment that is poor substrate for salmon spawning, in addition to the small waterfall at its mouth.

Both North and South creeks support adult pink salmon. Adult pinks were observed in South Creek upstream approximately 865 meters from the mouth of the stream, and to the upper reaches of the North Creek drainage. Survey results indicate the return of adult pinks peaks in August, and the estimated pink salmon returns are an order of magnitude higher in North Creek than in South Creek (15,000 versus 1,500). Although the adult pink run appeared to peak in August, it continued through September and was near completion by mid-October.

Four segments of the lower reaches of both North and South creeks were seined for out-migrating pink salmon during May 2000. Four recently emerged pink salmon fry (29 to 31 millimeters in length) were caught in North Creek, and none were caught in

South Creek. A total of 54 coho salmon (39 to 105 mm in length), 7 Dolly Varden (44 to 105 mm in length), 2 coast-range sculpins, and 1 starry flounder also were caught in North Creek with the beach seine. South Creek seining yielded 9 coho salmon (46 to 75 mm in length), 46 Dolly Varden (35 to 115 mm in length), 3 sculpins, and 1 starry flounder.

Adult coho salmon were only observed in the North Creek system. The North Creek system probably supports less than a dozen pairs of coho salmon adults (LGL, 2001). A total of six adult coho salmon were seen in September and three in October 2000. The North Creek watershed provides high value habitat for coho salmon juveniles, and they rear in the stream year round. Rearing coho salmon were observed throughout North Creek and as far upstream as 3 kilometers from the stream mouth. In total 276 (77 in May, 55 in August, 38 in September, 106 in October) coho salmon juveniles were caught in North Creek using seines and minnow traps.

Minnow trap catch data from 2000 provide evidence of a fairly wide range in size (39 to 196 mm) of coho juveniles rearing in the North Creek system from the spring through fall period. The multiple size groups indicate there are multiple-year classes of juveniles rearing in this system. Since it appears that more than one cohort of juvenile coho salmon rear in North Creek, coho may out-migrate as 1-year-old smolts or older. Out-migration of coho salmon from North Creek is likely to occur during the April to June period (LGL, 2001).

Even though no adult coho salmon were observed in South and Central creeks, juvenile coho salmon were observed in both. In total, 14 juvenile coho salmon, 42 to 108 mm in length, were captured in South Creek's lower 260 meters (9 in May, 0 in Aug. and Sept., and 5 in Oct), suggesting that the rearing habitat for juvenile coho in this system is restricted to the lower reach. The juvenile coho salmon trapped in South Creek were also smaller in size than those caught in North Creek.

In total, 29 juvenile coho salmon (60 to 115 mm in length) were trapped (4 in Aug., 8 in Sept., 17 in Oct.) in Central Creek, approximately 9 meters from the mouth and below a 0.6-meter waterfall. The coho salmon caught in Central Creek probably migrated there from the other head of the bay stream systems, perhaps to feed, because spawning apparently does not occur in Central Creek.

Dolly Varden and three-spined stickleback inhabit all the stream drainages at the head of the bay year round. A total of 217 Dolly Varden (47 to 165 mm in length) were minnow trapped in North Creek (51 in May, 57 in Aug., 42 in Sept., and 67 in Oct.). In total, 37 Dolly Varden (59 to 139 mm in length) were caught in Rust Creek, a southern tributary of North Creek (19 in May and 18 in Oct.). A total of 322 Dolly Varden (49 to 186 mm in length) were caught in Central Creek (99 in May, 108 in Aug., 43 in Sept., and 72 in Oct.). In total, 131 Dolly Varden (41 to 175 mm in length) were minnow trapped in South Creek (45 in March, 26 in Aug., 24 in Sept., and 36 in Oct.).

3.3.2.4 Marine Fish, Invertebrates, and Habitat

The offshore marine waters of the Krenitzin Islands, of which Akutan Island is a part, support a variety of marine fish, including halibut, Pacific Ocean perch, Pacific cod, sablefish, yellowfin sole, salmon, walleye pollock, sandlance, and Pacific herring. Pacific herring reportedly spawn on the coastal beaches of Akutan Island. Shellfish occurring in Akutan's offshore waters include Tanner crab and king crab. Red king crab rear at the mouth of Akutan Harbor, while Tanner crab and Dungeness crab are found within the harbor.

The tidal range in Akutan Harbor is relatively low and consequently the intertidal zone is typically between MHHW (+ 4.03 feet) and extreme low water (ELW) (-2.9 feet). The majority of the Akutan Harbor shoreline is steep and the associated intertidal zone narrow. However, at the head of the harbor and other low-lying areas, the intertidal zone extends hundreds of feet offshore to where the harbor floor suddenly drops to great depths.

The majority of the following information about Akutan Harbor's intertidal and subtidal resources was obtained by the USFWS during SCUBA diving surveys in 1983, 1999, and 2000. The Corps also obtained Akutan Harbor marine resources information during their FUDS program investigation of possible offshore petroleum contamination at the Old Whaling Station (Jacobs Engineering, 2001).

With the exception of the sandy beach areas, the majority of Akutan Harbor's intertidal and subtidal areas have similar habitat and species composition. Barnacles and limpets dominate the uppermost shoreline, and littorines inhabit the interstices of boulder and cobble beaches. Dense patches of blue mussels occasionally pocket the shoreline. Rockweed and sea lettuce algae commonly grow in the upper intertidal area. The mid-intertidal zone is dominated by sea lettuce and sea colander, and the substrate is a mix of sand and gravel with scattered aggregates of boulders and cobble. Nuttall's cockle and soft-shelled clams commonly occur in the softer sediments under the algal canopy. Numerous hermit crabs and littorines inhabit the surfaces of the algae mats. Lower intertidal zones are often similar to the mid-intertidal zones; however, the substrate has more silt and sea stars and anemones are more abundant. Beyond the intertidal zone into the sublittoral zone, the substrate becomes more silty and the slope more steep. Several species of sea stars, flatfish, and hermit crabs commonly occur in this type of habitat.

The intertidal zone at the head of the bay is broader than North Point because the beach has a lower profile. Sea lettuce and a variety of crabs commonly occur on the sandy intertidal substrate. Deeper in the subtidal zone, the substrate becomes more silty and sea stars, "flat" fish, and anemones attached to occasional boulders become more abundant.

In July 1983, a team of USFWS and Corps biologists seined potential harbor locations in Akutan Harbor (Crayton, 1983). At the head of the bay, pink salmon and sand lance were the most abundant fish species caught. Coho salmon were captured near the southern-most beach segment. Abundant numbers of silver spotted sculpin, Pacific tomcod, and a variety of flatfish were also caught. Beach seines at Akutan Point were made in the sandy pockets between rocky benches. Juvenile pink salmon (100+) were collected in three of four sets; however, Pacific sand lance was more numerous in all sets. Pacific tomcod, greenling, and several species of sculpin composed the remainder of the collection. Seining at a beach on the south shore of Akutan Harbor near the mouth of a stream yielded primarily pink salmon and Pacific sand lance, with smaller numbers of Dolly Varden, tomcod, and silver spotted sculpin.

The USFWS and U.S. Geological Survey, Biological Resources Division sampled near-shore fishes in Akutan Harbor during March and June 2000 using a beach seine (Robards and Schroeder, 2000). Their results indicate low numbers of near-shore fish were present during the winter and large numbers of near-shore juvenile salmon were present in June, which is a typical Alaska-wide pattern of near-shore fish use.

Approximately 99 percent of the 6,445 fish captured with a beach seine during the June 2000 survey were pink salmon. Of the 15 total fish species captured, adult rock sole and Dolly Varden were the next most abundant species. Several key forage fish species, including sand lance, capelin, and Pacific cod, were also captured. The June survey results were a sharp contrast to the 11 fish caught in 15 hauls during March.

In June, the most abundant fish captured at the head of the bay were Dolly Varden and rock sole. In total, only two fish (rock sole) were seined in March at the head of the bay. Also in March, only two fish (one pink salmon and one capelin) were caught in three beach seines between the City of Akutan and the northwest corner of the bay. Two June beach seines closer to the North Point alternative yielded 77 fish, the majority being Dolly Varden (41) and sculpins (6 silverspotted and 11 great). The largest concentration of pink salmon juveniles were collected on Akutan Harbor's south shore, near the Old Whaling Station (5,000+) and at a sandy beach (923) at the mouth of Akutan Harbor.

Of the three commonly caught species, juvenile pink salmon dominated, as they use near-shore areas for feeding and growth prior to migrating into oceanic waters. Catches of adult Dolly Varden and rock sole were lower probably due to their more advanced life-stage. Both of these species presumably use the large numbers of juvenile pink salmon as prey (Robards and Schroeder, 2000).

As part of their fish survey, LGL Alaska Research Associates, Inc. (LGL, 2000) beach seined North and South creeks in May, upstream from the approximately mean high tide line. Fifty-four coho salmon, seven Dolly Varden, four pink salmon, and two sculpin were caught at North Creek. Nine coho salmon, 46 Dolly Varden, 3 sculpin, and 2 starry flounder were caught at South Creek.

3.3.3 Threatened and Endangered Species

3.3.3.1 Steller's eider (Polysticta stelleri)

Steller's eider, listed in 1997 as federally threatened under the Endangered Species Act, over-winter in Akutan Harbor where they are thought to feed on bottom-dwelling mollusks and crustaceans in shallow water. In addition, the ADFG has designated the Steller's eider as a State species of special concern (SSC)[5].

The USFWS reported on the population status of Steller's eiders worldwide and in Alaska (USFWS, 1997). In the 1960s the world population was estimated to be as high as 500,000 birds, with up to 400,000 (80 percent) wintering in Alaska. Estimates in the 1990s indicate the worldwide population of Steller's eiders had fallen by 50 percent or more. Recent estimates indicate that as few as 150,000 to 200,000 birds could remain, with about 138,000 wintering in Alaska and perhaps up to another 40,000 wintering in western Russia and Scandinavia.

LGL Alaska Research Associates, Inc. surveyed Akutan Harbor during the winter of 1999/2000, and Steller's eider numbers expectedly changed throughout the winter (LGL, 2000). Eiders were not present in Akutan Harbor in November but by late-January, 450 birds were present. This number decreased to 350 birds in mid-February and to about 40 birds in mid-March. Flock size was variable within and among surveys. Most Steller's eiders were recorded in the southwest corner of the head of Akutan Harbor, along the south shore of Akutan Harbor, and northeast of the City of Akutan. Steller's eiders were found at the head of Akutan Harbor during January, February, and March 2000. The south shoreline of Akutan Harbor and the area northeast of the City of Akutan were used by Steller's eiders during January and February 2000.

Steller's eiders were present at the head of the bay during each of LGL's six surveys conducted in January and February 2000, and up to 72 percent of all birds observed during a single survey were seen at the head of the bay. All LGL's surveys suggested that Steller's eiders use the near-shore habitat (areas within 100 meters of shore) in the harbor almost exclusively, and most Steller's eiders were detected within 50 meters of shore.

Eiders were observed in similar numbers during surveys conducted in January and February 2001 (USFWS, 2001). A minimum of 252 Steller's eiders was observed using the western half of Akutan Harbor during January. On February 14, 11 Steller's eiders were observed immediately offshore of the city office. Twelve Steller's eiders were seen foraging in Salthouse Cove in water approximately 6 feet deep near the

[5] In 1993, the commissioner of ADFG created a new category for species potentially at risk: SSC. Although there are no legal requirements for how species on the list are to be treated, this new designation draws attention to the status and needs of vulnerable species before they become critical and require more extreme and costly management actions.

church. On February 17, 9 Steller's eiders were again observed offshore from the city offices; and in the area west of the Trident facility, 182 Steller's eiders were observed. A total of 262 Steller's eiders were counted on February 18 during a skiff survey around Akutan Harbor.

Efforts to index the abundance of Steller's eiders on much of their winter range in southwest Alaska were made during February and March 2000 aerial surveys (USFWS, 2000b). The surveys documented concentrations of Steller's eiders on their winter range from Chignik to Samalaga Island on the western tip of Umnak Island and along the northern shore of the Alaska Peninsula east to Nelson Lagoon and Port Moller. Local areas surveyed included Anchorage Bay (Chignik area), Sand Point (Shumagin Islands), False Pass, Akutan, Ouzinkie (Kodiak), and Unalaska. During the February survey, the eiders were more scattered than during the March survey, where they were more concentrated in Izembek and Nelson lagoons. Survey results in February 2000 recorded 647 Steller's eiders in Akutan Harbor and a few smaller flocks on Akun Island, a few miles to the east of Akutan Island. By the March aerial survey, fewer eiders remained in Akutan Harbor (USFWS, 2000b).

The Corps partially funded a USFWS research program designed to track the Steller's eiders migrating from their nesting grounds in Barrow, Alaska to their winter range. Four nesting Steller's eiders were implanted with radio transmitters, tagged, and tracked by satellite. Three of the Steller's eiders survived to migrate to their winter range along the northern coast of the Alaska Peninsula and near Sanak Island in the Pacific Ocean south of False Pass, Alaska. None of these tagged Alaska-nesting Steller's eiders established winter range near Akutan.

In March 2000, the USFWS proposed areas of Alaska important to Steller's eider as critical habitat and finalized the designation in January 2001 (USFWS, 2001b). Critical habitat refers to specific geographic areas that are essential for the conservation of a threatened or endangered species and that may require special management considerations. Areas designated as critical habitat include portions of the Kuskokwim Shoals (1,472 mi^2), the Seal Islands (24 mi^2), Nelson Lagoon (205 mi^2), Izembek Lagoon (140 mi^2), and intertidal zone lands in the Yukon-Kuskokwim Delta (989 mi^2). Approximately 65 percent of the designated lands are federal lands or waters, 25 percent are State waters, and the remaining 10 percent Native lands. The areas were designated as critical habitat because they are used by large flocks of Steller's eiders during breeding, molting, wintering, and staging for their spring migration. Much of the winter habitat is largely undisturbed and within national wildlife refuges, State game refuges, or State critical habitat areas (USFWS, 1996). The Akutan project area is within the winter range but does not have any habitat designated as critical.

3.3.3.2 Short-tailed Albatross (Phoebastria albatrus)

The short-tailed albatross is listed as a Federal and State endangered species under the Endangered Species Act. This species forages widely across the temperate and sub-arctic North Pacific, and can be seen in the Gulf of Alaska, along the Aleutian Islands, and in the Bering Sea. Although albatrosses are generally pelagic in distribution during the non-breeding season, they can be found less than 3 miles from shore.

Short-tailed albatrosses are not associated with harbor settings; however, any action that increases the number of fishing vessels participating in fisheries in the area has the potential to indirectly affect albatrosses. The boat harbor at Akutan will not increase the number of fishing vessels: The fishery itself brings the vessels to the area.

3.3.3.3 Marine Mammals

The Aleutian population of the northern sea otter *(Enhydra lutris)* has declined by 70 percent in the past 8 years, and has been designated a candidate species by the USFWS. Candidate species are those for which the USFWS has sufficient information on biological status and threats to propose them as endangered or threatened under the Endangered Species Act. As few as 6,000 otters may remain in the entire Aleutian chain, down from a 1980s population estimate of between 50,000 and 100,000 animals (Federal Register Vol. 65, No. 218, Nov. 9, 2000, Proposed Rules; 50 CFR Part 17, p. 67343-67345).

Sea otters were observed in Akutan Harbor during all biological surveys, beginning in 1983. Although not enumerated, sea otters were reported to be common in Akutan Harbor in 1983 (USFWS, 1983). LGL reported sea otters in Akutan Harbor during each of the 4 months (Nov., Jan., Feb., and March) they conducted their biological surveys in 1999/2000 (LGL, 2000). Approximately 30 sea otters were observed by the USFWS at the head of the bay in January 2001. At least 29 sea otters were observed in near-shore environments, generally as singles or pairs. However, one raft of 18 individuals was observed at the northwest corner of the harbor, near the mouth of North Creek (USFWS, 2001). The raft of sea otters was not observed feeding and was easily disturbed by the observer's presence. In addition, two otters were observed feeding in the near-shore areas of North Point. USFWS surveys in February 2001 observed two relatively large groups of sea otters, one group of seven at Akutan Point and one group of 12 near the mouth of South Creek.

Steller sea lions (*Eumeropias jubatus*), a Federal endangered species and State SSC, frequent the near-shore waters of Akutan Harbor. The NMFS (2001) reports that the nearest major rookery site is at Akutan Island/Cape Morgan and extends in a clockwise direction between the following geographic points: 54°03.5N/166°00.0W to 54° 05.5N/166°05.0W. A 1989 survey showed the rookery contained 578 animals. The NMFS (2001) also indicates that the nearest major haul-outs are at Akutan Island/Reef-Lava and extend in a clockwise direction between the following geographic points at 54°10.5N/166°04.5W to 54° 07.5N/166°06.5W and Akun Island/Billings Head at 54°18.0N/165°32.5W to 54°18.3N/165°31.5W. Critical habitat for the Steller sea lion also has been identified north of Akutan Island (50 CFR Part 226).

Ten or more Steller sea lions were observed in 1998 feeding approximately 60 to 100 yards offshore of the Old Whaling Station. LGL frequently observed Steller sea lions swimming in front of the City of Akutan in groups as large as 14 individuals (LGL, 2000). USFWS observations in January 2001 noted approximately 32 Steller sea lions associated with the discharge plume emanating from the Trident Seafoods fish processing plant. The sea lions would swim or drift with the current away from the plume then actively swim up-current and pass through it again. One group of five sea lions was observed at Akutan Point in February 2001 by USFWS (USFWS, 2001).

Harbor seals (*Phoca vitulina*), a State SSC, do not abundantly occur in Akutan Harbor. LGL did not observe any in the harbor during their November 1999 wildlife survey, but did observe one individual in each of its subsequent surveys conducted in January, February, and March 2000 (LGL, 2000). A small number of individual harbor seals were seen around the perimeter of Akutan Harbor by a USFWS biologist in January 2001 (one near the South Creek area and one along the north shore of Akutan Harbor near Trident's water source) and none were observed in February 2001 (USFWS, 2001). Harbor seal pupping typically occurs later in spring, and they have been documented to leave their newborn pups on the shores of the western Akutan Harbor while they forage elsewhere.

According to the National Marine Fisheries Service, no endangered or threatened cetaceans (the fin, right, humpback, blue, sperm, sei, and bowhead whales) occur within Akutan Harbor, but they may inhabit the waters surrounding the island. Local residents report that humpback whales (an endangered species) have entered Akutan Harbor, presumably to forage on large schools of fish (USFWS, 2002).

3.3.3.4 Miscellaneous

The arctic peregrine falcon (*Falco peregrinus tundrius*) is a former Federal threatened species, delisted in October 1994, and a State SSC. The American peregrine falcon (*Falco peregrinus anatum*) is a former Federal threatened species, delisted in August 1999, and a State SSC. The USFWS monitors delisted species for their comeback for a period of at least 5 years following delisting. The southwestern edge of both falcon's range lies at the southern tip of the Alaska Peninsula, about 100 miles east of the project area; therefore, the possibility exists that some individuals of both species might migrate through the area.

No federally listed or candidate plant species are reported to be from Akutan Island. Aleutian shield fern (*Polystichum aleuticum*), a Federal endangered species reported from Adak Island, has not been observed on Akutan Island, and is not expected to occur on the island because of unsuitable habitat.

3.3.4 Special Aquatic Sites

Special aquatic sites [as defined in 40 CFR Part 230, Section 404(b)(1)] are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values, and include: (1) sanctuaries and refuges, (2) wetlands, (3) mud flats, (4) vegetated shallows, (5) coral reefs, and (6) riffle and pool complexes. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. The wetlands that occur at the head of the bay and the riffle and pool complexes in North and South creeks are considered special aquatic sites.

3.3.5 Wetlands

A variety of methods have been developed to delineate and classify wetlands and assess their functions and values, and a number of them have been used and/or are being considered for use in Alaska (e.g. Anchorage Rapid Assessment Method; Homer Wetland Inventory and Ranking; Rapid Assessment Method for Southeast Alaska; Juneau Wetlands Study; Colville River Delta Bird Habitat Study; Trans-Alaska Gas System Wetland Evaluation Technique; Hydrogeomorphic Assessment Method; Federal Aviation Administration Stations Alaska Methodology for Wetland Delineation and Site Characterization) (Shempf, 1992). However, no one method has received widespread use or acceptance in Section 404 (b)(1) of the Clean Water Act evaluations for a variety of reasons, such as a failure to satisfy one or more technical or programmatic requirements, which include the ability to assess functions accurately and efficiently within the limited time and resources available.

It is important to point out that the Clinton Administration's Wetlands Plan addressed the need for improvement of wetlands assessment techniques to allow for better consideration of wetland functions in Section 10/404 permit decisions. The Corps of Engineers announced in 1996 (Federal Register, August 16, 1996, Vol. 61, Number 160, Page 42593-42603), through the National Action Plan, the strategy the Corps and other Federal agencies would follow to develop the Hydrogeomorphic Approach for Assessing Wetland Functions (HGM Approach). The HGM Approach is designed to focus on wetland functions and not address values because values represent the significance of wetland functions to society or individuals, and therefore are subjective. Because HGM-based regional assessment models have not yet been developed for Alaska wetland systems, the HGM approach cannot be applied to this project, however, the intent of the approach can.

The wetland assessment approach chosen for this project is a blend of methodologies (Adamus, 1989; Brinson, 1993; Cowardin *et al.*,1979; USACE, 1997 and 2000; Municipality of Anchorage, 1996) successfully used by a variety of State and Federal agencies, and is as follows.

Step 1: Delineate and classify the wetlands within the project area, including all categories of special aquatic sites identified in the EPA Section 404 (b)(1) guidelines.

Step 2: Identify the functions of the wetlands complex within each drainage basin (North, South, and Central creeks) in the project area.

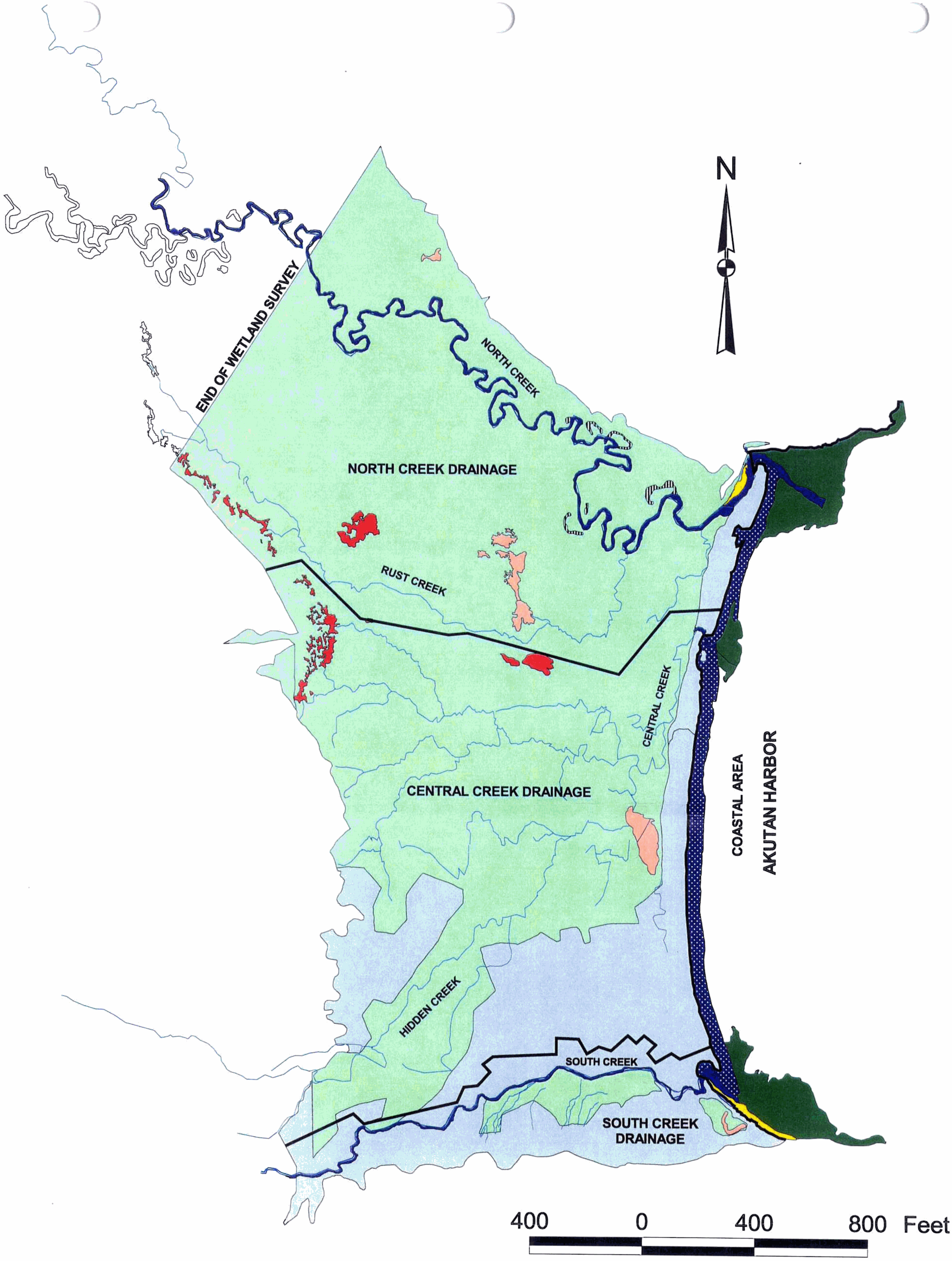
Step 3: Determine wetland values (i.e., are they essential, beneficial, or contributing) within each drainage based on their "level of functional input" for supporting resources of concern, as identified in the NEPA scoping process.

3.3.5.1 Wetland Delineation and Classification

A team of Corps of Engineers technical experts from the Research and Development Center conducted wetlands (Wakeley, 2001), hydrogeology (Dunbar *et al.*, 2001), and topographic (Berry *et al.*, 2001) investigations in the project area so that the information could be use to help characterize the wetlands at the head of Akutan Harbor. The wetlands delineation process included a review of the dominant plant assemblages, soils, and hydrologic conditions.

Approximately 100 acres of freshwater wetlands and 8 acres of marine wetland habitat exist within the 136-acre study area (figure FEIS-24). Within the limits of the wetland survey area, approximately 29 acres are not classified as wetlands. Approximately 72 percent of the wetlands at the head of Akutan Harbor can be classified as palustrine in the Cowardin *et al.* (1979) classification of wetlands and deep-water habitats. The mapping codes in figure FEIS-24 follow the USFWS, National Wetland Inventory mapping conventions, which is a modification of the Cowardin System. Exceptions are small ponded areas behind the beach berm in the east-central portion of the project area, along the base of the western mountains, and in abandoned meanders along North Creek. Some of the areas lacked emergent vegetation and would be classified either as palustrine aquatic bed (PAB) if they supported submerged or floating vegetation, or palustrine unconsolidated bottom (PUB) if they did not.

The freshwater wetland complex at the head of Akutan Harbor extends from the base of the northern hillside, southward across the entire alluvial plain between the bases of the beach ridge on the east and the hill slopes to the west. Occasional seep wetlands extend up the lower slopes of both the northern and western hills. To the southwest, the wetlands end in gradually rising terrain near the site of an old homestead. Isolated wetlands occur near the mouths of both North and South creeks, and along the right descending bank of South Creek.



Wetland Classifications*

FEIS-81

- PEM1 - Palustrine, emergent, persistent (94.9 acres)
- PAB3 - Palustrine, aquatic bed, rooted vascular (1.9 acres)
- PUB4 - Palustrine, unconsolidated bottom, organic (1.9 acres)
- R4EM - Riverine, intermittent, emergent (0.6 acres)
- M2US1 - Marine, intertidal, unconsolidated shore, cobble-gravel (4.4 acres)
- M2US2 - Marine, intertidal, unconsolidated shore, sand (0.3 acres)
- M2BB - Marine, intertidal, beach bar, sand (3.1 acres)
- Nonwetlands (29.2 acres)
- Drainage Boundary

*Wetland typing using Cowardin, L.M. *et. al.* (1979) Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service/Office of Biological Services-79/31, Washington, D.C. December. 131 p.

Figure FEIS-24. Wetland delineation and classifications within the major drainages at the head of Akutan Harbor.

The upper (southern) boundary of the wetlands along the water table within its zone of influence by intercepting any shallow groundwater flowing down-gradient.

The area surrounding North Creek is a complex of point bars, abandoned channels, natural levees, and cut banks. Elevations varied approximately 3 to 6 feet over short distances. Many of the areas sampled by Wakeley (2001) within the floodplain and immediately south of the North Creek were wetlands, although some were transitional toward uplands and more detailed sampling would perhaps identify a few small areas of non-wetlands.

Wetland deposits of Akutan Harbor are considered geologically young based on their thickness and geologic setting, and are underlain by coarse sand, which indicates a fluvial and/or estuarine type setting and filling mechanism exists at the head of the bay (Dunbar *et al.*, 2001). Development of the area's wetlands probably coincides with the formation of the now abandoned shoreline or relict beach, and entrenchment of North Creek along the northern valley margin (Dunbar *et al.*, 2001). Local tectonic uplifting likely formed the relict beach and effectively blocked the surface drainage, thereby producing the wetland conditions that exist today (Dunbar *et al.*, 2001).

3.3.5.2 Wetland Functional Assessment and Categorization

Wetland functions are defined as the normal or characteristic activities that take place in wetland ecosystems (Smith *et al.*, 1995). Novitzki, Smith , and Fretwell, (1995) define wetland functions as a process or series of processes that take place within a wetland. The variety of wetland functions can be simple to complex as a result of their physical, chemical, and biological attributes. However, not all wetlands perform all functions to the same degree or magnitude, if at all. The functions (hydrologic, biogeochemical, habitat, socio/economic) selected for this project's wetland assessment reflect the characteristics of the affected wetland ecosystem and landscape under consideration and the assessment objectives, which are:

- Evaluate the functions and relative "value" of the identified wetlands within the drainages at the head of Akutan Harbor.
- Identify unique or special uses of the wetlands by fish, wildlife, or humans.
- Estimate the losses or gains of wetland functions within each drainage as a result of project impacts.

The Corps' analysis of wetland functions included collecting detailed field notes on plant community composition and animal species use, as well as evaluating each wetland type within each drainage at the head of Akutan Harbor relative to the assessment criteria identified in table FEIS-8. The assessment consisted of a checklist of wetland types and the associated evaluation criteria and indicators. The evaluation criteria and indicators chosen for this project is an amalgamation of information gleaned from wetland functional assessment methodologies (e.g.

USACE, 2000 and 1997, Smith, 1995) and Section 404 Program Regulations (33 CFR, Section 320.4 (b)(2)), and to the best of the Corps' knowledge, accurately reflect the characteristics of the wetland complex and landscape under consideration at the head of Akutan Harbor.

The "value" of a wetland lies in the benefits that it provides to the environment or to people, something that is not easily measured. Defining wetland values is also complicated because wetland values are not absolute, as what is valuable and important to one person or government agency may not be valuable to another person or government agency. Wetland functions can also have value on several levels – internal, local, regional, and global (Novitzki, Smith, and Fretwell, 1995). For example, functions that provide internal values are the functions that maintain or sustain the wetland and are essential to the continued existence of the wetland. Therefore, the development of a single method for assigning values to the functions of wetlands is not a simple task, and probably no one method would satisfy all needs.

In the Corps' wetland evaluation of this project, each wetland type's "value" was not enumerated because functions and values of wetlands, by definition, are a result of an entire system working together. Instead, the Corps chose to group each drainage's wetlands into complexes that collectively function to support (in various degrees and magnitudes) the resources of concern identified through the scoping and wetland functions assessment processes. The functional wetland complexes were also defined by considering: (1) wetland communities delineated on aerial photographs; (2) observed associations of wetlands and uplands within topographic or hydrologic zones, or the association of wetlands and uplands that are important habitat areas; and, (3) observed degradation due to human intrusion, physical alteration of wetlands, or hydrologic characterization.

The Corps selected the descriptive terms "essential, beneficial, and contributing" to describe the functional degree and magnitude of each wetland complex and its support of resources of primary concern. The Corps believes that its three-wetland functional category designations more appropriately recognize the functional values that emanate from each wetland complex rather than the more traditionally used "high, medium, and low" terms.

Table 8 **Evaluation of wetlands functions at the head of Akutan Harbor, Alaska.**

			DRAINAGES											
			NORTH CREEK				SOUTH CREEK		CENTRAL CREEK			COASTAL AREA[1]		
FUNCTION	CRITERIA	INDICATOR	PEM 1	PAB 3	PUB 4	R4EM	PEM 1	PAB 3	PEM 1	PAB 3	PUB 4	M2 US1	M2 US2	M2 BB
HYDROLOGIC	Groundwater	Maintenance of base flow	X				X		X		X			
		Associated with perennial or intermittent watercourse	X	X	X	X	X		X	X	X			
		Recharge present		X		X			X	X	X			
		Discharge present	X	X	X	X	X	X	X	X	X	X		X
		Signs of variable water levels	X	X	X	X	X	X	X	X	X			
		Created by natural impoundment							X	X				
		Public or private wells												
	Surface Water	Located on lake or pond	X	X				X	X	X	X			
		Located on river or stream	X	X	X	X	X		X		X			
		Provides groundwater recharge	X	X	X				X	X	X			
		Outlet lacking or restricted	X		X	X		X	X	X	X			
		Estuary / Tidal										X	X	X
		Flood flow altering				X								
BIOGEOCHEMICAL	Sediment Retention and Toxicant	Serves as catchment basin		X		X				X				
		Sediments stabilization	X	X		X			X	X				
		No channels or streams						X		X				
		Known sources of toxicants												
		Associated with water course	X	X	X	X	X		X	X	X	X	X	
		Evidence of long-term retention	X	X		X		X	X	X				
		Evidence of erosion				X			X			X	X	X
	Nutrient Cycling	Connected to channel flow	X	X		X			X	X	X			
		Mostly vegetated	X	X	X		X	X	X	X	X			
		Has no surface outlet	X		X			X			X			
		Excess nutrient sources												
		Sediments exposed to air	X						X					
HABITAT	Fish	Anadromous species present	X			X	X					X	X	X
		Resident species present	X	X	X	X			X	X		X	X	X
		Pool-riffle present	X											
		Shade plants present				X								
		Water depth > 2 meters												
		Water depth < 2 meters	X	X	X	X	X	X	X	X	X			
		Wetland in flood plain	X			X		X						
		Toxicants are absent	X	X	X	X	X	X	X	X	X	X	X	X
		Permanently flooded		X		X		X		X				
		Threatened or endangered species present												
	Wildlife	Food resources occur	X			X			X	X		X	X	X
		Evidence of wildlife use	X	X	X	X			X	X		X	X	X
		Human presence infrequent	X	X	X	X	X	X	X	X	X			
		Undeveloped wetlands nearby	X	X	X	X	X	X	X	X	X	X	X	X
		Contiguous with other wetlands	X	X	X	X			X	X	X			
		Threatened or endangered species present										X		X
SOCIO / ECONOMIC		Archeological resources present												
		Cultural resources present							X					
		Consumptive uses of wetlands	X						X					

Key: PEM1 (palustrine, emergent, persistent); PAB3 (palustrine, aquatic bed, rooted vascular); PUB4 (palustrine, unconsolidated bottom, organic); R4EM (riverine, intermittent, emergent); M2US1 (marine, intertidal, unconsolidated shore, cobble-gravel); M2US2 (marine, intertidal, unconsolidated shore, sand); M2BB (marine, intertidal, beach bar, sand)

X-Denotes the function indicator is associated with indicated wetland classification within each drainage area.

1. The majority of criteria and indicators are not applicable to the coastal area.

Essential wetlands are of the utmost importance to be indispensable. They are the foundation without which an entire ecosystem or complex would collapse. They perform at least two, and typically more, significant wetland functions. The wetlands are considered most valuable in an undisturbed state, as uses or activities, especially those requiring fill, negatively impact known wetland functions.

Beneficial wetlands provide periodic significant contributions to a mixture of key wetland functions, usually on a more localized scale. The wetlands could possess some significant fish and wildlife resources. Cumulative losses associated with these wetlands would likely contribute to significant drainage basin or watershed water quality losses, flood problems, or loss of fish and wildlife habitats and/or public use.

Contributing wetlands have moderate values for one or more wetland function, but they generally have reduced or minimal functions and/or ecological values. Individual and cumulative impacts to these wetlands would have an insignificant impact on overall functions and values of the drainage wetlands.

Based on each drainage's delineated resources and the findings of interagency/public scoping meetings, the following resources of primary concern were identified:

> North Creek: anadromous (pink and coho salmon) fish populations and their spawning and rearing areas, resident fish populations (Dolly Varden) and their rearing habitat, riparian vegetation and associated avian populations, and subsistence activities.
>
> Central Creek: resident fish populations and their rearing habitat, juvenile coho salmon habitat at the creek's mouth, and stream-bank vegetation.
>
> South Creek: anadromous (pink and coho salmon) fish populations and their spawning and rearing areas, resident fish populations and their rearing habitat, subsistence activities, riparian vegetation, and isolated palustrine wetlands.
>
> Coastal Area: Nearshore juvenile pink salmon populations and their staging areas, near shore over-wintering Steller's eider habitat, and essential fish habitat (i.e., delta sediment/gravel deposits at the mouth of area creeks).

After assimilating all available wetland resource information, the Corps used its best professional judgment to delineate wetland functional assessment categories and depict their general locations within each drainage (figure FEIS-25). Table FEIS-9 tabulates the number of acres in each drainage area's wetland functional assessment category.

Table FEIS-9. Number of acres in each drainage area's wetland functional assessment category, Akutan Harbor, Alaska.

Wetland Functional Assessment Category	North Creek Drainage	Central Creek Drainage	South Creek Drainage	Coastal Area	Total Acres
Essential	23.5	7.7	2.3	5.3	**38.8**
Beneficial	10.8	24.4	0	2.6	**37.8**
Contributing	18.1	12.1	0.3	0	**30.5**
Non-wetland	1.2	16.9	11.1	0	**29.2**
Total acres	**53.6**	**61.1**	**13.7**	**7.9**	**136.3**

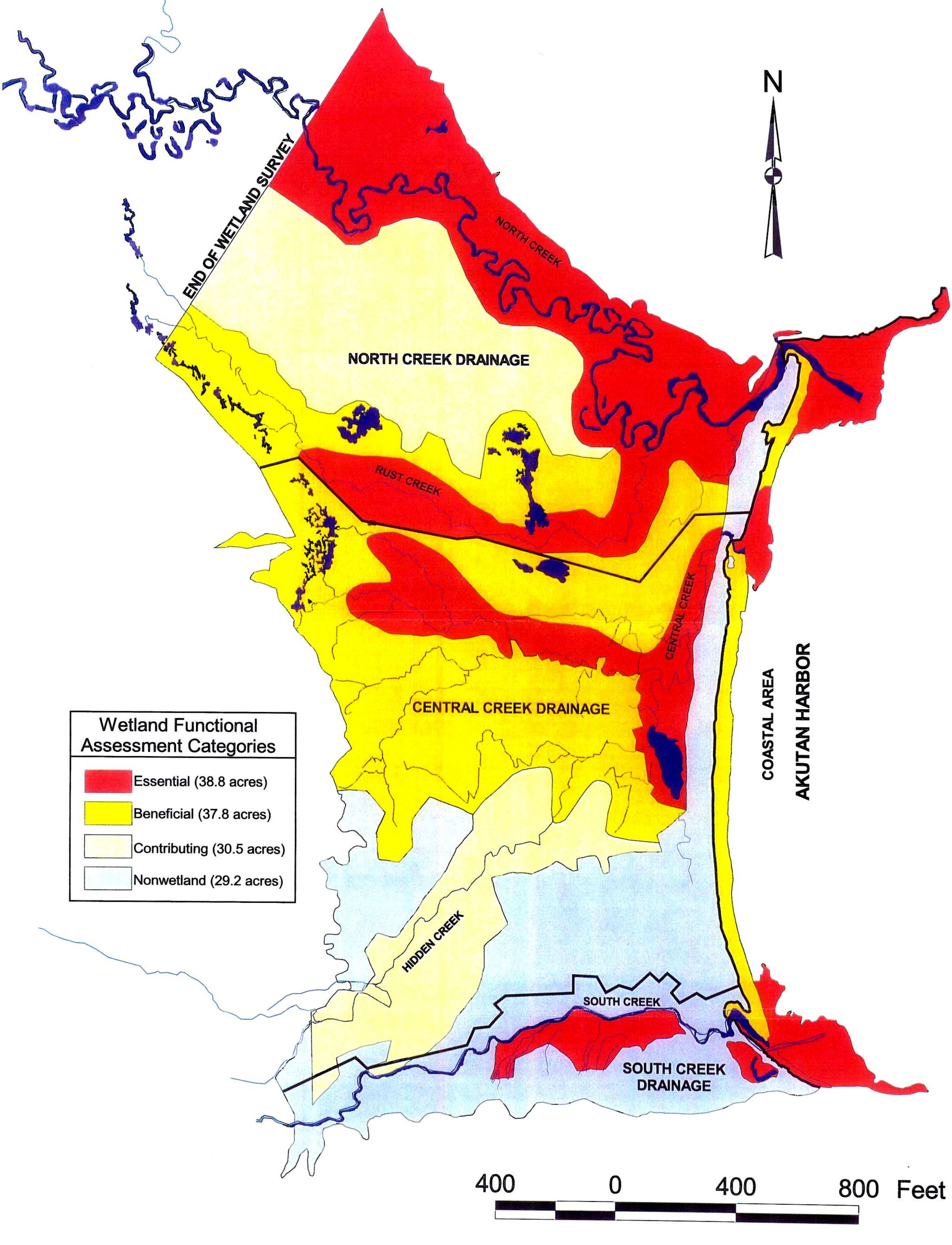


Figure FEIS-25. Wetland functional assessment categories within each drainage at the head of Akutan Harbor.

3.3.6 Essential Fish Habitat

The 1996 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (Act) amendments require consultation between the Secretary of Commerce and Federal and State agencies on activities that may adversely impact essential fish habitat (EFH) for those commercial fish species managed by fish management plans (FMP) and managed under the Act. Although the concept of EFH is similar to "critical habitat" under the Endangered Species Act, measures recommended by the National Marine Fisheries Service to protect EFH are advisory, not proscriptive.

Essential fish habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of EFH: "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle. EFH is a subset of all areas occupied by a species.

Habitats of particular concern are subset areas of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Habitat areas of particular concern include near-shore areas of intertidal and submerged vegetation, rock, and other substrates. These areas provide food and rearing habitat for juvenile groundfish and spawning areas for some species. All near-shore marine and estuarine habitats used by Pacific salmon, such as eelgrass beds, submerged aquatic vegetation (seaweeds), emergent vegetated wetlands, and certain intertidal zones, are sensitive to natural or human induced environmental degradation, especially in urban areas and in other areas adjacent to intensive human-induced developmental activities.

The FMP for the groundfish fishery of the Bering Sea and Aleutian Islands area lists four species categories. The four categories are: (1) the target species category (Pollock, cod, etc.), (2) the "other species" category (sculpins, skates, etc.), (3) the prohibited species category (halibut, herring, etc.), and the nonspecified species category (urchin, rattails, etc.). The National Oceanic and Atmospheric Administration General Council determined that within FMPs, EFH must be described and identified for those species listed within the target species and the other species categories. The prohibited species and the nonspecified species categories are outside FMPs and therefore are not considered EFH for the purposes of sections 303(a)(7) and 305(6) of the Act.

With the assistance of the NMFS, the Corps has determined that EFH exists in Akutan Harbor for the following species and associated life stage(s):

Species	Associated Life Stage
Walleye pollock	juveniles and eggs
Pacific cod	adults and late juveniles
Atka mackerel	adults and late juveniles
Yellowfin sole	adults and late juveniles
Flathead sole	adults and late juveniles
Rock sole	adults and late juveniles
Alaska plaice	adults and late juveniles
Sculpin spp.	adults and late juveniles
Skates spp.	adults and late juveniles
Red king crab	all
Golden king crab	eggs, late juveniles, and matures
Tanner crab	larvae

Table FEIS-10 presents a summary of each EFH species habitat association and other pertinent information used in assessing the impacts of the project, as described in section 4.3.5.

3.4 Cultural Resources

3.4.1 Archeological and Historical Resources

3.4.1.1 Prehistory

The prehistory of Akutan Island and the rest of the Aleutian Islands is broken into the Anangula traditions, approximately 8,500-7,500 years before present (BP) and the Aleutian tradition, beginning approximately 5,500 BP in the eastern Aleutian Islands, and ending with historic contact with Russian explorers in AD 1741 (McCartney, 1984). Based on a pedestrian survey of the project area by Corps archeologists, where subsurface testing was used, there is no evidence of the Anangula and Aleutian traditions within the project area. However, Chulka, on nearby Akun Island, was occupied from AD 780 until 1878, when the people moved to Akutan where there was a trading post (Holland, 1982).

3.4.1.2 Russian Period

Russian fur traders first visited the Krenitzin Islands, which include Akutan Island, in 1766. Captain Afanasii Ocheredin of the *Sv. Pavel* ordered one of his crew foremen, Matvei Polozkov, to explore Akutan Island in August the following year (Black, 1999). Polozkov established his main camp on Akun, but left contingents on Akutan and other islands in the Krenitzin group (Black 1999).

A naval expedition commanded by Captain Krenitzyn dropped anchor in Captains Bay on Unalaska in 1768. During the journey, Krenitsyn sent his navigator to shore for fresh drinking water on Akutan. Nearby was a summer village with five houses. In an expedition led by Captain Levashev 3 weeks later, his navigator, Ia. I. Shabanov reported that while searching for a suitable harbor on Akutan Island, he encountered "a settlement of two semi-subterranean dwellings" (Black, 1999).

Table FEIS-10. Essential fish habitat in the Akutan Harbor area (Lat./Long. Point - 54° 13' N, 165° 80' W) per National Marine Fisheries Service.

				HABITAT ASSOCIATIONS									
				Location						Substrate			
Species	Life Stage / Activity	Known Concentrations	General Distribution	Intertidal	1 - 50 m	50 - 100 M	>100 M	Bay/Estuarine	Not Known	Mud/Clay/Silt	Sand/Gravel	> Pebble / Cobble	Pelagic Domain
Walleye Pollock	J		X		X	X	X						Pelagic
	E		X				X						Pelagic
Pacific Cod	A	X			X	X	X			X	X		Demersal
	LJ	X			X	X	X			X	X		Demersal
Yellowfin Sole	A	X		X	X	X	X	X			X		Demersal
	LJ	X			X	X	X	X			X		Demersal
Atka Mackerel	A	X			X	X	X						Semi-Demersal; Semi-Pelagic
	LJ	X							X				Pelagic Domain Unknown
Flathead Sole	A		X		X	X	X			X	X		Demersal
	LJ		X		X	X	X			X	X		Demersal
Rock Sole	A		X		X	X	X				X		Demersal
	LJ		X		X	X	X	X			X		Demersal
Alaska Plaice	A		X		X	X				X	X		Demersal
	LJ		X		X	X				X	X		Demersal
Sculpin ssp.	A		X	X	X	X	X			X	X		Demersal
	LJ		X	X	X	X	X						Demersal
Skate ssp.	A		X			X	X						Demersal
	LJ		X			X	X						Demersal
Red King Crab	M		X		X	X	X			X	X	X	30-500 meters (shelf, slope)
	LJ		X	X	X	X	X			X	X	X	intertidal-500 meters (shelf, slope)
	EJ		X	X	X	X	X						intertidal-500 meters (shelf, slope)
	L		X										Pelagic
	E		X	X	X	X	X	X		X	X	X	intertidal-500 meters (shelf, slope)
Golden King Crab	M		X				X				X	X	100-200 meters (shelf)
	LJ		X								X	X	> 500 meters (slope)
	E		X				X				X	X	100-200 meters (shelf)
Tanner Crab	L		X										Pelagic

A - adults M - mature LJ - late juveniles J - juveniles EJ - early juveniles L - larvae E - eggs

In 1792, five villages on Akutan were inhabited; Chaxigada, Ugayuxta, Kexta or Chexta, Sishxina, and Yagilak. However, a census conducted in 1821 indicated only the villages of Basinkoe, Golovskoe, and Sutkhov were still populated (Black, 1999). By 1834, only one village remained on Akutan. This village had "two small dwellings occupied by 13 people" (Black, 1999). The hot springs on Akutan were of interest to the Russians and in the 1830's a caretaker was assigned by the Russian American Company to maintain a recreational establishment there (Black, 1999). In 1838, a small pox epidemic reached the area. Epidemics combined with forced relocations of the Aleuts by the Russians devastated the population. Toward the end of the Russian period, the population of Akutan Island was absorbed into nearby settlements (Black, 1999).

3.4.1.3 American Period

The Western Fur & Trading Company established Akutan as a center of the sea otter trade in 1878. Aleuts from neighboring islands were drawn by the post to Akutan. That year, 63 people came to Akutan and the Russian Orthodox Church was built (McGowan, 1999). The Alaska Commercial Company bought the trading post in 1879. The commercial base for the community remained sea otter pelt procurement until an international agreement outlawed the practice in 1911.

The Alaska Whaling Company selected Akutan for its North Pacific whaling station in 1911. The harbor was sheltered, had plenty of fresh water, and was only 35 miles from Dutch Harbor, where provisions and ship repairs were available. The location of the station was also advantageous because of its proximity to Unimak Pass, a major sea route and sea mammal passage (Denfeld, 1996). It was the only whaling station in the Aleutian Chain, and people from Akutan found work at the station. The station was in operation from 1912 to 1939, with the exception of 1931-1933. Poor whale catches at Akutan in 1938 and 1939 forced the closure of the station. The Akutan station was not in use from 1939 to 1942.

In late 1941, the United States Navy closed the North Pacific sea-lanes, and in 1942 the U.S. Navy began leasing the facility (Denfeld, 1996). After the Japanese attacked Unalaska in June 1942, the U.S. government evacuated Akutan residents to the Ketchikan area, and the village wasn't re-established until 1944 (McGowan, 1999). A five-man Seabee detachment arrived to install emergency seaplane facilities, placed two warning buoys in Akutan Harbor, and deposited drums of aviation gas on the whaling station dock in July 1942. When they inspected the station, they found it in poor condition (Denfeld, 1996). In October 1942, Akutan Harbor became a refueling station for Russian ships (Denfeld, 1996). The dock was rebuilt, the bunkhouses and quarters were rehabilitated, the warehouses were cleaned, and the water supply dam above the station was rebuilt. Fuel was stored in six large fuel oil tanks on the hillside above the facility and diesel was stored in 22 whale oil cookers and a wood-stave tank. The whaling station at Akutan was closed in early 1945 due to a decline in Russian shipping, and a fire burned the station to the ground in 1948.

The Wakefield Seafood Processors began to catch and process king crab in Akutan in 1948. This industry became more profitable, and in 1968, Wakefield constructed a new dock on land leased from the Orthodox Church (McGowan, 1999). Seawest, Inc. purchased the Wakefield operations in 1979, which set off a rapid economic expansion in Akutan. The village of Akutan was incorporated as a city in 1979 (McGowan, 1999).

3.4.1.4 Site Surveys

In 1953, a team led by Philip T. Spaulding conducted a brief reconnaissance in the Krenitzin Island group and located at least five sites on Akutan believed to have been settlements (Black, 1999). In 1974, Ted Banks reported an archaeological site (AHRS card UNI-00033) at the head of Akutan Harbor that had been recently disturbed by military or commercial operations. Turner walked the area and only found a campfire stain that appeared recent.

After consulting the Alaska Heritage Resources Survey (AHRS), Corps archeologists conducted a pedestrian survey at the head of Akutan Bay. The remains of two structures and a large wood post corral or fence were at the south end of the project area (AHRS ID # UNI-00097). The fenced area includes several corrals and the remains of a possible herding chute. Three lines of galvanized wire were strung between the posts, and the fourth wire attached to the top of the posts was barbed wire.

Two square depressions and one round depression on the hillside on the south side of the bay are probably remains from World War II activities. These depressions may have been used to camouflage Quonset huts or tents and protect them from wind. No artifacts or other cultural remains were found in or near this depression.

The beach berm along the head of the bay was also surveyed using transects approximately 50 meters apart. A series of depressions were found along the length of the berm. Debris in the feature included 55-gallon drums, oil filter cans, unidentified metal, and wood. No cultural material beyond recent debris was found in these depressions. A survey along the base of the hills forming the valley revealed no cultural remains.

3.4.2 Subsistence Activities

Two types of subsistence might occur at Akutan: that which is allowed for Alaska Natives under the Marine Mammal Protection Act, and that allowed by rural residents under the authority of Alaska National Interest Lands Conservation Act.

"Subsistence is the non-commercial, traditional and customary harvest of renewable resources for food, clothing, fuel, transportation, construction, arts, crafts, sharing, and customary trade. These uses of wild resources are of important cultural and economic value in rural Alaska. Akutan is a typical rural community in the sense that subsistence activities are prevalent and significant."[6]

In 1990-1991, 96 percent of Akutan households attempted to harvest subsistence resources from around the Akutan/Akun islands area and, due to sharing, 100 percent used wild resources (ADFG, 2001). The Akutan community harvested 69 different subsistence resources. The top nine species were: halibut (18 percent), sockeye salmon (16 percent), Steller sea lion (16 percent), Pacific cod (6 percent), feral cattle (6 percent), coho salmon (5 percent), pink salmon (4 percent), harbor seal (4 percent), and ducks (3 percent) (ADFG, 1993). Fish accounted for over half (57 percent) of the subsistence take in Akutan, as residents harvested an average 868 usable pounds of fish per household. Besides halibut, cod, and salmon, other fish species harvested include greenling, flounder, sole, herring, black rockfish, sculpin, Dolly Varden, and trout (ADFG, 2001).

Harvests of land mammals, birds and eggs, and marine invertebrates each were 6 percent of the total community subsistence harvest. Marine invertebrates harvested by Akutan households include chitons, king and tanner crab, and octopus.

Within Akutan Harbor, Akutan residents harvest a variety of resources, including salmonberries, and pink and coho salmon. Very little duck hunting occurs inside Akutan Harbor, as most Akutan residents hunt freshwater and other ducks around Akun Island. Sea lion and seal hunting usually occur outside of Akutan Harbor. Interviews with several Akutan residents indicate that some subsistence/personal-use fishers harvest mostly pink and some coho salmon at the head of the bay from North and South creeks (Burns, 1998). A gillnet set by an Akutan resident in early October 2000 was reported to catch 23 adult coho salmon. No salmon are taken from Akutan Harbor's streams for commercial harvesting purposes.

[6] Exerpt from Appendix B (Economic Analysis of Navigation Improvements at Akutan, AK) of the Navigation Improvements, Akutan Harbor, Feasibility Report. Unless otherwise noted, the information presented in this section was excerpted from the subject appendix, which relies heavily on ADFG-gathered subsistence data.

4.0 ENVIRONMENTAL CONSEQUENCES OF THE RECOMMENDED PLAN: RECONFIGURED 12-ACRE INLAND MOORING BASIN

This section contains an analysis of the potential impacts associated with the recommended plan: the reconfigured 12-acre, inland mooring basin. The No-Action alternative is presented first as a basis of comparison for the proposed actions. The analysis considers various types of potential impacts, including short-term, long-term, direct, indirect, secondary, and cumulative impacts. Some impacts may also be identified as significant and/or unavoidable. All impacts are mitigated in terms of avoidance, minimization, and/or compensation to the maximum extent practicable. Table FEIS-3 summarizes in a general way, the impacts associated with the recommended plan, and also compares it with the other designs considered at the head of Akutan Harbor.

4.1 No-Action Alternative

The No-Action alternative would avoid all proposed harbor construction-related impacts and loss of habitats, and would not achieve the main project objective, which is to provide protected moorage for the Bering Sea commercial fishing fleet. Future environmental conditions without the proposed action, however, would not be void of environmental impacts. The Bering Sea commercial fishing fleet would continue to: (1) use Akutan Harbor as a place of refuge; (2) deliver its catch to Trident Seafoods for processing; (3) use Trident Seafood's refueling facility; (4) chronically have petroleum-related spills in the harbor and discharge vessel-generated gray water; (5) store fishing gear at Trident's facilities and the Old Whaling Station; and (6) be a solid-waste generator while in Akutan Harbor. All six aforementioned activities would likely affect Akutan Harbor's fish and wildlife resources, especially the over-wintering Steller's eider population.

In addition, a wide variety of impacts would likely be associated with the construction of an airport on the island by ADOT/PF and FAA. For example, the construction of the airport access road would certainly include filling of wetlands at the head of Akutan Harbor and possibly placing fill in the harbor's intertidal area. Vehicular and foot traffic on sections of the road along Akutan Harbor's coastline could disturb local wildlife, including over-wintering Steller's eider. The uplands and wetlands at the head of Akutan Harbor would also be impacted by development activities associated with airport development.

Impacts associated with Akutan Harbor's seafood processing industry would continue, such as the discharging of seafood processing wastes, the incineration of solid wastes, and the permitted or improper placement of fill material into Akutan Harbor. Akutan Harbor's deteriorated water quality would continue to be monitored by the USEPA in conjunction with its NPDES responsibilities to establish seafood processing waste effluent limitations.

4.2 Physical Environment

4.2.1 Air Quality

Section 176(c) of the Clean Air Act (CAA) requires that Federal agencies ensure their activities are in conformance with Federally-approved CAA state implementation plans for geographical areas designated as "non-attainment" and "maintenance" areas under the CAA. The Akutan area is in the Southcentral Alaska Intrastate Air Quality Congrol Region No. 010 and is not designated as a "non-atainment" or "maintenance" area.

The Corps coordinated with the USFWS, NMFS, USEPA, ADFG, and the ADEC during the NEPA scoping process to determine the impacts (if any) of the project on Akutan's air quality. Internet research was also conducted on the topic. Guidance was also obtained from the material received at the Corps' Prospect Clean Air Act workshop. No air quality-related comments were received on the draft EIS from the public or state or federal agencies.

Air quality in the immediate project area would be affected by emissions from harbor construction and its operation. The proposed dredging and disposal activities would primarily involve the use of diesel-powered dredging equipment and land-based heavy construction equipment and haul trucks. Fugitive dust emissions during construction are unlikely because wet working conditions would predominate. Collectively, construction-related emissions would be temporary and intermittent, and would stop at the end of the construction period. However, the dredged material stockpiles could become a fugitive dust source when the material dried and was battered by periodic high winds.

The 58 fishing vessels associated with the mooring basin would be a source of air emissions. Vessel emissions are associated with cruising within Akutan Harbor, operating during the maneuvering mode, and vessel hoteling, which is docking within the mooring basin with running engines while the crew is onboard. Collectively, a full mooring basin with hoteling vessels could be expected to input larger quantities of pollutants, especially particulates associated with diesel fuel. The pollutants of primary concern are nitrogen oxides, carbon monoxide, sulfur dioxide, and particulate matter less than 10 microns in diameter.

The impact of air emissions on sensitive members of the Akutan community could be a special concern. Sensitive receptor groups would include children, the elderly, and the acutely and chronically ill. The cumulative build up of air emissions from hoteling vessels could be considered significant, but temporary because stagnant atmospheric conditions, which often result in adverse pollutant concentrations, are a rarity in the Akutan area. This is because low-pressure weather systems and accompanying winds are often formed in the Aleutian Islands and ventilate the area, preventing the build-up of air pollutants. Therefore, National Ambient Air Quality Standards would not likely be exceeded.

The Corps believes that incorporating the USFWS's recommendations, as identified in their FWCA reports; other agency recommendations; and Endangered Species Act-related terms and conditions into the project's design and construction, operation, development, and monitoring phases (see sections 2.4.1 through 2.4.5) will mitigate to the maximum extent practicable, the potential environmental impacts of the project on Akutan Harbor's air quality.

4.2.2 Hydrology

Potentially adverse hydrological impacts are associated with constructing the project within the wetland complex at the head of Akutan Harbor. However, because the effects cannot be absolutely quantified with the available information and models, they are discussed qualitatively instead (Dunbar, Corcoran, and Murphy, 2001).

Dredging any inland mooring basin at the head of Akutan Harbor would potentially affect the area's freshwater table in several ways. First, the shape of the water table surface would be altered. In addition, the shoreline would be extended inland and would impose a new water table base level in the interior of the basin. The recommended plan would expand the Akutan Harbor shoreline inland approximately 1,200 feet, for a width of about 1,200 feet north and south, effectively cutting in half the draining basin at the head of the bay. Groundwater and surface water that now flow and discharge to the eastern shoreline would likely enter the mooring basin to the south from the northern uplands, to the north from the southern uplands, and to the east from the western hillside. The establishment of a new water table base level would also shorten the flow path and steepen the flow gradient.

It is difficult to predict how the freshwater table would adjust following the dredging. Dredging would bring the sea farther inland with an accompanying encroachment of the saltwater interface. As a result, the remaining wetlands would be expected to become more saline. The effect on the actual elevation of the freshwater table after equilibrium is established following construction is unknown; however, the elevation of the freshwater table would be directly dependent on the volume and flow rate of aquifer recharge into the basin. Currently, the water table is shallow throughout the entire study area and the underlying soils are relatively coarse grained. It is likely that the water table would remain shallow, providing harbor construction does not alter the character of the headwaters, flow of the major streams, and aquifer recharge. A major unknown is the quantity of recharge that occurs along the western edge of the central basin from fractures in the volcanic uplands in contact with the Holocene basin fill. Excavation and partial removal of the western valley wall may possibly impact fracture flow into the central basin and has the potential to adversely affect aquifer recharge and resulting water table elevations.

Another effect on streams from the increased gradient might be to heighten the erosive power of the streams, potentially leading to headward erosion to the north and south. An extreme result of headwater erosion would be stream piracy, whereby an eastwardly flowing stream is intercepted (captured) and its waters diverted to the south by a headward-cutting stream, but this is unlikely to occur at the project site.

Streams and surface runoff from the steep uplands immediately west of the basin currently drain onto the low marsh in the central portion of the basin. Dredging an inland basin would cause streams and runoff to enter the saltwater environment (i.e., the new mooring basin) almost a half-mile farther inland and at a steeper gradient than at present. Conceivable problems are accelerated erosion of the steep uplands to the west of the proposed harbor and possible realignment of streams.

The Corps reviewed existing groundwater models to determine the model most suited to predict the impacts of constructing any size inland mooring basin (Dunbar, Corcoran, and Murphy, 2001). A one-dimensional groundwater model based on the Ghylen-Herzberg Principle was best able to qualitatively predict the impacts to the water table and the saltwater interface due to harbor construction. Excavation of marsh and other sediments for harbor expansion in the central portion of the basin would decrease overburden pressures and possibly remove fine-grained, low permeability materials above the volcanic rock underlying the basin. Deep groundwater flowing in fractures and other discontinuities within the rock would therefore have easier access to the surface underlying the proposed harbor area. Groundwater in the rock is presumably under artesian conditions imposed by elevated piezometric levels within the highlands to the west. Therefore, groundwater may tend to flow readily to the surface beneath the harbor and potentially create freshwater "ponding" beneath the harbor. What effect this upsurge of freshwater would have on the encroachment of the saltwater interface is unknown.

The recommended plan would be expected to have little, if any, effect on discharge, sediment supply, and salinity of North Creek because the creek flows eastward to the sea and north of the drainage divide. Stream piracy would, of course, divert the flow of North Creek, but piracy is an extreme result that is not expected; and for similar reasons, South Creek would not be impacted (Dunbar, Corcoran, and Murphy, 2001). Stream discharge and sediment supply are not envisioned to change, providing harbor construction avoids these creeks.

The Corps has drawn the following hydrologic conclusions based on the fieldwork performed (Dunbar, Corcoran, and Murphy, 2001) during this investigation:

- Of the three inland mooring basin options, constructing the 20-acre inland mooring basin would have the most significant adverse impact on the wetlands hydrology at the head of Akutan Harbor. The recommended plan would have the least amount of adverse environmental impact.

- Surface water and groundwater flow into the central basin would be permanently impacted by the project. Surface drainage and groundwater flow would no longer discharge to the east as they do now. Surface drainage and groundwater flow would discharge directly into the excavated harbor from the west (adjacent to uplands), south (South Creek area), and north (North Creek area), or because of the stockpiles' assorted fill activities, the surface drainage may flow around the perimeter of the harbor and into neighboring streams.

- The shape of the water table at the head of Akutan Harbor would be altered by the project. Extending the shoreline inland would impose a new base level in the interior of the basin. A new base level would shorten the flow path and steepen the flow gradient, thus affecting the overall shape of the water table. It is assumed that water levels would adjust themselves and eventually establish a new gradient similar to the current gradient. However, the new gradient would depend on the magnitude of recharge to the shallow aquifer in the headwaters of the valley, which is currently unknown.

- After dredging an inland mooring basin, the saltwater interface would move inland to the new shoreline, and the new depth to the saltwater interface would be dependent upon the new elevation of the water table after construction. Exactly what the elevation of the water table would be following construction is unknown because of the limited amount of data on aquifer recharge. However, it is expected that the water table would have a similar gradient and elevation comparable to existing conditions, providing the volume of aquifer recharge is equivalent to the amount of groundwater discharging into the bay and to nearby streams after construction.

- A potentially damaging effect of increased stream and groundwater gradients is accelerated surface erosion of the terrain. Increased stream gradients may heighten the erosive power of the streams, potentially leading to head-ward erosion to the north and the south. An extreme situation would be stream piracy, whereby an eastward-flowing stream is intercepted, causing the head-ward cutting stream to divert surface waters into the harbor basin; however, this is unlikely to occur in this project's situation.

- The project would not be expected to have an effect on stream discharge, sediment supply, and the salinity of North Creek because the creek flows eastward to the head of Akutan Harbor and north of the drainage divide. South Creek would not be impacted for similar reasons. Stream discharge and sediment supply along these creeks are not envisioned to change providing harbor construction directly avoids these creeks.

The Corps believes that incorporating the USFWS's recommendations, as identified in their FWCA reports; other agency recommendations; and Endangered Species Act-related terms and conditions into the project's design and construction, operation, development, and monitoring phases (see sections 2.4.1 through 2.4.5) will mitigate to the maximum extent practicable, the project's potential environmental impacts on the head of Akutan Harbor's hydrology.

4.2.3 Water Quality and Circulation

The Corps and other agencies involved in the NEPA scoping process identified many water quality issues associated with the construction and operation of the proposed boat harbor at Akutan, Alaska. The known, poor water circulation in inner-Akutan Harbor, the long history of discharging seafood-processing wastes in Akutan Harbor, and periodic petroleum spills exacerbate Akutan Harbor's current water quality problems. The USEPA and ADEC focused their concerns on the possible effects of the harbor on Akutan Harbor's impaired water body status, i.e. the total maximum daily loads (TMDL) for biochemical oxygen demand (BOD) and settleable solids residues (SSR). The harbor's design, as described in the DEIS, was also a concern because it was feared that the harbor basin would not exchange enough water with Akutan Harbor and circulate it adequately enough within the basin to maintain water quality standards. Construction activities (e.g. dredging, dredged material disposal, and placement of jetties) likely would have the most immediate impact on water quality, while harbor operation activities (e.g. chronic petroleum spills and waste disposal) could affect water quality in the long-term. The following sections discuss the aforementioned issues in more detail.

4.2.3.1 Construction-related Impacts

The recommended plan would dredge a mooring basin out of a freshwater wetland complex that is currently isolated from Akutan Harbor's marine environment. An entrance channel would be dredged through a beach berm to connect the mooring basin to Akutan Harbor (figure FEIS-9).

The large volume of material to be dredged and means of disposal, via upland stockpiling, would likely mean that the project construction season would require 2 years. Turbid water produced while dredging the inland mooring basin would remain isolated from Akutan Harbor until such time that the entrance channel is constructed. Dredging the entrance channel would immediately produce turbid water conditions from its initiation to conclusion, as the area to be dredged is in direct contact with Akutan Harbor's inner harbor. Upon breaching the entrance channel, an undetermined volume of turbid water would begin discharging into Akutan Harbor.

In addition to increasing turbidity, dredging activities would temporarily increase suspended solids, decrease dissolved oxygen concentrations, and increase dissolved nutrients concentrations in receiving waters. Associated with increased turbidity and suspended solids would be a decrease in water clarity, along with the suspension of fine materials. The length of time it takes for the suspended material to settle out, combined with the current velocity, determines the size and duration of the dredging and breakwater construction-related turbidity plume. Dissolved oxygen levels in aquatic habitats are usually reduced by the introduction of high concentrations of suspended particulates, which dredging does. However, the reduction in dissolved oxygen is usually brief. A study of dredged material released in San Francisco Bay (USACE, 1973) showed a 3 to 4 minute reduction in dissolved oxygen near the point of release, and another study in New York Harbor (Lawler, Matusky, and Skelly, 1983) showed a small reduction in dissolved oxygen near the dredge, but no reductions in levels 200 to 300 feet away from the dredging activities. Nutrients could be released into the water column during the dredging operations, but they are not expected to promote nuisance growths of phytoplankton, as water temperatures are too low and the dredging period too short to facilitate growth.

The recommended plan includes constructing dredged material stockpiles in wetlands and uplands adjacent to the mooring basin. Turbid water draining from the wet, stockpiled material that has the potential to adversely impact the water quality at the head of Akutan Harbor and neighboring anadromous fish streams. Runoff from the stockpiles would be either collected by perimeter berms and directed back into the mooring basin or collected in temporary settling basins constructed adjacent to the mooring basin and within the footprint of the dredged material stockpile.

Accidents resulting in spills of fuel, lubricants, or hydraulic fluid from the equipment used during dredging and breakwater construction could occur and adversely affect water quality. Water quality impacts would depend on the amount and type of material spilled as well as specific conditions (e.g. currents, wind, temperature, waves, and vessel activity). In most cases, such spills would be small and cleaned up immediately, causing less than significant impacts in the short term.

Overall, construction-related impacts of dredging a mooring basin and entrance channel would temporarily degrade water quality, but not result in any long-term, adverse impacts. Impacts (e.g. increased turbidity and suspended solids, and possible reductions in dissolved oxygen) would generally be confined to the immediate vicinity, i.e., the head of Akutan Harbor. However, the simultaneous discharge of seafood processing wastes and harbor construction-related turbidity could combine to cause a longer-term, but temporary, water quality problem in Akutan Harbor because circulation model results indicate that circulation at the head of Akutan Harbor is isolated to some degree from the outer harbor waters, suggesting that there is incomplete flushing in the inner harbor (Jones and Stokes, 1992). More recent circulation modeling appears to validate previous modeling findings (Coastline Engineering, 2001).

4.2.3.2 Mooring Basin Mixing and Circulation

A 3-dimensional numeric model (Princeton Ocean Model) was used to predict the mixing (exchange coefficient) capability of the inland mooring basin, as designed and described in the DEIS (Coastline Engineering, 2001). In the numeric model, the mooring basin was oriented, as it would be constructed, i.e. its short axis (width) is aligned east-to-west in line with the major wind directions. In an enclosed region such as a boat basin, winds tend to generate surface flows in the wind direction and subsurface flows in the opposite direction. A clockwise gyre would likely occur during ebbing tides and a counterclockwise gyre would form during flooding tides. Larger tidal ranges generally produce better water quality in a boat harbor than do smaller ranges.

The numeric model ran three likely wind/tidal flow scenarios: (1) the no-wind situation in which all the exchange is driven by tidal velocities; (2) a 10-knot east wind superimposed on the tidal flow; and (3) a 10-knot west wind superimposed on the tidal flow. The exchange coefficients and residence time for a pollutant (e.g. BOD) inside the mooring basin for those cases are as follows:

	No wind	**10-knot wind (east)**	**10-knot wind (west)**
Vertically-averaged exchange coef.	0.08	0.15	0.23
Residence time (days)	6.25	3.2	1.9

The "no wind" value is low indicating poor exchange between the mooring basin and Akutan's inner harbor. The mixing is significantly improved by adding wind, particularly from the west. According to Cardwell *et al.* (1981), (who used a physical model and not a numeric model), the basin wide-average exchange coefficient should be equal to or greater than 0.30 for the basin to be considered sufficiently well mixed to maintain adequate water quality. Although Cardwell looked for values of 0.30, a value of 0.25 was usually acceptable if the harbor design had been optimized.

It would appear that low tidal range coupled with the relatively small, deep basin and wide entrance channel all combine to limit mixing. However, the Corps expects maximum circulation and water exchange to occur when strong winds (>10 knots) occur from the west during flooding and ebbing spring tides. A spring tide has a greater-than-average range around the times of a new and full moon.

Since issuance of the DEIS, concern arose about developing ways to improve the harbor basin's mixing by modifying the shape of the boat basin further. Additional numeric models were developed and run to address the issue (Coastline Engineering, 2003). Results indicate that reconfiguring the original, more-rectangular harbor design to a more circular one (in concert with a narrowed entrance channel) would substantially increase water circulation within the basin and its exchange (0.25 exchange coefficient, no wind considerations) with Akutan Harbor. Based on the studies findings, the tentatively selected alternative harbor design (as described in the DEIS) was redesigned to be more curvilinear (figure FEIS-9).

4.2.3.3 Impacts of Anthropogenic Substances

During the DEIS scoping process, concern was raised about what effects the discharge of seafood processing wastes into Akutan Harbor might have on the mooring basin's water quality, and what effect a boat harbor's operations (i.e., contributions of spilled petroleum products, biochemical oxygen demand, and settleable solid residues) might have on Akutan Harbor's water quality, especially since Akutan Harbor is identified as water quality impaired.

Seafood processing wastes: The outfalls at the Trident plant discharge significant quantities of processing wastes directly into Akutan Harbor. These discharges have been the subject of past studies during the process of securing NPDES discharge permits by various processors. Three scenarios were run [using the Princeton Ocean Model and two author-constructed, unnamed 3-dimensional models (100-meter grid element by 20 layers for the outer harbor and a 7.62-meter grid element by 10 layers for the boat basin)] to determine the fate of discharged seafood processing wastes from the Trident facility (Coastline Engineering, 2001): one with no wind and the others with a 20-knot wind from the east and west. Note: Winds occur at Akutan over 70 percent of the time, but rarely exceed 20 knots. These scenarios were selected in an attempt to bracket the no-wind case, which is suspected to have the least amount of mixing, with the extreme wind cases from the directions expected to have the largest effect on mixing in the harbor. The no-wind case showed that there is a cross-harbor transport from Trident's outfall. Transport into the inner harbor from the discharge point is slightly increased along the southern shoreline; and out of the harbor it is slightly increased along the northern shore. For the east-wind case, the distribution appears a little more confusing toward the head of Akutan Harbor, while towards its mouth the major transport seems to be along the southern shore, just opposite of the no-wind case. Judging by the surface layer, the transport inward appears also to be along the southern shoreline. The west-wind case shows a strong transport both in and out of Akutan Harbor along the north shore, and it appears that vertical mixing may be much more intense for this case. Based on study results, it is highly unlikely that any seafood processing wastes discharged from the Trident Seafoods facility would enter the harbor basin located at the head of Akutan Harbor (Coastline Engineering, 2001).

Spilled petroleum products: The proposed harbor would generate more vessel traffic at the head of Akutan Harbor and thereby tend to increase spill potential; however, the harbor could reduce the potential for large spills from damaged vessels and would make it easier to contain spills. Petroleum products commonly enter the marine environment through bilge pumping, fueling, and improper response to spills. An estimated 65 percent of petroleum released into water is due to chronic discharges, whereas the remaining 35 percent is due to massive spills (Maccarone and Bryorad, 1994). Petroleum sheen is sometimes unavoidable near working vessels because even a minute quantity of petroleum tracked on deck from below or from dripping hydraulic lines can produce light surface sheen during wet weather.

In an attempt to determine the fate of spilled substances in Akutan Harbor, a spill trajectory model (Coastline Engineering, 2001) was used that permitted inputting controls for wind speed and direction, and a means to adjust spill properties. The model combined wind and current scenarios to determine areas that might be more or less exposed to the effects of a spill. According to model results, most petroleum spills occurring at the head of Akutan Harbor would be dispersed according to the predominant wind direction and tide stage. While some of the spilled substances would reach the mouth of Akutan Harbor, the majority would disperse and circulate within Akutan Harbor.

Biochemical oxygen demand and settleable solid residues: Historically many seafood-processing facilities operated in Akutan Harbor, and the seafood wastes from these facilities have significantly degraded the water quality of Akutan Harbor. The State of Alaska has listed Akutan Harbor as a water-quality limited water body, and the USEPA has listed Akutan Harbor as a Clean Water Act Section 303(d) Tier III impaired water body.

The USEPA has established two metrics to regulate the amount of pollutants discharged into Akutan Harbor. One is the total maximum daily load (TMDL) for settleable solid residues (SSR) and the other is the TMDL for biochemical oxygen demand (BOD_{5}) (USEPA 1995). The USEPA and ADEC are concerned that the proposed Akutan boat harbor will create additional BOD and that this BOD will further impair the water quality of Akutan Harbor. The Corps prepared a report that identified potential harbor-derived BOD sources, quantified the amount of BOD the proposed harbor could produce, and discussed it's affect on the BOD TMDL established by the USEPA (Appendix FEIS-5); the report's findings follow.

Twelve potential sources of BOD were evaluated to determine their relevance to the proposed project. Four of the twelve sources are primarily associated with harbor infrastructures: (1) dredging, (2) storm water runoff, (3) algal blooms, and (4) debris. The remaining eight sources are primarily associated with vessels: (1) sewage, (2) gray water, (3) petroleum products, (4) wastewater from fish holds, (5) wastewater from deck washing, (6) bilge water, (7) ballast water, and (8) fish waste.

The Corps believes that four of the 12 potential sources of BOD at the proposed harbor at Akutan are both applicable and significant: boat sewage, gray water, dredging, and storm-water runoff. These four are likely to occur in either sufficient quantity or with sufficient frequency to be important to the overall BOD load of the proposed harbor. BOD created from a worst-case scenario was also quantified for comparison. The result is a range of BOD values likely to result from the construction and operation of the proposed boat harbor at Akutan.

The primary harbor construction activity, dredging, is not expected to generate a substantial BOD load. Dredging would be a temporary and minor source of BOD because it would occur only during the construction and maintenance phases, would take place over 2 to 4 months, and most of the dredged material would be clean sand and gravel that settles quickly. Also, the mooring and turning basins would not be connected via the entrance channel to Akutan Harbor until after the basins are completely dredged. The amount of BOD (~2 lbs./day expected; ~35 lbs./day worst case) entering Akutan Harbor during dredging of the entrance channel would be minimized through the use of suction dredging and silt curtains. Maintenance dredging would likely produce similar amounts of BOD and would occur every 25 years if necessary.

Once the harbor is built and fully functional, the Corps believes that storm-water runoff (~23 lbs./day expected; ~327 lbs./day worst case) into the mooring basin would generate the most BOD, followed by gray water (~0.40 lbs./day expected; ~38 lbs./day worst case), and sewage discharges (~0.30 lbs./day expected; ~30 lbs./day worst case). Implementing and enforcing BMPs is crucial to minimizing and/or eliminating these types of BOD sources. For example, constructing grassy buffers or vegetative swales around the harbor would help eliminate polluted storm-water runoff from entering the mooring basin and surrounding wetlands. Providing restrooms and showers at the harbor and encouraging their use could minimize both gray water and sewage in the harbor. Petroleum-related BOD sources would be minimal (0.03 lbs./day), unless a major fuel spill occurred in the harbor (~104 lbs./day). Although the calculated worst-case BOD for a petroleum spill is higher than the BOD for gray water or sewage, in reality a petroleum spill would be unlikely to contribute much BOD because of dispersal, removal during cleanup, and slow degradation rates. Collectively, BOD sources would generate an expected BOD load of about 24 pounds per day, and a worst case BOD load of 498 pounds per day, which is approximately 0.02 percent to 0.34 percent of the Akutan Harbor BOD TMDL of 149,100 pounds per day.

Since the BOD TMDL was established in 1995, two of the seafood processors involved in the BOD calculation have discontinued their discharges. Trident Seafoods, Inc. is now the only anthropogenic BOD discharger in Akutan Harbor, and since 1998, they have reduced their BOD discharges significantly to approximately 105,000 pounds per day, well below their TMDL BOD_5 allocation of 133,200 pounds per day. Trident Seafoods, Inc. also now ships it's settleable solids (stick) waste offshore, and the reported pile of settleable solids in the form of fish remains sitting on the bottom off the Trident Seafoods dock is likely significantly reduced in size, thereby reducing its contribution to the overall BOD loading for Akutan Harbor. Thus, all existing anthropogenic BOD sources in Akutan Harbor combined with the estimated severe case for the marina would reach only approximately 71 percent of the TMDL.

The USEPA believes the natural sources of settleable solids in Akutan Harbor are insignificant, and the Corps believes that the harbor's settleable solids contribution would be insignificant as well. The insignificant amount of SSR the harbor might generate would not contribute to the seafood waste piles Trident Seafoods, Inc. already deposited upon the seafloor of Akutan Harbor. In addition, modeling conducted by Coastline Engineering (2001) has shown that no Trident-generated SSR would reach the head of Akutan Harbor and therefore would not enter the mooring basin. Therefore, the Corps believes that harbor activities will not violate State of Alaska settleable solids water quality standards, i.e. settleable solids associated with harbor activities will not cause a sludge, solid, or emulsion to be deposited beneath or upon the surface of the water, within the water column, or the bottom, or upon adjoining shoreline.

Because of the Corps' findings, the Corps has requested that USEPA reallocate Akutan Harbor's BOD and SSR waste loads that were established in 1995, taking into account the future construction and operation of the new harbor at the head of Akutan Harbor.

In summary, water quality could be significantly degraded if harbor operations do not control the release of toxic substances that would be harmful to humans, fish, bird, or plant life, or the release of hydrocarbons or related contaminants to the surface waters in such concentrations that they would violate State, or Federal statutes; or cause noticeable degradation to the biota within and proximal to the project site, such that recovery of the biota would be substantially impaired, prevented, or prolonged for extended periods.

The Corps believes that incorporating the USFWS's recommendations, as identified in their FWCA reports; other agency recommendations; and Endangered Species Act-related terms and conditions into the project's design and construction, operation, development, and monitoring phases (see sections 2.4.1 through 2.4.5), will mitigate to the maximum extent practicable, the potential environmental impacts on the project area's and Akutan Harbor's water quality.

4.3 Biological Resources

4.3.1 Vegetation

The two predominant vegetation communities of sedges and grasses at the head of Akutan Harbor will be adversely impacted by the project alternatives. Those vegetated areas not destroyed by the dredging of the harbor basin would be destroyed by the construction of the staging area and dredged material stockpiles. Approximately 29 acres of sedge-dominated vegetation and 28 acres of grass-dominated vegetation would be directly destroyed by dredge and fill activities. The harbor area would impact approximately 23 acres of sedge vegetation and 6 acres of grassland; the staging area would impact approximately 2 acres of sedge vegetation and 6 acres of grassland; and the dredged material stockpile would impact approximately 4 acres of sedge vegetation and 16 acres of grassland. Vegetation communities outside the project footprint could also be adversely impacted due to possible drainage of groundwater into the harbor basin and the possible increases in groundwater salinity; however, increased salinity effects on plant communities are not expected to be significant because one of the most abundant plants in the area, Lyngbye's sedge, is commonly found in estuarine areas throughout the Northwest and should be tolerant of more saline conditions (Wakeley, 2001). Lyngbye's sedge might increase in abundance or coverage in the remaining areas as long as existing hydrology is maintained. Other species that are adapted to saline conditions, but not seen in the project area, include seaside arrow-grass (*Triglochin maritium*) and alkali grass (*Puccinellia* spp.). These and other salt-tolerant wetland species may become established if there are nearby seed sources.

The Corps believes that incorporating the USFWS's recommendations, as identified in their FWCA reports; other agency recommendations; and Endangered Species Act-related terms and conditions into the project's design and construction, operation, development, and monitoring phases (see sections 2.4.1 through 2.4.5) will mitigate to the maximum extent practicable, the potential environmental impacts of the project on the area's vegetation.

4.3.2 Fish and Wildlife

The following project activities would affect the fish and wildlife resources at the head of Akutan Harbor: mobilization of construction equipment and personnel to and from the project site; dredging and dredged material disposal; rubblemound breakwater jetty construction; operation of the harbor; and harbor-related development. Impacts associated with threatened and endangered species are discussed separately in section 4.3.3.

Equipment barged to the project site would be off-loaded at the head of Akutan Harbor, and if necessary, beach material located around the high tide line would be used to construct a ramp from the barge to the adjacent upland area. Construction equipment might also be transported to the site via the to-be-constructed airport road, which would connect the community of Akutan to airport facilities. Benthic marine resources (e.g. epi- and infauna) inhabiting the sandy substrate within the physical footprint of the barge landing area would be destroyed. Any avians using the near-shore environment would be displaced, as well as any terrestrial wildlife using the adjacent beach and the area around the beach berm. Sea otters and Steller sea lions, although uncommon in the sandy beach area, would likely avoid the area. Barge-associated activities are not expected to affect freshwater or marine fishery resources.

An equipment staging area would likely be constructed adjacent to the barge-landing site, just inland behind the beach berm. Wildlife inhabiting the footprint of the staging area would be displaced. Nearby anadromous fish streams would not be adversely affected, as no construction equipment or personnel would be permitted to disturb such systems. Construction workers would probably live in Akutan and be transported daily to the harbor site via a skiff or by vehicle, assuming that the road to the airport facility has already been constructed and passes close to the head of Akutan Harbor.

Dredging and dredged material disposal activities would permanently displace wildlife (e.g. small mammals, fox, waterfowl, and passerines birds) from the habitat within the project site. Central and Rust creeks' freshwater fishery resources (e.g. three-spined stickleback and Dolly Varden) would be permanently destroyed by dredging an inland mooring basin, as the creeks flow through the footprint of the project. The anadromous fish populations using North and South creeks would not be adversely impacted by dredging and disposal activities because they are located entirely out of the project footprint. However, if left uncontrolled, turbid runoff from dredged material stockpiles could migrate to these same anadromous fish streams and degrade water quality to such an extent that the safety of resident adult and juvenile fish could be jeopardized. Marine near-shore fishery resources would be displaced and benthic organisms destroyed when the entrance channel is mechanically dredged. Dredging-generated turbidity and settleable solids would also deter fish from using the near-shore area and smother adjacent benthic communities.

All marine epi- and infauna within the sandy, soft bottom footprint of the rubblemound breakwater would be permanently destroyed; however, over time the armor rock face of the breakwater should become colonized with marine algae and an associated invertebrate community. The high level of human activity associated with breakwater construction would temporarily displace shorebirds and other avian fauna from using the adjacent shoreline and near-shore marine habitat. The physical construction of the breakwater would also deter fish from using the area because of the turbidity generated while placing the breakwater core and amour rock material into the water.

Placing rubblemound breakwaters into near-shore waters may affect the long-shore movements of juvenile fish. The proposed breakwaters would extend approximately 150 feet, nearly perpendicular, from shore. The depth of the water at the most seaward point of the breakwater would be –20 feet MLLW. Juvenile fish, particularly pink and coho salmon, moving north and south along the shoreline at the head of the bay would have to cross the 100-foot-wide, 18-foot-deep entrance channel, thereby, possibly exposing them to increased predation from other fish. Rather than crossing the entrance channel, juvenile fish may choose to move into the mooring basin where shallower water exists and swim around the perimeter of the mooring basin before exiting on the other side of the entrance channel. The amour rock 2:1 slope of the rubblemound breakwaters and the mooring basin's 3:1 slope protection rip-rap would likely function as a shallow shelf for fish to travel along and above. To facilitate the movement of fish around the breakwaters, a 5-foot-wide fish bench will be constructed on the outside of the breakwaters at –1.0 feet MLLW.

Operating a harbor at Akutan could have a long-term impact on the area's fish and wildlife resources. Harbor-related activities include, at a minimum, the movement of vessels into and out of the harbor, boat maintenance, heavy equipment operation, loading and off-loading vessels and equipment, harbor lighting, human movements, generating solid waste and its disposal, and collectively the noise generated from said activities.

Vessels currently move into and out of Akutan Harbor, and in doing so, displace waterfowl and sea ducks within their intended course and boat wake. Positioning a harbor at the head of Akutan Harbor would expand the area the transiting vessels would disturb, which may have environmental consequences because the head of Akutan Harbor functions as a place of refuge for sea ducks and other avian species, including the threatened Steller's eider. Furthermore, vessel and harbor lights could become an attractive nuisance causing bird collisions, and subsequent injury or death. But perhaps the greatest potential for environmental impacts associated with vessels would be the effects of petroleum compounds and other hazardous materials spills. Increases in vessel traffic would most likely increase the risk of fuel spilled in the harbor basin and Akutan Harbor.

Fuel spills affect marine birds by direct contact, and mortality is caused by ingestion during preening as well as hypothermia from matted feathers. Once in the marine environment, oils and fuels have a tendency to collect in the bottom sediments and concentrate in marine organisms. These harmful substances commonly enter the marine environment through bilge pumping, fueling, and improper response to spills.

An estimated 65 percent of petroleum released into waters is due to chronic discharges, whereas the remaining 35 percent is due to massive spills (Maccarone and Bryorad, 1994). Accumulation of light petroleum sheen and other pollutants within the harbor basin also is an ecological concern. Petroleum sheen is sometimes unavoidable near working vessels because even a minute quantity of petroleum can produce light surface sheen during wet weather.

Diesel oil, the main fuel-related contaminant of concern, is readily and completely degraded by naturally occurring microbes in 1 or 2 months. Much of spilled diesel is lost to evaporation and dispersal soon after spilling, and diesel spilled during the summer might be biodegraded to a less toxic state by winter when Steller's eiders are present. However, diesel is considered to be one of the most acutely toxic oil types to fish, invertebrates, and algae. Crabs and shellfish can be tainted from small diesel spills in shallow, near-shore areas. These organisms bioaccumulate the oil, but also depurate the oil, usually over a period of several weeks after exposure.

Operating a harbor would generate a great deal of fishing industry-related solid waste. If not properly disposed of, waste could become an attractive nuisance to wildlife. The local bald eagle population and small mammals would be particularly attracted to any putrefying waste. A local rat population could become established at the harbor and flourish if rat-infested vessels are permitted to use the harbor and improperly dispose of trash. Improperly disposed of fishing gear (nets, crab pots, rope, floats, etc.) could become an entrapment hazard for local wildlife, especially if disposed of in the marine environment. Currently, Trident Seafoods and the City of Akutan incinerate their waste and recycle selected metals.

Stationary and transient noises related to the harbor and its operation would be expected to disturb area wildlife more than the current noise sources. Stationary sources are typically related to specific land uses: transient sources move through the environment along established paths or randomly. The total acoustical environment of a locale is the blend of the background noise with unwanted noise. Wildlife response to noise is diverse but generally they either become accustomed to the noise or become startled and flee the area. In the short term, harbor generated noise would likely cause wildlife (avians and small mammals) to flee and avoid using certain areas, but in the long term, wildlife probably become habituated to the sounds of the harbor (running engines, heavy machinery operation, etc.) and reestablish themselves near the harbor. The transient sounds of motor vehicles using the road from the City of Akutan to the harbor, and vessels transiting back and forth through Akutan Harbor would be expected to randomly disrupt sea ducks and other wildlife such as sea otters and sea lions. In the long term, continuous noise-harassment of wildlife could cause individuals to permanently leave the protective environment of Akutan Harbor and seek refuge elsewhere in possibly lesser quality habitat.

Establishing a harbor at the head of the bay could stimulate harbor-support commercial developments to include vessel repair facilities, heavy equipment repair shops, fishing industry supply stores, etc. Such developments would probably require filling wetlands, thereby permanently displacing the wildlife resources using the habitat.

The Corps believes that incorporating the USFWS's recommendations, as identified in their FWCA reports; other agency recommendations; and Endangered Species Act-related terms and conditions into the project's design and construction, operation, development, and monitoring phases (see sections 2.4.1 through 2.4.5) will mitigate to the maximum extent practicable, the potential environmental impacts on the fish and wildlife resources at the head of Akutan Harbor.

4.3.3 Threatened and Endangered Species

4.3.3.1 Steller's Eider

On June 15, 2001, the USFWS received the Corps' biological assessment and letter determining that the harbor project at Akutan was likely to adversely affect over-wintering Steller's eider, and requesting formal consultation. Impacts would be generated by vessel traffic, oil spills, and harbor operations. On July 23, 2001, the USFWS requested additional information, which the Corps supplied on September 19, 2001. Formal consultation began on September 20, 2001, and the USFWS submitted a final biological opinion (FEIS Appendix 4) to the Corps on September 2, 2003.

The Corps believes that construction of a 58-vessel mooring basin and entrance channel at the head of Akutan Harbor could directly and indirectly impact over-wintering Steller's eiders. Minimal Steller's eider habitat would be destroyed to construct the harbor; however, Steller's eiders using the head of Akutan Harbor for foraging, loafing, and shelter could be acutely and chronically impacted by increased vessel traffic, activities associated with harbor operations, and petroleum-based spills. Harbor-generated vehicular and foot traffic between the harbor and the community on a proposed non-federal road connecting the community of Akutan to a proposed airport could periodically displace Steller's eiders that are known to congregate along the north shore of Akutan Harbor.

The Corps also believes that the risk of petroleum-related spills in Akutan Harbor could increase proportionately with increases in vessel traffic entering and leaving the harbor basin. Petroleum spills of various types are associated with the operation of vessels in and around Akutan Harbor. Approximately 65 spills were reported to have occurred in Akutan Harbor between 1991 and 1999, the largest being approximately 10,000 gallons (Day and Pritchard, 2000). Diesel fuel appears to be the most common product spilled. Operator error and equipment failure accounted for 49 percent and 34 percent of the spills, respectively (Day and Pritchard, 2000).

If a direct loss of Steller's eiders were to occur through oiling, it would most likely result from spills associated with harbor operations, refueling at Trident Seafoods, the grounding of a vessel entering or leaving the harbor basin, and colliding/sinking vessels. The degree of impact to Steller's eiders, though, would depend on factors such as the type of fuel spilled, the size of the spill, time of year of the spill, where in the harbor the spill occurred, the direction and speed of wind at the time of the spill, and the response time of containment vessels. Tidal circulation is relatively mild in Akutan Harbor and surface wind currents would likely have more of a role in transporting surface oil throughout the bay. Indirect losses of Steller's eiders may occur by ingesting petroleum-contaminated prey resources.

There has been a relatively long history of seafood processing in Akutan Harbor, and for many years the harbor's over-wintering Steller's eider population has been exposed to deteriorating water quality conditions. The entire Aleutian Islands seafood processing industry's seafood waste discharges are covered under General Permit AKP520000, which is about to be published in the Federal Register. The USEPA prepared a Steller's eider biological assessment and conducted formal consultation with the USFWS before finalizing the general permit. The USFWS included a Steller's eider take in their biological opinion of USEPA's biological assessment, and the USEPA put stipulations in the general permit to reduce the effects of the seafood processing industry on the Steller's eider.

Based on the USFWS's database; the current status of the Alaska breeding population of Steller's eiders; the environmental baseline for the project area; and the cumulative effects of the proposed action, it is the USFWS's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the species. Therefore no reasonable and prudent alternatives are recommended. However, the USFWS believes reasonable and prudent measures (RPM) are necessary and appropriate to minimize impacts of incidental take of Steller's eider. A cursory summary of the terms and conditions are presented in section 2.4 (Recommended Plan Mitigation and Environmental Protection Measures), and the complete list of terms and conditions are in FEIS-Appendix 4.

4.3.3.2 Short-tailed Albatross

On June 9, 2001, the USFWS received the Corps' biological assessment and letter determining that the harbor project at Akutan is not likely to adversely affect the short-tailed albatross. Human-induced threats to this species include hooking and drowning on commercial long-line gear, entanglement in derelict fishing gear, ingestion of plastic debris, and contamination from oil spills. In their July 23, 2001, letter to the Corps, the USFWS stated that based on the project description and considering that the harbor project is not expected to add additional boats to the long-line fisheries fleet, they concur with the Corps' determination that no impacts to the short-tailed albatross would occur as a result of the proposed action.

4.3.3.3 Marine Mammals

Vessels transiting the full length of Akutan Harbor, vessel-related petroleum spills, and the overall increase of human activities in Akutan Harbor could impact Akutan Harbor's Steller sea lion (an endangered species under NMFS jurisdiction) and sea otter (a candidate species for listing under the Endangered Species Act and jurisdiction of the USFWS) populations. No other endangered or threatened cetaceans or pinnipeds under NMFS's jurisdiction would be impacted by the project.

Steller sea lions and sea otters could be temporarily displaced from using feeding areas because of vessel traffic between the City of Akutan and Trident Seafoods docks, and the harbor at the head of Akutan Harbor. USFWS observations of sea otters along Akutan Harbor's north shore indicate that feeding sea otters are easily disturbed by human presence along the shoreline. However, Steller sea lions in Akutan Harbor do not appear to be easily disturbed by human shoreline activities.

Both species can be adversely impacted by oil spills. Steller sea lions, which do not frequent shallow waters in Akutan Harbor, will avoid areas spoiled by an oil spill by quickly swimming away. Sea otters, however, which normally stay close to shore to feed and rest, are easily oiled and unable to quickly leave a contaminated area. Excessive oiling eliminates the insulating factor of the sea otter's fur and causes mortality. Sea otter mortality and/or adverse physiological/morphological effects can also result if large volumes of oil are ingested during grooming.

4.3.4 Special Aquatic Sites

Subpart 230.10(a)(3), Restrictions on Discharges, Section 404(b)(1) Guidelines states that all practicable alternatives to a proposed discharge, which do not involve a discharge into a special aquatic site, are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise. And in cases involving a discharge into a special aquatic site for a non-water dependent activity, practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise.

The wetlands at the head of Akutan Harbor and the riffle and pool complexes in North and South creeks are considered special aquatic sites. The recommended plan would not affect North and South creeks' riffle and pool complexes, as the footprint of the project avoids these sensitive areas. However, the recommended plan would unavoidably affect wetland habitat (see section 4.3.5).

4.3.5 Wetlands

4.3.5.1 Delineating Impacts of Recommended Plan

The recommended plan would directly impact approximately 43.7 acres of freshwater wetlands and associated ecosystem resources (table FEIS-11; figure FEIS-26). More specifically, the harbor area would impact 27.7 wetland acres; the staging area would impact 4.8 wetland acres; and the dredged material stockpile area would impact 11.2 wetland acres. In total, 43.7 acres of wetlands would be directly impacted by the project.

Beneficial wetlands is the largest wetland category impacted by the project features and amounts to 23.3 acres or 53.3 percent of the total wetlands impacted (table FEIS-

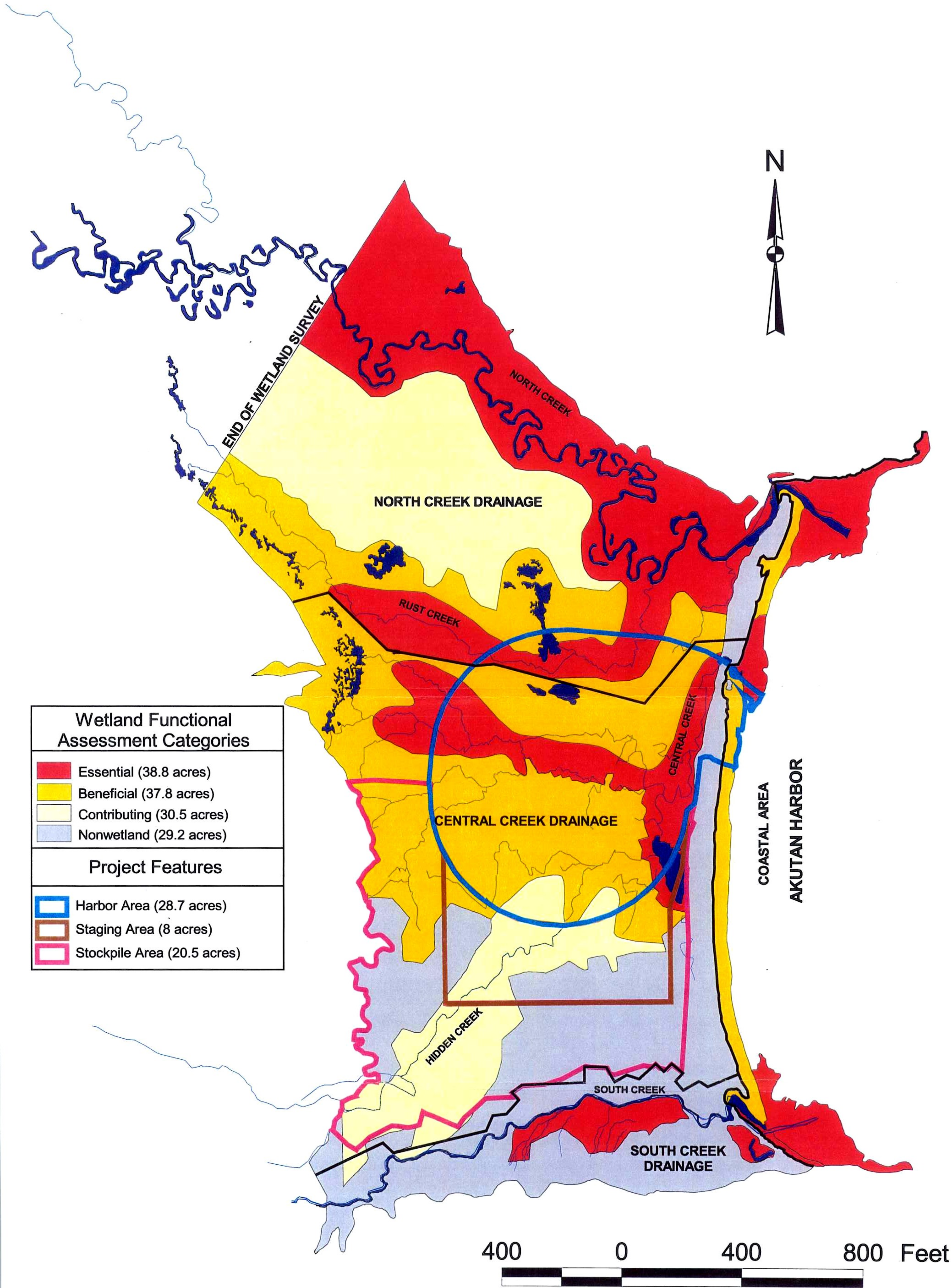


Figure FEIS-26. Wetland functional assessment categories within each drainage at the head of Akutan Harbor that are directly impacted by project featrues.

11). The amount of essential and contributing wetlands impacted by the project would be approximately the same (9.5 acres, or 21.7 percent; and 10.9 acres or 25 percent respectively).

The Central Creek drainage would experience the most wetland loss, as 88.6 percent (38.7 acres) of the total wetland loss generated by the project would occur there, followed by the North Creek drainage (9.8 percent, 4.3 acres) and the Coastal Area (1.6 percent, 0.7 acres).

Potential impacts to wetlands may extend beyond the project outline to adjacent areas due to: (1) drainage of groundwater into the harbor basin; and, (2) changes in wetland plant species composition due to possible increases in groundwater salinity. Lowering of the water table in a fringe around the excavated basin may occur because the water level in the basin (sea level) is lower than the water table in the surrounding wetlands. This is similar to the lateral effect of a drainage ditch in an agricultural field. The water table is lowered out to a distance determined by soil hydraulic conductivity, ditch (basin) depth, water table height, and other factors. The Corps did not evaluate the possible width of the affected zone because most of the area adjacent to the harbor basin would be filled for the staging and dredged material stockpile areas; however, a peninsula of existing beach ridge and adjacent wetlands would extend from the south between the harbor basin and Akutan Harbor. Even though they would not be filled, wetlands in this area may be lost due to lowering of the water table.

There is also a possibility that wetland areas adjacent to the harbor basin that are not filled may become more saline. Effects of increased salinity on plant communities are not expected to be significant, however. One of the most abundant wetland plants in the area, Lyngbye's sedge, is commonly found in estuarine areas and should be tolerant of more saline conditions. It might increase in abundance or coverage in the remaining wetlands as long as existing hydrology is maintained. Other species that are adapted to saline conditions, but were not seen at the Akutan site, include seaside arrow-grass (*Triglochin maritimum*) and alkali grass (*Puccinellia spp.*). These and other salt-tolerant wetland species may become established if there are nearby seed sources.

The wetland functional values associated with the Central Creek drainage (table FEIS-8) would be virtually lost, as the majority of impacts associated with the project are located there. Resident fish (Dolly Varden and threespined stickleback) populations and their rearing habitat would be destroyed, except for those populations inhabiting the streamlet sections nearest the toe of the western hillside. All stream-bank vegetation would be destroyed, and the mouth of Central Creek would no longer be available for juvenile coho salmon to use. No wetland functional values associated

Table FEIS-11. Number of acres in each drainage's wetland functional assessment category that are impacted by the major project features of the FEIS Recommended Plan, Akutan Harbor, Alaska.

Drainage	WFAC *	Harbor Area ** (28.7 acres)	Staging Area (8.0 acres)	Stockpile Area (20.5 acres)	Acres Impacted
North Creek	E	2.4	0	0	2.4
	B	1.9	0	0	1.9
	C	0	0	0	0
	N	0	0	0	0
	Subtotal	**4.3**	**0**	**0**	**4.3**
Central Creek	E	6.2	0.4	0.4	7.0
	B	14.7	1.2	4.9	20.8
	C	1.8	3.2	5.9	10.9
	N	1.0	3.2	9.3	13.5
	Subtotal	**23.7**	**8.0**	**20.5**	**52.2**
South Creek	E	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	N	0	0	0	0
	Subtotal	**0**	**0**	**0**	**0**
Coastal Area	E	0.1	0	0	0.1
	B	0.6	0	0	0.6
	C	0	0	0	0
	N	0	0	0	0
	Subtotal	**0.7**	**0**	**0**	**0.7**
	Grand Total	**28.7**	**8.0**	**20.5**	**57.2**
			Nonwetlands		**13.5**
			Wetlands		**43.7**
			Essential	21.7%	9.5
			Beneficial	53.3%	23.3
			Contributing	25.0%	10.9

* Wetland Functional Assessment Category (WFAC):
E = Essential; B=Beneficial; C=Contributing; N=Nonwetland

** Harbor project area (28.7 acres) includes basin (14.9 acres), entrance channel (1.3 acres), and perimeter road and slopes (12.5 acres) with the South Creek drainage would be impacted by the project. North Creek's wetland functions (table FEIS-11) should remain intact, with the exception of the Rust Creek area. The northern part of the harbor basin would destroy the middle reach of the creek; however, the functional values (Dolly Varden and threespined stickleback) of the affected section should be restored and enhanced when the creek was reconstructed and a fish block at its mouth was removed to allow anadromous fish to enter the system.

4.3.5.2 Mitigation Analysis

Section 404 of the Clean Water Act requires an evaluation of the discharge of dredged or fill material into waters of the U.S., including wetlands, in accordance with regulatory requirements of the Section 404(b)(1) Guidelines.[7] The guidelines are the substantive environmental criteria used in evaluating discharges of dredged or fill material.

Because of the recommended plan's known and potential impacts on wetlands at the head of Akutan Harbor, the Corps attempted to meet the substantive requirements of the Section 404(b)(1) Guidelines and be consistent with the USEPA/Department of Army Mitigation Memorandum of Agreement (MOA).[8] The Mitigation MOA, while designed primarily for compliance with Section 404 of the Clean Water Act through the Corps' Regulatory program, also established a mitigation sequence that provides a sound framework to ensure that the environmental impacts of Federal and permitted actions are acceptable. Under this framework there is a general three-step sequence for mitigating potential adverse impacts to the aquatic environment associated with a proposed discharge: (1) avoid potential impacts to the maximum extent possible; (2) minimize impacts; and (3) compensate for the loss of aquatic resource functions.

Although the State of Alaska is not exempt from the national "no overall net wetland loss" policy, concerns have been raised in Alaska about how "practicability" and "flexibility" considerations involved in implementing the alternative analysis and compensatory mitigation requirements of the Clean Water Act Section 404 regulatory programs are affected by circumstances in Alaska.[9] Specifically, this statement recognizes that avoiding wetlands may not be practicable where there is a high portion of land in a watershed or region that is wetlands and the remaining non-

[7] The Corps' complete Section 404(b) (1) evaluation is in FEIS-Appendix 6, and excerpts of it are reiterated in this section for discussion purposes.

[8] USEPA/Department of Army Mitigation Memorandum of Agreement Concerning the Determination of Mitigation Under the Clean Water Act 404(b)(1) Guidelines. Effective date February 7, 1990. FR Vol. 55, No. 48, March 12, 1990.

[9] Memorandum dated May 13, 1994, regarding statements on the mitigation sequence and no net loss of wetlands in Alaska. From R.H. Wagland, USEPA, Director, Office of Wetlands, Oceans, and Watersheds and M.L. Davis, U.S. Army Asst. for Regulatory Affairs to A.L. Ewing, Associate Regional Administrator, Alaska Operations Office, USEPA Region X and Major General S.G. Genega, Director of Civil Works, U.S. Army Corps of Engineers.

wetland areas are not developable. Where wetlands have been avoided to the extent practicable, emphasis is placed on minimizing project impacts to wetlands by reducing the footprint of the project, using co-location of facilities whenever possible, and seeking to locate the project in lower value wetlands. Where neither avoidance nor compensatory mitigation is practicable, minimizing impacts might be the primary means of satisfying compliance with the Section 404(b)(1) Guidelines. Restoring, enhancing, or creating wetlands through compensatory mitigation may not be practicable due to limited availability of sites or technical/logistical limitations, or due to the abundance of wetlands in the region.

The avoidance-sequencing step was applied early in the Corps' site-selection planning process, as many potential project locations in Akutan Harbor were identified. The head of Akutan Harbor and many other potential locations were not initially selected because of environmental and engineering concerns. North Point, the more environmentally compatible location, was chosen as the tentatively selected site and evaluated in more detail. However, upon further engineering and economic analysis, the North Point site proved to not be feasible. Only one other site in Akutan Harbor had a hint of economic viability: the head of Akutan Harbor. A more detailed economic and engineering analysis of this site determined that it would be feasible. Several conceptual harbor designs were then developed, and only the inland designs were determined to have the greatest net economic benefits. The largest harbor basin design (20 acres or larger) would be the NED Plan, but the environmentally preferred design (reconfigured 12-acre basin) was selected as the recommended plan. The reconfigured 12-acre basin would, to the maximum extent practicable, avoid and minimize impacts to the area's biological resources of concern, which include i.e., wetlands, anadromous fish streams, near-shore marine environment, and over-wintering Steller's eider and their habitat.

Once the 12-acre basin was selected, a variety of project modifications were made to avoid and minimize impacts to wetlands and the ecological resources they support. The footprint of the project was shifted as far south as possible to minimize impacts to North Creek's essential wetlands and fishery resources, and to the maximum extent possible, confine wetland impacts to the Central Creek area, which does not support spawning populations of pink and coho salmon. The basin side-slopes above MHW were steepened to 2:1 from 3:1 to reduce the dredged material quantities and associated wetland impacts.

The avoidance-sequencing step was also used to determine the least damaging alternative for positioning the water dependent, staging area. The 8-acre staging area (and the 72,000 cubic yards of dredged material used to construct it) was positioned on the south side of the harbor basin because of uplands availability and the lack of essential wetlands. The location totally avoids the significant biological resources in the North Creek drainage: an anadromous fish stream and essential wetlands.

Unlike the staging area, disposing of 771,000 cubic yards of dredged material is not a water-dependent action; therefore, unless demonstrated otherwise, practicable disposal alternatives that do not involve special aquatic sites (which include the head of Akutan Harbor wetlands) are presumed to be available and to have less adverse impact. Dredged material disposal alternatives were extensively discussed in section 2.3.2.1 (Alternative Identification and Analysis), excerpts of which are applicable in this discussion and are reiterated.

Avoidance sequencing was used to evaluate six dredged material disposal alternatives. Two alternatives involve transporting dredged material outside Akutan Harbor: Deepwater disposal in Akutan Bay and upland disposal at Unalaska, AK. Deepwater disposal and transporting dredged material to Unalaska, although environmentally preferred, would be prohibitively expensive primarily due to the high barge-transportation costs and the expenses associated with extending the construction season.

The four remaining alternatives have various degrees of cost effectiveness and associated environmental advantages and disadvantages. Environmental issues aside, disposing the dredged material on the intertidal beach at the head of Akutan Harbor is the most cost effective alternative, followed by indiscriminately discharging the material (via a suction dredge pipeline) offshore into Akutan Harbor. The costs associated with stockpiling the material onshore at the head of Akutan Harbor or at the Whaling Station are higher because of the required use of earthmoving equipment.

Two of the four remaining disposal alternatives would place dredged material into Akutan Harbor's near-shore and offshore marine environment. Akutan Harbor's near-shore marine environment supports a species-rich and diverse community of benthic organisms, kelp, fish communities, and shallow water habitat used by seabirds, sea ducks, and marine mammals. The Corps, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Alaska Department of Fish and Game agreed during NEPA scoping that placing dredged material on the intertidal beach habitat at the head of Akutan Harbor is not environmentally acceptable because of its significant and adverse impacts on over-wintering Steller's eider (a threatened species) habitat, essential fish habitat, the near-shore movement of fish (especially juvenile salmonids), and on Akutan Harbor's water quality, which is dissolved oxygen-impaired. Placing sandy dredged material on unlike-shoreline material consisting of gravel, cobble, and/or rock also is not environmentally acceptable because it would cause significant adverse impacts on the heavily vegetated substrate used by assemblages of benthic organisms and juvenile fish for refuge and spawning.

Ocean disposal of dredged material can in many cases be environmentally benign, and in some cases, environmentally beneficial; however, this would not be the case in Akutan Harbor. First of all, the cost-effective range (2 miles) of using a suction-dredge pipeline in Akutan Harbor is totally within the area classified as a water-impaired water body for dissolved oxygen. Second, the indiscriminate discharge of dredged material offshore into Akutan Harbor would adversely impact at a minimum water quality, king crab habitat, benthic epifauna/infauna organisms and their habitat, and the food resources fed upon by Steller sea lions. For the aforementioned reasons, the indiscriminate discharge of dredged material in offshore areas of Akutan Harbor is not considered further. However, opportunities may exist within Akutan Harbor for the beneficial use of dredged material in a manner or location that provides ecological benefit. A secondary benefit of implementing an ecosystem restoration plan with the dredged material would be that the amount of material to be disposed of would be reduced.

The presumptive least damaging alternative for the disposal of dredged material would be to use uplands, if sites are available and cost-effective to reach. The only uplands that exist within the cost-effective range (2 miles) of the suction dredging equipment is at the head of Akutan Harbor, at the Whaling Station, at the Trident Seafoods Processing facility and its commercial fishing gear storage yard, and at the City of Akutan. Because of their steep slope, the uplands associated with the hillsides bordering Akutan Harbor are not suitable for storing dredged material. With the exception of the uplands at the head of the Akutan Harbor and the Whaling Station, the uplands at the Trident Seafoods Processing facility and the City of Akutan are already heavily developed with commercial and/or residential buildings and therefore, not suitable for the storage of dredged material.

The Whaling Station has approximately 13 acres of privately owned property that is currently being used as a crab pot storage facility. Commercial fishing vessels are known to use its dilapidated woodpile pier. The site is also eligible for listing in the National Register of Historic Places and is currently a U.S. Army, Formerly Used Defense Site military cleanup site. Because of the site's inability to accommodate the 771,000 cubic yards of dredged material, and for the aforementioned circumstances, the site does not appear to be practicable.

Approximately 30 acres of non-wetlands were identified within the survey area at the head of Akutan Harbor (see sections 3.3.1, Vegetation; and, 3.3.5, Wetlands); however, only 9 acres would be reasonably accessible for dredged material disposal. The remaining 11.2 acres needed for stockpiling would consist of essential (0.4 acres), beneficial (4.9 acres), and contributing (5.9 acres) wetlands (figure FEIS-26 and table FEIS-11).

The Corps recognizes that disposing of dredged material onshore (in uplands and wetlands) at the head of Akutan Harbor and/or in offshore areas within inner-Akutan Harbor would have adverse impacts on the affected area's ecological resources, and that there are environmental tradeoffs associated with selecting one over the other.

Disposing of dredged material in Akutan Harbor's near-shore and deep-water environments would totally avoid impacting the Central Creek's wetlands and associated fishery resources; however, it would adversely impact benthic resources; near-shore movement of fish; essential fish habitat; water quality in an impaired water body for dissolved oxygen; over-wintering Steller's eider (a threatened species) habitat; Steller sea lions (an endangered species) and other marine mammals (e.g. sea otters, a candidate species); and, king crab and their habitat.

Disposing the dredged material onshore at the head of Akutan Harbor would totally avoid impacting the aforementioned marine resources in Akutan Harbor and utilize available uplands; it would, however, adversely impact Central Creek's wetlands and associated fishery resources. Opportunities may exist to reduce impacts to Central Creek's wetlands and associated fishery resources by using some of the dredged material for aquatic restoration projects in Akutan Harbor.

An evaluation of the environmental tradeoffs, in concert with the USFWS, ADFG, and NMFS, has lead the Corps to conclude that the onshore disposal of dredged material on uplands and wetlands within the Central Creek drainage is the least environmentally damaging and practicable alternative; and that efforts to conduct an aquatic restoration project using some amount of the dredged material in Akutan Harbor could further reduce wetland impacts.

The final mitigation-sequencing step involves compensating for unavoidable wetland impacts. After considering the functional wetland values lost in the 43 acres of wetlands impacted by the proposed action, onsite compensatory mitigation was undertaken in areas adjacent to the project site. A 41.7-acre Conservation Easement was established in the North Creek drainage to preserve essential wetlands and anadromous fish resources. In addition, the section of Rust Creek destroyed by constructing the harbor basin would be reconstructed, and a fish block at its mouth with North Creek would be removed to allow anadromous fish to use Rust Creek and its adjacent wetlands. To reduce the impacts of the dredged material stockpiles on wetlands, an undetermined amount of dredged material would be used for proven-feasible ecosystem restoration projects within the Akutan Harbor vicinity.

In conclusion, the Corps strove to avoid adverse impacts and to offset unavoidable adverse impacts to existing aquatic resources, and for wetlands strove to achieve a goal of no overall net-loss of values and functions. The Corps believes that potential impacts have been avoided to the maximum extent practicable and that the remaining unavoidable impacts have been minimized through project modification and compensated for to the extent appropriate and practicable. The determination of what level of mitigation constitutes "appropriate" mitigation is based solely on the values and functions of the aquatic resource that would be impacted. Under the Guidelines, "practicable" is defined as available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. The Corps also believes that the amount of mitigation provided is commensurate with the anticipated impacts of the project on wetlands and the ecological resources they support.

4.3.6 Essential Fish Habitat

The inland harbor design at the head of Akutan Harbor would affect, at a minimum, rock sole, sculpin, walleye pollock, and Pacific cod EFH because, based on field investigations, these species occur within the area where the entrance channel and rubblemound jetties would be constructed. Although not directly observed at any of the project alternative sites, the remaining listed species in table FEIS-10 could be affected as well because Akutan Harbor is within their known general distribution range.

Dredging a mooring basin out of the freshwater wetland complex at the head of Akutan Harbor would create marine habitat where none existed before. Dredging the entrance channel into the inland basin would alter shallow sand/gravel habitat into a deeper more uniform bottom, probably devoid of vegetation. The sections that follow summarize species-specific, applicable life cycle information (NMFS *et al.,* 1998 and NPFMC, 1999) and discuss associated project impacts, if any.

Walleye Pollock (juveniles and eggs). Spawning occurs pelagically around mid-March and eggs develop throughout the water column in water from 70 to 80 meters deep. Egg development is water temperature dependent, and can take 17 to 25 days to develop. The species goes through a larval stage of approximately 60 days that is distributed in the upper 40 meters of the water column. Early juveniles are found both pelagically and on the bottom, and feed on naupliar stages of copepods and small euphausiids. Strong year classes are found from the outer to inner shelf, while weak year classes are found only on the outer continental shelf. Juveniles occur on the outer shelf, upper slope, and basin. Juveniles and their food resources may occur in the project area, but the construction of a boat harbor at the head of Akutan Harbor would not likely affect the distribution or abundance of the species.

Pacific Cod (adults and late juveniles). Pacific cod is a transoceanic species, occurring at depth from shoreline to 500 meters and associated with mud/silt/clay to gravel substrate. Adults are demersal and form aggregations during the peak spawning season, which extends from January through May. Eggs are demersal and adhesive and hatch in 15 to 20 days. The next life stage is larval, which undergoes metamorphosis at 25 to 35 mm. Small cod mainly feed on invertebrates while the large adults are mainly piscivorous. The most important dietary items are euphausids, miscellaneous fishes, and amphipods. Adult Pacific cod are not likely to inhabit the harbor footprint; however, juveniles might.

Atka Mackerel (adults and late juveniles). Adults occur in large localized aggregations, usually at depths less than 200 meters and generally over a rough, rocky, and uneven bottom, near areas where tidal currents are swift. Adults are pelagic during much of the year, but migrate annually to moderately shallow waters where they become demersal during spawning. Eggs are deposited in nests built and guarded by males on rocky substrates or on kelp in shallow water. Eggs hatch in 40 to 45 days, releasing planktonic larvae that become wide spread. Little is known about the early juvenile period. Constructing a harbor at Akutan Harbor would not likely affect Atka mackerel because the affected area does not provide their preferred habitat.

Yellowfin Sole (adults and late juveniles). This species exhibits a benthic lifestyle. They spawn between May and August in shallow water and feed primarily on sandy bottoms, on polychaetes, bivalves, amphipods, and echiurids, as do late juveniles. Juveniles are separate from the adult population, remaining in shallow areas until they reach approximately 15 centimeters. Adults migrate to deeper waters of the shelf margin in winter to avoid extreme cold water temperatures. Yellow fin sole would be temporarily displaced from the project area during construction and would likely return to use the area for feeding after construction.

Flathead Sole (adults and late juveniles). This species exhibits a benthic lifestyle and occupies separate winter (spawning) and summertime feeding distributions. Spawning starts as early as January, primarily in deeper waters near the margins of the shelf and the adults migrate to the mid- and outer-continental shelf in April or May of each year for feeding. Feeding mainly occurs on ophiuroids, tanner crab, osmerids, bivalves, and polychaetes. Eggs and larvae are planktonic. Flathead sole would be temporarily displaced from the project area during construction and would likely return to use the area for feeding after construction.

Rock Sole (adults and late juveniles). This species exhibits a benthic lifestyle and occupies separate winter (spawning) and summertime feeding distributions on the continental shelf. Feeding on bivalves, polychaetes, amphipods, and miscellaneous crustaceans occurs primarily in sandy substrate. After spawning rock sole begin to actively feed and migrate to the shallows of the continental shelf. Surveys have indicated that most of the population can be found at depths from 50 to 100 meters in substrates of gravel, mud, and sand. Newly hatched larvae are pelagic and remain so until they are about 20 mm in length, when they assume their side-swimming, bottom-dwelling form. Juveniles are separate from the adult population, remaining in shallow areas until they reach age 1. Rock sole would be temporarily displaced from the project area during construction and would likely return to use the area for feeding after construction.

Alaska Plaice (adults and late juveniles). Adults and late juveniles occur within the inner, middle, and outer shelf zone on mud/sand/gravel habitat. Plaice return to the middle and inner shelf zone for feeding in spring, summer, and fall. They feed on polychaetes, amphipods, and echiurids. This species could occur in the general Akutan Harbor vicinity, but is not likely within the area of the project site.

Sculpins (adults and late juveniles). Sculpins are a large circumboreal family of demersal fishes inhabiting a wide range of habitats in the North Pacific Ocean and Bering Sea. Habitats range from tidepools to water depths of 1,000 meters. Adult and juvenile sculpins are mainly known to be associated with substrates from mud/silt/clay to gravel. Most sculpins spawn in the winter. All species lay eggs, but some general fertilization is internal. Eggs are generally laid among rocks and are guarded by the males. The larval stage is found across broad areas of the shelf and slope. Sculpins generally eat small invertebrates. Sculpins are present at the proposed harbor site, and placing a harbor at the proposed site would displace them during construction. They would re-establish themselves after construction and little overall habitat loss is expected.

Skates (adults and late juveniles). Adults and juveniles are demersal and feed on bottom invertebrates (crustaceans, mollusks, and polychaetes) and fish. Adults and late juveniles primarily occur between 50 and 200 meters on the Aleutian Islands shelf. Little is known of their habitat requirements for growth or reproduction, nor of any seasonal movements. Project activities are unlikely to impact adult and late juvenile skates because of the great depths they inhabit.

Red King Crab. Adult red king crabs typically inhabit depths less than 300 meters within the inner continental shelf zone. They molt multiple times per year through age 3, after which molting is annual. Shallow inshore areas (less than 50 meters) are very important to king crab reproduction as they move inshore to molt and mate. Larval stages are distributed according to vertical swimming abilities, and the currents, mixing, or stratification of the water column. Generally, the larvae occupy the upper 30 meters of the water column, often in the mixing layer near the sea surface. After several molts, the crabs settle to the bottom. Settlement on habitat with adequate shelter, food, and temperature is imperative to survival of the first settling crabs. They prefer high relief habitat such as boulders, cobble, and shell debris. Young-of-the-year require near-shore shallow habitat. Late juvenile stage crabs are most active at night when they feed and molt. The habitat at the head of Akutan Harbor is poor for supporting any red king crab life cycle.

Golden king crab. Adults are found at depths from 100 meters to 1,000 meters, generally in high relief habitat such as inter-island passes, and are usually slope-dwelling. Strong currents are prevalent. Their physical habitat requirements are associated with hard bottoms, steep rocky slopes, and narrow ledges, and they coexist with abundant quantities of epifauna, sponges, hydroids, sea stars, bryozoans, and brittle stars. The habitat in and around the project site is not conducive to supporting this species

Tanner Crab (larvae). Larvae are typically found in the water column from 0 to100 meters in early summer. They are strong swimmers and perform diel migration in the water column, i.e., they at are depth at night. Information is not available to define essential habitat for the larval stage in the Eastern Aleutian Islands stocks.

4.4 Socio-Economic Resources

The proposed project would provide the commercial fishing fleet with transient and permanent moorage space where none exists. The community of Akutan would benefit economically from the harbor by increased employment opportunities and the harbor would provide a stable base for the Bering Sea fishing industry. Adjacent infrastructure development would also promote diverse employment opportunities.

Subsistence hunting and fishing occurs primarily outside Akutan Harbor, and traditional subsistence areas are usually accessed using small skiffs. With a harbor, subsistence users could purchase and moor larger boats and then use them to more easily and safely access their subsistence areas, especially in poor weather, and extend the range of their subsistence activities.

There is no market value associated with subsistence production because it is a non-market commodity. However, the value of increased subsistence can be measured by its substitution value; that is, the value (local cost) of the food that would be replaced by subsistence production. Theoretically, the recommended plan would generate total annual benefits of approximately $52,000 (Feasibility Report Appendix B, Economic Analysis of Navigation Improvements at Akutan, AK).

4.4.1 Protection of Children

On April 21, 1997, Executive Order 13045, Protection of Children From Environmental Health and Safety Risks was issued requiring each federal project to identify and assess environmental health and safety risks that may disproportionately affect children. The Executive Order came in response to a growing body of scientific research that revealed that children, because their bodies are still developing, suffer disproportionately from environmental health and safety risks. Further, the executive order notes, children's size and weight may diminish their protection from standard safety features and their behavior patterns may make them more susceptible to accidents.

The proposed project site is isolated and approximately 2 miles from the City of Akutan. Access to the site is currently limited to boat and foot traffic; however, vehicular traffic would be capable of accessing the site after the road to the head of Akutan Harbor is constructed as part of the State of Alaska's airport development project. The only commercial development between the City and the project site is the Trident Seafoods processing plant.

The proposed action would affect the community as a whole, and there would be no environmental health or safety risks associated with the action that would disproportionately affect children.

4.4.2 Environmental Justice

Executive Order 12898, directs federal agencies to address disproportionately high and adverse human health and environmental effects on minority and low-income populations. As discussed in section 3.1, 80 percent of the population in Akutan and 71 percent of the population of the Eastern Aleutians Borough is minorities. In addition, 45.5 percent of the people in Akutan are living below the poverty level.

CEQ guidance states, "Where a potential environmental justice issue has been identified… the agency should state clearly… whether in light of all the facts and circumstances, a disproportionately high and adverse… impact on minority populations, low income populations, or Indian tribe is likely to result from the proposed action and any alternatives."

4.4.2.1 No-Action Alternative

Under this alternative, no harbor would be constructed. This would result in continuing damage to vessels and docking facilities at Trident Seafoods. Other than the relatively natural protection provided by Akutan Harbor, commercial and recreational vessels would have no protected moorage or launching facilities. The Bering Sea fishing fleet would continue to seek moorage at other places, providing no benefit to the Akutan community. This alternative poses no change to the existing environment or health of Akutan or the Eastern Aleutians Borough.

4.4.2.2 Human Environment

The visual landscape of Akutan Harbor could be changed with the addition of a spur road, a harbor, breakwaters, and floats. The project features would displace some wildlife and eliminate some wetlands. The 2-mile distance of the project to the community would help reduce visual, noise, and other impacts on the community. However, the harbor would likely stimulate commercial development in the area, which would result in increased foot and vehicle traffic between the harbor site and community, as well as seasonally and permanently increase the community's population.

4.4.2.3 Social and Economic Environment

The proposed harbor would provide economic benefits to the community. The harbor would provide a safe and protected place to moor and launch vessels. This could enhance commercial, recreational, and subsistence activities that already exist in Akutan. The harbor's construction would also stimulate commercial development in the area, which would diversify and improve employment opportunities. This in turn should help stimulate growth within the community and alleviate a pressing local problem of declined enrollment in the Akutan School.

4.4.2.4 Human Health

Mitigation and environmental protection measures incorporated into the project design and operation address potential human health impacts; however, human health conditions in Akutan are not expected to drastically change during or after harbor construction. Hydrocarbon emissions associated with the operation of heavy construction equipment is expected to be minimal. Emissions from operating vessels would also be expected. The use of low-Nox engines, alternative fuels, and catalytic converters would limit harmful air emissions, and the predominantly windy environment would disperse them quickly.

Vessel-derived petroleum spills into Akutan Harbor would have a local impact on Akutan Harbor's water quality. This could affect local marine biological resources, including any resources in Akutan Harbor harvested for subsistence. The harvest of subsistence foods such as marine fish and shellfish are most affected by these risk perceptions; however, the local community does not routinely conduct subsistence activities in Akutan Harbor. The anadromous fish harvested at the head of Akutan Harbor would not be affected by petroleum spills.

In conclusion, the proposed navigation improvements at Akutan would affect minority and low-income populations, but do not represent disproportionately high and adverse effects. Contrary to resulting in a disproportionate placement of adverse environmental, economic, social or health effects on minority and low-income populations, the proposed action would result in economic and social benefits to the local community as a whole.

4.5 Archeological/Historical Resources

There are two AHRS sites at the head of the bay: the reported pre-contact site (AHRS ID # UNI-00033) and the Brown/Rathke farm site (AHRS ID # UNI-00097). Banks (1974) reported a pre-contact period "camp fire stain" at the head of Akutan Harbor. Despite the Corps' extensive testing with both an auger and soil probe, no evidence of pre-contact occupation was encountered and UNI-00033 was not found.

The Brown/Rathke farm site has integrity of location and setting. But because the buildings and structures on the farm have been removed or destroyed, the site lacks integrity of design, materials, workmanship, feeling, and association. The period of significance for this site is roughly 1960 to 1970. Under Criteria Consideration G, a property built in the last 50 years may be nominated to the National Register of Historic Places (NRHP) only if it is of exceptional importance. "The phrase 'exceptional importance' may be applied to the extraordinary importance of an event or to an entire category of resources so fragile that survivors of any age are unusual" (*Guidelines for Evaluating and Nominating Properties That Have Achieved Significance Within the Last Fifty Years,* National Register Bulletin #22, p. 1).

The Brown/Rathke farm site represents a post-World War II movement to revive ranching in the Aleutian Islands that began when the Russians brought fox to the Aleutian chain for fur farming. Sheep and cattle ranching and reindeer herding continue in the chain today. This farm is not an exceptional example of this movement, and better examples exist on nearby islands (e.g. Chernofsky and Fort Glenn). The Brown/Rathke farm is not eligible for the NRHP under Criterion A. The individuals who built and operated the farm were not of local, state, or national importance as required for eligibility to the NRHP under Criterion B. Structures at the Brown/Rathke farm lack characteristics sufficient for eligibility to the NRHP under Criterion C. The Brown/Rathke farm is not eligible to the NRHP under Criterion D because it does not have the potential to provide information important to our understanding of history or prehistory due to a lack of integrity.

The two square and one round depression are from World War II Quonset huts or tents. Artifacts and other features from this period were not encountered, but these three depressions were associated with the World War II occupation at the whaling station (AHRS ID # UNI-00086) along the south shoreline of Akutan Harbor. These features lack integrity of feeling, association, materials, workmanship, design, and setting because the Quonset huts have been removed and no World War II era artifacts or structures remain in the area. The component at the head of Akutan Harbor is outside the area of potential effect.

The depressions along the beach berm contained modern debris, and there was speculation that they may have been old house depressions used to bury or contain trash. However, no pre-contact cultural material was found in the depressions, in the walls of the depressions, or in tests placed in and near the depressions. Based on the artifacts found in the depressions, the depressions were associated with the Brown/Rathke farm.

Based on the determination of the three sites reported or recorded within the project area, there would be no historic properties affected by the proposed harbor project. The World War II depressions at the head of Akutan Harbor are outside the project area and would not be affected. These depressions are not eligible for the NRHP because they lack integrity. The Brown/Rathke farm is not eligible for the NRHP because it is an unexceptional property younger than 50 years and lacks integrity required for Criteria A and C. The reported pre-contact site, AHRS ID # UNI-00033, was not located during the archaeological survey, despite extensive testing. Earlier reports of a pre-contact burn stain and extensive damage by wartime activities lead to the conclusion that it has since been destroyed.

The Alaska State Historic Preservation Officer (SHPO) concurs with the Corps' finding that the farm site (UNI 00097) is not eligible for listing in the NRHP. The SHPO also concurs with the Corps' finding that no historic properties would be affected by the undertaking.

4.6 Unavoidable Adverse Impacts

Unavoidable, short and long term adverse impacts would occur at the head of Akutan Harbor as a result of constructing the recommended plan.

- Emissions from construction equipment would have a local affect on air quality; however, the impacts would be temporary and intermittent, and would cease at the end of the construction period.

- Dredging a mooring basin in a freshwater wetland complex would have a long-term impact on the complex's hydrology. Surface runoff and the shallow groundwater aquifer would no longer flow to the east into Akutan Harbor, but instead would discharge into the mooring basin. The existing freshwater water table would adjust to a new level, and along with a new level of saltwater intrusion, possibly affect the type of wetland vegetation that becomes established around the periphery of the mooring basin.

- Anticipated, incomplete circulation in the mooring basin may facilitate water quality degradation (i.e. lower dissolved oxygen concentrations); however, modeling results suggest that with adequate wind speed and proper wind direction, water quality degradation would be kept to a minimum.

- Approximately 43.7 acres of wetlands and associated ecological functions and 13.5 acres of uplands (non-wetlands) would be permanently destroyed by constructing the harbor, staging, and dredged material stockpile areas. The majority of the wetland impacts would occur within the Central Creek drainage. Depending on how the new freshwater water table adjusts after dredging, more saltwater-tolerant wetland vegetation may become established within the Central Creek drainage.

- Within the footprint of the project, fish-bearing (threespine stickleback and Dolly Varden) ponds and streamlets (primarily within the Central Creek drainage) would be permanently destroyed by dredging and dredged material disposal activities.

- Dredging and filling activities would permanently destroy marine epi- and infauna inhabiting the footprint of the entrance channel and the rubblemound breakwaters.

- Sea otters and over-wintering Steller's eiders would be exposed to chronic releases of petroleum products into the marine environment, and if the releases were large enough, mortalities may occur. Furthermore, prey species may become contaminated with petroleum-based chemical components. Harbor operations and increased vessel use of the head Akutan Harbor would likely disturb over-wintering Steller's eider and sea otters that heavily use the area.

4.7 Cumulative Impacts

The Council on Environmental Quality defines cumulative impact as follows:

> *"Cumulative impact" is the impact on the environment that results from the incremental impact of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individual minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).*

Cumulative effects analysis necessarily involves assumptions and uncertainties. Determining the threshold beyond which cumulative effects significantly degrade a resource, ecosystem, and human community is often problematic, as no definitive thresholds for cumulative analysis exist.

In general, a project or activity may lead to or allow additional activities that might not otherwise have occurred. For example, a new road might improve access to an area, which might increase development there. That additional development would be an indirect or induced impact resulting from road construction.

Peratrovich and Nottingham, Inc. in 1981-82 prepared a conceptual plan of harbor development at the head of Akutan Harbor, but the community has not, and does not plan to officially adopt and implement the plan. At this time, the City of Akutan has not prepared any land use development plan for the area surrounding the harbor site.

Although no foreseeable projects have been identified for this analysis, constructing a harbor at Akutan would likely stimulate the development of harbor-related businesses, such as fueling stations, vessel repair shops, vessel storage, grocery/supply stores, equipment storage areas, etc. It is possible that additional seafood processing facilities might become established in the harbor. The community of Akutan would likely expand utility and other services (e.g. power generation, water, and waste disposal) to the harbor. Most development would likely occur on upland areas constructed from the mooring basins dredged disposal material; however, some businesses may choose to apply for a Corps Section 10/404 permit to fill wetlands or intertidal areas and construct their businesses there.

Plans by the ADOT/PF and FAA to construct a road to a proposed airport on the island would likely increase the levels of human activities in and around the proposed harbor. Commercial fishing boat operators could travel to the harbor to exchange crewmembers and load supplies that were flown to the island and transported to the harbor. The harbor could also be used to moor a water taxi if ADOT/PF and FAA decide that that means of transportation to the airport is more feasible than constructing a road to the airport.

Recent discussions with representatives from the Akutan community and Aleutians East Borough indicate that the above scenario may occur, with the exception of additional seafood processing plants being constructed. Other than Deep Sea Fisheries' failed attempt to become established in Akutan Harbor in 1993, no other seafood processing companies have recently planned or are now planning an operation in Akutan Harbor, primarily because of the competitive nature of the business, diminishing fish stocks, tightly regulated fishing quotas, and the lack of suitable land for development. A new harbor at Akutan would not increase Bering Sea commercial fish harvests or any other type of commercial resource extraction, but would make present levels of harvest safer and more efficient.

The cumulative effects of petroleum spills and dumping solid wastes into Akutan Harbor could in the long-term adversely affect the area's marine fish and wildlife resources. The chronic release of petroleum products into the marine environment from vessels and refueling facilities would cumulatively reduce water quality and contaminate the marine resources that local fish and wildlife rely on for food. In the long term, this exposure could adversely affect the ability of animals to feed, migrate, and breed, and in some cases cause mortality.

Akutan Harbor's shoreline and near-shore area are currently littered with fishing-industry-related trash (e.g. fishing nets, floats, crab pots, and lines) and trash (e.g. oil cans, lead batteries, and Styrofoam) from unknown sources. In some cases, selected trash has become a potential entrapment hazard for wildlife and in other cases selected trash, if ingested, can cause mortalities. Increased vessel use in Akutan Harbor may exacerbate the trash problem and cumulatively, may increase the frequency of wildlife entrapment and mortality.

Wetlands at the head of Akutan Harbor would be permanently lost due to harbor construction, and associated growth would likely be restricted to the dredged material stockpile areas. As stockpiled dredged material is used (e.g. road construction, airport construction, and ecosystem restoration projects), suitable harbor uplands would be made available for development.

5.0 COASTAL CONSISTENCY/PERMITTING REQUIRMENTS

A Partnership Agreement (PA), dated May 1997, serves to improve cooperation, coordination, and communication between the Alaska Division of Governmental Coordination and the Corps, now known as the Alaska Office of Project Management and Permitting. The PA describes the process both agencies agree to follow in making and reviewing consistency determinations for Federal activities and in reviewing Federal permit actions that affect Alaska's coastal zone. The authority to enter into this agreement is based on Section 307 of the Coastal Zone Management Act (CZMA) of 1972, as amended. The CZMA requires that all federally conducted or supported activities, including development projects, that affect the natural resources or uses of the coastal zone be undertaken in a manner consistent to the maximum extent practicable with approved State coastal management programs. The NEPA process is the cornerstone of the Corps' environmental compliance process for construction projects. This FEIS has been prepared to identify issues, provide information, document coordination and compliance requirements for the Akutan navigation improvements project, and to ensure that coastal issues are identified and the coastal resources are considered in the NEPA decision. To do this, the FEIS incorporates the requirements specific to the CZMA program and applicable coastal district management plan, and provides information needed for the coastal consistency review.

This project would take place within the Aleutians East Borough (AEB) Coastal Management Zone. A coastal consistency analysis of the project, relative to the AEB Coastal Management Program plan's (AEB, 1992) policies and guidelines, is contained in FEIS-Appendix 7.

The Corps or project sponsor (Aleutians East Borough) would likely require the following permits from various State of Alaska agencies:

1. Alaska Department of Natural Resources

a. Fish Habitat Permit: This permit is issued prior to the Corps awarding the construction contract. The information required for this permit is contained in the FEIS and/or the final design documents for any construction directly related to streams, e.g., stream relocations or obstruction removals.

b. Tideland Use Permit. The Alaska State Department of Natural Resources has stated that a Tideland Use Permit is required. If necessary, the project sponsor (AEB) has agreed to apply for the permit.

2. Alaska Department of Environmental Conservation

a. 401 Water Quality Certification: This certification is issued after the State of Alaska Coastal Consistency Review, which is completed at the conclusion of public review of the FEIS.

A Right-of-Entry agreement between the Corps and the project area's landowner (Akutan Corporation) would be obtained prior to construction.

A copy of the project's 404(b)(1) Evaluation (FEIS-Appendix 6) and FEIS will be provided to the Corps' Alaska District's Regulatory Branch for their reference and use when the time comes to process harbor-related, Section 10/404 permit applications.

The Corps believes that with the issuance of the aforementioned permits and implementation of the project's mitigation plan, the project would comply with, and would be conducted in a manner consistent to the maximum extent practicable with, the Alaska Coastal Management Program and AEB coastal management plan.

6.0 LIST OF PREPARERS AND CONTRIBUTORS

The preparers of and major contributors of information to this FEIS and other parts of the Akutan Navigational Improvements feasibility study and report are listed below:

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7.0 REFERENCES

Adamus, P.R., Larson, J.S., and Clairain, E.J. Jr. 1989. Functional Assessment of Freshwater Wetlands: A Manual and Training Outline. Publication No. 89-6, The Environmental Institute: University of Massachusettes, Amherst.

Alaska Dept. Fish and Game. 1978. *Alaska's Wildlife and Habitat Volume II.*

Alaska Dept. Fish and Game. 1993. *Atlas to the Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fish, Southwest Region, Resource Management Region III*

Aleutians East Borough (AEB). 2001. Coastal Resources Inventory and Environmental Sensitivity Maps, Aleutians East Borough, Alaska. Prepared by Research Planning, Inc., Columbia, South Carolina. Prepared for Aleutians East Borough. September.

_______. 1992. Aleutians East Borough Coastal Management Program: Program Coastal Area Boundary, Policies, Implementation, Resource Inventory, and Analysis. Prepared by Jon Isaacs and Associates. November.

Bank, T. P. II. 1974. Letter to Dr. Karen Wood Workman, State Archaeologist. Alaska Department of Alaska National Resources, Anchorage.

Berry, T.E., M.R. Graves and M.J. Bishop. 2001. Development of a Digital Elevation Model and Topographic Map for the Proposed Site of the Akutan Harbor Project, Akutan Island, Alaska. Prepared by Environmental Laboratory, U.S. Army Engineer Research and Development Center, Vicksburg, MS. 9 pp + map inserts.

Black, L.T. 1999. *The History and Ethnohistory of the Aleutians East Borough.* Edited by Richard A. Pierce, Katherine L. Arndt and Sarah McGowan. Limestone Press, Fairbanks.

Brinson, M.M. 1993. A Hydrogeomorphic Classification for Wetlands. Prepared for U.S. Army Corps of Engineers, Waterways Experiment Station, Wetlands Research Program Technical Report WRP-DE-4. August. 101 p.

Burns, J. 1998. Trip report for proposed Akutan Small Boat Harbor. Memorandum dated 30 September 1998, for CEPOA-EN-CW-ER. 2 pp.

Cardwell, R.D. and R.R. Koons. 1981. *Biological considerations for the siting and design of marinas and affiliated structures in Puget Sound.* State of Washington, Department of Fisheries, Tech. Rept. No. 60. 31 pp.

Coastline Engineering. 2001. Circulation Modeling in Akutan Harbor and the Potential Impacts by and to the Proposed Small Boat Harbor, Draft Report. Prepared for Tryck Nyman Hayes, Anchorage, Alaska. October. 108 pp.

Cora, C. 2001. Personal communication on July 25, 2001, phone conversation (206-553-1148). U.S. Environmental Protection Agency, Compliance Section, Seattle, Washington

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31, U. S. Fish and Wildlife Service, Washington, DC.

Denfeld, C.D. 1996. *The Akutan Whaling and Naval Fueling Station: A History, Akutan Island, Alaska.* Alaska District, U.S. Army Corps of Engineers, Anchorage.

Dunbar, J.B., M.K. Corcoran and W.L. Murphy. 2001. Hydrogeology of Proposed Harbor Site at Head of Akutan Bay, Akutan Island, Alaska. Prepared by Environmental Laboratory, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS. 62 pp + appendices.

Holland, K.M. 1982 *Chulka Bone Artifacts, Akun Island, Alaska: Analysis and Description.* Master's thesis, Arizona State University, Tempe.

Isaacs and Associates. 1993. Aleutians East Borough Coastal Management Program. Coastal Area Boundary, Policies, Implementation, Resource Inventory and Analysis.

Jacobs Engineering Group, Inc. 2001. *Marine Sediment Remedial Investigation Report, Akutan, Alaska.* Prepared for U.S. Army Corps of Engineers, Alaska District, Anchorage, AK. Total Environmental Restoration Contract. Contract No. DACA 85-95-D-0018. Anchorage, Alaska. October.

_______. 1996. *Site Visit -Trip Report 21 January - 2 February 1996, Akutan Naval Station, Akutan, Alaska.* Prepared for U.S. Army Corps of Engineers, Alaska District, Anchorage, AK. Total Environmental Restoration Contract. Contract No. DACA 85-95-D-0018. Anchorage, Alaska. February.

_______. 1996. *DRAFT Engineering Evaluation/Cost Analysis Interim Removal Action, Akutan Naval Station, Akutan, Alaska.* Prepared for U.S. Army Corps of Engineers, Alaska District, Anchorage, AK. Total Environmental Restoration Contract. Contract No. DACA 85-95-D-0018. Anchorage, Alaska. April.

Jones and Stokes. 1992. Draft Environmental Assessment. Deep Sea Fisheries Shore-based Seafood Processing Plant. Work Assignment #13. Prepared for U.S. Environmental Protection Agency, Region X, Seattle, WA.

Koutitas, C. 1988. Mathematical models of coastal circulation. Pages 49-103 *in* Mathematical Models in Coastal Engineering. Pentech Press. London, England.

Lawler, Matusky, and Skelly Engineers. 1983. Results of Water Quality Tests in Prototype Silt Curtain Testing Program. Westway Project Prepared for Parsons Brinkerhimm, Quade, and Douglas.

Maccarone, A. and J. Brzorad. 1994. Gull and waterfowl populations in the Arthur Kill. Pp. 201-214 in Burger, ed. *Before and after an oil spill: the Arthur Kill*. Rutgers University Press, New Brunswick, NJ.

McCartney, A.P. 1984. *Prehistory of the Aleutian Region*. In: Handbook of North American Indians, Arctic, Vol. 5. Pp. 119-135. Smithsonian Institution, Washington, D.C.

McGowan, S. 1999. The Modern Village of Akutan: 1878 to Present. In: *The History and Ethnohistory of the Aleutians East Borough*. Lydia T. Black, edited by Richard A. Pierce, Katherine L. Arndt and Sarah McGowan. Limestone Press, Fairbanks.

Municipality of Anchorage. 1996. Anchorage Wetlands Management Plan, Ten-year Revision. Prepared by the Department of Community Planning and Development, Anchorage, AK.

National Marine Fisheries Service (NMFS), North Pacific Fishery Management Council, and Alaska Department of Fish and Game. 1998. Habitat Assessment Reports for Essential Fish Habitat. Prepared for Technical Teams for Essential Fish Habitat. 433 pp.

North Pacific Fishery Management Council (NPFMC). 1999. Environmental Assessment for Amendment 55 to the Fishery Management Plans for the Groundfish Fishery of the Bering Sea and Aleutian Islands; Amendment 55 to the Fishery Management Plan for Groundfish of the Gulf of Alaska; Amendment 8 to the Fishery Management Plan for the King and Tanner Crab Fisheries in the Bering Sea/Aleutian Islands; Amendment 5 to the Fishery Management Plan for Scallop Fisheries off Alaska; and, Amendment 5 to the Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska. Anchorage, AK. 364 pp.

Novitzki, R.P., Smith, R.D., and Fretwell, J.D. 1995. Restoration, Creation, and Recovery of Wetlands: Wetland Functions, Values, and Assessment. National Water Summary on Wetland Resources. U.S. Geological Survey Water Supply Paper 2425. http://water.usgs.gov/nwsum/WSP2425/functions.html

Peratrovich and Nottingham, Inc. 1982. Akutan Soil Exploration and Barge Landing Design Study. Prepared for City of Akutan. Anchorage, AK

Science Applications International Corporation (SAIC). 1993. Problem Assessment Development for Akutan Harbor: Annotated Bibliography. Alaska Water Quality Based Controls Support. Prepared by SAIC, Falls Church, Virginia for U.S. EPA, Region X. 28 pp.

Selkregg, L.L. N.D. undated, *Alaska Regional Profiles Southwest Region*. Published by University of Alaska, Arctic Environmental Information and Data Center.

Shannon and Wilson, Inc. 2001. Geotechnical Report, Akutan Small Boat Harbor, Akutan, Alaska. Submitted to Tryck Nyman Hayes, Inc., Anchorage, Alaska. June. 11 pp. + figures and appendices.

Schempf, J.H. 1992. Wetland Classification, Inventory, and Assessment Methods: An Alaska Guide to their Fish and Wildlife Application. Habitat Division Technical Report 93-2 ADFG, Habitat Division. Juneau, Alaska.

Smith, R.D., A. Ammann, C. Bartoldus, and M. Brinson. 1995. An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices. U.S. Army Corps of Engineers Waterways Experiment Station. Wetlands Research Program Technical Report WRP-DE-9, October 70 p.

State of Alaska Department of Community and Regional Affairs. N.D. Community of Akutan Profile. http://alaskm.com/cgi-bin/showeity. 1 p.
Tryck Nyman Hayes. 1998. *Akutan Harbor Feasibility Study, Phase I Preliminary Site Assessment Report*. In association with Coastline Engineering for U.S. Army Corps of Engineers, Alaska District. July. 29 pp. + appendices.

U.S. Army Corps of Engineers, Alaska District (USACE). 2000. Southeast Alaska Freshwater Wetland Assessment Method. Juneau Regulatory Field Office, Regulatory Branch – East Section, Alaska District. Version 1.4, August 2000. 27 p.

_______. 1997. Methodology for Wetland Delineation and Site Characterization. Federal Aviation Administration Stations, Alaska. Prepared by B&B Environmental, Inc, Anchorage, AK. September. 15 p.

_______. 1973. Effects of Dredged Material on Dissolved Oxygen in Receiving Water. Prepared for U.S. Army Corps of Engineers, San Francisco District, under contract No. DACW07-73-1005.

U.S. Department of Commerce, National Marine Fisheries Service. 1996. Office of Protected Resources Home Page http://kingfish.ssp.mfs.gov

U.S.EPA. 1995. Total maximum daily load (TMDL) for biochemical oxygen demand (BOD_5) in the waters of Akutan Harbor, Alaska.

_______. 1993. Environmental Assessment. Deep Sea Fisheries Shore Plant and Cumulative Effects of Seafood Processing Activities in Akutan Harbor, Alaska. Region 10, Seattle, WA. In association with Jones & Stokes Assoc., Inc. Bellevue, WA. June. 116 pp. + appendices.

_______. 1984. Effects of seafood waste deposits on water quality and benthos, Akutan Harbor, Alaska. EPA 910/9-83-114. Seattle, WA.

U.S. Fish and Wildlife Service. 2002. Comments on the Draft Feasibility Report and Draft Environmental Impact Statement for Navigation Improvements at Akutan, Alaska. Letter to U.S. Army Corps of Engineers, Anchorage, AK, dated December 2, 2002.

U.S. Fish and Wildlife Service. 1983. Planning Aid Report. Bottomfish Harbor Study, Akutan, Alaska. Anchorage, Alaska. September. 30 pp.

_______. 1978. *Catalog of Alaskan Seabird Colonies*. FWS/OBS-78/78. Anchorage, Alaska.

Wakeley, J. 2001. Delineation of Wetlands on the Proposed Site of the Akutan Harbor Project, Akutan Island, Alaska. Prepared by Environmental Laboratory, U.S. Army Engineer Research and Development Center, Vicksburg, MS. 36 pp.

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